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The Connection between Maternal Employment and Childhood Obesity: Inspecting the Mechanisms

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Abstract: This paper investigates the channels through which maternal employment affects childhood obesity. We use time diaries and interview responses from the Child Development Supplement of the Panel Study of Income Dynamics which combine information on children's time allocation and mother's labor force participation. Our empirical strategy involves estimating the effect of children's activities and meal routines on BMI, estimating the effect of maternal employment on these activities and routines and then combining these two estimates. We find that maternal employment affects child weight through two main mechanisms – supervision and nutrition, however, the particular channels vary by mother's education.

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I. Introduction

Over the past several decades, obesity has swept across the US and other industrialized countries, affecting all age groups. The fraction of overweight children between the ages of six and eleven increased from 4 percent in the 1960s to 13 percent by 1999. The problem of childhood obesity has already triggered a federal policy response – a new law (Public Law 108 - 265) requires schools to have a local wellness program by the beginning of school year 2006-2007, which must address both nutritional and physical activity goals. The immediate cause of the increase in obesity is clear: calories taken in persistently exceed calories burned. The more fundamental reasons are less clear: why would so many people in these particular years choose to systematically take in more calories than they expend? According to Cutler, Glaeser, and Shapiro (2003) and Philipson and Posner (2003), technological progress is responsible for cheaper fattening foods and a more sedentary lifestyle, while Chou, Grossman and Saffer (2004) claim that a decrease in smoking and an increase in the availability of restaurants, especially fast food restaurants, is responsible.

Any potential explanation for the phenomenal increase in *childhood* obesity must also involve changes in parental behavior, lifestyle, or attitudes (Patrick and Nicklas 2005, Golan and Crow 2004, and Ebbeling et al. 2002). One important change over this period that has touched family life in many ways is the increase in employment among mothers. Recently a few papers have documented a positive relationship between maternal employment and the bodyweight of her children (Anderson, Butcher and Levine 2003, Ruhm 2004, Lamerz et al. 2005, and Liu et al. 2005). Interestingly, this connection seems to be especially pronounced for highly educated, well off, white families. Taking the connection between mothers' employment and childhood obesity as given, this paper aims to identify the mechanisms by which mothers' labor supply

affects children's weight, and why the effect of maternal employment is more pronounced for children from higher socioeconomic backgrounds.

The overarching theoretical principle guiding the empirical investigation is the concept of a health production function for children, where child's health (inversely measured by obesity) is the output and mother's time at home with the child is the input. Given a low level of maternal education, the child's health production function is depicted by locus L in Figure 1. Each additional hour of mother's time increases the child's health but there are diminishing returns to mother's time. The production function for a mother with a high level of education would lie above L because mothers with more schooling have superior information which allows the same input level to produce a better health outcome. However, it is not clear from economic theory whether the slope of the production function is affected by maternal education. Thus, the production function for a highly educated mother could look like H1, with the same shape as L, or could look like H2, where the slope is steeper at every input level. The steeper slope implies that children benefit more in terms of health from an additional hour of their mother's time if she is highly educated than if she is not, at every input level.

Thus, we might expect the effect of mothers' employment on children's health, represented by the slope of the production function, to be different by mother's education for two reasons. First, mother's education may be related to the average input level. If highly educated mothers work more hours on average, then even if the production functions have the same shape – as depicted by L and H1 in Figure 1, highly educated mothers are going to be on a steeper portion of the curve (point B) than the average less educated mother (point A). Second, mother's education may increase the slope of the production function, as depicted by H2, such that given the same input level, highly educated mothers are on a steeper slope (point C) than less educated

mothers (point A). In either case, we would observe that an additional hour worked by a highly educated mother will have a more detrimental effect on her child's health than an additional hour worked by a less educated mother.

Economic theory suggests that there are various channels through which maternal employment can influence childhood bodyweight. First, a working mother has less time available for the family. That means the mother has less time to cook and prepare meals. Working mothers may decide to cook fewer meals at home, opting instead for more restaurant meals, skipping some meals like breakfast, or preparing more ready to eat meals, take out or delivered meals. Restaurant meals, especially from fast food restaurants, and ready to eat meals are generally more densely packed with calories than meals prepared at home. There is also evidence (Stauton and Keast (1989) and Morgan et al. (1986)) that skipping breakfast is associated with overall higher calorie consumption. Moreover, a low meal frequency may lead to higher concentrations of 24 hour insulin, which, in turn, can lead to increased fat deposition and higher body weight (see Ma et al., 2003). This channel suggests that higher maternal employment results in higher children's bodyweight.

Similarly, working mothers have less time and energy available to supervise and participate in their children's activities. This may mean that children are more autonomous in choosing their own activities or that the children spend more time in the care of others – either in school or in child care. Since parents presumably care more about the future health of their children than do other caretakers or children themselves, this may result in more time in front of the television, less time in outside activities, and a greater quantity of unhealthy snacks. Anderson and Butcher (2006) argue that schools "have given students greater access to 'junk' foods and soda pop," and find that access to junk food in schools increases students' weight. On the other hand, other

caretakers may be able to offer a more structured routine involving physical activities with other children and healthier snacks than parents might provide. For example, von Hippel et al. (2007) show that children gain weight during summer months more rapidly than during the school year. Thus, it is not clear *a priori* which effect a greater amount of time spent in school or in child care will have on a child's weight status.

Third, increased hours worked by the mother results in higher household income. There is a large empirical literature which finds a negative relationship between obesity and socioeconomic status (e.g. Gordon-Larsen et al. 2003, Zhang and Wang 2004a, 2004b). The reasons for this linkage are debatable. Higher disposable income may allow households to provide better quality food or enroll children in organized activities which would reduce children's weight. However, the linkage might be entirely due to selection; people with low discount rates invest in education, which brings them higher earnings, and invest in their health, which keeps their weight in the normal range. While income in general is believed to have a negative effect on obesity, higher household income results in more restaurant meals (if restaurant meals are normal goods) which could result in a higher bodyweight for reasons elaborated above. Thus, economic theory does not unambiguously predict whether this channel results in higher or lower bodyweight for children.

Finally, we expect that currently working mothers returned to work sooner after birth and thus were less able to breastfeed or stopped breastfeeding earlier. There is evidence that bottle fed infants are more likely to be overweight as children and adults than breastfed infants (Lucas et al. 1980, 1981). Thus, it may be that a mother's average work hours are correlated with her child's BMI because they are a good indicator of the probability that her child was bottle fed.

To quantify the importance of the various channels through which maternal employment may affect children's body weight, we use the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID). The CDS is well suited for this analysis because it includes the height and weight of the child, time diaries of the child's activities during one weekday and one weekend day, and a great deal of information about the child's household through the linkage with the main PSID survey.

The data and sample are described in section 2. There, using our dataset, we also replicate the empirical finding that maternal employment has a positive and significant effect on children's BMI which is stronger for highly educated mothers. In section 3, we detail our empirical strategy, which involves estimating two sets of equations: First, we estimate the effect of children's activities and meal routines on children's body max index (BMI); second, we estimate the effect of maternal employment on these activities and routines. Third, we combine these two estimates. We present our results in section 4. We find that the effect of activities on BMI and the effect of maternal employment on activities vary greatly by the mother's educational status. In particular, among highly educated mother families, mother's employment increases time spent watching TV, which in turn, significantly increases a child's BMI. On the other hand, if the mother has no more than a high school diploma, mother's employment significantly increases the amount of time a child spends in school, which in turn, significantly *decreases* a child's BMI. However, for both education groups maternal employment decreases the number of meals consumed by children which in turn increases their weight. Finally, we offer a summary and conclusion in section 5.

