Maternal employment and adolescent development[1]

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Abstract:

This study investigates how maternal employment is related to the cognitive development and body weight of 10 and 11 year olds, controlling for a wide variety of child, mother and family characteristics. The results suggest that limited market work benefits youths who are relatively "disadvantaged" and even long hours, which occur infrequently, are unlikely to leave them much worse off. By contrast, maternal labor supply is estimated to have more uniformly harmful consequences for "advantaged" adolescents. The negative cognitive effects for these youths probably partly occur because maternal labor supply reduces the time spent in enriching home environments. Some of the growth in obesity may be related to determinants of excess weight common to the child and mother.

Article:

Research examining the effects of maternal employment has been motivated by rapidly rising labor force participation rates of mothers and increased shares of children living in female-headed households .[2] Recent studies of young children use sophisticated procedures to deal with nonrandom selection into maternal employment and heterogeneity of child and family characteristics. These analyses generally indicate a deleterious impact of labor supply occurring during the child's first year, with less consistent consequences for subsequent work. However, it is not clear whether the effects persist and most studies of adolescents lack the same sophistication. In addition, research on both young and older children generally focuses on average effects, without carefully considering whether the findings systematically differ with socioeconomic status (SES). This study addresses both issues. The effects of maternal employment on 10 and 11 year olds are examined using data from multiple years of the National Longitudinal Survey of Youth (NLSY) and special attention is paid to non-uniform treatment

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[2] Between 1975 and 2000, participation rates of mothers with non-adult children increased from 47.4% to 72.9%, and from 39.0% to 65.3% for those with children younger than six (U.S. Department of Labor, Bureau of Labor Statistics, 2006). In 1960, just 8% of children lived with only their mother and 88% were in two-parent households; the corresponding 2005 figures were 23% and 67% (U.S. Bureau of the Census, 2006).

effects by estimating results for subsamples stratified by sex, race/ ethnicity, maternal education, household structure and a multivariate indicator of SES.

The results suggest that maternal employment has small average effects but sharply disparate impacts across categories of youths. Moderate labor supplies is estimated to have no impact or to benefit "disadvantaged" children and long hours, which occur rarely, are unlikely to leave them much worse off. By contrast, maternal job-holding is predicted to have deleterious consequences for "advantaged" adolescents. One reason for the negative effects on cognitive development is probably that these children are removed from enriching home environments when their mothers work. The elevation in obesity is less easily explained, although the data suggest a role for determinants common to both the child and mother (like family eating habits).

As with all non-experimental analyses, caution must be taken in providing a causal interpretation to these findings. Compared to most previous research, however, particularly comprehensive controls for non-random selection into maternal employment are included and some effort is made to investigate reverse causation — where child outcomes influence future labor supply. Remaining omitted variables biases may lead to underestimates of the adverse effects and reverse causation is probably more important for low than high SES families. The qualitative pattern of results, however, seems unlikely to be strongly affected.

1. Previous research

The relationship between maternal employment and cognitive development or behavior problems during early childhood has been widely studied. Previous investigations obtain positive effects (Vandell and Ramanan, 1992; Moore and Driscoll, 1997), negative impacts (Leibowitz, 1977; Stafford, 1987; Mott, 1991; Belsky and Eggebeen, 1991) or results that differ with the timing of work or specific group or outcome analyzed (Desai et al., 1989; Baydar and Brooks- Gunn, 1991; Blau and Grossberg, 1992; Parcel and Menaghan, 1994; Greenstein, 1995; Barglow et al., 1998).[3] Carefully conducted recent analyses generally indicate negative consequences of job-holding during the child's first year (Neidell, 2000; Han et al., 2001; Brooks-Gunn et al., 2002; Waldfogel et al., 2002; Baum, 2003; Ruhm, 2004; James-Burdumy, 2005; Verripoulou and Joshi, 2005; Hill et al., 2005) but with a less consistent impact for subsequent work. It is unclear, moreover, whether the effects last into adolescence. Harvey (1999) finds that the negative effects of first year employment are temporary, whereas Neidell (2000), Han et al. (2001) and Waldfogel et al. (2002) indicate greater persistence.

Studies of adolescents are also voluminous. Many researchers (Hillman and Sawilowky, 1991; Gottfried and Gottfried, 1994; Paulson, 1996; Vander Ven et al., 2001) conclude that maternal employment does not affect outcomes such as academic achievement, delinquency, or substance abuse. However, some obtain positive impacts (Richards and Duckett, 1994; Muller, 1995) or negative consequences (Bogenschneider and Steinberg, 1994), and there is a tendency to find greater gains or lower costs from part-time (versus full-time) work and for girls, blacks or children with less educated parents (Richards and Duckett, 1991; Bogenschneider and Steinberg, 1994; Wolfer and Moen, 1996).

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[3] The limited research on paternal employment (Parcel and Menaghan, 1994; Harvey, 1999; Ermisch and Farncesconi, 2001; Waldfogel et al., 2002; Ruhm, 2004) obtains inconclusive results.

These inferences should be viewed as tentative because research on adolescents often analyzes small and unrepresentative samples, with large but imprecisely estimated coefficients frequently interpreted as indicating no effect.[4] Importantly, mothers working long hours may differ from those who do not in ways that are inadequately accounted for. For example, women with characteristics associated with high ability tend to have elevated employment rates (Vandell and Ramanan, 1992; Waldfogel et al., 2002; Ruhm, 2004; Hill et al., 2005). If these advantages extend to productivity in home activities, maternal labor supply will be positively associated with child outcomes even without a causal impact.[5] Reverse causation also presents problems if work hours are influenced by child outcomes in previous periods.

2. Econometric methods

Economic models emphasize that parental employment has potentially ambiguous effects because it reduces the time available to invest in children (possibly accompanied by increases in stress and lower energy levels) but simultaneously enhances the ability to purchase productive inputs.[6] The empirical analysis below is operationalized by allowing outcomes for child i at age t (C_{it}) to be an additive separable function of maternal work hours at ages t-n through t (H_{it}= {H_{it}, H_{it-1},...H_{it-n}}) and production shifters (V_{it}), according to:

$$C_{it} = \alpha + \boldsymbol{H}_{it}\beta_t + V_{it} + \varepsilon_{it},$$

for ε_{it} an i.i.d. disturbance.[7]

Ruhm (2004) highlights several important econometric issues when using this approach. First, the parameters of primary interest, $\hat{\beta}$, will be biased if the uncontrolled portion of V is correlated with H. A primary strategy is to include a sufficiently rich set of covariates that the error term is orthogonal to H_{it}, while excluding variables resulting from parental job-holding. A second key feature is to control for maternal employment during the youth's entire life (through the birthday prior to assessment), rather than for just a portion of it. Maternal employment characteristics before birth are also included, in the hope that these absorb the effects of remaining omitted variables without causally affecting outcomes. Sibling fixed-effect and propensity score models provide additional tests of the robustness.[8] Finally, reverse causation becomes a more serious potential concern as the age of assessment increases. Some indication of its importance is obtained by estimating models including controls for employment in the calendar year after

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[4] For example, analyses by Hillman and Sawilowky (1991), Gottfried and Gottfried (1994), Paulson (1996), and Richards and Duckett (1994) contain 51, 106, 240 and 295 individuals. Menaghan et al. (2000), Anderson et al. (2003), and Aughinbaugh and Gittleman (2004) provide relatively sophisticated examinations of adolescents.

[5] The bias could be in the opposite direction if working women have less interest or ability in home production.

[6] See Ruhm (2004) for example. There is debate over the strength and causes of beneficial income effects. Time-diary data confirm that working reduces the time mothers spend with children (Zick and Bryant, 1996; Bianchi, 2000; Sandberg and Hofferth, 2001; Ichino and Sanz de Galdeano, 2005) but there is uncertainty about the extent to which productive activities are protected. Bianchi (2000) provides evidence that long hours cause parents to be tired and stressed. Complementary mechanisms through which employment may affect children include: disruption of mother- child attachments (Belsky, 1988); reductions in the quantity and quality of interactions (Hoffman, 1980); weakening of social capital (Coleman, 1988); and "role model" effects (Haveman and Wolfe, 1995).

[7] This is a "hybrid" equation (Rosenzweig and Schultz, 1983) because it is neither a production function nor a reduced-form demand equation (whose arguments are prices and wages).

[8] Some researchers (e.g. Baum, 2003; Anderson et al., 2003; James-Burdumy, 2005) use IV strategies. For this study it is difficult to devise instruments with the power to predict differences in employment during the various periods controlled for. Similar problems confront efforts to obtain `natural experiments".

assessment. For example, a positive coefficient might be expected if child health or developmental problems lead mothers to reduce work hours in future periods.

3. Data and descriptive results

Data are from the National Longitudinal Survey of Youth (NLSY), a sample of U.S. residents born between January 1, 1957 and December 31, 1964 and surveyed since 1979. Children born to and living with female NLSY respondents have been interviewed at two year intervals beginning in 1986, with information used here through 2000. The NLSY provides longitudinal information on a large number of children and includes great detail on maternal, child and household characteristics. The sample analyzed contains children born between 1979 and 1988 and who were 10 or 11 years old at one of the biennial assessment dates between 1986 and 1998. Their mothers were 35 to 42 years old at the end of 1999. The NLSY covers approximately 90% of childbearing for this cohort but does not represent all fertility, since it excludes some births to older women (who tend to have high incomes and education).[9]

3.1. Outcomes

Cognitive development is proxied by scores on the Peabody Picture Vocabulary Test (PPVT) and Peabody Individual Achievement Test Mathematics (PIAT-M) and Reading Recognition (PIAT-R) subtests. These widely used assessments have high test-retest reliability and concurrent validity (Baker et al., 1993). The PPVT measures receptive vocabulary for Standard American English and provides a quick estimate of verbal ability and scholastic aptitude. The PIAT-M assesses attainment in mathematics beginning with early skills, such as recognizing numerals, and progressing to advanced concepts in geometry and trigonometry. The PIAT-R indicates word recognition and pronunciation ability by examining skills such as matching letters, naming names and reading single words aloud.

