Parental employment, family routines and childhood obesity

Patricia M. Anderson

* Dartmouth College, United States  
NBER, United States

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A B S T R A C T

Using the Early Childhood Longitudinal Survey-Kindergarten Class of 1998–1999 (ECLS-K) data from kindergarten through eighth grade, this paper investigates the relationships among maternal employment, family routines and obesity. More hours worked by the mother tend to be negatively related to positive routines like eating meals as a family or at regular times, or having family rules about hours of television watched. Many of these same routines are significantly related to the probability of being obese, implying that family routines may be a mechanism by which maternal employment intensity affects children's obesity. However, inclusion of family routines in the obesity regression does not appreciably change the estimated effect of maternal employment hours. Thus, the commonly estimated deleterious effect of maternal employment on children's obesity cannot be explained by family routines, leaving the exact mechanisms an open question for further exploration.

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1. Introduction

A growing body of research has focused on the relationship between parental employment patterns and childhood obesity. There are many reasons why an increase in parental employment intensity might increase child obesity. For example, dual career families typically have to make more use of child care. Even for school-aged children, it is typical for families to use before or after-school care (or both). This use of non-parental care may impact family routines in multiple ways, depending on the stability of the care arrangements. When these arrangements are not stable, it may be especially difficult to maintain family routines around meal times and bedtimes, and to ensure regular periods of active play. Even with stable care arrangements, the time constraints inherent in dual-career families may make it difficult to maintain routines, and may also result in more reliance on conveniences such as fast food.

In this paper I use data from the Early Childhood Longitudinal Survey-Kindergarten Class of 1998–1999 (ECLS-K) to investigate the relationship between parental employment patterns, family routines, and childhood obesity. While I show that mother's hours worked and type of child care both seem to be significantly related to some family routines, and (as has been seen in the literature) more hours worked per week by the mother is significantly positively related to a child's risk of obesity, the relationship between employment and weight is robust to controlling for family routines and the type of child care. Interestingly, there are also some significant relationships between family routines and child weight that are robust to controlling for maternal employment hours. Neither maternal employment nor family routines appear to have a causal relationship with the diet and activity behaviors available in the data, though. In the next section I review some of the past literature on parental employment, family routines and obesity, followed by a description of the data and empirical approach used, before discussing my main results. I conclude with some thoughts on future research directions.
2. Background

There is a large and growing literature on the effect of parental employment on children’s obesity. Anderson et al. (2003) focus on the intensity of a mother’s work over the lifetime of the child, finding an arguably causal relationship on the probability that a child is overweight.1 While they hypothesize that the mechanism for this effect may be related to the time constraints imposed by working more hours per week, the focus is purely on estimating the size of the reduced form effect of hours on the probability of being overweight. A range of follow-up studies using different samples of U.S. children have generally found similar results, with no evidence of a role for paternal employment (e.g., Aranéo, 2008; Courtemanche, 2009; Fertig et al., 2009; Liu et al., 2005; Ruhm, 2008). While not focusing on employment, per se, Morrissey et al. (2011) and Miller and Han (2008) both find weight increases with nonstandard work schedules. Note that such schedules may be related to a lack of family routines or to instability in child care.

In a study focusing on single mothers of kindergarteners, Herbst and Tekin (2011) find that the positive effect of an indicator variable for maternal employment is no longer significant when they include type of child care used in the year before starting school.2 Instead, higher weights are limited to kindergartners who were previously in center-based care (especially) and those cared for by relatives. It is possible that being in these types of care are better proxies for a higher intensity of work than the simple employment indicator variable. However, using the same data, but not limiting themselves to single mothers, Maher et al. (2007) find that it is family, friend and neighbor care that is significantly positively related to overweight (although for Latino children nonparental care seemed protective of obesity).

While the literature finding an effect of maternal employment on children’s obesity has become fairly large, somewhat less progress has been made on determining the mechanism behind this effect. Fertig et al. (2009) and Cawley and Liu (2007) are some of the only papers to directly address the question. The former use children’s time diaries from the Child Development Supplement of the Panel Study of Income Dynamics (PSID), while the latter use mother’s time diaries from the 2003–2006 American Time Use Survey (ATUS). Overall, there is some evidence for the role of different eating patterns for the children of employed mothers, but differences in activity levels do not look as promising. For example, Cawley and Liu (2007) find that employed women spend less time cooking, less time eating with their children, and have a higher likelihood of purchasing prepared foods.3 Fertig et al. (2009) find that the impact of maternal employment is reduced when accounting for the number of meals eaten. However, they find only marginal effects of TV watching. Similarly, Morrissey et al. (2011) find no impact of TV watching or physical activity, when measuring activity by step counts, Parker (2007) finds no difference across children by the labor force status of their mothers.4