II. The Data

The data used in this study come from the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID). The PSID has followed approximately 5,000 families since 1968. This original sample includes an equal probability, nationally representative sample of about 3,000 households called the Survey Research Center (SRC) sample, and a sample of about 2,000 low-income families called the Survey of Economic Opportunity (SEO) sample. Over time, the study has added the 'split-off' households of children and other members of the original PSID households after they leave and start their own families, such that in 1996 there were over 8,700 families involved in the survey.

Currently, the CDS consists of two waves. The first wave involves a sample of approximately 3,500 children under the age of thirteen who are members of PSID families in 1997. Because the sample of children is drawn from both the SRC and the SEO samples, the children's sample has unequal selection probabilities. The second wave involves re-interviewing about 2,900 children in 2002, when they were between the ages of 5 and 17. In this analysis, we use approximately 3,400 observations of 2,500 children from 1,100 PSID families. We have two observations on many children and there are some siblings as the CDS included at most two children from a family. Of the approximately 3,000 observations (3,500 + 2,900 – 3,400 = 3,000) that we omit, 700 are of children under the age of 3 at the first interview; the remainder are omitted because of missing information on height, weight, or mother's work hours, or there was no complete time diary for the child in a given wave.[1]

Table 1 presents some descriptive statistics by mother's education. The primary variables of interest in this analysis are whether the child is overweight. The conventional basis

[1] In addition, we omitted 132 observations for children with physical measures that would put them in the first tenth of the first percentile of CDC Growth charts.

for determining whether a child is overweight is the child's body mass index. BMI is calculated as weight in kilograms divided by height in meters squared (kg/m^2). The Centers for Disease Control (CDC) has produced a chart of percentiles describing the BMI distribution by the age (in months) and sex of children based on early waves (from the 1960s, 70s, and 80s) of the nationally representative National Health and Nutrition Examination Survey (NHANES). Following the CDC and others (Anderson, Butcher, and Levine 2003), we define children to be overweight if the child's BMI is above the 95^{th} percentile for their age and sex. Because of the growing numbers of overweight children, more than 5 percent of children are classified as overweight in our sample measured in 1997 and 2002: the percentage of children overweight is 23.6 among less educated mothers and 20.3 among more educated mothers. Correspondingly, the average BMI of the children is 0.78 higher (= 20.65 – 19.87) in households with less educated mothers compared to highly educated mothers. In addition, we compute the child's percentile in the CDC's BMI distribution.

The other key variable in this study is the hours per week worked by the mother. On average, less educated mothers worked 15 hours per week over the child's life while highly educated mothers worked over 19 hours per week on average. Consistent with this, the fraction of mothers who have never worked during this child's life is twice as high for less educated mothers (12.3% vs. 6.2%).

The remainder of Table 1 describes the sample with a list of our main demographic controls. On average, children were just under 10 years old. Because the CDS draws from both the SRC and the SEO samples, there are a large proportion of black families –44 percent of children with less educated mothers are black and 31 percent of children with highly educated mothers are black. On the other hand, the Hispanic sample is disproportionately small because

of the design of the PSID. The Latino sample added to the PSID in 1990 was dropped in 1995 and a new immigrant sample was added in 1997. The CDS includes about 250 immigrant children from this new sample, some of whom are Hispanic.

Of particular importance to this analysis, we can calculate the mother's BMI from the main household interview which asks the height and weight of the head of the household and the spouse. These questions are only available in the 1986, 1999, 2001, and 2003 interviews. We use the mother's BMI in 1999 for the 1997 CDS wave and her BMI in 2001 for the 2002 CDS wave. The definition for obesity among adults accepted by the CDC is a BMI above 30. In our sample, nearly 28 percent of less educated mothers are obese while almost 19 percent of highly educated mothers are obese. The difference in father's BMI between the two groups is slightly less pronounced.

A. Replication

Before describing the time diaries which allow us to investigate the mechanisms by which mother's employment can affect a child's BMI, we want to confirm that the empirical relationship between mother's employment and child's BMI exists in the PSID. The previous studies by Anderson, Butcher, and Levine (2003), Ruhm (2004), and Liu, Hsiao, and Chou (2005) used the NLSY, while Lamerz et al. (2005) used German data. We replicate the previous analysis using PSID data in Table 2. For comparison, we construct control variables similar to those used by Anderson, Butcher, and Levine (2003). We find that, in the full sample, mother's work hours are positively correlated with the probability that the child is overweight. In addition, consistent with Anderson, Butcher, and Levine (2003), Ruhm (2004), and Lamerz et al. (2005), the effect of maternal employment is greater for more advantaged children (those with a highly educated mother). Thus, this relationship appears to exist across several data sources.

B. Time Diaries

The time diaries are a unique feature of this data. The primary caregiver or the child was asked to write down what the child was doing at every point in time over two days – one weekday and one weekend day. We have taken this information and divided the child's time into sixteen categories: sleeping, eating, attending school, being baby-sat, TV watching, playing indoor games, socializing, shopping, traveling, playing on the computer or with video games, doing homework, playing sports, doing chores around the house, taking lessons (in dance, golf, etc.), working at a part-time job, and other miscellaneous passive activities, e.g. reading and interacting with others. For a detailed list of the specific activities included in each categories, see the appendix.

Since a child can be engaged in multiple activities simultaneously, the time diary permits two activities to be assigned to any given time – a primary and a secondary activity. For example, a child could be watching television while being in daycare. Either one of these could be listed as the primary or secondary activities. We use all of the available information and, as a result the total number of hours accounted for over the two days is greater than 48 hours.

Table 3 provides the number of hours that a child spends on these activities by the child's age and mother's employment level during the two time diary days. These activities are sorted by time use in the first column. By far, sleeping takes the most amount of time. After miscellaneous passive activities, an aggregate category, children spend their time in school, followed closely by watching TV.

One potential problem for our analysis is the possibility that the data quality of the time diary entries may be worse for mothers who work. That is, mothers who work may know less about their child's activities and thus report those activities with more measurement error. It is

true that children are more likely to fill out the diary themselves if their mother works more hours. However, on average, the children of mothers who work long hours are older and age of the child is the strongest predictor of how involved the child was in filling out the diary. This measurement error argument assumes that the mother is a more accurate reporter of their children's activities than the children themselves. However, mothers are more likely to be influenced by social norms in their responses than children, so one could make the argument that measurement error is smaller when children report their own activities. In any case, we argue that any bias from this type of measurement error is negligible because when we control for whether the mother filled out the diary without the child's help, the results presented in this paper are unchanged.

