

Maternal Nonstandard Work Schedules and Adolescent Overweight

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Abstract

Objectives. We investigated whether nonstandard shift work by mothers was associated with adolescent overweight.

Methods. Multiple regression analyses were conducted using a sample of mother-child pairs (n=2,353) from the National Longitudinal Study of Youth to examine the association between the number of years mothers worked at nonstandard schedules and adolescent overweight at age 13 or 14. Separate analyses were also conducted by family income and family type.

Results. Child's BMI increased significantly if mothers worked either a few years or many years at nonstandard schedules. Risk of overweight was also significantly associated with four or fewer years of maternal nonstandard schedules. In both cases, results were driven by those families in the "near-poor" income group, with a few years of nonstandard work also associated with increased risk of adolescent overweight in single mother families.

Conclusions. Results indicate the importance of the heretofore-overlooked association between maternal nonstandard schedules and adolescent overweight at 13 or 14. This association among those families who are "near-poor" and in single-mother families suggests that such work may disrupt the work-family balance, impacting adolescent overweight.

Overweight among young people is one of the most publicized public health issues of the current generation. While only about 5% of children in the United States aged 2-19 were considered overweight in 1974,¹ by 2003-2004 this figure was 17.1%.² Among adolescents aged 12- to 19-years-old, overweight rose from 5% to 11% between 1960 and 1988-1994,³ and has recently increased from 14.8% in 1999-2000 to 17.4% in 2003-2004.²

Overweight has been linked to a host of physical, social, and psychological problems for adolescents including type 2 diabetes,⁴ sleep problems,⁵ asthma,⁶ hypertension, and depression,⁷ among others. Moreover, overweight in childhood and adolescence has been found to be associated with adult overweight⁸⁻¹⁰ and numerous health and social problems that attend to it.

Although genetic and environmental factors and their interactions are generally identified as being responsible for increases in adolescent overweight, the large increases among a relatively stable population suggest changes in the environment as largely responsible.¹¹ Furthermore, while a growing caloric imbalance¹² (expending fewer calories than are consumed) prompted by a more sedentary lifestyle is understood to be at the root of the obesity epidemic for both young people and adults,¹³ the exact nature of this imbalance remains unclear.

Some have suggested that among other causes, parental work may be associated with adolescent overweight^{1,14,15} through a greater reliance on fast food (e.g., if parental work hours interfere with the time needed to prepare healthy meals)¹⁶ or television watching by children.¹ Whereas one early study found no association between maternal work and nutrient intake by children,¹⁷ more recent analyses have demonstrated a positive association between American mothers' work hours and child overweight by age eleven.^{18,19} A study of Canadian children ages six to eleven found similar results, although no association was found with fathers' work hours.²⁰ Finally, a recently

published British study found that maternal work was positively associated with early childhood overweight.²¹

Parental nonstandard shifts (e.g., evening, night, or early morning) may be particularly likely to place children at risk of overweight. For example, parents working evening or early morning hours may have less time or energy to take children to sports practice or games and may be more likely to provide their children with pre-prepared or fast food. While some previous studies have examined associations between maternal nonstandard work schedules and children's well-being,²²⁻²⁴ none have examined how such work is related to children's overweight. Given estimates that over one third of dual-earner households have at least one parent working nonstandard shifts,²⁵⁻²⁷ it is vital to examine this relationship.

Given the evidence reviewed above, we hypothesize that maternal nonstandard work schedules will be positively associated with children's body mass index (BMI) and overweight at age 13 or 14. Although childhood and adult overweight are only moderately correlated, research has found overweight at age 13 or 14 and adulthood adiposity to be highly correlated,¹⁰ and adolescence is a period when young people are at high risk for becoming overweight.¹¹ Moreover, independent of adult weight, adolescent overweight is associated with adulthood morbidity such as colorectal cancer and gout for men and arthritis in women.²⁸

Methods

Data

We use data from the National Longitudinal Study of Youth – Child Supplement (NLSY-CS), a sample of births to the female participants of the 1979 National Longitudinal Study of Youth (NLSY79). Mothers from this group were between the ages of 14 and 22 at the time of the first survey in 1979. Data from the NLSY79 was collected annually until 1994 and every other year thereafter. The NLSY-CS began in 1986 and collected information bi-annually from mothers regarding their children. In 1988, the NLSY-CS began to directly survey children aged 10 to 14.