The analysis focuses on "standard" scores. These have been commonly used (e.g. see Baydar and Brooks-Gunn, 1991; Blau and Grossberg, 1992; Parcel and Menaghan, 1994; Ruhm, 2004) and represent age-specific conversions of the raw scores designed (during the 1970s) to have a normal distribution with a mean of 100 and a standard deviation of 15. For ease of interpretation, the scores have been transformed to have a mean of zero and a standard deviation of one for the nationally representative NLSY subsample, so that the regression coefficients show the standard deviation change in test scores predicted by a one unit change in the explanatory variable. These are sometimes referred to as "effect sizes".

The final two outcomes indicate excess weight. Youths are classified as "obese" if their body mass index (BMI) is ≥ 95th percentile for gender and age-specific growth charts compiled by the National Center for Health Statistics; they are "at risk of overweight" if BMI is ≥ 85th percentile (Kuczmarski et al., 2000).[10] Since these thresholds were benchmarked for reference

[9] See Center for Human Resource Research (2001, 2002) for additional information on the NLSY.

[10] BMI is weight in kilograms divided by height in meters squared. See www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age. htm for further information. The CDC terms youths ≥ 95th percentile as "overweight" rather than "obese". The "at risk of overweight" group below includes children above the 95th percentile, where government statistics do not.

populations from the 1960s through 1980s, secular increases in weight imply that far more than 5% (15%) of the NLSY sample are obese (at risk of overweight).[11]

3.2. Maternal employment

The models control for average weekly work hours divided by 20, so a one unit change corresponds to 20 additional hours of weekly labor supply. Most models control for average weekly work hours during the period from the child's birth through the week of the birthday preceding assessment — when they turned 10 or 11. The first year of the child's life (denoted as year 1) covers the four quarters after birth, year 2 includes the fifth through eight quarters and so on, through the eleventh year.[12] For purposes of brevity, this is often referred to using terms like "all years" or the child's "entire life". Some estimates allow nonlinear impacts; others separate employment during the first three and later years. Paternal employment is largely ignored, a significant limitation dictated by severe constraints on the data available for fathers.

3.3. Other explanatory variables

The analysis exploits the extensive information available in the NLSY. A vector of "basic" background variables includes continuous measures of birth order, mother's age (in years), a quadratic for child age in months, and dummy variables for race/ethnicity (2 variables), sex of the child, the mother's 1980 score on the Armed Forces Qualifications Test (AFQT), her education (3 variables) and if a spouse/partner was in the household during the child's birth year. Unless noted, all regressors are measured at the child assessment date. Table A.1 further describes these and other variables used in the study.

Most models include supplemental characteristics providing additional information on time or financial resources, child health endowments at birth and the quality of maternal inputs. Early child health problems are incorporated through dichotomous indicators of low and very low birth weight (2 variables), long hospital stay at birth, hospitalization during infancy and physician visits for illness during the first three months of life (3 variables). Total family income in the year prior to birth is included, as are relative ages of the youth's siblings (4 variables) and a dummy variable for whether the mother attended a private secondary school.

A third set of regressors, labeled "maternal employment characteristics", control for occupation of the mother in the quarter before pregnancy (5 variables), the number of weeks prior to birth that she stopped working (4 variables) and her average weekly work hours in the year prior to pregnancy (the 40th through 91 st weeks prior to birth). These supply information on tastes for employment and opportunity costs of not working that are potentially correlated with unobserved influences on child development.

I tested the sensitivity of the results to including a still more detailed "auxiliary" set of family

[11] I also analyzed Behavior Problems Index (BPI) scores and a dichotomous measure of smoking or drinking. Consistent effects were not obtained for BPI scores. Maternal employment was correlated with large increases in early substance use, but relatively few 10 or 11 year olds had engaged in these activities, limiting statistical power.

[12] Average work hours during the child's first four years of life were constructed using summary data in the NLSY Child/Young Adult File. Averages for other years used data from the NLSY Work History File, containing weekly employment information from January 1, 1978 through the end of 1999.

and location characteristics (see Table A.1 for details), which might potentially account for attitudes, experiences and geographic factors correlated with investments in children.[13] They were omitted from the "preferred" econometric models, however, because their impact is likely to be indirect or of limited importance and may be captured by the "basic" or "supplemental" regressors. Also some of them (e.g. presence of the father) could be endogenous.

To avoid excluding persons lacking data on one or more covariates, the regressors were sometimes set to zero and dummy variables created denoting missing values. For example, mothers not reporting an AFQT score were given a zero value and the "missing AFQT" variable was set to one.[14] Alternatively, some dummy variables were valued at one when the specified condition was met and zero when it was not or when the relevant data were absent.[15]

3.4. Socioeconomic Status

Some evaluation of differential effects for "advantaged" and "disadvantaged" youths uses univariate measures of race/ethnicity, maternal education or presence of a spouse/partner in the household at birth. However, most analysis focuses on a multivariate index constructed by regressing total family income in the calendar year before assessment on mother's age (at child birth), AFQT score, education, child race/ethnicity, and presence of a spouse/partner in the household during the birth year. Youths were ordered by predicted incomes and classified as high (low) SES if in the upper (lower) half of the distribution.[16]

This SES index simultaneously accounts for a large number of determinants, rather than relying on multiple stratifications with highly correlated indicators, and removes some sources of endogeneity.[17] For example, current income varies with the mother's employment but this is less of an issue for predicted incomes that rely on group rather than individual characteristics.[18] Since the ranking procedure does not capture components of SES unrelated to predicted incomes, it is complementary to rather than a substitute for the univariate measures.

3.5. Home Environment

Home environments are proxied by total standard scores on the Home Observation Measurement of the Environment — Short Form (HOME). The HOME inventory contains observational and parent-reported items assessing emotional support and cognitive stimulation for children through the home environment, planned events and family surroundings. The total score reflects the sum

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[13] Location-specific measures of the number of physicians, and crime, birth, marriage and divorce rates are from the restricted-use NLSY Geocode File and refer to the county of residence.

[14] This was also done for pre-pregnancy income, father's presence in the household and local area characteristics.

[15] This strategy was used for hospitalizations and doctor visits, race/ethnicity and low birth weight. Forty-eight observations were deleted because of missing data on one or more years of maternal employment.

[16] Rosenbaum and Ruhm (2007) use a similar procedure. Predicted incomes were relatively low for black children and those born into single-parent households; they were positively related to the mother's AFQT score, education and age. Being Hispanic had a statistically insignificant positive predicted effect. Sample weights were incorporated when calculating the income percentiles.

[17] Researchers considering SES differences typically stratify samples using single variables such as education, income or occupational attainment (e.g. Anderson et al., 2003; Zhang and Wang, 2004) or composites, like the Hollingsworth index, representing simple combinations of two or more factors (e.g. Gordon-Larsen et al., 2003).

[18] Some endogeneity may remain. For instance, nonwhites have relatively low average incomes and high obesity prevalence but both could result from third factors.

of 20 to 40 individual items, which vary with child age.[19] HOME scores were averaged over the assessment year and two and four years earlier, then transformed to have a mean of zero and standard deviation of one for the nationally representative NLSY subsample.

3.6. Patterns of Maternal Employment

Fig. 1 provides kernel density estimates for weekly maternal employment hours during the first, third and tenth year of the child's life, and the average over all years .[20] There are spikes at 0 and 40 hours for each individual year, fairly constant probabilities for intermediate hours and low rates of labor supply beyond 40 hours per week. The fraction of mothers with no annual work experience declines and the spike at 40 hours becomes more pronounced as the child ages. The distribution of hours over the child's entire life is considerably more uniform: over 93% of mothers work at some point, averaging 19.0 hours per week; and the 10th, 25th, 50th, 75th and 90th percentiles are 0.8, 6.6, 18.0, 30.2 and 38.1 hours.

Mothers work much less in their first child's year than before pregnancy (11.8 vs. 19.0 hours) but labor supply rises substantially in the second year (to 15.1 hours) and increases steadily thereafter due to growth at both the intensive and extensive margins (see the top panel of Table 1). Just 57% are employed during the child's infancy, compared to 64% in year 2 and 76% in year 10; the probability of working ≥40 hours per week is 7%, 14% and 30%.

Labor supply also increases with socioeconomic status. High SES mothers average 21 hours per week over the child's life, versus 17 hours for the low SES group (see the lower panel of Table 1). They are 1.3 times as likely to work ≥ 20 hours weekly (51% vs. 40%) and average ≥40 hours over twice as often (7.9% vs. 3.7%). However, almost all (93%) of low SES mothers engage in some market employment.

3.7. Descriptive Relationships

Maternal employment is associated with favorable child outcomes. The top panel of Table 2 shows that children whose mothers averaged ≥30 hours per week had mean cognitive test scores .16 to .17 standard deviations above those whose mothers worked <15 hours. They also had

[19] A sample question on cognitive stimulation is "How often do you read stories to your child" (in various wordings for children ≤ 9); an example related to emotional support is "How often is your child expected to clean his/her room" (for ages ≥ 6). Interviewer observations cover topics such as cleanliness of the household and the mother's interactions with the child. Information on father-figures is provided through questions on time spent with the child in general or outdoor activities and the frequency with which the child eats meals with both the father-figure and mother. The HOME inventory has high validity and reliability and has been extensively analyzed (Mott, 2004).

[20] Results in this section and the next refer to the nationally representative subsample of the NLSY. Similar findings are obtained using weighted data for the full sample.