Finally, these data also provide a few diet-related aspects of the household. These are shown in Table 4. We know from the time diary whether meals take place in a restaurant or at home. However, we cannot distinguish whether the meal eaten at home is from a restaurant (like take-out or delivery pizza). On average, fewer than 6 meals were eaten over the two days, and less than one was eaten in a restaurant. We are also interested in breastfeeding and allowances which can be affected by maternal employment and may impact a child's nutritional intake. These variables are available from the CDS parent interview. Although we find a negligible difference in the probability of a child being breastfed among mothers by working hours, highly educated mothers are almost twice as likely to have breastfed (not shown).

III. The Empirical Strategy

The goal of this paper is to investigate the channels through which maternal employment affects children's BMI. We assume that maternal employment affects the number and

composition of meals and the nature of her children's activities, which influence calorie intake and expenditure, thereby affecting the child's BMI. Thus, our empirical strategy consists of estimating two equations. First, we estimate the direct effects of number and type of meals (calorie intake) and activities (calorie expenditure) on BMI. Then, we estimate the effects of maternal employment on these direct determinants of body weight.

Let the BMI of child *i* be a linear function of the direct determinants of body weight. For simplicity, we will use two examples of these direct determinants in this discussion: the number of meals in an average day (*NM*) and the number of hours watching TV in an average day (*TV*). Let *X* represent characteristics of the child and family related to both maternal employment and the child's body weight which confound the relationship of interest. For example, we control for the child's age because BMI changes with age and mothers of older children are more likely to work. We control for race because black and Hispanic children are more likely to be overweight and black and Hispanic mothers may be less likely to work because they face a tougher job market than white mothers. We then estimate a series of equations of the following form:

$$ln\ BMI_i = \alpha_0 + \alpha_{NM} NM_i + \alpha_3 X_i + \varepsilon_i, \quad (1)$$

$$ln\ BMI_i = \beta_0 + \beta_{TV} TV_i + \beta_3 X_i + \mu_i, \quad (2)$$

where ε_i and μ_i are idiosyncratic error terms with mean zero. We estimate each of these equations separately, instead of running one regression with all of the time allocations and routines, to avoid multi-collinearity. The time allocations do not add up to 48 hours because of double counting, but they necessarily range between 100 and 200 percent of the child's time.

Both the number of meals and the duration of TV watching depend on the number of hours the mother works (*MWH*) as follows:

$$NM_i = \gamma_0 + \gamma_{NM} ln\ MWH_i + \gamma_2 X_i + u_i \quad (3)$$

$$TV_i = \delta_0 + \delta_{TV} ln\ MWH_i + \delta_2 X_i + v_i, \quad (4)$$

where u_i and v_i are idiosyncratic error terms with mean zero. Based on the model above the full effect of maternal employment on a child's BMI is equal to:

$$\frac{\partial \ln BMI}{\partial \ln MWH} = \frac{\partial \ln BMI}{\partial NM}\frac{\partial NM}{\partial \ln MWH} + \frac{\partial \ln BMI}{\partial TV}\frac{\partial TV}{\partial \ln MWH} = \alpha_{NM}\gamma_{NM} + \beta_{TV}\delta_{TV}. \quad (5)$$

Of particular interest to this study, we can decompose the effect of maternal employment on a child's BMI by channel to assess the relative importance of the various channels proposed. Thus $\alpha_{NM}\gamma_{NM}$ is the part of the effect attributable to a change in the number of meals and $\beta_{TV}\delta_{TV}$ is the part of the effect attributable to a change in the amount of TV watching that results when mothers work more.

We estimate equations (1), (2), and (4) using ordinary least squares (OLS). Because NM_i is a non-negative count variable, we estimate equation (3) using a Poisson maximum likelihood regression. For dichotomous dependent variables, we compute marginal effects from a probit regression.

The goal is to estimate a set of elasticities of a child's BMI with respect to mother's work hours, one for each channel. These elasticities are computed by multiplying the appropriate coefficients from two regressions—equations (1) and (3), for example. Computing the standard error on this elasticity is not trivial because there is covariance between the estimators from equations (1) and (3). To deal with this issue, we "stack" our two equations and estimate them using seemingly unrelated estimation. That is, we stack the data needed for equation (1) on top of the data needed for equation (3) such that the dependent variable for the first half of the data is $ln\ BMI_i$ and is NM_i in the second half of the data. Then, we can compute a standard error on a non-linear combination of coefficients from this one regression on stacked data, and it fully accounts for the correlation between the error terms across the two equations.

IV. Results

Table 5 presents the results for three groups: the full sample, less educated mothers, and more educated mothers. For each group we report the results in the following way: the first column presents the results of regressing the child's log BMI on variables that capture the child's calorie intake and expenditure, as expressed in equations (1) and (2); the second column presents estimates of the effect of maternal employment on the variables we have chosen to capture calorie intake and expenditure, as expressed in equations (3) and (4); and the third column presents the total effects, decomposed by variable, as in equation (5).In all of the regressions, we control for the variables listed in the bottom part of Table 1 plus child's age squared, whether the time diary was taken in the winter months, winter interacted with the North Central region, winter interacted with the Northeast region, whether the weekend day of the diary was a Saturday (vs. a Sunday), which wave of the CDS the observation comes from, and whether the mother answered the time diary without the assistance of the child. South is the omitted region category. We also include missing indicators for all of the control variables included.

A. The effect of calorie intake and expenditure on a child's BMI

Our results on the correlation of the time allocations with BMI and the probability of being overweight reveal some interesting patterns. In the full sample (column 1), while the number of meals eaten over the two observed days and having been breastfed are significantly and negatively related to BMI, as predicted, the fraction of meals in a restaurant and whether the child received an allowance are not. We expected that restaurant meals, which we assume to be more calorie-dense, would increase the probability of being overweight. However, we cannot distinguish between fast food and conventional restaurants in our data, thus it may be that

families that go to restaurants often go to healthy restaurants. We predicted that allowances, with which the child could buy junk food, would also increase a child's BMI.

More time spent eating is negatively related to children's weight, which is related to the effect of the number of meals on BMI and could possibly be the effect of fast food consumption, which both takes little time and is dense in fat and calories. We had argued that time spent in the care of others might be positively or negatively related to children's weight, but we don't find evidence of that in the full dataset. However, both time spent socializing and time in miscellaneous passive activities (which in large part consists of interacting with adults) are negatively associated with BMI, which suggests that it is not the setting, but the nature of activity that are important.

In the full sample, time spent watching TV is positively and significantly associated with child's BMI. In fact, of all the activities that are significantly associated with BMI, TV watching has the largest elasticity in absolute value. This result is consistent with Proctor et al. (2003) and Hancox et al. (2004).

Playing sports, which we expected to have a negative effect on BMI, is indeed negatively correlated with BMI, but only significantly so for mothers with 12 years of schooling or less. Because the time playing sports is often outside of school time, this result is not inconsistent with Cawley, Meyerhoefer, and Newhouse (2005) who find that an increase in mandated time for physical activity in school does not have a significant impact on children's BMI.

Surprisingly, doing chores appears to significantly increase the probability of being overweight, given that these could be more physical activities like mowing the lawn and walking the dog. We find that children who do a lot of chores spend less time socializing, playing sports, and working. It could be the case that overweight children have less of a social life and, hence,

spend more time at home helping adults. Alternatively, parents of overweight children may assign them more chores as a way of forcing them to perform more physical activities.