The study sample consists of all children in the NLSY-CS whose mothers had ever worked since their birth and who could be followed longitudinally to age 13 or 14, with no missing data for height and weight at ages 13 or 14. The sample consists of 2,353 children from five cohorts born between 1982 and 1991 who reached age 14 between 1995-1996 and 2003-2004, the last year of publicly available data. This study is the first to make use of a full 14 years of data from the NLSY-CS to examine the relationship between maternal work and child overweight.

Table 1 provides demographic characteristics for the total sample and by maternal work schedules. As shown in Table 1, mothers who had only worked standard shifts were relatively more advantaged compared to those who had ever worked nonstandard shifts, while mothers who did not work during some years were the least advantaged.

--- TABLE 1 ABOUT HERE ---

Measures

Child overweight. This outcome is assessed using both continuous and discrete measures of BMI (kg/m²). BMI has been identified as a valid measure for assessing overweight in adults as well as for children and adolescents.^{30,31} In a previous study, self-report data like that used for mother and child height and weight in the NLSY were found to accurately identify teen overweight in 96% of cases.³² As a discrete measure, adolescents are defined to be overweight if their BMI is above the age- and gender-specific 85th percentile as specified by the National Center of Health Statistics guidelines.³⁰ This cutoff includes children who are “overweight” ($\geq 95^{\text{th}}$ percentile) and “at risk of being overweight” (85th – 94th percentiles). Our sample has a lower rate of overweight than samples from previous representative studies,^{1,2} which may reflect self-report bias on the part of the respondents. For simplicity, “overweight” is used to identify adolescents from the 85th percentile and higher in the present study because children from both the at-risk and the overweight groups are important targets for public health interventions, and the inclusion of the at-risk group increases the statistical power of the analyses.

Parental work schedules. The NLSY79 collects detailed data on work schedules. The shift usually worked by the respondent at her current or most recent job was reported every year starting in 1979 and every other year starting in 1994. Five choices were available: “day shift” (anytime between 6 a.m. and 6 p.m.), “evening shift” (anytime between 2 p.m. and midnight), “night shift” (anytime between 9 p.m. and 8 a.m.), “split shift” (consisting of two distinct periods each day), and “hours vary.” From 1986 to 1989, however, respondents were asked instead to identify the beginning and end times for their shift at their current or most recent job. In addition to this, beginning in 1990, another question was asked with seven choices to determine the “shift usually worked by the respondent at current or most recent job”: “regular day shift,” “regular evening shift,” “regular night shift,” “shift rotates” (changes periodically from days to evenings or nights), “split shift,” “irregular hours,” and “other.”

A variable representing the number of years a mother had worked nonstandard shifts by the time her child was 13 or 14 years old was created, coded for each year as 1 if a mother worked at hours other than “regular day shifts” and 0 otherwise. Thus, this variable was the sum of the years a mother had worked at nonstandard shifts by the time her child was 13 or 14 years old. A value of zero represents *only* working standard shifts. An initial graphing of the data indicated a curvilinear relationship between the number of years a mother worked at nonstandard shifts and both child’s BMI ($r = -.02, ns$) and overweight ($r = -.04, p < .05$). Thus, the squared and cubed terms of the number of years a mother worked nonstandard shifts were also included in all analyses. Mothers were coded as “not working” if during an interview year they either responded “they did not work” or their average hours worked per week were 0. From 1983 onwards, mothers reported on their spouse’s or partner’s work schedule, and a corresponding variable was created in a similar fashion.

Parental work hours. Because average maternal work hours over the child’s lifetime has been found to be associated with child overweight in previous analyses,¹⁸⁻²⁰ dummy variables were created indicating whether mothers worked an average of 1-20 hours, 21-30 hours, 31-40 hours, and 40 or

more hours per week over the child's first 13 or 14 years.ⁱ A continuous variable was also created for the spouse's or partner's average weekly work hours (as reported by mothers) by the time a child was 13 or 14.

Family income. Previous analyses have found that the association between maternal work hours and child overweight was limited to families with higher socioeconomic status.^{18,19,21} We thus constructed a variable of predicted family income by regressing net family income in the year of childbirth on mother's age at childbirth, mother's cognitive ability as measured by the Armed Forces Qualifying Test (AFQT)ⁱⁱ, mother's years of education at childbirth, child's race/ethnicity, and whether the mother was married at childbirth.ⁱⁱⁱ Families were further divided into four quartiles, which allowed us to examine how the relationship between parental work schedules and child overweight might differ by family income and to also carefully divide families into those under the poverty line (first quartile) and those above but near the poverty line (second quartile), who are often disadvantaged due to ineligibility for various types of public assistance programs.³⁵

Covariates. Prior analyses have found that young, low-income, less educated, and single mothers are more likely to work nonstandard hours.³⁶ To partially address potential omitted variable or selection bias, an extensive set of child and family characteristics that have been shown to be associated with family processes and adolescent development were controlled for in all models. These include factors measured at or before childbirth such as: whether the child is male, whether the child was low birth weight (<2500 grams), whether the child was first born, child's race/ethnicity, mother's age, mothers' years of education, mother's marital status, the natural log of net family

ⁱ To explore potential interaction effects between maternal nonstandard shift work and work hours, we also conducted additional analyses including interactions between the years of nonstandard shift work and variables representing full-time and part-time work by mothers. However, no significant effects were found for these interactions.