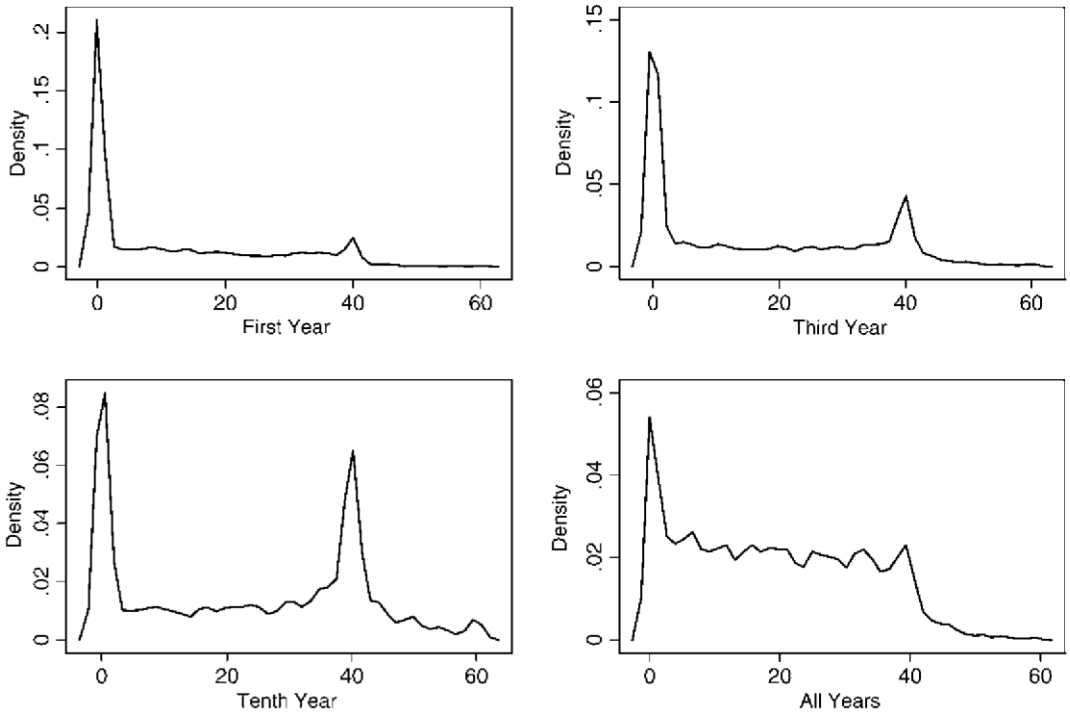

Fig. 1. Average Weekly Work Hours of Mother at Specified Child Ages.

Table 1
Maternal employment at specified child ages

Time Period/Group	Average Weekly Work Hours	Prob (Hours>0)	Prob (Hours≥20)	Prob (Hours≥40)
Before Pregnancy	19.0	.747	.475	.165
Year 1	11.8	.569	.272	.070
Year 2	15.1	.636	.363	.140
Year 3	16.3	.638	.398	.155
Year 4	17.3	.652	.421	.179
Year 5	18.3	.679	.448	.201
Year 6	19.3	.689	.468	.215
Year 7	20.3	.710	.491	.236
Year 8	21.6	.733	.523	.259
Year 9	22.8	.750	.555	.269
Year 10	23.5	.762	.564	.298
Year 11	24.3	.782	.588	.307
Post-Assessment	24.8	.771	.596	.333
All Years	18.9	.934	.453	.057
Years 1 – 3	14.4	.763	.339	.054
After Year 3	20.7	.911	.508	.111
Low SES	17.0	.927	.402	.037
High SES	20.9	.940	.509	.079

Note: Table displays results for the nationally representative subsample of the NLSY. The sample size is 2201. Year 1 refers to the first four quarters of the child's life, year 2 to the fifth through eighth quarter, and so forth. The period before pregnancy indicate the 40th through 91st weeks prior to child birth; that after assessment to the calendar year following the survey date at which the child is 10 or 11 years old. "All years" refers to the period from the child's birth until the birthday preceding the assessment date. "After year 3" indicates the same period, with the exclusion of the first three

years. SES is determined by ranking children according to predicted total family income in the year prior to assessment. Predicted income is estimated by regressing income on maternal age, education and AFQT scores, race/ethnicity and presence of a spouse/partner in the household in the birth year. High (low) SES children are those whose families are in the top (bottom) half of the predicted income distribution. The results in the lower panel of the table refer to employment in all years.

higher probabilities of obesity and overweight risk. Youths with mothers employed 15–29 hours per week generally had intermediate outcomes.[21]

These disparities need not reflect causal effects. Children with mothers supplying large amounts of labor tend to come from advantaged families and possess favorable characteristics. Women averaging ≥ 30 hours per week were older at child birth (23.5 vs. 22.7 years) and more often had attended college (43.8% vs. 25.5%) than those working <15 hours. They more frequently lived with a partner in the birth year (80.4% vs. 69.6%), had higher AFQT scores (44.4 vs. 33.5), greater income in the calendar year before assessment ($54,106 vs. $36,891); and their children less frequently had low birth weight (4.8% vs. 6.8%).

There are sharp SES gradients for all outcomes. Average differences between the top and lower half of the SES distribution are .78, .62, and .59 standard deviations for PPVT, PIAT-M, and PIATR scores and —5.8 and —3.6 percentage points for obesity and overweight risk (see Table A.2). These disparities again mainly reflect factors other than maternal employment: high SES youths

Table 2
Sample means of selected variables by average weekly work hours of mother

Variable	Full Sample	Average Weekly Work Hours		
		0–14	15–29	≥30
Outcome				
PPVT	0.00 (0.02)	−0.10 (0.04)	0.08 (0.04)	0.06 (0.04)
PIAT-Mathematics	0.00 (0.02)	−0.09 (0.04)	0.05 (0.04)	0.08 (0.04)
PIAT-Reading Recognition	0.00 (0.02)	−0.09 (0.04)	0.05 (0.04)	0.08 (0.04)
Obese (%)	12.7 (0.7)	11.9 (1.1)	12.5 (1.3)	14.1 (1.5)
Overweight Risk (%)	29.2 (1.0)	29.0 (1.5)	27.8 (1.7)	31.5 (2.0)
Family Background				
Mother's Age (years)	22.9 (0.1)	22.7 (0.1)	22.7 (0.1)	23.5 (0.1)
Mother Has Attended College (%)	32.4 (1.0)	25.5 (1.4)	32.7 (1.8)	43.8 (2.1)
Mother's AFQT Score	38.3 (0.6)	33.5 (0.9)	40.1 (1.0)	44.4 (1.1)
Spouse/Partner Present (%)	74.5 (0.9)	69.6 (1.3)	76.5 (1.6)	80.4 (1.6)
Total Family Income in Previous Year ($)	43,848 (1696)	36,891 (2265)	45,170 (3317)	54,106 (3570)
Child Characteristics				
Low Birth Weight (%)	6.2 (0.5)	6.8 (0.8)	6.6 (0.9)	4.8 (0.9)
Very Low Birth Weight (%)	0.8 (0.2)	1.0 (0.3)	0.6 (0.3)	0.5 (0.3)

Note: See note on Table 1. Table displays averages for the nationally representative subsample of the NLSY, with standard errors in parentheses. Work hours are averaged over all years. PPVT and PIAT scores are normalized to have a mean (standard deviation) of 0 (1) for the nationally representative NLSY subsample. Mother's age or education and presence of a spouse/partner refer to year in which the child was born. Total family income is for the calendar year before assessment. Low (very low) birth weight refer to less than 2500 (1500) grams.

rarely had low birth weight (5.8% vs. 8.9%), were much more often born into two-parent households (92.5% vs. 46.0%) and to have college-educated mothers (56.0% vs. 16.2%).

4. Econometric Estimates

Table 3 summarizes predicted effects of a 20 hour per week increase in maternal employment, averaged over the child's life, for four econometric specifications. Estimation is by ordinary least

[21] When considering employment during just the first three years, the highest cognitive scores were obtained when mothers averaged 15–29 hours per week, with statistically insignificant differences for longer hours.

Table 3
Regression estimates of the effect of maternal employment

Outcome	(a)	(b)	(c)	(d)
PPVT Score	.262 (.026)	.048 (.023)	.023 (.024)	−.006 (.027)
PIAT-Mathematics Score	.195 (.025)	.055 (.024)	.044 (.024)	−.002 (.028)
PIAT-Reading Recognition Score	.190 (.025)	.020 (.024)	−.001 (.024)	−.021 (.028)
Obesity	.016 (.008)	.029 (.009)	.022 (.009)	.027 (.010)
Overweight Risk	.030 (.011)	.040 (.012)	.032 (.012)	.045 (.014)
Other Regressors	None	B	B,S	B,S,E

Note: Table shows predicted effect of a 20 hour increase in average weekly maternal work hours during the period from the child's birth through the birthday prior to assessment. Outcomes are for children 120143 months of age. The cognitive assessments are normalized to have a standard deviation of one. Estimation is by ordinary least squares for the cognitive outcomes and as binary probit models for obesity and overweight risk. All models control for the assessment year. The categories of additional regressors are basic child, maternal and household characteristics (B); supplementary child health, family background and location specific characteristics (S), and pre-pregnancy maternal employment characteristics (E). Sample sizes are 3521, 3556, 3547, 3775, and 3775 for PPVT, PIAT-M, PIAT-R scores, Obesity and Overweight Risk.

squares for the cognitive outcomes and as binary probit models for obesity and overweight risk (with other covariates evaluated at the sample means). All models control for the assessment year, with additional regressors detailed at the bottom of the table. B, S and E refer to the vectors of basic, supplemental and maternal employment characteristics described above. Other specifications briefly summarized (but not displayed), include controls for HOME scores, post-assessment employment, auxiliary characteristics or state fixed-effects.

4.1. Cognitive Development

Column (a) of Table 3, which controls only for work hours and the assessment year, confirms the high cognitive scores of 10 or 11 year olds with employed mothers — effect sizes range from .19 to .26. Inclusion of the basic set of covariates (specification b) cuts the parameter estimates by at least 70%. Adding supplemental regressors further reduces the predicted gains (column c), and accounting for pre-pregnancy employment characteristics yields small and insignificant negative point estimates. In model (d), a 20-hour per week increase in employment predicts less than a .01 standard deviation reduction in verbal and mathematics scores and a .02 standard deviation decrease in reading performance. The estimates become slightly more negative when HOME scores are included — effect sizes are –.02, –.01 and –.03 —— although still statistically insignificant. Except where noted, subsequent tables do not control for HOME scores, out of concern that these are affected by maternal employment. However, I selectively report results of models containing them and, in Section 4.7, carefully examine how SES differences in the effects of maternal employment are influenced by the home environment.

Including auxiliary characteristics or state fixed-effects does not substantially alter the findings but, if anything, suggests more deleterious impacts. Specifications controlling for maternal work hours through the child's 9th or 10th (rather than 10th or 11th) birthday were also estimated, to eliminate contemporaneous effects, but with virtually no change in the results.