Finally, it is interesting to note the striking difference between the results by mother's education. The effects of breastfeeding, time in school, shopping, sports, and miscellaneous passive activities are only significant for less educated mothers (column 4). On the other hand, the effects of watching TV and eating are only significant for highly educated mothers (column 7). However, having fewer meals affects child's weight in both sub-groups.

B. Estimating the effect of maternal employment on calorie intake and expenditure

The second part of our empirical strategy is to estimate the effect of maternal employment on the variables we have chosen to capture calorie intake and expenditure. Columns 2, 5, and 8 of Table 5 present the results of running regressions of the form expressed by equations (3) and (4) above. Each cell contains the marginal effect from a separate regression of each calorie intake or expenditure variable on our independent variable of interest – the log of the average number of hours worked per week by the mother since the birth of the child.. That is, the first coefficient in column 2, -0.026**, indicates that, for the full sample of mothers, the marginal effect of mother's work on the number of meals for the full sample is negative and significant at the one percent level.

We find that mother's employment has a wide variety of effects in the full sample (column 2). However, just as in the previous section, the effects vary substantially by the mother's education. In particular, of the ten left-hand side variables that have a significant coefficient in column 2, only two are significant for both less educated and highly educated mothers – the negative effect on the number of meals and the positive effect on the time spent in

child care. Two of the effects are not significant for both groups of mothers – on the percentage of meals in restaurants and on the child's time spent working.

The other effects differ by mother's education. Children with less educated mothers who work more hours spend more time in school and traveling/commuting, and less time sleeping and playing indoor games. Nomaguchi (2006) reported similar findings on the effects of maternal employment on time spent in school. The effects are quite different for children of highly educated mothers. In this group, children of mothers who work more watch more TV and spend less time in miscellaneous passive activities.

Given the time and energy constraints of all working mothers, most of these effects are expected and reasonable. The only effect that may need interpreting is the effect on children's work in the full sample. We suggest that mother's who work more value work and may want their children to acquire that value by earning their own money while young. Naturally, this effect only kicks in for older children.

C. How does maternal employment affect childhood obesity?

Finally, we can put the coefficients from the previous regressions together to determine the relative importance of the various mechanisms we have considered in this analysis. We present these combined coefficients in columns 3, 6, and 9 of Table 5. The coefficients in each column are computed by multiplying the coefficients in the two previous columns; the standard error on this term is estimated by seemingly unrelated regression as described in a section above.

We find that the number of meals is the most persistent mechanism through which maternal employment affects child's BMI – although the elasticity is small, it is significant for both education groups (the p-value for the less educated mothers is 11%) as well as the full sample.

The other mechanism through which maternal employment affects child's BMI for less educated mothers is the increased time their children spend in school. For more educated mothers, the largest effect is through the time their children spend watching TV – the more mothers work, the longer their children spend in front of the TV, which, in turn, increases their BMI (p-value on the combined effect is 11%).

Based on an OLS regression of child's log BMI on log working hours of the mother the total elasticity of child's BMI with respect to mother's working hours is around one percent for all groups, which is very similar to the magnitude of the results reported by Anderson, Butcher, and Levine (2003). Thus, if a highly educated mother doubles her work hours from the average of almost 20 hours per week to 40 hours per week, her child's BMI would increase by one tenth of a percent because of increased time in front of the TV, which is one tenth of the overall effect. Similarly, the school time effect for children of low educated mothers is also near 10 percent of the overall effect in absolute value.

Our findings suggest that maternal employment affects a child's BMI in two ways: 1) there is a nutritional effect – children of mothers who work longer hours have fewer meals, and either eat bigger portions or substitute snacks in between meals (this effect is similar for both education groups); and 2) there is a supervision effect – with less maternal supervision, children of highly educated mothers watch more TV which might be accompanied by the consumption of foods high in calories, while children of less educated mothers stay longer at school taking part in activities which reduce their BMI.

D. Sensitivity Analyses

We have conducted two additional sensitivity analyses to check the robustness of our findings. First, we check the sensitivity of child's weight to an alternative measure of maternal

labor supply. Our main measure of maternal work hours captures both current and past patterns of employment where our measure of time use represents only current behaviors. Thus, we may underestimate our effect sizes if past maternal work has little or no effect on current time use. To address this concern, we report the elasticities of BMI with respect to mother's work hours in the two years prior to the interview. These results are summarized in Table 6 and suggest that long run and short run maternal employment affects child weight similarly.

The second set of analyses targets the reliability of our dependent variable. Since BMI might not be the best measure of weight, particularly for children and adolescents we use two additional dependent variables: BMI percentiles and BMI categories. BMI categories assign children to three groups: normal weight (BMI percentile under 85), at risk of overweight (85^{th} to 95^{th} percentile), and overweight. We estimate the effects of activities on BMI percentiles and BMI categories and report the results in Table 7. The results are similar to (and more significant, if anything) the results obtained using log BMI as a dependent variable (reported in columns 1, 4, and 7 of Table 5), suggesting that the results are not sensitive to the particular measure of weight status used.

V. Conclusions

In this paper, we have replicated the empirical connection found in the NLSY between mother's employment and childhood BMI/obesity for the PSID. We then inspect the mechanisms which connect hours worked by the mother to BMI/obesity of the child. In the first stage of our analysis, we find that the usual suspects, like being bottle fed, a small number of meals, and much time in front of the TV are positively correlated with bodyweight and that playing sports in negatively correlated with bodyweight (at least for less educated mothers). At the second stage,

we find that the number of meals is negatively correlated with mother's work, while TV watching, for example, is positively correlated with mother's work. The results from these two steps taken separately provide some evidence that mother's employment has influenced childhood body weight. Combining these results, as we do in table 5, reveals that this effect is not of great significance economically.

Two important limitations of this study are the small sample size and the lack of detail available about meals. A larger sample would allow us to disaggregate by child's age which would sharpen the analysis since the activities of 3 year-olds are quite different from the activities of teenagers and the effects of maternal employment on childhood obesity are likely age specific. Despite the small sample sizes, we did find some evidence (not shown) that maternal work hours only affect the time spent sleeping when the child is very young and only affect TV watching which the child is over age 9.

We believe that a possible reason that we do not get stronger results on restaurant meals, as opposed to meals at home, for example, is that we do not have information on take out meals. The pizza delivered from the hut to the home and eaten at home is as fattening as the pizza eaten in the hut. In our data set we can also not distinguish between a meal at a fast food restaurant and a salad in a conventional restaurant. We suspect that families who frequently eat greasy pizzas and fatty burgers in restaurants also use more fatty and calorie rich foods in meals that are cooked at home. Answering the question of how mother's employment affects childhood obesity via the channel of the number and variety of meals cooked probably requires a much more detailed data set.

Because of these limitations, we believe it would be premature to conclude that the majority of the mechanisms evaluated in this analysis are not relevant based on the results of this

single study. Prior to making this conclusion, it is necessary to replicate these findings with other data and research strategies.

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Appendix: Detailed Activities in Each Time Use Category

Sleep
Includes night sleep, "in bed" but not asleep, naps and resting.