ⁱⁱ The internal consistency of the AFQT has been reported as greater than 0.90³³, and AFQT scores are highly correlated with other measures of cognitive ability including the Verbal Reasoning and Numerical Ability Composite of the Differential Aptitude Test (0.84), and the Mathematics (0.76), Language (0.80), and Reading (0.83) composites of the California Aptitude Test.³⁴

ⁱⁱⁱ This procedure closely follows Ruhm¹⁹, who uses the same set of variables to predict what he terms "socioeconomic status" in the year before assessment. 7

income, mother's AFQT score, and mother's BMI in 1981. All analyses also controlled for a number of factors by the time a child was 13 or 14 years-old, including the spouse's/partner's average work hours, the number of years that the mother had been a single parent, the years a family had lived under the poverty line, and the years a spouse/partner had worked at nonstandard schedules.

Additionally, two variables that have been found to be likely mechanisms for child overweight were also included: frequency of child's television-watching and eating together with parents. Child television-watching (mother's report of how many hours of television the child watches on a typical weekday, top-coded to 24) has been associated with childhood overweight.³⁷⁻⁴⁰ How often the child eats with both the mother and father (coded as 0 = never, 1 = once a month or less, 2 = once a week, 3 = several times a week, 4 = once a day, 5 = more than once a day) has been associated with the consumption of healthy food and nutrients in adolescents.^{41,42} For all analyses, both variables were averaged across all years of available data to create a mean measure for when the child is 13 or 14. Table 1 provides descriptive statistics for all analyzed variables.

Empirical Strategy

We utilized a series of ordinary least squares (OLS) regressions for the continuous outcome variable (BMI) and logistic regressions for the dichotomous outcome variable (child overweight) to examine the association between maternal work schedules and child overweight, taking into account the covariates described above. Sub-analyses were also conducted to examine whether the association between maternal shift work and child overweight differed by family income and whether a child had ever lived with a single-mother. Because the sample is comprised of 2,353 children from 1,703 families, standard errors in all analyses were adjusted for non-independence using the "cluster" function in STATA. For simplicity, we focus on the results for the parental work schedule variables (results for all other controls shown in Appendix 1).

Results

Table 2 presents the OLS regression estimates (unstandardized coefficients with 95% confidence intervals) of maternal work schedules on child's BMI at age 13 or 14. As seen in Column 1, the results for the total sample suggest that the three nonstandard work-schedule variables were significantly associated with child's BMI at age 13 or 14, although the cubed term was only marginally significant. Specifically, one to five years of nonstandard shift work was significantly associated with increases in child BMI at age 13 or 14, but this positive relationship was reversed if mothers worked at nonstandard shifts for six or seven years. However, a child's BMI at age 13 or 14 increased with more than seven years of nonstandard shift work by mothers.

--- TABLE 2 ABOUT HERE ---

Columns 2 through 5 of Table 2 present the results by family income. Results indicate that the relationship between maternal nonstandard work schedules and child's BMI seen in Column 1 was mainly due to children in the second family-income quartile (family incomes near but above the poverty line). Columns 6 and 7 of Table 2 present results by family type and indicate that the main results from Column 1 do not appear to be related to this variable.

Table 3 presents odds ratios with 95% confidence intervals representing the logistic regression estimates of maternal work schedules on children's risk of being overweight at age 13 or 14. As shown in Column 1, all three maternal nonstandard work schedule variables were significantly associated with the odds of a child being overweight at age 13 or 14 for the total sample. Specifically, one to four years of maternal nonstandard shift work were significantly associated with an increased risk of a child being overweight at age 13 or 14. Any additional years beyond four reduced this risk, but this reduction became increasingly smaller beyond seven years of nonstandard work schedules. Results by family income (Columns 2-5) confirm that maternal nonstandard shift work was only significantly associated with the odds of a child being overweight in families with predicted incomes in the 2nd quartile of the distribution.