Models holding post-assessment employment constant indicate a fairly strong positive relationship between test scores and the mother's future labor supply.[22] This suggests reverse causation, where good cognitive performance is positively related to subsequent work hours. Assuming a similar pattern at younger child ages, the estimates in Table 3 are likely to understate

[22] The coefficients (standard errors) on future employment in models that otherwise correspond to column (d) are .032 (.019), .036(.019) and .035(.019) for PPVT, PIAT-M and PIAT-R scores.

the negative effects of work. However, even accounting for this, there is little evidence that maternal employment strongly affects cognitive development of the typical child.

4.2. Obesity and Overweight Risk

Maternal work hours are positively associated with excess weight in model (a) of Table 3. In contrast to the cognitive outcomes, however, including additional controls (specifications b through d) does not attenuate the estimates — an extra 20 hours of weekly employment is predicted to raise obesity and overweight risk by 1.6 and 3.0 percentage points in column (a) versus 2.7 and 4.5 points in column (d). Such magnitudes are substantial.[23] Moreover, while consistent with Anderson et al.'s (2003) evidence that maternal job-holding increases child obesity, large positive coefficients on future employment (in models that include it) raise doubts

Table 4
Effects of maternal employment for advantaged and disadvantaged children

Group	PPVT	PIAT-M	PIAT-R	Obesity	Overweight Risk
Disadvantaged Children					
Hispanic or Black	.051 (.040)	.043 (.040)	.018 (.039)	.018 (.015)	.039 (.020)
Mother Has Not Attended College	.070 (.033)	.065 (.034)	.020 (.035)	.023 (.013)	.028 (.017)
No Spouse/Partner Present in Birth Year	.041 (.045)	.024 (.049)	.051 (.048)	.004 (.020)	.035 (.024)
Low SES (bottom 50%)	.038 (.035)	.064 (.037)	.030 (.038)	.011 (.015)	.017 (.019)
Advantaged Children					
Not Hispanic or Black	−.118 (.036)	−.078 (.041)	−.071 (.040)	.025 (.013)	.040 (.020)
Mother Has Attended College	−.163 (.046)	−.130 (.048)	−.121 (.047)	.025 (.015)	.072 (.023)
Spouse/Partner Present in Birth Year	−.032 (.034)	−.008 (.035)	−.047 (.035)	.038 (.012)	.056 (.017)
High SES (top 50%)	−.079 (.043)	−.091 (.044)	−.102 (.043)	.036 (.013)	.079 (.021)

Note: See notes on Table 3. The specification estimated is the same as model (d) of that table, with the sample limited to the specified group. Maternal education refers to status in the year the child was born. SES is determined by ranking children according to predicted total family income in the year prior to assessment. Predicted income is estimated by regressing total family income on maternal age, education and AFQT scores, race/ethnicity and presence of a spouse/partner in the household in the birth year. High (low) SES children are those whose families are in the top (bottom) half of the SES distribution. Samples sizes range between 2024–2165 for Hispanics or blacks, 1497–1600 for non-Hispanic non-Blacks, 2405–2569 for no college, 1116–1206 for attended college, 1270–1357 for no spouse/partner present in birth year, 2251–2418 for spouse/partner present in birth year, 2164–2298 for low SES and 1357–1477 for high SES children.

that these represent causal effects.[24] The employment parameters are only minimally affected by controlling for HOME scores, auxiliary characteristics or state fixed effects.

4.3. Socioeconomic Status

Small average effects of maternal employment mask sharp socioeconomic disparities. This is shown in Table 4, which displays results for subsamples stratified by race/ethnicity, maternal education, presence of a spouse/partner at child birth, and the previously described multivariate SES index. Here and below, all specifications control for the survey year, basic, supplemental and maternal employment characteristics (equivalent to model d of Table 3).

Substantial negative impacts are predicted for advantaged youths, compared to neutral or favorable consequences for the less advantaged. Effect sizes for the three cognitive scores range between .02 and .07 for disadvantaged 10 an 11 year olds (see the top panel of Table 4), versus —.01 to —.16 for their advantaged peers (shown in the lower panel). The magnitudes vary with the sample stratification criteria but the estimated consequences of the mother's labor supply are

[23] At the sample means, 13.4% (30.5%) of children are predicted to be obese (at risk of overweight); therefore the estimates in model (d) imply that 20 extra work hours raise the probability by 20% (15%).
[24] The coefficient (standard error) is .013 (.007) for obesity and .027 (.010) for overweight risk.

always more adverse for high SES youths. Particularly noteworthy are the big reductions in cognitive performance associated with employment by highly educated mothers. The patterns are similar for excess body weight. Twenty hours of weekly employment predicts 0.4 to 1.8 (1.7 to 3.9) percentage point growth in obesity (overweight risk) among disadvantaged youths, compared to a 2.5 to 3.8 (4.0 to 7.9) point increases for advantaged adolescents.[25]

Table 5
Effects of maternal employment at different child ages by socioeconomic status

Time Period	PPVT	PIAT-M	PIAT-R	Obesity	Overweight Risk
Low SES Children					
Years 1 – 3	−.023 (.042)	−.018 (.044)	.019 (.045)	.002 (.018)	.009 (.023)
After Year 3	.045 (.034)	.065 (.035)	−.014 (.036)	.008 (.014)	.010 (.018)
High SES Children					
Years 1 – 3	−.084 (.050)	−.089 (.051)	−.077 (.050)	−.014 (.015)	.015 (.024)
After Year 3	−.015 (.045)	−.022 (.046)	−.040 (.044)	.043 (.014)	.062 (.021)

Note: See notes on Tables 3 and 4. The specification estimated is the same as model (d) of Table 3, except for additional controls for average weekly work hours (divided by 20), during the specified years. Each panel displays results of a separate model. "Low" SES refers to children in the bottom half of the SES distribution, calculated based on predicted family income, and "High" SES to those in the top half of the distribution.

Several recent studies (Brooks-Gunn et al., 2002; Ruhm, 2004; Lopoo, 2004) and some earlier research (Greenstein, 1995) provide evidence that high SES children are particularly disadvantaged by maternal employment. With the exception of Anderson et al. (2003), however, this issue receives only peripheral attention. The remainder of the analysis therefore focuses on SES differences, emphasizing results for the multivariate measure based upon predicted incomes.

4.4. Age Differences

The first years of life are believed to be especially important for children because of early influences on brain development, learning skills, self-esteem and emotional security (Shore, 1997; Heckman, 2000).[26] This is examined in Table 5, using models that allow maternal employment during the first three years to have different effects from subsequent labor supply.

The results are consistent with the early years being a "critical period" for cognitive outcomes — labor supply coefficients during the first three years are more negative or less positive than for subsequent work in five of six cases, although the differences are not statistically significant.[27] By contrast, the estimated effects are small during both periods when considering obesity and overweight risk of low SES children, and the negative consequences for high SES youths are largely restricted to labor supply occurring after the first three years.

4.5. Nonlinearities

[25] The SES differences are significant, at the .05 level, for cognitive outcomes in all cases except for presence/absence of a spouse and, for race, when considering PIAT-R scores. The disparities are not statistically significant for body weight, except for the multivariate SES measure for overweight risk. The SES differentials are reduced when HOME scores are also controlled for, as discussed in Section 4.7.

[26] However, the role of early brain development remains controversial (Bruer, 1999).

[27] Separately controlling for work hours in year 1 and years 2 and 3 reveals more negative labor supply effects on cognitive development during the infancy period in some but not all cases.

The impact of maternal employment could vary with its intensity. Several studies (Parcel and Menaghan, 1994; Richards and Duckett, 1994; Muller, 1995; Ruhm, 2004) suggest benefits of limited employment that exceed those for longer work hours. Specification (b) of Table 6 allows for such nonlinearities through models that include a quadratic in labor supply. The first three rows of each panel indicate changes predicted when mother's average 20, 30 or 40 hours of work weekly over the child's life, compared to no employment. Model (a) shows corresponding estimates from models that exclude the quadratic term. The fourth row presents p-values for the

Table 6
Linear and quadratic estimates of effect of maternal employment on the cognitive development and body weight by SES

	PPVT		PIAT-M		PIAT-R		Obesity		Overweight Risk	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Low SES Children										
Effects of Working										
20 Hours	.038	.217	.064	.153	.030	.166	.011	.022	.017	.009
30 Hours	.057	.185	.096	.159	.044	.142	.017	.025	.025	.020
40 Hours	.076	.061	.128	.119	.059	.047	.023	.022	.033	.034
P-Value										
Hours Squared		<.001		.052		.003		.564		.757
Joint Test	.279	<.001	.086	.035	.432	.009	.443	.631	.370	.637
High SES Children										
Effects of Working										
20 Hours	−.080	−.003	−.091	.033	−.102	−.106	.032	.010	.071	.063
30 Hours	−.120	−.053	−.137	−.030	−.153	−.157	.051	.030	.111	.103
40 Hours	−.160	−.135	−.183	−.144	−.204	−.205	.073	.066	.152	.150
P-Value										
Hours Squared		.251		.069		.946		.233		.767
Joint Test	.065	.094	.037	.022	.017	.058	.007	.012	<.001	<.001
Hours Squared	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Note: See notes on Tables 3 and 4. The specification estimated is the same as in column (d) of Table 3, except that model (b) also includes a quadratic for maternal work hours. SES is determined by ranking children according to predicted total family income in the year prior to assessment. High (low) SES children are those whose families are in the top (bottom) half of the SES distribution. Effects of working refer estimated differentials relative to no employment by the mother during the child's life. For the binary probit estimates, these are calculated as differences in predicted values averaged across all sample members. The P-Value for joint test refers to the hypothesis that the linear and quadratic term (if any) on work hours are jointly equal to zero; that on hours squared is the p-value for only the quadratic term.

null hypothesis that the coefficient on hours squared is zero; the fifth for the null hypothesis that all employment coefficients in the model equal zero.

The results again differ sharply by SES. Allowing for nonlinearities (specification b), moderate amounts of employment have strongly positive anticipated cognitive impacts for disadvantaged youths, with test scores expected to be maximized when the mother averages 22 to 26 hours of work per week and negative effects obtained only for very long hours. Compared to not working, 20 hours of weekly employment predicts PPVT, PIAT-M and PIAT-R gains of .22, .15 and .17 standard deviations.[28] These findings contrast with the small and insignificant impacts using the linear models (see specification a). However, neither the linear nor quadratic specifications indicate any employment effect on obesity or risk of overweight.