Miscellaneous Passive Activities
Includes coffee breaks, unscheduled breaks at work, before and after work activites, household paperwork (paying bills, balancing checkbook, getting mail), watching another person do typically female household tasks, watching another person do typically male household tasks, watching another person do household tasks, baby care, giving child care, play with household children, helping children learn, coaching/leading outdoors/non-organization activities, help with homework, giving children instructions, disciplining children, conversations within household, reading to a child, medical care at home, babysitting, coordinating or facilitating child's social or instructional activities, other child care and travel related to child care, waking up, showering, bathing, dressing, getting ready, brushing teeth, personal hygiene activities, personal/private activities, affection activities between household members, non-medical care to adults in household, help and care to relatives not living in household, help and care to neighbors and friends, other personal activities, positive emotional affect (smiling, laughing), negative emotional affect (crying, moaning), travel related to personal care or helping others with personal care, financial services at home, shopping on the computer, media activities on the computer, computer work, watching others participate in activities, listening (radio/music), reading (or looking at books), conversations and talking, arguing and fighting, relaxing (taking a break), thinking, "doing nothing," smoking, joking, laughing, hobbies (photography, working on/repairing things, collections, carpentry/woodworking), domestic crafts (preserving food, needlework, sewing, care of animals, arts and crafts), pottery, painting, drawing and sculpture, writing poetry and writing in a diary, musical/theatre/dance activities (playing an instrument, whistling, singing for fun, karaoke, acting/rehearsing for a play), travel related to passive leisure activites.

TV Watching
Includes TV watching

Attending School
Includes regular full time classes, school field trips (that are part of or not a part of regular school hours), other classes and courses of academic or nonacademic nature, being tutored, other professional classes, military training, ROTC.

Eating
Includes meals at home, meals away from home, eating at restaurants, meals eaten at friends/relatives, snacks at home or away from home (new code for 2002).

Playing Indoor Games
Includes playing dress up, playing house, playing fireman, playing pretend, getting/giving makeovers, playing card games, playing board games, playing social games, doing puzzles or word/educational games, playing trivia games, playing with toys, unspecified play indoors(getting into stuff, making a mess, play wrestling), unspecified play games.

Sports
Includes practices, organized meets and games for team and non-team sports (swimming, golf, tennis, skating, football, baseball/softball, basketball, volleyball, soccer, hockey, track and running, gymnastics or dance, squash and racquetball, ice skating, bowling, wrestling, martial arts, paddleball, water sports, other seasonal sports, skiing, sledding, snow boarding, skateboarding, pool, Frisbee, weight lifting, kickball, street hockey, rock climbing, trampoline, yoga), other out of doors sport activities (hunting, shooting, fishing, boating, sailing, camping, snowmobiling, extreme sports, bicycling, horseback riding, motorcycling, "off-roading," big wheels, tricycling), non social dancing (ballet, modern dance), playing social games, unspecified play outdoors.
*Note: specific coding for each sport was developed for the 2002 data.

Socializing
Includes volunteering and organization helping activities (attending meetings for hospital volunteer groups, community groups, after-school club groups; working as administrator or representative for hospital volunteer groups, community groups, after-school club groups; fundraising for hospital volunteer groups, community groups, after-school groups; direct help to individuals or groups as a member of a volunteer organization; and other activities related to a volunteering with an organization), attending religious services or individual or small group religious practices, meetings for church groups and other religious helping groups, activities related to attending professional and union organizations, activities related to child, youth, family organizations, activities related to fraternal organizations, activities related to political party and civic participation, activities related to special interest/identity organizations, activities related to before/after school clubs (math/science club, band/choir/orchestra, drama/art club, student council/yearbook/newspaper club, debate club, honors society, foreign language club, history/social science club), other miscellaneous organization activity and travel related to these activities, attending sports events (football games, baseball games, basketball games, volleyball games, soccer games, hockey games, swimming meets, track meets, gymnastics meet), seeing a movie, attending a theater, opera, or ballet, go to a museum or art gallery, going to the zoo, miscellaneous social and entertaining activities, visiting with others, socializing with other people outside of the household, talking/chatting, paying a visit, parties, wedding receptions, at a bar, at a nightclub, at a coffee shop, dancing, attending a dance, recreational alcohol use (new code for 2002), recreational drug use (new code for 2002), other events such as holiday events and decorating for a party.

Traveling
Includes travel to and from school (including waiting for parent/bus), other school related travel, travel to and from organizational events and meetings (as a helper and including waiting time for travel), travel to sport/leisure activities (including waiting for travel) vacation travel, travel to and from social/entertainment activities, household related travel (new code for 2002), passive leisure related travel (including waiting for related travel.

Shopping
Includes obtaining goods (groceries, household goods, cars, furniture, clothing), going to hardware stores, drug stores, department stores, shopping, going to the mall, window shopping,

buying gas, personal care services (beauty, barber shop, hairdresser, tanning), medical care (doctors visits, dentist, making appointments), financial services (going to the bank, paying bills, going to accountant, loan agencies, insurance offices), other government services (post office, passport, sporting licenses, marriage licenses, police station), auto services and repair, clothes repair and dry cleaning, appliance repair, household repair services, "running errands," other professional services non-specific, professional services from a lawyer, individual and group counseling or mental health services, picking up food at takeout place, other obtaining services, getting money/gift from adults (allowance, lunch money), related travel to obtaining goods and services.

Chores
Includes meal preparation, cooking, fixing lunches, serving food, setting table, putting groceries away, doing dishes, loading and unloading dishwasher, meal cleanup, clearing table, routine indoor cleaning and chores (dusting, making beds, washing windows, vacuuming, "housework"), laundry and clothes care, ironing, mending clothes, putting clothes away, maintenance and indoor repairs on the house (plumbing, painting, fixing), care of houseplants, repairing appliances and furniture, gardening, weeding, composting, picking, outdoor cleaning, yard work, raking leaves, mowing grass, garbage removal, cutting wood, cleaning garage, snow shoveling, outdoor repairs (fixing the roof, painting the house), home improvements (remodeling of house), improvements to grounds around the house, other outdoor and indoor household activities, pet care (including playing with pets, walking the dog), car care and necessary repairs, car maintenance (oil change, car wash, changed tires).

Computer/Video Games
Includes electronic video games, educational computer lessons, playing computer games, "surfing the net," downloading pictures and music, burning CD's, programming, computer communication, e-mail, instant messaging, chat rooms, financial computer services, online media, reading online newspapers, stock quotes, weather reports, installing hardware and software, computer library functions, non-specific computer work, computer repair/setup, computer photo processing, other PDA, "palm pilot" work, computer related travel.

In Child Care
Includes at babysitters before or after school, child receives care if not in school, receiving child care, child is passive recipient of personal care, child being comforted by parent, daycare/nursery school for children not in school, daycare/nursery school before or after school.

Homework
Includes studying, research, reading, "went to library," reviewing homework with parent/caregiver, using the computer for homework and studying, and non-computer related homework

Lessons
Includes lessons in dance, lessons in sports activities (sport unspecified), swim lessons, golf lessons, tennis lessons, skating lessons, lessons in gymnastics/fitness activity, yoga lessons, martial arts lessons, body movement lessons, aerobics/kick boxing/pilates class, music lessons, voice lessons, lessons in musical instruments, other lessons.

Work
Includes income producing activities, regular full-time paid work, work at home (activities done for pay at home), part time jobs (paper routes, babysitting), job searching (visiting work agencies, interviews, phone calls, answering want ads), other work-related activities, travel related to job search, travel to and from workplace (waiting for related travel).