--- TABLE 3 ABOUT HERE ---

Columns 6 and 7 in Table 3 show that although no significant associations were found between family type and BMI, single mothers' nonstandard shift work was significantly related to child's risk of overweight. Specifically, a few years of such work for children living in single-mother family increased the risk for overweight, while additional years posed a lower risk with indications that this risk might increase again with more than ten years of nonstandard shift work.

To ease interpretation of the results, Figure 1 presents lowess-smoothed curves of the estimated associations between maternal nonstandard shifts and child overweight for groups where a significant relationship was evident. Panel 1 of Figure 1 shows OLS estimates for the total sample and for those families with predicted incomes in the 2nd quartile of the distribution. In both cases, predicted increases in BMI peaked around two years of nonstandard work by mothers, decreased to a low point around seven years of nonstandard work, and subsequently began to increase. Although indicative of relatively small effect sizes, these results suggest that a child may have a higher BMI if her/his mother works nonstandard schedules for either only a few years or almost every year by the time the child turns 13 or 14.

--- FIGURE 1 ABOUT HERE ---

Panel 2 of Figure 1 presents the logistic regression odds ratios for the total sample, families with predicted 2nd quartile incomes, and children who had ever lived in a single-mother household. For all groups, the results indicated that children's odds of being overweight increased when mothers worked at nonstandard schedules for one to four years during the first 13 or 14 years of a child's life, after which additional years of nonstandard shift work were associated with decreases in these odds. This was particularly true for single-mother families and those in the 2nd quartile of the income distribution, for whom six to nine years of maternal nonstandard shift work was associated with an approximately 50% decrease in the odds of a child being overweight.

Discussion

Complimentary to previous studies that have focused on work hours in examining the relationship between parental work and child overweight¹⁸⁻²¹ our analysis reveals a new factor contributing to this relationship. Specifically, the type of shift worked by mothers appears to be pertinent, particularly for families with incomes that put them in the near-poor category. Our results are robust to controlling for an extensive set of child, parental, and family characteristics, including mothers' work hours and potential mechanisms such as child television-watching and the frequency of children and parents eating meals together.

We may only speculate as to the mechanism underlying our results. The findings for those families with incomes in the 2nd quartile seem to confirm prior evidence that those living near the poverty line are relatively disadvantaged; indeed, their ineligibility to receive various types of government assistance may put them at an even greater disadvantage than those officially living in poverty.³⁵ Families in this group had a median family size of four and income of nearly \$24,900 (2004 dollars) in the year of childbirth and a median family size of four and income of about \$32,400 when the child was 13 or 14. Although these amounts place these families above the poverty line (\$18,850 for a family of four in 2004), they also place them out of the eligibility range for a number of public programs. Another explanation may be that these mothers are forced into jobs requiring nonstandard shifts, which might be disruptive to family meal preparation and activity routines. Indeed, a significantly higher proportion of mothers from this group had ever worked an evening shift by the time a child was 13 or 14 years-old (.435) than those in the 3rd or top income quartiles (.368 and .229, respectively). However, the available data offer no direct proof that these mothers were forced into their jobs.

The significant association between maternal nonstandard work schedules and child overweight for single-mother families lends support to the notion that in families with fewer adults, nonstandard work schedules may affect family activities or household food preparation and consumption behaviors in a way that substantially impacts child overweight.

Our findings also highlight that mothers working at nonstandard hours for only a few years or almost all of the time may provide different home environments, which in turn may have implications for children's BMI. The former group may include mothers who had to temporarily work nonstandard hours because of some unexpected situation (e.g., spouse's unemployment) that disrupted the existing family arrangement. The latter group may represent a long-term arrangement wherein children do not consistently have adults available for dinner or breakfast or to help them participate in sports, which may have profound implications for food consumption and activity levels.

Despite significant increases in BMI associated with maternal nonstandard work schedules, it is important to note that five or more years of such work posed a decreased risk for child overweight. This may have been due in part to a family's ability to accommodate to mothers' work schedules. Nonetheless, beyond seven or eight years, we observe that the reductions in risk decreased in all cases, suggesting that long-term nonstandard work beyond ten years may in fact pose a risk for increased overweight.

Still, the exact mechanisms behind the relationship between maternal work schedules and child overweight remain unclear. No clear patterns were evident between television-watching or family meals and child overweight, and taking into account these potential pathways did not explain the links between maternal work schedules and child overweight.