Closely related to the idea of a relationship between maternal employment and obesity is the relationship between child care and obesity. In fact, one potential pathway for the effect of maternal employment is via what happens in child care versus parental care. Recall that Herbst and Tekin (2011) conclude that compared to parental care, children in center-based care or other non-relative care prior to kindergarten are more likely to be overweight, while an indicator for maternal employment is not significant. Lumeng et al. (2005), however, find no association between extensive center-based pre-school care and overweight in later years. Additionally, they find a decreased probability of overweight (relative to parental care) for limited center-based care. Finally, Pearce et al. (2010) find that it is being in informal child care (mainly grandparents as caregivers) that is associated with a significantly higher probability of being overweight, with no relationship between overweight and formal care. Interestingly, the deleterious effect of informal care was only found for children whose mothers were in a managerial or professional job.

While there is a literature related to family routines and obesity, most papers simply focus on one family routine in particular, rather than more broadly on the role of routines overall. A common focus is on family mealtime.5 For example, Taveras et al. (2005) find that children with a higher frequency of family dinner are less likely to be observed to be overweight in a baseline period, but find no association with the likelihood of becoming overweight over time. Sen (2006), however, finds not only a similar cross-sectional relationship, but also a lower probability of becoming overweight and higher likelihood of not staying overweight, although these relationships only hold for white children. Gable et al. (2007) focus on a broader definition of family meal frequency, adding breakfast and dinner together, and find that eating more family meals in kindergarten and first grade is associated with a lower probability of becoming overweight by 3rd grade.6 Finally, while the focus of Utter et al. (2008) was on children in New Zealand, they conclude that any beneficial effect of family dinner frequency may be driven by such families being more supportive generally of healthful behaviors, since in their study the beneficial effect was only observed in simple regressions, disappearing when controlling for a range of

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1 They focus only on pre-adolescent children age 3–11.
2 These kindergarteners are from the same survey used by this paper, the ECLS-K.
3 Earlier articles not explicitly focused on childhood obesity have also noted that maternal employment is correlated with less meal planning, shopping, and food preparation (e.g., Crepinsek and Burstein, 2004; Ziol-Guest et al., 2006).
4 Note that in addition to looking at employed mother’s food shopping/preparation behaviors, Crepinsek and Burstein (2004) also look at children’s level of vigorous activity and find no relationship with maternal employment.
5 See Rhee (2008) for a more detailed review of the family meals literature, in the context of a broader discussion of the role of parenting styles.
6 They also find a positive association between more hours of TV and becoming overweight, but no relationship for aerobic activities. Note they also use the ECLS-K data that I use here, although with some sample restrictions.
demographic variables. They did not, however, find a relationship between family dinner frequency and access to and consumption of foods high in fat and/or sugar. Thus, it does not appear that family meal routines are simply a reflection of limited snacking.

Another family routine with a significant literature is bedtime, as the impact of sleep on obesity is well-researched. For example, Sekine et al. (2002) find a significant dose–response association between later bedtimes and childhood obesity. Conditional on BMI, Chaput and Tremblay (2007) find that shorter sleep duration is positively related to waist circumference, implying a particular effect on abdominal adiposity, rather than body weight more broadly speaking. Finally, while there is a large literature on the association between children’s television viewing and obesity, the relationship between family routines and rules about television and obesity is unexplored. Of course, to the extent that family rules are such that they reduce television viewing, then we would expect a similar relationship to rules as is found to actual screen time.

Overall, then, there is fairly strong evidence that maternal employment has an effect of childhood obesity, but the mechanisms remain a bit murky. There is disagreement in the literature over the role of child care, but some consensus around the idea that meal routines may be disrupted, as working mothers spend less time planning, shopping for, and preparing meals. Given numerous findings that increased frequency of family meals is beneficial, and if maternal employment reduces this frequency, then one mechanism may be through this family routine. While there is fairly strong evidence for the role of sleep duration and television watching on obesity, it is less clear whether maternal employment is related to television rules and bedtime routines. Again, to the extent that maternal employment affects these family routines, additional mechanisms may be identified. In the next section, I describe the Early Childhood Longitudinal Study Kindergarten Class of 1998–1999 (ECLS-K) data, and how I use it to explore the relationships among maternal employment, family routines and obesity.