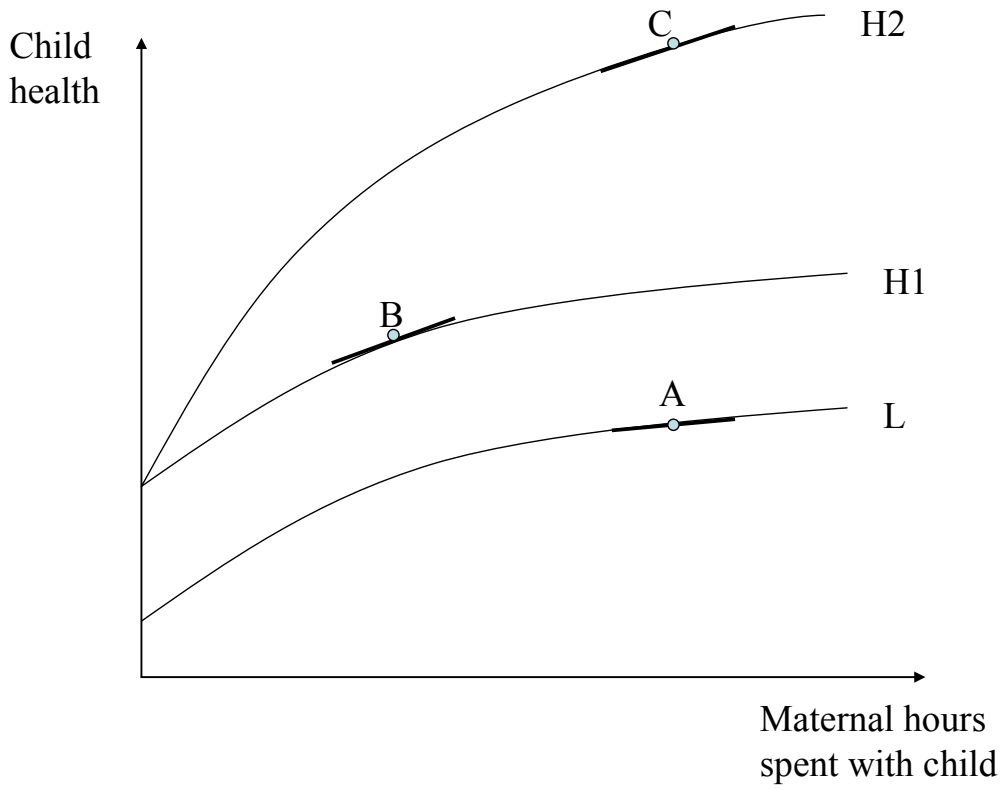

Figure 1. Maternal Education and Child's Health Production

Table 1: Descriptive Statistics by Mother's Education

	Mother's Ed ≤ 12 years		Mother's Ed > 12 years	
	Mean	N	Mean	N
Overweight (BMI>95th percentile for age & sex)	23.6%	1736	20.3%	1545
BMI of children	20.65	1736	19.87	1545
BMI Percentile of children*	67.0	1736	64.3	1545
Hours per week worked by mother over child's life	15.15	1736	19.43	1545
Mother never worked during child's life	12.3%	1736	6.2%	1545
Age of child	9.83	1736	9.54	1545
Black	43.8%	1734	31.0%	1540
Hispanic	10.9%	1734	2.3%	1540
Female	50.8%	1736	47.5%	1545
First born child	43.5%	1736	59.2%	1545
Birth weight (pounds)	7.19	1716	7.50	1531
Number of children in household	2.39	1736	2.23	1545
Age of mother at child's birth	25.55	1628	28.76	1534
Education of mother in 1997 (years)	10.53	1736	14.81	1545
Mother is obese (BMI>30)	27.8%	1696	19.4%	1524
Father is obese (BMI>30)	23.3%	1390	18.6%	1395
Parents always married over child's life	47.2%	1736	69.6%	1545
Annual labor income over child's life ('000)	$26.33	1401	$52.01	1368
Hours per week worked by father over child's life	34.39	1381	39.04	1345
Mother received foodstamps in last year	20.0%	1678	5.7%	1504
Northeast	10.5%	1736	18.2%	1542
North Central	22.6%	1736	24.6%	1542
South	45.5%	1736	39.4%	1542
West	21.4%	1736	17.8%	1542
Urban	51.4%	1554	57.3%	1448

*Percentiles based on 2000 CDC Growth Charts by gender and child's age in months.

Table 2: Replication of result that mother's employment affects probability of being overweight
Dependent Variable: Overweight

Sample:	Full Sample	Mother's Ed ≤ 12	Mother's Ed > 12
Log hours/week worked by mother over child's life	0.016*	0.006	0.021*
	(0.006)	(0.009)	(0.010)
Child's Age	-0.019*	-0.017	-0.021+
	(0.009)	(0.013)	(0.012)
Child's Age Squared	0.001	0.000	0.000
	(0.000)	(0.001)	(0.001)
Black	0.068**	0.056+	0.086**
	(0.021)	(0.029)	(0.032)
Hispanic	0.145**	0.174**	0.152*
	(0.038)	(0.051)	(0.064)
Female	-0.050**	-0.040*	-0.052**
	(0.013)	(0.020)	(0.019)
First born child	0.014	0.009	0.018
	(0.015)	(0.022)	(0.023)
Birth weight (pounds)	0.016**	0.016*	0.019*
	(0.006)	(0.008)	(0.008)
Number of children in household	-0.011	-0.011	-0.004
	(0.008)	(0.010)	(0.012)
Age of mother at birth	0.002	0.001	0.002
	(0.001)	(0.002)	(0.002)
Education of mother in 1997 (years)	-0.005	-0.000	-0.021*
	(0.003)	(0.005)	(0.009)
Mother is obese (BMI>30)	0.149**	0.116**	0.184**
	(0.020)	(0.026)	(0.032)
Breastfed	-0.042*	-0.048*	-0.027
	(0.017)	(0.023)	(0.024)
Fraction of child's life parents married	-0.031	-0.001	-0.095*
	(0.025)	(0.034)	(0.040)
Log labor income/1000 over child's life	-0.008	-0.002	0.006
	(0.010)	(0.014)	(0.015)
Log hours/week worked by father over child's life	-0.008	-0.013	-0.007
	(0.010)	(0.015)	(0.017)
Northeast	-0.027	-0.021	-0.019
	(0.022)	(0.035)	(0.030)
North Central	-0.013	-0.030	0.000
	(0.019)	(0.027)	(0.029)
West	-0.033	-0.035	-0.033
	(0.021)	(0.031)	(0.031)
Urban	-0.021	-0.047*	0.006
	(0.016)	(0.023)	(0.022)
2002 interview	0.057**	0.058**	0.064**
	(0.015)	(0.022)	(0.023)
Observations	4290	2188	1911

Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%

Table 3: Average Time Use Over 2 Days by mother's work hours and child's age (in hours)

	Mother works < 15 hours/week		Mother works ≥ 15 hours/week	
	Child's Age<10	Child's Age≥10	Child's Age<10	Child's Age≥10
Sleeping	22.1	20.3	21.6	20.0
Misc. passive activities	10.3	11.4	9.8	10.9
Attending school	5.1	5.7	5.3	5.7
TV watching	4.7	5.3	5.0	5.9
Eating	3.1	2.9	3.0	2.9
Playing indoor games	3.1	0.9	2.9	0.7
Sports	2.7	2.2	2.4	1.8
Socializing	1.6	1.9	1.7	1.9
Traveling	1.3	1.5	1.5	1.7
Shopping	1.0	1.1	1.2	1.0
Chores	0.8	1.1	0.8	1.2
Computer/Video games	0.8	1.8	0.9	1.7
In child care	0.7	0.1	1.0	0.1
Homework	0.5	1.1	0.6	1.1
Lessons	0.1	0.0	0.1	0.0
Work	0.0	0.5	0.0	0.7
Total*	58.0	57.6	57.9	57.3
Observations	831	850	847	907

A description of each of the categories is provided in the appendix.