Conversely, maternal labor supply predicts strong deleterious impacts for high SES adolescents that, except for PIAT-M scores, accumulate in an approximately linear fashion. The adverse

[28] Estimated effect sizes were .16, .11 and .12 in quadratic models that also controlled for HOME scores.

effects expected for long work hours are large in both the linear and quadratic specifications. Compared to not working, 40 hours per week of maternal employment is estimated to reduce PPVT, PIAT-M and PIAT-R scores by. 16,. 18 and .20 standard deviations and raise obesity and overweight risk by 7.3 and 15.2 percentage points in model (a), versus .14,.14 and .21 standard deviations and 6.6 and 15.0 points in specification (b).[29]

4.6. Alternative Specifications and Tests of Robustness

Boys are often thought to be particularly affected by early environmental conditions.[30] Although the estimates were usually not precise enough to establish clear gender differences, the point estimates generally did suggest stronger negative consequences of maternal employment for boys than girls. Effect sizes for working 20 hours per week on PPVT, PIAT-M and PIAT-R scores were —.01,.—03 and —.05 for males, versus .00, .03 and .02 for females; obesity and overweight risk were anticipated to rise 4.5 and 4.3 percentage points for boys, compared to 1.5 and 4.8 points for girls.[31]

Some researchers (Neidell, 2000; Ermisch and Farncesconi, 2001; Waldfogel et al., 2002; Anderson et al., 2003; Aiza, 2004; Aughinbaugh and Gittleman, 2004; James-Burdumy, 2005) use sibling fixed-effect (FE) models to control for time-invariant maternal factors. These are not a panacea. Since child-specific attributes (uncorrelated with the maternal fixed-effect) are not held constant, the resulting bias may be larger than in OLS estimates if unobserved differences across children are a key determinant of sibling variations in maternal labor supply. Most evidence (e.g. Behrman et al., 1982; Powers, 2003) suggests that mothers work less when their children have health or developmental problems, implying that the FE models are likely to underestimate costs of maternal employment. Even so, for high SES siblings, the fixed-effect estimates revealed more deleterious cognitive effects than analogous OLS specifications.[32]

A similar pattern was obtained when calculating average treatment effects using propensity score (PS) models, where the treatment (control) group were youths whose mothers averaged at least 30 (10 or fewer) hours of weekly work.[33] Maternal employment was again generally predicted to have small and insignificant impacts for low SES adolescents, although the PS models yielded substantial but imprecisely estimated negative effects on PPVT and PIAT-R scores.[34] By

[29] Controlling for HOME, 40 hours per week of employment is predicted (in model a) to reduce PPVT, PIAT-M and PIATR scores by. 13,. 16 and .19 standard deviations and increase obesity and overweight risk by 7.5 and 15.3 percentage points.

[30] Desai et al. (1989), Richards and Duckett (1991) and Brooks-Gunn et al. (2002) obtain stronger negative effects of maternal employment for boys than girls but Han et al. (2001) fail to uncover gender differences, Waldfogel et al. (2002) obtain larger negative effects for girls, and the relative magnitudes in Ruhm (2004) vary across outcomes.

[31] Smaller and less consistent gender disparities were obtained when limiting the sample to high SES youths.

[32] Large but insignificant positive (negative) FE coefficients were obtained for the PPVT and PIAT-M (PIAT-R) scores of low SES youths, while the OLS coefficients were small. Reliable FE estimates could not be obtained for obesity or overweight risk because the conditional logit procedures depend on the small sample of siblings with different values for these dichotomous outcomes.

[33] Youths whose mothers averaged more than 10 and less than 30 hours of employment were excluded. These estimates used kernel-matching with a Gaussian kernel. Computation of the average treatment effects was restricted to the region of common support. Bootstrapped standard errors were obtained using 250 repetitions.

[34] The PS models yielded effect sizes of —.10 and —.11 for these outcomes, versus OLS estimates of .02 and —.01.

contrast, the PS specifications predicted consistently larger deleterious consequences than corresponding OLS models for high SES youths.[35]

While data limitations preclude a full examination of the role of spousal characteristics, the results are robust to controlling for the husband's education and work hours.[36] For children in two-adult households (at the assessment date), 20 hours of maternal employment is predicted to lower PPVT, PIAT-M and PIAT-R scores by .067, .006 and .069 standard deviations and raise obesity and overweight risk 4.0 and 5.4 percentage points in models that hold spouse characteristics constant. This compares to reductions of .072, .011 and .073 standard deviations and increases of 4.1 and 5.5 points in specifications that do not. Such findings suggest that omitted information on husbands is unlikely to seriously bias the main results.[37]

4.7. Sources of SES Disparities

I tested, but found no support, for the possibility that particularly deleterious consequences of maternal employment for advantaged youths occur because the benefits provided by the mother's earnings are muted at high SES. When added to the regressions, the coefficients on family incomes or maternal earnings (averaged over several years) were close to zero, and those on work hours were scarcely affected.[38]

Reverse causation may be more problematic for low than high SES mothers. For instance, if the opportunity costs of not working are greater for women earning high wages or employed in desirable occupations, their future labor supply might be relatively unresponsive to prior child outcomes. Some evidence supports this possibility. The coefficients on post-assessment employment for PPVT, PIAT-M and PIAT-R scores are .04, .06 and .07 (.03, .00, and —.02) for low (high) SES youths, suggesting that good cognitive performance leads to relatively big increases in subsequent employment for disadvantaged mothers and that the overstatement (underestimate) of employment-related cognitive gains (losses) might be relatively large for their children.[39] However, this probably accounts for only a small portion of the observed SES differentials.[40]

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[35] Effect sizes from the PS models were —.11, —.05 and —.14 for PPVT, PIAT-M and PIAT-R scores, versus —.05,.02 and —.09 in corresponding OLS specifications. The PS (OLS) models predicted 6.6 and 14.5 (4.4 and 11.2) percentage point increases in obesity and overweight risk. The SES differences are not an artifact of the classification thresholds. When dividing the sample into thirds (rather than halves) of the predicted income distribution, the estimated effects again become uniformly more negative as socioeconomic status increases. This is also true when using family income in the year prior to pregnancy as an alternative SES categorization method (with the rational that pre-pregnancy incomes are not affected by maternal employment during the child's life).

[36] Education is measured at the time of assessment; employment refers to the preceding calendar year.

[37] Patterns of maternal employment make this even less likely. Women averaging 15-29 hours of work per week have less educated spouses than those employed smaller or larger amounts, while the work hours of husbands and wives are essentially unrelated.

[38] These results are consistent with other evidence (Shea, 2000; Aughinbaugh and Gittleman, 2003) of zero or very small positive income effects on child outcomes. Family incomes were measured for the calendar year prior to the assessment date and 2, 4, 5, 6, 7, 8 and 9 survey years earlier. Maternal earnings were averaged for the year before assessment and the previous 2, 4, 6, 8 and 10 years. The choice of periods was dictated by data availability.

[39] Consistent differences were not observed for obesity or overweight risk.

[40] Estimated SES gaps in maternal employment effects ranged from 10 to 14 percentage points for cognitive scores, in specifications controlling for post-assessment employment, versus 11 to 15 points in those that did not.

Advantaged adolescents may have particularly enriching home environments, implying relatively high costs of being placed in nonparental care. Consistent with this, the most negative consequences of employment for academic test scores were obtained for children with highly educated mothers (see Table 4), suggesting a key role of time inputs by educated parents .[41] By contrast, family structure (proxied by presence of an adult male in the birth year) was of equal or greater importance when considering obesity, possibly reflecting differences in eating habits or recreational activities.

Table 7
Estimated effects of home environment on cognitive development and body weight by SES

Regressor	PPVT		PIAT-M		PIAT-R		Obesity		Overweight Risk	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
All Children										
HOME	.204 (.017)	.249 (.024)	.152 (.018)	.185 (.025)	.159 (.018)	.193 (.025)	−3.8E-5 (.006)	−.004 (.009)	.002 (.009)	.006 (.012)
HOME * Work Hours		−.055 (.020)		−.040 (.021)		−.041 (.021)		.005 (.008)		−.005 (.010)
Low SES Children										
HOME	.168 (.020)	.198 (.028)	.123 (.021)	.146 (.030)	.145 (.021)	.176 (.030)	.003 (.009)	.003 (.012)	.014 (.011)	.018 (.015)
HOME * Work Hours		−.040 (.026)		−.030 (.028)		−.041 (.028)		1.7E−4 (.012)		−.006 (.015)
High SES Children										
HOME	.283 (.032)	.414 (.050)	.212 (.033)	.264 (.052)	.175 (.032)	.204 (.051)	−.002 (.010)	−.015 (.016)	−.018 (.015)	−.013 (.025)
HOME * Work Hours		−.124 (.037)		−.049 (.038)		−.027 (.037)		.011 (.011)		−.005 (.018)

Notes: See notes on Tables 3 and 4. SES is determined by ranking children according to predicted total family income in the year prior to assessment. Specification (a) corresponds to specification (d) of Table 3, with the addition of a control for the total standard score on the Home Observation Measurement of the Environment (HOME), averaged over measurements at the assessment year and two and four years earlier, and normalized to have a mean of zero and a standard deviation of one for the nationally representative NLSY subsample. Model (b) also includes an interaction of the HOME score with maternal work hours. All models also control for the vectors of "basic", "supplemental" and pre-pregnancy employment characteristics.

The data confirm that home environments vary systematically with SES. Average HOME scores of children in the top half of the predicted income distribution are .71 standard deviations above those of youths in the lower half, and the environments of advantaged adolescents are superior across other measurable dimensions.[42] Model (a) of Table 7, which includes the HOME standard score as an additional regressor, shows that favorable home environments predict better cognitive performance. A one standard deviation increase the HOME score is estimated to raise verbal, mathematics and reading test scores by. 15 to .20 standard deviations for the full sample, with effect sizes ranging from .12 to. 17 (.18 to .28) for low (high) SES youths. HOME scores are not consistently related to obesity or overweight risk.