Not all parents have the option to choose their shifts; for many parents, particularly single mothers working in low-income, low-skilled positions, a nonstandard shift is a requirement of the job that can upset the work-family balance. Nonetheless, appropriate solutions are possible. Community-based programs might be offered to inform families about how to best prevent overweight. For instance, mothers from at-risk families might be educated on how to prepare inexpensive and healthy meals in a short amount of time or how to prepare food in advance (e.g., by cooking weekday meals in advance on the weekend).

Despite its limitations, this study contributes toward a better understanding of the continued incidence of overweight among youth by illuminating the role played by parental work schedules. Nonetheless, additional fine-grained research is needed to further our understanding of how parental work schedules may affect child health. For instance, exploring how nonstandard shift work in different sectors (e.g., health care fields) would be useful; it is possible that health care workers may be more knowledgeable and skillful in providing healthy meals and encouraging physical activity despite working nonstandard shifts. This may offset the effects of a parent's work schedule on a child's well-being. With a sizable proportion of parents working at nonstandard shifts, more research is warranted to more fully understand the implications that work-family arrangements may have for adolescent and child overweight.

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TABLE 1. Descriptive Characteristics of the Sample for Children Whose BMI was Available at Age 13/14

Characteristics	Mothers Who Ever Worked (n=2,353 children from 1,753 families)	Mothers Who Ever Worked Nonstandard Shift (n=1,740)	Mothers Who Never Worked Nonstandard – Only Standard (n=262)	Mothers Who Never Worked Nonstandard – Some Years Standard and Some Not Working (n=351)
<i>Child Characteristics</i>				
% Non-Hispanic White	51.30	51.49	58.40	45.01
% Non-Hispanic Black	28.94	29.89	21.37	29.9
% Hispanic	19.76	18.62	20.23	25.07
% Male	49.89	49.66	51.53	49.86
% Low Birth weight	6.97	7.18	5.34	7.12
% First Born	38.16	36.55	51.53	36.18
Mean BMI at Age 13-14 (SD)	22.22 (5.26)	25.40 (5.41)	21.80 (4.72)	21.86 (4.87)
% Child is at Risk of Overweight or Overweight	24.90	25.40	23.28	23.64
<i>Mother Characteristics at Childbirth</i>				
Mean Age (SD)	25.23 (3.51)	25.07 (3.51)	26.66 (3.11)	24.93 (3.53)
Mean Years of Education (SD)	12.53 (2.17)	12.42 (2.15)	13.55 (2.02)	12.30 (2.18)
% Mother is Married	70.80	68.68	86.64	69.52
<i>Mother Characteristics Before Childbirth</i>				
Net Family Income – Constant 2004 Dollars (SD)	48,245 (89,348)	47,499 (101,631)	62,322 (35,535)	41,437 (34,721)
Logged Net Family Income – Constant 2004 Dollars (SD)	10.38 (.940)	10.32 (0.95)	10.89 (0.59)	10.26 (0.96)
Mean AFQT-Revised Percentile Score (SD)	38.17 (27.29)	37.96 (27.10)	48.38 (25.84)	31.59 (27.12)
Mean BMI in 1981 (SD)	22.12 (3.56)	22.18 (3.64)	21.75 (2.90)	22.11 (3.62)
<i>Adult Work Characteristics When Child is 13-14 Years-Old</i>				
Mean # Years Worked (SD)	7.83 (2.94)	8.00 (2.77)	9.87 (1.40)	5.46 (3.10)
Mean # Years Mother Worked Nonstandard Shift (SD)	2.44 (2.40)	3.30 (2.22)	0	0
Mean Hours Mother Worked per Week (SD)	27.75 (13.04)	27.86 (12.79)	38.39 (6.09)	19.25 (12.03)
% of Mothers who Worked an Average of 1-20 Hours per Week	29.66	29.20	2.29	52.42
% of Mothers who Worked an Average of 21-30 Hours per Week	21.72	23.62	6.10	23.94
% of Mothers who Worked an Average of 31-40 Hours per Week	29.45	28.10	51.15	19.94
% of Mothers who Worked an Average of 40+ Hours per Week	19.17	19.08	40.46	3.70
Mean # Years Spouse/Partner Worked Nonstandard Shift (SD)	2.02 (2.50)	2.06 (2.47)	2.19 (2.85)	1.69 (2.31)
Mean Hours Spouse/Partner Worked per Week (SD)	43.81 (8.60)	44.00 (8.67)	43.56 (6.39)	43.01 (9.67)
<i>Other Variables</i>				
Mean Number of Years Mother Spent as a Single Parent (SD)	2.78 (3.65)	2.90 (3.63)	1.54 (2.88)	3.07 (4.07)
Mean Number of Years Mother Spent in Poverty (SD)	2.16 (3.00)	2.30 (2.99)	0.21 (0.61)	2.91 (3.49)
Mean How Often Child Eats with Both Mother and Father (SD)	3.15 (1.23)	3.09 (1.25)	3.36 (1.04)	3.27 (1.25)
Mean Mother's Report of TV Hours Watched by Child (SD)	4.26 (3.04)	4.37 (3.06)	3.55 (2.86)	4.31 (3.03)

Note. AFQT = Armed Forces Qualifications test; BMI = Body Mass Index; at Risk of Overweight or Overweight = Body Mass Index at or above 85th percentile.