*Total is greater than 48 hours because at any given time, two activities can be reported.

Table 4: Determinants of Diet by Mother's Work Hours

	Mother works < 15 hours/week		Mother works ≥ 15 hours/week	
	Child's Age<10	Child's Age≥10	Child's Age<10	Child's Age≥10
Total number of meals	6.3	5.0	5.8	4.8
Percent of meals in a restaurant	10.4%	11.8%	11.7%	14.6%
Child breastfed as infant	50.4%	45.5%	47.6%	42.6%
Percent with an allowance (age>5)	57.5%	56.7%	58.6%	54.7%
Observations	831	850	847	907

Table 5: The Implied Effect of Mother's Employment on BMI, by Channel

Sample:	Full Sample			Mother's Ed ≤ 12			Mother's Ed > 12		
Variable (V):	∂lnBMI / ∂V	∂V / ∂lnMWH	∂lnBMI / ∂lnMWH	∂lnBMI / ∂V	∂V / ∂lnMWH	∂lnBMI / ∂lnMWH	∂lnBMI / ∂V	∂V / ∂lnMWH	∂lnBMI / ∂lnMWH
Number of meals	-0.007**	-0.026**	0.0002**	-0.005+	-0.020*	0.0001	-0.007**	-0.027**	0.0002*
	(0.002)	(0.006)	(0.0001)	(0.003)	(0.008)	(0.0001)	(0.003)	(0.008)	(0.0001)
% meals in restaurant	0.033	0.007*	0.0002	0.042	0.005	0.0002	0.014	0.008	0.0001
	(0.022)	(0.003)	(0.0002)	(0.034)	(0.004)	(0.0003)	(0.030)	(0.005)	(0.0003)
Breastfed	-0.022*	-0.014	0.0003	-0.028+	-0.009	0.0003	-0.013	-0.014	0.0001
	(0.010)	(0.012)	(0.0003)	(0.014)	(0.015)	(0.0004)	(0.014)	(0.019)	(0.0003)
Receives allowance	-0.007	0.009	0.0000	-0.001	0.022	0.0000	-0.012	0.007	-0.0001
	(0.009)	(0.010)	(0.0001)	(0.014)	(0.015)	(0.0002)	(0.012)	(0.017)	(0.0002)
Fraction of time spent									
sleeping	-0.053	-0.002+	0.0001	0.013	-0.003*	0.0000	-0.165	-0.002	0.0003
	(0.068)	(0.001)	(0.0001)	(0.093)	(0.001)	(0.0003)	(0.113)	(0.001)	(0.0003)
misc. passive activities	-0.081*	-0.004*	0.0003	-0.087+	-0.003	0.0003	-0.058	-0.005+	0.0003
	(0.035)	(0.002)	(0.0002)	(0.051)	(0.003)	(0.0003)	(0.050)	(0.003)	(0.0003)
watching TV	0.166**	0.004**	0.0006*	0.128	0.001	0.0002	0.191+	0.006**	0.0012
	(0.062)	(0.001)	(0.0003)	(0.080)	(0.002)	(0.0002)	(0.102)	(0.002)	(0.0007)
attending school	-0.058	0.002+	-0.0001	-0.227*	0.004**	-0.0008+	0.082	-0.000	0.0000
	(0.064)	(0.001)	(0.0001)	(0.095)	(0.001)	(0.0004)	(0.090)	(0.001)	(0.0001)
eating	-0.189*	-0.001	0.0002	-0.037	-0.001	0.0000	-0.452**	-0.000	0.0001
	(0.096)	(0.001)	(0.0001)	(0.131)	(0.001)	(0.0002)	(0.161)	(0.001)	(0.0004)
playing indoor games	-0.077	-0.001+	0.0001	-0.151	-0.002+	0.0003	-0.029	-0.001	0.0000
	(0.082)	(0.001)	(0.0001)	(0.110)	(0.001)	(0.0003)	(0.128)	(0.001)	(0.0001)
playing sports	-0.117	-0.001	0.0001	-0.236*	-0.001	0.0001	-0.030	-0.001	0.0000
	(0.077)	(0.001)	(0.0001)	(0.103)	(0.001)	(0.0003)	(0.113)	(0.001)	(0.0001)
socializing	-0.139+	-0.000	0.0000	-0.164	0.001	-0.0002	-0.096	-0.001	0.0001
	(0.073)	(0.001)	(0.0001)	(0.115)	(0.001)	(0.0002)	(0.091)	(0.001)	(0.0002)
traveling	-0.157	0.001**	-0.0002	-0.327	0.001*	-0.0004	-0.072	0.001	-0.0001
	(0.161)	(0.000)	(0.0002)	(0.261)	(0.000)	(0.0003)	(0.203)	(0.001)	(0.0002)
shopping	0.173	0.000	0.0001	0.306+	0.000	0.0000	-0.005	0.000	0.0000
	(0.122)	(0.001)	(0.0001)	(0.181)	(0.001)	(0.0002)	(0.156)	(0.001)	(0.0000)
doing chores	0.244+	0.001	0.0001	0.319	0.001	0.0002	0.189	0.000	0.0001
	(0.146)	(0.000)	(0.0001)	(0.204)	(0.001)	(0.0003)	(0.206)	(0.001)	(0.0001)
computer/video games	-0.045	-0.001	0.0000	0.140	-0.000	0.0000	-0.127	-0.001	0.0001
	(0.077)	(0.001)	(0.0001)	(0.104)	(0.001)	(0.0001)	(0.127)	(0.001)	(0.0002)
in child care	0.112	0.002**	0.0002	0.566	0.001*	0.0006	-0.231	0.002**	-0.0006
	(0.202)	(0.000)	(0.0003)	(0.373)	(0.000)	(0.0005)	(0.153)	(0.001)	(0.0004)
doing homework	-0.189	-0.000	0.0001	-0.082	0.000	0.0000	-0.224	-0.001	0.0001
	(0.136)	(0.000)	(0.0001)	(0.245)	(0.000)	(0.0001)	(0.170)	(0.001)	(0.0002)
taking lessons	0.024	-0.000	0.0000	-0.697	-0.000	0.0000	0.347	-0.000	-0.0001
	(0.537)	(0.000)	(0.0000)	(0.646)	(0.000)	(0.0001)	(0.715)	(0.000)	(0.0002)
working	0.085	0.001*	0.0001	0.060	0.001	0.0000	0.132	0.001	0.0001
	(0.136)	(0.000)	(0.0001)	(0.199)	(0.001)	(0.0002)	(0.200)	(0.001)	(0.0001)