Specification (b) in Table 7 augments the model by interacting HOME scores with maternal work hours. We expect the interaction coefficient to be negative if the mother's employment is particularly harmful to children raised in enriching environments. This occurs for the three cognitive outcomes, although the parameter estimate is not always statistically significant. Given

[41] Bianchi et al. (2004) show that educated mothers spend relatively large amounts of time with children and devote more of it to particularly beneficial activities (e.g. reading to rather than watching television with them). The education differentials have risen over time, despite faster growth in the employment of highly educated mothers.
[42] High SES youths are more likely to have visited a museum in the previous year (84.4% vs. 72.3%), to have been read to by their mother ≥three or more times per week at ages 6 or 7 (55.1% vs. 37.1%), and watch 1.1 fewer hours of television daily (3.8 vs. 4.9 hours).

the absence of any main effect of HOME scores on obesity or risk of overweight, small and insignificant interaction effects for these outcomes are not surprising.

Table 8 examines the extent to which SES disparities in the effects of maternal employment can be attributed to gaps in HOME scores. The rows labeled "At Actual HOME Score" indicate predicted impacts, without adjusting for these differences, as obtained from regressions identical to specification (d) of Table 3, for children with reported HOME scores.[43] The rows labeled "At Average HOME Score" show the expected effect from specification (b) of Table 7 but with the HOME score and its interaction with work hours set to zero — the average for the nationally representative NLSY subsample. The bottom panel displays the total SES disparity (calculated as the difference between the first rows of the middle and upper panels) the predicted gap for children living in average home environments (the difference between the second rows of these panels) and the fraction explained by disparities in average HOME scores (one minus the second row of the lower panel divided by the first row, expressed in percent).

The findings confirm that heterogeneity in home environments explains, in a statistical sense, a large portion of the SES disparity in maternal employment effects on cognitive development. For instance, 20 hours of weekly labor supply reduces predicted PPVT scores of high SES youths by .080 standard deviations and increases those of low SES adolescents by .038 standard deviations, for a gap of –.118 standard deviations. The anticipated decreases for low and high SES adolescents with average HOME scores are .006 and .043 standard deviations, leaving a differential of .037 standard deviations and implying that 69% of the original disparity has been accounted for. Differences in HOME scores similarly explain 33% and 42% of the SES gap in PIAT-M and PIAT-R performance, but none of the disparity in excess body weight. Since the HOME inventory imperfectly proxies of the home environment, these results may provide a lower-bound on the explained portion of observed SES disparities.

The NLSY contains no information on physical activity or food intake, which (mechanically) determine obesity. However, there is indirect evidence that maternal employment changes factors, such as eating habits, that have common effects across family members. Higher maternal BMI and changes in the mother's BMI (from before pregnancy to the assessment date) are positively

[43] A maximum of 0.4% of observations are lost due to missing HOME scores.

Table 8
Effects of Work Hours on Cognitive Development and Body Weight At Actual and Average Home Environment

Predicted Employment Effect	PPVT	PIAT-M	PIAT-R	Obesity	Over-weight Risk
Low SES Children					
At Actual HOME Score	.038 (.035)	.064 (.037)	.030 (.038)	.012 (.015)	.019 (.019)
At Average HOME Score	−.006 (.037)	.032 (.040)	−.011 (.040)	.012 (.016)	.015 (.020)
High SES Children					
At Actual HOME Score	−.080 (.043)	−.091 (.044)	−.102 (.043)	.037 (.013)	.081 (.021)
At Average HOME Score	−.043 (.042)	−.072 (.044)	−.088 (.043)	.036 (.013)	.080 (.021)
SES Disparity Due to Difference in Home Environment					
Total SES Disparity	−.118	−.155	−.131	.025	.061
Disparity Remaining After Controlling for HOME Score	−.037	−.104	−.077	.024	.066
% of SES Disparity Explained	68.7	33.1	41.8	1.1	−6.9

Note: The predictions at "Actual HOME Score" are obtained for specifications corresponding to model (d) of Table 3, with SES based on predicted income and the sample restricted to observations with valid HOME score data. Those at "Average HOME Score" are obtained from the coefficients on work hours in model (b) of Table 8, which are the expected effects of maternal employment when HOME scores are equal to zero (the average value for the nationally representative NLSY subsample).

related to adolescent obesity and overweight risk.[44] Controlling for changes in the mother's BMI reduces the SES disparity in maternal employment "effects" by 11 % (8%) for obesity (overweight risk).[45] Moreover, increased labor supply reduces predicted assessment date BMI for low SES mothers while raising that of their high SES counterparts.[46] The differences are not always statistically significant and need not represent causal relationships but they are consistent with a role for common family factors.

5. Discussion

This analysis suggests that although few of the deleterious consequences of maternal employment observed around the time of school entry persist through early adolescence for the typical child, there appear to be sharp socioeconomic variations in these small average effects, with much more negative impacts predicted for advantaged youths. Moreover, it provides evidence that work during the earliest (rather than later) years of the child's life may be associated with particularly deleterious consequences for cognitive development but not necessarily other outcomes. For instance, maternal employment after the third year of the child's life is most strongly associated with obesity among advantaged youths.

[44] A one kg/m^2 increase in maternal BMI at the assessment date is predicted to raise obesity (overweight risk) by 0.9 (2.2) percentage points for high SES youths and 1.0 (1.6) points for low SES adolescents. A one kg/m^2 change in the maternal BMI is estimated to increase obesity by 0.5 (0.9) percentage points for low (high) SES youths and overweight risk by 0.9 (2.0) points.

[45] The predicted SES gaps decrease 56% and 46% when maternal BMI before pregnancy and at the assessment date are separately controlled for.

[46] Controlling for the same covariates as in model (d) of Table 3, 20 extra hours of weekly employment predicts a 0.68 (0.63) kg/m^2 reduction (increase) in the BMI of low (high) SES mothers. These relationships are attenuated but not eliminated when also controlling for pre-pregnancy BMI or examining changes in BMI.

The most favorable results for low SES 10 and 11 year olds are predicted when the mother works approximately half-time — averaging 20 hours per week is anticipated to raise verbal, mathematics and reading test scores by 0.22, 0.15 and 0.17 standard deviations, compared to no work, with little effect on excess body weight. Forty hours of weekly employment, which is rare, appears to eliminate many of the cognitive benefits but still to leave the disadvantaged adolescents better off than if the mother did not hold a job.

By contrast, the estimates suggest substantial and uniformly negative consequences of maternal employment for high SES youths. Averaging 40 hours per week decreases expected cognitive test performance by .14 to .20 standard deviations and raises obesity (overweight risk) by 7.3 (15.2) percentage points. We do not fully understand why maternal job-holding is particularly deleterious for high SES youths. A tentative conclusion, however, is that much of the cognitive impact occurs because employment pulls these children out of home environments conducive to learning. This does not explain the findings for obesity, but there is some suggestion of a role for determinants of weight common to both the child and mother.

These findings demonstrate that the pathways to desirable child outcomes probably vary with family circumstances and highlight the need to examine other potential sources of SES disparities. For example, disadvantaged children are often cared for by grandparents (Anderson and Levine, 2003; Rosenbaum and Ruhm, 2007), which might reduce the negative effects of maternal employment if relatives provide time investments of similar quality as mothers. Alternatively, labor supply by high SES women might relatively frequently be motivated by divorce or other family events that adversely affect children. Also, experimental evidence indicates that the work requirements of welfare reform harm adolescent school performance (Gennetian et al., 2002),

Table 9
Predicted test scores and obesity/overweight prevalence by maternal employment and SES

Average Weekly Work Hours	PPVT (percentile)	PIAT-M (percentile)	PIAT-R (percentile)	Obesity (%)	Overweight Risk (%)
Low SES Children					
0	26.3	30.7	32.8	16.1	31.0
20	32.9	35.8	38.5	17.2	32.7
40	28.1	34.7	34.4	18.4	33.5
High SES Children					
0	59.4	57.4	61.4	7.3	20.9
20	56.7	58.6	57.8	10.5	27.8
40	53.9	52.2	54.0	12.4	31.9

Note: See notes on (Tables 3, 4 and 6). SES is determined by ranking children according to predicted total family income in the year prior to assessment. High (low) SES children are those whose families are in the top (bottom) half of the SES distribution. The table shows the predicted test score percentile or percent predicted to be obese or at risk of overweight for the specified average weekly maternal work hours over the child's life. Predictions on cognitive outcomes for low SES children are based on the quadratic work hours specification, while those for body weight are from the linear model. They are based on a linear specification for the high SES group, except for PIAT-M scores, where the quadratic model is used. Test percentiles are calculated for each individual, with maternal work hours set to the specified value, and then averaged across all children in the group.

suggesting different consequences of voluntary and mandated maternal employment for low SES youths.

Over 90% of mothers work during their child's first 10 or 11 years but fewer than half average 20 or more hours and less than 6% at least 40 hours weekly. When combined with the results above,

this suggests that low SES families are generally making employment decisions consistent with the most favorable child outcomes. Conversely, even limited employment is predicted to have negative effects for advantaged adolescents.

High SES youths, however, do relatively well, however, even when their mothers work. Table 9 shows the outcomes predicted at 0, 20 and 40 hours of maternal employment.[47] An advantaged 10 or 11 year old whose mother averaged 40 hours per week is expected to have considerably worse cognitive performance than if her mother did not work — scoring at the 52nd through 54th percentiles on the three tests, rather than the 57th through 61st percentiles. Nevertheless, this is well above the 33rd through 39th percentiles predicted for a low SES child whose mother averaged 20 hours per week (approximately where test performance is maximized). Overweight risk and obesity are also relatively rare for advantaged youths, unless their mothers were employed full-time. The welfare implications of these findings are unclear since child outcomes are just one argument in the parents' utility function.[48] High SES families may willingly forgo some gains to their children to obtain other benefits.[49] Alternatively, they might be unaware of the negative labor supply effects, implying suboptimal outcomes.

Several limitations of the analysis deserve mention. The NLSY is not entirely representative, since it excludes some fertility of older mothers and is restricted to children born between 1979 and 1988. The employment consequences may depend on the technologies or institutional arrangements in place, and so could differ across locations or for more recent cohorts (e.g. if workplaces have become more "family-friendly"). Better understanding the mechanisms by which parental investments promote child development might facilitate less costly methods of achieving the same benefits. The role of paternal employment also needs to be more carefully examined, which is difficult given the shortcomings of existing data sources.