TABLE 2. OLS Regression Estimates of Maternal Work Schedules on Child's BMI At Age 13/14

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable	Full Sample n = 2353 (Robust 95% C.I.)	1 st Quartile of Predicted Income n = 451 (Robust 95% C.I.)	2 nd Quartile of Predicted Income n = 549 (Robust 95% C.I.)	3 rd Quartile of Predicted Income n = 627 (Robust 95% C.I.)	4 th Quartile of Predicted Income n = 726 (Robust 95% C.I.)	Mother Was Never a Single Parent n = 1157 (Robust 95% C.I.)	Mother Was Ever a Single Parent n = 1196 (Robust 95% C.I.)
# Years Mother Worked Nonstandard Shift by Child Age 13-14	0.526 (0.023 - 1.028)*	1.133 (-0.129 - 2.395)+	1.397 (0.284 - 2.510)*	-0.216 (-1.181 - .750)	0.342 (-0.418 - 1.102)	0.428 (-0.259 - 1.114)	0.561 (-0.185 - 1.307)
# Years Mother Worked Nonstandard Shift by Child Age 13-14 - Squared	-0.156 (-0.310 - -0.003)*	-0.347 (-0.738 - 0.045)+	-0.402 (-0.742 - -0.062)*	-0.083 (-0.206 - 0.372)	-.099 (-0.320 - 0.122)	-0.113 (-0.317 - 0.091)	-0.163 (-0.393 - 0.067)
# Years Mother Worked Nonstandard Shift by Child Age 13-14 - Cubed	0.011 (-0.001 - 0.023)+	0.026 (-0.005 - 0.058)	0.029 (0.003 - 0.055)*	-0.009 (-0.031 - 0.013)	0.007 (-0.010 - 0.024)	0.007 (-0.009 - 0.022)	0.012 (-0.006 - 0.030)
R-squared	0.130	0.176	0.193	0.126	0.144	0.123	0.147

Note. Models control for whether the child is male, was low birth weight (<2500 grams), and was first born; child's race/ethnicity; mother's age at childbirth; mother's years of education at childbirth; mother's marital status at childbirth; the natural log of net family income in the year of childbirth; mother's AFQT score; mother's BMI in 1981; the number of years a mother was a single-parent by the time the child was 13 or 14 years-old; and the number of years a family lived under the poverty line by the time the child was 13 or 14 years-old; the number of years a spouse/partner worked at nonstandard schedules by the time the child was 13 or 14-years-old; the average hours worked by spouse/partner by the time the child was 13 or 14-years-old; child television-watching hours; and how often a child eats together with both mother and father. BMI = body mass index. + $p < .10$, * $p < .05$, ** $p < .01$.

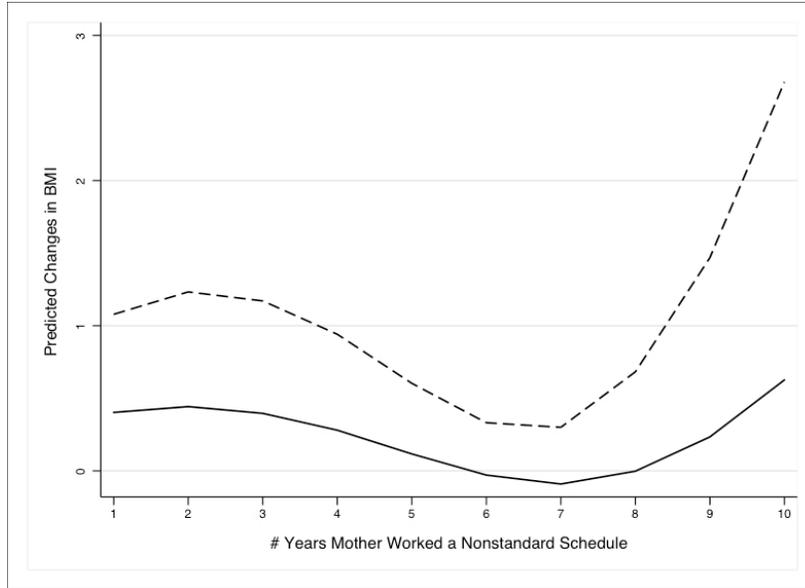
TABLE 3. Logistic Regression Estimates of Maternal Work Schedules on the Risk of Child Being at Risk of Overweight or Overweight At Age 13/14