Each coefficient in the first and second columns comes from a separate regression. The third column of each sample is computed by multiplying the coefficients from a regression of ln BMI on an activity and a regression of an activity on ln mother's work hours. The standard error on this combined term is estimated by seemingly unrelated regression on "stacked" data. Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 6: The Implied Effect of Mother's Employment on BMI, by Channel, using only the last 2 years of mother's work

Sample:	Full Sample	Mother's Ed ≤ 12	Mother's Ed > 12
Variable (V):	∂lnBMI / ∂lnMWH	∂lnBMI / ∂lnMWH	∂lnBMI / ∂lnMWH
Number of meals	0.0002**	0.0001	0.0002*
	(0.0001)	(0.0001)	(0.0001)
% meals in restaurant	0.0002	0.0002	0.0001
	(0.0002)	(0.0002)	(0.0003)
Breastfed	0.0001	0.0000	0.0001
	(0.0002)	(0.0003)	(0.0002)
Receives allowance	0.0000	0.0000	0.0000
	(0.0001)	(0.0002)	(0.0002)
Fraction of time spent			
sleeping	0.0001	0.0000	0.0001
	(0.0001)	(0.0002)	(0.0002)
misc. passive activities	0.0003	0.0002	0.0003
	(0.0002)	(0.0003)	(0.0003)
watching TV	0.0004+	0.0001	0.0010
	(0.0002)	(0.0002)	(0.0006)
attending school	-0.0001	-0.0008+	0.0001
	(0.0002)	(0.0004)	(0.0002)
eating	0.0002	0.0001	0.0001
	(0.0001)	(0.0002)	(0.0004)
playing indoor games	0.0001	0.0001	0.0000
	(0.0001)	(0.0002)	(0.0002)
playing sports	0.0000	-0.0001	0.0000
	(0.0001)	(0.0003)	(0.0001)
socializing	0.0001	0.0000	0.0001
	(0.0001)	(0.0002)	(0.0002)
traveling	-0.0001	-0.0002	0.0000
	(0.0001)	(0.0002)	(0.0001)
shopping	0.0001	0.0001	0.0000
	(0.0001)	(0.0002)	(0.0000)
doing chores	0.0002	0.0002	0.0001
	(0.0001)	(0.0002)	(0.0001)
computer/video games	0.0000	0.0000	0.0002
	(0.0001)	(0.0001)	(0.0002)
in child care	0.0002	0.0006	-0.0006
	(0.0003)	(0.0005)	(0.0004)
doing homework	0.0001	0.0000	0.0002
	(0.0001)	(0.0001)	(0.0003)
taking lessons	0.0000	0.0001	-0.0001
	(0.0000)	(0.0001)	(0.0002)
working	0.0000	0.0000	0.0000
	(0.0001)	(0.0001)	(0.0001)

These coefficients are computed by multiplying the coefficients from a regression of percentile BMI on an activity and a regression of an activity on ln mother's work hours. The standard error on this combined term is estimated by seemingly unrelated regression on "stacked" data. Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 7: The effect of activities on Percentile BMI and the Probability of Being Overweight

Sample:	Full Sample		Mother's Ed ≤ 12		Mother's Ed > 12	
Dependent Variable:	BMI Ptile	Cutoffs	BMI Ptile	Cutoffs	BMI Ptile	Cutoffs
Number of meals	-0.887**	-0.027*	-0.447	-0.015	-1.052*	-0.028
	(0.263)	(0.011)	(0.352)	(0.015)	(0.415)	(0.017)
% meals in restaurant	4.857+	0.202	2.235	0.215	6.861	0.182
	(2.883)	(0.125)	(4.182)	(0.173)	(4.192)	(0.201)
Breastfed	-2.722+	-0.140*	-4.479*	-0.187*	-0.221	-0.062
	(1.403)	(0.059)	(1.986)	(0.080)	(2.100)	(0.090)
Receives allowance	-0.853	0.009	-0.519	0.055	-1.036	-0.033
	(1.166)	(0.051)	(1.703)	(0.076)	(1.727)	(0.080)
Fraction of time spent						
sleeping	-0.666	-0.305	8.443	-0.097	-14.158	-0.924
	(9.510)	(0.395)	(12.895)	(0.523)	(14.955)	(0.707)
misc. passive activities	-10.281*	-0.490*	-12.499+	-0.503+	-4.570	-0.372
	(5.016)	(0.205)	(6.944)	(0.275)	(7.551)	(0.327)
watching TV	19.002*	0.968**	17.619	0.688	13.414	1.159*
	(8.026)	(0.332)	(10.956)	(0.442)	(12.305)	(0.543)
attending school	-6.653	-0.132	-33.924**	-0.951+	14.572	0.461
	(9.055)	(0.393)	(12.200)	(0.541)	(13.893)	(0.609)
eating	-16.561	-0.512	7.290	0.058	-56.403*	-1.738
	(14.275)	(0.617)	(18.585)	(0.793)	(25.282)	(1.123)
playing indoor games	-4.036	-0.362	-4.267	-0.639	-7.026	-0.409
	(11.330)	(0.505)	(14.257)	(0.670)	(18.610)	(0.781)
playing sports	-0.507	-0.589	-20.549	-1.234*	21.054	0.011
	(11.050)	(0.489)	(14.792)	(0.623)	(16.947)	(0.834)
socializing	-13.697	-0.408	-18.641	-0.191	-6.325	-0.603
	(11.718)	(0.478)	(17.879)	(0.691)	(13.971)	(0.670)
traveling	-22.574	-1.367	-57.017	-2.621+	-6.130	-0.797
	(23.157)	(0.980)	(35.735)	(1.533)	(30.127)	(1.312)
shopping	12.823	0.720	21.597	1.585+	-0.174	-0.744
	(16.007)	(0.669)	(22.506)	(0.881)	(21.980)	(1.042)
doing chores	10.825	0.659	12.194	1.104	19.971	0.459
	(18.031)	(0.841)	(23.928)	(1.059)	(27.489)	(1.363)
computer/video games	3.529	-0.092	28.128*	0.533	-11.197	-0.135
	(10.529)	(0.464)	(13.160)	(0.562)	(17.903)	(0.850)
in child care	-15.271	0.030	45.325	0.886	-53.829+	-0.660
	(23.021)	(0.894)	(29.367)	(1.382)	(31.443)	(1.162)
doing homework	-34.088+	-0.830	-9.605	0.029	-41.770	-1.192
	(19.549)	(0.828)	(33.216)	(1.382)	(25.415)	(1.150)
taking lessons	-2.891	-4.941	-128.881	-6.051	183.420+	-5.335
	(66.193)	(3.777)	(102.459)	(5.205)	(111.156)	(6.239)
working	0.074	0.317	14.339	0.321	-14.035	0.514
	(14.812)	(0.703)	(19.626)	(0.990)	(24.014)	(1.115)
Observations	3432		1736		1542	

Each coefficient is from a separate regression. OLS when dependent variable is BMI Ptile; Ordered probits when Cutoffs (1=underweight or normal weight, 2=risk of overweight, 3=overweight). Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.