The models rely on the explanatory variables to account for the selection into market work, rather than exploiting exogenous sources of variation. Identifying natural experiments or instrumental variable approaches would be helpful. That said, the negative consequences of maternal employment for high SES youths are unlikely to be an artifact of the estimation technique. The predicted labor supply effects typically become less favorable with more complete controls for heterogeneity and women tend to work less if their offspring have low test scores in previous years, probably inducing a positive correlation between employment and cognitive development. Maternal fixed-effect and propensity score models also yield similar or more negative estimates than corresponding OLS specifications for advantaged adolescents. On the other hand, reverse causation may be more important for disadvantaged youths, suggesting that the preceding estimates may overstate the benefits of maternal employment for them.

[47] These were obtained using a quadratic in work hours for low SES youths and a linear model for their high SES counterparts, except for PIAT-M scores where a quadratic specification was used. For obesity and overweight risk, average predicted changes were calculated with other covariates evaluated at the individual values.

[48] Currie and Thomas (2001) indicate that early test performance is strongly related to future educational and labor market outcomes, suggesting that the cognitive effects may have lasting costs. The negative health consequences of excess weight during adolescence are well known (e.g. see Must and Strauss, 1999; Ebbeling et al., 2002).

[49] For example, time off work might reduce advancement in the labor market and lower future incomes.

Appendix A

Table A.1
Variables Used in Analysis

Variable	Description
	Outcomes
PPVT	Peabody Picture Vocabulary Test-Revised Total Standard Score
PIAT-M	Peabody Individual Achievement Test, Mathematics Total Standard Score
PIAT-R	Peabody Individual Achievement Test, Reading Recognition Total Std. Score
Obesity	Body Mass Index (BMI) at or above sex- and age-specific 95th percentile cut point
Overweight Risk	BMI at or above sex- and age-specific 85th percentile cut point
	Maternal Employment
Hours	Average Weekly Work Hours (divided by 20) during specified period
Post-Assessment	Average Weekly Work hours (divided by 20) in calendar year after assessment
	"Basic" Child, Maternal and Household Characteristics (B)
Age	Age of child (in months) at assessment date
Age Squared	Age Squared of child at assessment date
Race/Ethnicity	Child is Hispanic or a non-Hispanic Black (2 d.v.'s)
Female	Child is Female (d.v.)
Parity	Birth order of child
AFQT Score	Mother's score on the Armed Forces Qualification Test in 1980
Mother's Age	Age (in years) of mother at the time of child's birth
Education	Mother completed high school, attended college, college graduate at assessment date (3 d.v.'s)
Spouse	Spouse/Partner present in birth year (d.v.)
	Supplemental Maternal, Family and Child Characteristics (S)
Birth weight	Low ($\leq$2500 grams) or Very Low ($\leq$1500 grams) Birth weight (2 d.v.'s)
Long Hospital Stay	Child stayed in hospital longer than mother following birth (d.v.)
M.D. Visit	M.D. visit in first, second/third month of life (2 d.v.'s)
Hospitalization	Child hospitalized during first year (d.v.)
Income	Family Income in Year Before Birth (2000 year dollars)
Siblings	Sibling born $\leq$18, 19–36 months before/after child's birth (4 d.v.'s)
Private	Mother's current or last secondary school attended in 1979 was private (d.v.)
	Pre-Pregnancy Employment Characteristics (E)
Weeks Before	Mother Stopped Working 0, 1–13,14–39, 40–155 weeks before birth (4 d.v.'s)
Hours Before	Average Weekly Work Hours (divided by 20) in Year Prior to Pregnancy
Occupation	Occupation of main job in 4th quarter prior to birth was: professional/managerial, sales, clerical, crafts/operative, service/household (5 d.v.'s)
	Auxiliary Family and Location Characteristics (A)
Father Present	Father living in household at assessment date (d.v.)
Location	Mother lived outside U.S., in Southern U.S., or in rural area at age 14 (3 d.v.'s)
Grandmother Work	Mother's mother worked when mother was 14 (d.v.)
Learning Resources	Mother had magazines, newspaper, library card in home in age 14 (3 d.v.'s)
Foreign Born	Mother's mother/father foreign born (2 d.v.'s)
Grandparents Educ.	Mother's mother/father completed high school, attended college (4 d.v.'s)
Both Parents	Mother lived with both mother and father at age 14 (d.v.)
Mother Only	Mother lived with mother and no adult male in household at age 14 (d.v.)
First Smoked	Mother smoked first cigarette before age 14 (d.v.)
Marijuana	Mother tried marijuana/hashish, before age 21 (d.v.)
Mother's Siblings	Mother had 0, 3–5, $\geq$6 siblings (3 d.v.'s)
Residence	Lives in central city, SMSA/MSA at assessment date (2 d.v.'s)
	Auxiliary Family and Location Characteristics (A)
Crime	Local crime rate (in 1985)
Birth	Local birth rate (in 1984)
Marriage	Local marriage rate (in 1984)

(continued on next page)

Table A.1 (*continued*)

Variable	Description
Divorce	Local divorce rate (in 1985)
Physician	Local physicians per 100,000 people (in 1985)
	Home Environment
HOME	Home Observation and Measurement of the Environment — Short Form Total Standard Score, averaged over three assessments
	Maternal Body Mass Index
BMI Before	Maternal BMI based on weight immediately before pregnancy.
BMI as Assessment	Maternal BMI based on weight at child assessment date.

Note: All variables are obtained from the NLSY. See text for additional details.

Table A.2
Sample Means of Selected Demographic Characteristics and Outcomes By SES

Variable	Low SES	High SES
Outcomes		
PPVT	−0.59 (0.02)	0.19 (0.03)
PIAT-Mathematics	−0.44 (0.02)	0.18 (0.03)
PIAT-Reading Recognition	−0.38 (0.02)	0.21 (0.03)
Obesity (%)	16.8 (0.8)	11.0 (0.8)
Overweight Risk (%)	32.4 (1.0)	28.8 (1.2)
Family Background		
Mother's Age (years)	21.2 (0.1)	24.8 (0.1)
Mother Has Attended College (%)	16.2 (0.7)	56.0 (1.3)
Mother's AFQT Score	18.6 (0.3)	49.1 (0.7)
Spouse/Partner Present (%)	46.0 (1.0)	92.5 (0.7)
Total Family Income in Previous Year ($)	30,960 (1382)	54,790 (2497)
Child Characteristics		
Low Birth Weight (%)	8.9 (0.6)	5.8 (0.6)
Very Low Birth Weight (%)	1.3 (0.2)	0.4 (0.2)

Note: See note on Table 4. SES is determined by ranking children according to predicted total family income in the year prior to assessment. High (low) SES children are those whose families are in the top (bottom) half of the SES distribution. Standard errors are in parentheses.

References

Aiza, Anna, 2004. Home Alone: Supervision After School and Child Behavior. Journal of Public Economics 88 (9–10),
1835–1848.

Anderson, Patricia M., Levine, Phillip B., 2003. "Child Care and Mother's Employment Decisions", in Finding
Jobs: Work and Welfare Reform, edited by David Card and Rebecca Blank. New York: Russell Sage Foundation, 2000,
420–62.

Anderson, Patricia M., Butcher, Kristin F., Levine, Phillip B., 2003. Maternal Employment and Overweight Children.
Journal of Health Economics 22 (3), 477–504.

Aughinbaugh, Alison, Gittleman, Maury, 2003. "Does Money Matter" A Comparison of the Effect of Income on Child Development in the United States and Great Britain. Journal of Human Resources 37 (2), 416–440.

Aughinbaugh, Alison, Gittleman, Maury, 2004. Maternal Employment and Adolescent Risky Behavior. Journal of Health
Economics 23 (4), 815–838.

Baker, Paula C., Keck, Canada K., Mott, Frank L., Quinlan, Stephen V., 1993. NLSY Child Handbook, 1986–1990. Center for Human Resource Research, Columbus, OH.

Barglow, Peter, Contreras, Josefina, Kavesh, Laura, Vaughn, Brian E., 1998. Developmental Follow-up of 6–7 Year Old
Children of Mothers Employed During Their Infancies. Child Psychiatry and Human Development 29 (1), 3–20.
Baum, Charles L., 2003. Does Early Maternal Employment Harm Child Development? An Analysis of the Potential
Benefits of Leave Taking. Journal of Labor Economics 21 (2), 409–448.
Baydar, Nazli, Brooks-Gunn, Jeanne, 1991. Effects of Maternal Employment and Child-Care Arrangements on Preschoolers' Cognitive and Behavioral Outcomes: Evidence from the Children of the National Longitudinal Survey of Youth. Developmental Psychology 27 (6), 932–945.
Behrman, Jere R., Pollack, Robert A., Taubman, Paul, 1982. Parental Preferences and Provision for Progeny. Journal of
Political Economy 90 (1), 52–73.
Belsky, Jay, 1988. The 'Effects' of Infant Day Care Reconsidered. Early Childhood Research Quarterly 3, 235–272.
Belsky, Jay, Eggebeen, David, 1991. Early and Extensive Maternal Employment and Young Children's Socioemotional
Development. Journal of Family and Marriage 53, 1083–1110 (November).
Bianchi, Suzanne, 2000. Maternal Employment and Time With Children: Dramatic Change or Surprising Continuity.
Demography 37 (4), 401–414.
Bianchi, Suzanne, Cohen, Philip N., Raley, Sara, Nomaguchi, Kei, 2004. Inequality in Parental Investments in Child- Rearing: Expenditures, Time, and Health. In: Neckerman, Kathryn M. (Ed.), Social Inequality. Russell Sage
Foundation, New York, pp. 189–219.
Blau, Francine B., Grossberg, Adam J.,1992. Maternal Labor Supply and Children's Cognitive Development. The Review
of Economics and Statistics 74 (3), 474–481.
Bogenschneider, Karen, Steinberg, Laurence, 1994. Maternal Employment and Adolscents' Academic Achievement: A
Developmental Analysis. Sociology of Education 67 (1), 60–77.
Brooks-Gunn, Jeanne, Han, Wen-Jui, Waldfogel, Jane, 2002. Maternal Employment and Child Cognitive Outcomes in the
First Three Years of Life: The NICHD Study of Early Child Care. Child Development 73 (4), 1052–1072.
Bruer, John T., 1999. The Myth of the First Three Years: A New Understanding of Early Brain Development and Lifelong
Learning. The Free Press, New York.
Center for Human Resource Research, 2001. NLSY79: Users Guide: A Guide to the 1979–2000 National Longitudinal Survey of Youth Data. Center for Human Resource Research, Ohio State University, Columbus, OH.
Center for Human Resource Research, 2002. NLSY79: Child and Young Adult Data Users Guide: A Guide to the 1986– 2000 Child Data, 1994–2000 Young Adult Data. Center for Human Resource Research, Ohio State University, Columbus, OH.