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable	Full Sample n = 2353 Odds Ratio (Robust 95% C.I.)	1 st Quartile of Predicted Income n = 451 Odds Ratio (Robust 95% C.I.)	2 nd Quartile of Predicted Income n = 549 Odds Ratio (Robust 95% C.I.)	3 rd Quartile of Predicted Income n = 627 Odds Ratio (Robust 95% C.I.)	4 th Quartile of Predicted Income n = 726 Odds Ratio (Robust 95% C.I.)	Mother Was Never a Single Parent n = 1157 Odds Ratio (Robust 95% C.I.)	Mother Was Ever a Single Parent n = 1196 Odds Ratio (Robust 95% C.I.)
<i># Years Mother</i>							
Worked Nonstandard Shift by Child Age 13-14	1.362 (1.072 - 1.731)*	1.401 (0.833 - 2.357)	2.149 (1.212 - 3.810)**	1.093 (0.695 - 1.717)	1.285 (0.798 - 2.069)	1.259 (0.882 - 1.797)	1.408 (1.013 - 1.959)*
<i># Years Mother</i>							
Worked Nonstandard Shift by Child Age 13-14 - Squared	0.904 (0.840 - 0.973)**	0.885 (0.756 - 1.037)	0.770 (0.644 - 0.922)**	0.973 (0.846 - 1.119)	0.926 (0.803 - 1.068)	0.939 (0.841 - 1.050)	0.887 (0.802 - 0.981)*
<i># Years Mother</i>							
Worked Nonstandard Shift by Child Age 13-14 - Cubed	1.007 (1.001 - 1.012)*	1.009 (0.996 - 1.022)	1.018 (1.004 - 1.033)*	1.000 (0.989 - 1.012)	1.005 (0.994 - 1.016)	1.003 (0.994 - 1.012)	1.008 (1.000 - 1.016)*
Pseudo R-squared	0.061	0.081	0.140	0.064	0.106	0.083	0.062

Note. Models control for whether the child is male, was low birth weight (<2500 grams), and was first born; child's race/ethnicity; mother's age at childbirth; mother's years of education at childbirth; mother's marital status at childbirth; the natural log of net family income in the year of childbirth; mother's AFQT score; mother's BMI in 1981; the number of years a mother was a single-parent by the time the child was 13 or 14 years-old; and the number of years a family lived under the poverty line by the time the child was 13 or 14 years-old; the number of years a spouse/partner worked at nonstandard schedules by the time the child was 13 or 14-years-old; the average hours worked by spouse/partner by the time the child was 13 or 14-years-old; child television-watching hours; and how often a child eats together with both mother and father. BMI = body mass index. + $p < .10$, * $p < .05$, ** $p < .01$.