3. Data and approach

The ECLS-K is longitudinal survey whose original sample was children beginning kindergarten in the fall of 1998, and at this point has seven waves of data available. After a baseline interview in the fall of 1998, follow-ups occurred in the springs of 1999, 2000, 2002, 2004 and 2007. Thus, for students making typical academic progress, these interviews will take place toward the end of kindergarten, 1st, 3rd, 5th and 8th grades.

In each wave of the ECLS-K there is information on parental employment and child height and weight. For all but the final wave, there is also detailed information on the primary type of child care arrangement used. Child care information is also available for the year prior to kindergarten. Information on family routines is available in each of the spring waves, and includes such things as frequency of eating breakfast as a family, and eating dinner as a family, and whether those meals are served at regular times. In all but the final wave, there is also information on bed times (whether there is one, what time the child usually goes to bed). Also available in each wave is information on family rules about television viewing. In most waves there are also estimates of actual amounts watched, as well as reports of the amount of time spent in physically active pursuits. Finally, for the 2004 and 2007 waves, there is a limited set of questions on the child’s dietary choices, not only in school, but also outside of school. Most notably, there is information on frequency of eating fast food, as well as of eating nutritious foods such as salads, carrots and green vegetables. Tables 1A and 1B present summary statistics for the variables in each of the analysis samples.

The data available in the ECLS-K allow me to first estimate a reduced form relationship between family routines and maternal employment. To do this, I run separate regressions of each routine (e.g., mealtimes, bedtimes, television viewing rules) on employment hours, controlling for demographics and child care type dummies. If maternal employment is not correlated with any family routines, we cannot expect these routines to function as a mechanism for the frequent finding of a positive effect of employment on obesity. To the extent that there is a relationship, though, I can further investigate the role of family routines in childhood obesity. This investigation is two-fold. First, it is important to examine whether these routines appear to have any relationship to actual diet and activity behaviors. Second, similar to Fertig et al. (2009), it is useful to determine whether these routines (and/or behaviors) might be the mechanism by which maternal employment affects childhood obesity. A few key advances are possible here beyond what Fertig et al. (2009) were able to do. For example, the ECLS-K sample is quite a bit larger than that from the PSID, which should improve precision of the estimates. Additionally,

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7 See Taheri (2006) for a summary of studies finding an association between short sleep duration and obesity (leading the author to editorialize that encouraging good sleeping habits might help prevent obesity), and Van Cauter and Knutson (2008) for a review of the scientific basis for the role of sleep in affecting obesity.

8 See Anderson and Butcher (2006) for a discussion about studies on television and obesity, including both observational and experimental approaches.

9 I will be able to investigate these relationships below.

10 A subsample was surveyed in the fall of 1999 (wave 3), but these data are not used here.

11 In the models estimated below, it is assumed that these adolescents have no child care, since they are in 8th grade.

12 As with the child care variable, the models below assume that these adolescents no longer have strict bedtime routines.

13 Neither routines nor activities are asked about in the fall baseline interview, but I assume that the spring 1999 responses about these typical routines are also applicable to this previous fall. Information about TV watching and activities is not available in wave 4.

14 The demographic variables are: dummies for race, gender, living with both biological parents, a set of dummies for highest level of parental education, and continuous variables for child’s age, the mother’s age, and the family’s approximate income.
Table 1A
Summary statistics.