Coleman, James S.,1988. Social Capital and the Creation ofHuman Capital. American Journal of Sociology 94, s95–s120. Currie, Janet, Thomas, Duncan, 2001. Early Test Scores, School Quality and SES: Longrun Effects on Wages and
Employment Outcomes. Research In Labor Economics (Worker Wellbeing in a Changing Labor Market) 103–132. Desai, Sonalde, Chase-Lansdale, P. Lindsay, Michael, Robert T., 1989. Mother or Market? Effects of Maternal
Employment on the Intellectual Ability of 4-Year Old Children. Demography 26 (4), 545–561 (November). Ebbeling, Cara B., Pawlak, Dorota B., Ludwig, David S., 2002. Childhood Obesity: Public-Health Crisis, Common Sense
Cure. The Lancet 360 (9331), 473–482 (August 10).
Ermisch, John Marco Farncesconi. 2001. “The Effects of Parents' Employment on Children's Educational Attainment”,
mimeo, June, University of Essex.
Gennetian, Lisa A., Duncan, Greg J., Know, Virginia W., Vargas, Wanda G., Clark-Kauffman, Elizabeth, London, Andrew S., 2002. How Welfare and Work Policies for Parents Affect Adolescents: A Synthesis of Research. Manpower Demonstration Research Corporation, New York.
Gordon-Larsen, Penny, Adair, Linda S., Popkin, Barry M., 2003. The Relationship of Ethnicity, Socioeconomic Factors,
and Overweight in U.S. Adolescents. Obesity Research 11 (1), 121–129.
Gottfried, Adele E., Gottfried, Allen W., 1994. Role of Maternal and Dual-Earner Employment Status in Children's Development. In: Gottfried, Adele E., Gottfried, Allen W. (Eds.), Redefining Families: Implications for Children's
Development. Plenum Press, New York, pp. 55–97.
Greenstein, Theodore N., 1995. Are the “Most Disadvantaged” Children Truly Disadvantaged by Early Maternal Employment? Journal of Family Issues 16 (2), 149–169 (March).
Han, Wen-Jui, Waldfogel, Jane, Brooks-Gunn, Jeanne, 2001. The Effects of Early Maternal Employment on Later Cognitive and Behavioral Outcomes. Journal of Family and Marriage 63, 336–354 (February).
Harvey, Elizabeth, 1999. Short-Term and Long-Term Effects of Early Parental Employment on Children of the National
Longitudinal Survey of Youth. Developmental Psychology 35 (2), 445–459.
Haveman, Robert, Wolfe, Barbara, 1995. The Determinants of Children's Attainment: A Review of Methods and Findings.
Journal of Economic Literature 33 (4), 1829–1878.
Heckman, James J., 2000. Policies to Foster Human Capital. Research In Economics 54 (1), 3–56 (March).
Hill, Jennifer L., Waldfogel, Jane, Brooks-Gunn, Jeanne, Han, Wenjui, 2005. Maternal Employment and Child
Development: A Fresh Look Using Newer Methods. Developmental Psychology 41 (6), 833–850.
Hillman, Stephen B., Sawilowky, Shlomo S., 1991. Maternal Employment and Early Adolescent Substance Use.
Adolescence 26 (104), 829–837.
Hoffman, L.W., 1980. The Effects of Maternal Employment on the Academic Studies and Performance of School-Age Children. School Psychology Review 9, 319–335.

Ichino, Andrea, Sanz de Galdeano, Anna, 2005. Reconciling Motherhood and Work: Evidence from Time-Use Data in Three Countries. In: Hammermesh, Daniel S., Pfann, Gerard A. (Eds.), The Economics of Time Use. Elsevier B. V.,
Amsterdam, pp. 263–288.
James-Burdumy, Suzanne, 2005. The Effect of Maternal Labor Force Participation on Child Development. Journal of
Labor Economics 23 (1), 177–211.
Kuczmarski, Robert J., Ogden, Cynthia L., Grummer-Strawn, Laurence M., et al., 2000. CDC Growth Charts: United
States. Advance Data from Vital and Health Statistics, no. 314. National Center for Health Statistics, Hyattsville, MD. Leibowitz, Arleen, 1977. Parental Inputs and Children's Achievement. Journal of Human Resources 12 (2), 242–251. Lopoo, Leonard M., 2004. The Effect of Maternal Employment on Teenage Childbearing. Journal of Population
Economics 17 (4), 681–702.
Menaghan, Elizabeth, Mott, Frank, Cooksey, Elizabeth, Jekielek, Susan, 2000. Work and Family Patterns: Effects Across
Generations. Journal of Socio-Economics 29 (6), 587–590.
Moore, Kristin A., Driscoll, Anne K., 1997. Low-Wage Maternal Employment and Outcomes for Children: A Study. The
Future of Children 7 (1), 122–127 (Spring).
Mott, Frank L., 1991. Developmental Effects of Infant Care: The Mediating Role of Gender and Health. Journal of Social
Issues 47 (2), 139–158.
Mott, Frank L., 2004. The Utility of the HOME-SF Scale for Child Development Research in a Large National Longitudinal Survey: The National Longitudinal Survey of Youth 1979 Cohort. Parenting Science and Practice 4
(2–3), 259–270 (April and September).
Muller, Chandra, 1995. Maternal Employment, Parental Involvement, and Mathematics Achievement Among
Adolescents. Journal of Marriage and Family 57, 85–100 (February).
Must, A., Strauss, R.S., 1999. Risks and Consequences of Childhood and Adolescent Obesity. International Journal of
Obesity 23 (Supplement 2), S2–S11.
Neidell, Matthew J. 2000. “Early Parental Time Investments in Children's Human Capital Development: Effects of Time
in the First Year on Cognitive and Non-cognitive Outcomes”, mimeo, University of California at Los Angeles, August.
Parcel, Toby L., Menaghan, Elizabeth G., 1994. Early Parental Work, Family Social Capital, and Early Childhood
Outcomes. American Journal of Sociology 99 (4), 972–1009 (January).
Paulson, Sharon E., 1996. Maternal Employment and Adolescent Achievement Revisited: An Ecological Perspective.
Family Relations 45 (2), 201–208.
Powers, Elizabeth T., 2003. Children's Health and Maternal Work Activity: Definitions under Alternative Disability
Definitions. Journal of Human Resources 38 (3), 522–556.

Richards, Maryse H., Duckett, Elena, 1991. Maternal Employment and Adolescents. In: Lerner, Jacqueline V., Galambos, Nancy L. (Eds.), Employed Mothers and Their Children. Garland Publishing, Inc., New York, pp. 85–130. Richards, Maryse H., Duckett, Elena, 1994. The Relationship of Maternal Employment to Early Adolescent Experience
With and Without Parents. Child Development 65, 225–236.
Rosenbaum, Dan T., Ruhm, Christopher J., 2007. "Family Expenditures on Child Care". B.E. Journals in Economic Analysis and Policy 7 (1), Topics, Article 34, 1–30.
Rosenzweig, Mark R., Schultz, T. Paul, 1983. Estimating A Household Production Function: Heterogeneity, the Demand for Health Inputs, and Their Effects on Birth Weight. Journal of Political Economy 91 (5), 723–746 (October).
Ruhm, Christopher J., 2004. Parental Employment and Child Cognitive Development. Journal of Human Resources 39
(1), 155–192 (Winter).
Sandberg, John F., Hofferth, Sandra L., 2001. Changes in Children's Time With Parents: United States, 1981–1997.
Demography 38 (3), 423–436 (August).
Shea, John, 2000. Does Parents' Money Matter? Journal of Public Economics 77 (2), 155–184.
Shore, Rima, 1997. Rethinking the Brain: New Insights Into Early Development. Families and Work Institute, New York. Stafford, Frank P., 1987. Women's Work, Sibling Competition, and Children's School Performance. American Economic
Review 77 (5), 972–980 (December).
U.S. Bureau of the Census, 2006. Living Arrangements of Children Under 18 Years Old: 1960 to Present. http://www. census.gov/population/socdemo/hh-fam/ch1.pdf2006accessed from.
U.S. Department of Labor, Bureau of Labor Statistics, 2006. Women in the Labor Force: A Databook. Report, vol. 996. accessed from: http://www.bls.gov/cps/wlf-databook-2006.pdf.
Vandell, Dobrah L., Ramanan, Janaki, 1992. Effects of Early and Recent Maternal Employment on Children from Low-
Income Families. Child Development 63 (4), 938–949 (August).
Vander Ven, Thomas M., Cullen, Francis T., Carrozza, Mark A., Wright, John Paul, 2001. Home Alone: The Impact of
Maternal Employment on Delinquency. Social Problems 48 (2), 236-257.
Verripoulou, George, Heather, Joshi, 2005. Does Mothers' Employment Conflict with Child Development? Multilevel Analysis of British Mothers Born in 1958, mimeo. University of London.
Waldfogel, Jane, Han, Wenjui, Brooks-Gunn, Jeanne, 2002. The Effects of Early Maternal Employment on Child
Cognitive Development. Demography 39 (2), 369-392.
Wolfer, Loreen T., Moen, Phyllis, 1996. Staying in School: Maternal Employment and the Timing of Black and White
Daughters' School Exit. Journal of Family Issues 17 (4), 540-560.
Zhang, Qi, Wang, Youfa, 2004. Socioeconomic Inequality of Obesity in the United States: Do Gender, Age, and Ethnicity
Matter? Social Science and Medicine 58 (6), 1171-1180.
Zick, Cathleen D., Bryant, W. Keith, 1996. A New Look at Parents' Time Spent in Child Care: Primary and Secondary Time Use. Social Science Research 25 (3), 260-280.