FIGURE 1. Predicted Increases in Dependent Variable by Model

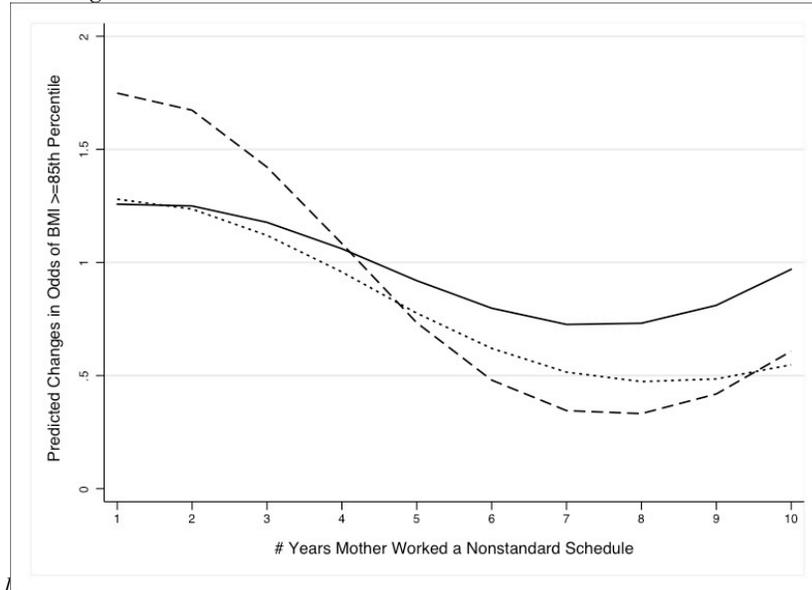
OLS Model



—————
Full Sample

- - - - -
*2nd Quartile of
Predicted Income*

Logit Model



—————
Full Sample

- - - - -
*2nd Quartile of
Predicted
Income*

.....
*Mother was
Ever a Single
Mother*

Appendix 1. Full Models for OLS and Logistic Regressions for the Total Sample

Variable	BMI At Age 13/14	Risk of Overweight or Overweight At Age 13/14
	Coefficient (Robust 95% C.I.)	Odds Ratio (Robust 95% C.I.)
# Years Mother Worked Nonstandard Shift by Child Age 13-14	0.526 (0.039 - 1.028)*	1.362 (1.072 - 1.731)*
# Years Mother Worked Nonstandard Shift by Child Age 13-14 – Squared	-0.156 (-0.309 - -0.003)*	0.904 (0.840 – 0.973)**
# Years Mother Worked Nonstandard Shift by Child Age 13-14 – Cubed	0.011 (-0.001 - 0.023)+	1.007 (1.001 - 1.012)*
Mother Worked an Average of 21-30 Hours per Week by Child age 13-14	0.474 (-0.147 – 1.096)	0.929 (0.688 - 1.255)
Mother Worked an Average of 31-40 Hours per Week by Child age 13-14	-0.050 (-0.611 - 0.511)	(1.220) (0.913 - 1.629)
Mother Worked an Average of More than 40 Hours per Week by Child age 13-14	0.639 (-0.016 - 1.295)+	1.041 (0.748 - 1.450)
Child is Black	0.747 (0.057 - 1.437)*	1.241 (0.918 - 1.679)
Child is Hispanic, not Black	-0.025 (-0.650 - 0.600)	1.146 (0.852 -1.542)
Child is Male	-0.266 (-0.665 - 0.134)	1.339 (1.101 - 1.628)**
Child was Low Birth Weight (<2500g)	-0.444 (-1.289 - 0.400)	0.925 (0.621 - 1.377)
Child is First Born	0.224 (-0.219 - 0.666)	1.137 (0.908 - 1.423)
Mother's age at Childbirth	0.114 (0.041 - 0.187)**	1.050 (1.017 - 1.085)**
Mother's Education at Childbirth	-0.102 (-0.232 – 0.029)	0.955 (0.894 - 1.020)
Log of Net Family Income in Year Before Child's Birth -- 2004 dollars	0.091 (-0.327 - 0.508)	1.060 (0.905 - 1.243)
Mother was Married at Childbirth	-0.564 (-1.317 - 0.189)	0.732 (0.526 - 1.018)+
Mother's Revised Score on AFQT test	-0.011 (-0.023 - 0.001)+	0.997 (0.991 - 1.003)
Mother's BMI in 1981	0.425 (0.353 - 0.496)***	1.128 (1.091 - 1.166)***
# Years Spouse/Partner Worked Nonstandard Shift by Child Age 13-14	0.017 (-0.071 – 0.104)	0.995 (0.951 - 1.041)
Average Hours per Week Worked by Spouse/Partner by Child Age 13-14	-0.006 (-0.034 – 0.022)	1.008 (0.995 - 1.021)
# Years Spouse/Partner Worked Nonstandard Shift is Missing	0.086 (-1.499 – 1.670)	1.424 (0.752 - 2.699)
Average Hours per Week Worked by Spouse/Partner is Missing	.167 (-1.809 – 2.142)	0.972 (0.427 - 2.213)
Number of Years Mother Spent as a Single Parent	0.069 (-0.055 – 0.192)	1.006 (0.951 - 1.021)
Number of Years Mother Spent in Poverty	-0.066 (-0.181 – 0.048)	0.969 (0.919 - 1.021)
Mother's Report of TV Hours Watched by Child	.035 (-0.044 – 0.114)	1.013 (0.979 - 1.049)
How Often Child Eats with Both Mother and Father	0.161 (-0.092 – 0.414)	1.007 (0.896 - 1.131)
Constant	10.011 (5.073 - 14.950)***	-
Observations	2353	2353
(Pseudo) R-squared	0.130	0.061

Note. The referent group is children who are non-Hispanic White and whose mothers worked an average of 1-20 Hours per week. + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.