<table>
<thead>
<tr>
<th></th>
<th>(1) Main sample</th>
<th>(2) Sample w/out last wave</th>
<th>(3) Sample w/exercise and TV</th>
<th>(4) Sample w/all behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obese</td>
<td>0.096</td>
<td>0.093</td>
<td>0.110</td>
<td>0.138</td>
</tr>
<tr>
<td></td>
<td>(0.295)</td>
<td>(0.291)</td>
<td>(0.313)</td>
<td>(0.345)</td>
</tr>
<tr>
<td>Mother’s h/wk (10s)</td>
<td>2.640</td>
<td>2.549</td>
<td>2.735</td>
<td>2.919</td>
</tr>
<tr>
<td></td>
<td>(1.921)</td>
<td>(1.945)</td>
<td>(1.881)</td>
<td>(1.807)</td>
</tr>
<tr>
<td># Days/wk have family brkfst</td>
<td>4.231</td>
<td>4.316</td>
<td>4.065</td>
<td>3.568</td>
</tr>
<tr>
<td></td>
<td>(2.477)</td>
<td>(2.474)</td>
<td>(2.477)</td>
<td>(2.427)</td>
</tr>
<tr>
<td># Days/wk have brkfst reg time</td>
<td>5.417</td>
<td>5.471</td>
<td>5.322</td>
<td>5.099</td>
</tr>
<tr>
<td></td>
<td>(1.697)</td>
<td>(1.682)</td>
<td>(1.703)</td>
<td>(1.690)</td>
</tr>
<tr>
<td># Days/wk have family dinner</td>
<td>5.609</td>
<td>5.654</td>
<td>5.542</td>
<td>5.367</td>
</tr>
<tr>
<td></td>
<td>(1.750)</td>
<td>(1.746)</td>
<td>(1.749)</td>
<td>(1.751)</td>
</tr>
<tr>
<td># Days/wk have dinner reg time</td>
<td>5.225</td>
<td>5.281</td>
<td>5.111</td>
<td>4.857</td>
</tr>
<tr>
<td></td>
<td>(1.948)</td>
<td>(1.933)</td>
<td>(1.988)</td>
<td>(2.032)</td>
</tr>
<tr>
<td>Have a regular bedtime?</td>
<td>0.837</td>
<td>0.912</td>
<td>0.787</td>
<td>0.743</td>
</tr>
<tr>
<td></td>
<td>(0.370)</td>
<td>(0.284)</td>
<td>(0.410)</td>
<td>(0.437)</td>
</tr>
<tr>
<td>Go to bed after 10 pm?</td>
<td>0.116</td>
<td>0.126</td>
<td>0.113</td>
<td>0.127</td>
</tr>
<tr>
<td></td>
<td>(0.320)</td>
<td>(0.332)</td>
<td>(0.316)</td>
<td>(0.333)</td>
</tr>
<tr>
<td>Have rules on TV at all?</td>
<td>0.896</td>
<td>0.898</td>
<td>0.897</td>
<td>0.895</td>
</tr>
<tr>
<td></td>
<td>(0.305)</td>
<td>(0.303)</td>
<td>(0.304)</td>
<td>(0.306)</td>
</tr>
<tr>
<td>Have rules on TV hours?</td>
<td>0.466</td>
<td>0.470</td>
<td>0.449</td>
<td>0.379</td>
</tr>
<tr>
<td></td>
<td>(0.499)</td>
<td>(0.499)</td>
<td>(0.497)</td>
<td>(0.485)</td>
</tr>
<tr>
<td># Days/wk with vigorous exercise</td>
<td>4.007</td>
<td>4.077</td>
<td>3.947</td>
<td>3.987</td>
</tr>
<tr>
<td></td>
<td>(2.087)</td>
<td>(1.907)</td>
<td>(1.907)</td>
<td>(1.907)</td>
</tr>
<tr>
<td># Hours/wkday watch television</td>
<td>2.070</td>
<td>2.070</td>
<td>2.234</td>
<td>2.234</td>
</tr>
<tr>
<td></td>
<td>(1.556)</td>
<td>(1.621)</td>
<td>(1.621)</td>
<td>(1.621)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4.074)</td>
<td>(4.074)</td>
</tr>
<tr>
<td># Times/wk drink milk</td>
<td></td>
<td></td>
<td>10.491</td>
<td>(9.200)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(9.200)</td>
<td>(9.200)</td>
</tr>
<tr>
<td># Times/wk eat fast food</td>
<td></td>
<td></td>
<td>2.635</td>
<td>(4.199)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4.199)</td>
<td>(4.199)</td>
</tr>
<tr>
<td># Times/wk eat snacks at school</td>
<td>0.608</td>
<td>0.608</td>
<td>0.608</td>
<td>0.608</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1.297)</td>
<td>(1.297)</td>
</tr>
<tr>
<td>Base period obesity</td>
<td>0.069</td>
<td>0.069</td>
<td>0.070</td>
<td>0.072</td>
</tr>
<tr>
<td></td>
<td>(0.254)</td>
<td>(0.254)</td>
<td>(0.256)</td>
<td>(0.259)</td>
</tr>
<tr>
<td># Observations</td>
<td>58,129</td>
<td>53,336</td>
<td>33,528</td>
<td>9588</td>
</tr>
</tbody>
</table>

the panel nature allows me to control for a baseline obesity measure, since many unobserved variables are likely to be affecting children’s body weight.\(^{15}\) Most importantly, I can investigate the relationship of maternal employment hours on the routines, as well as on behaviors (both unconditionally and conditional on the routines), which allows for a potentially better understanding of the mechanisms. Only after fully examining the relationships among maternal employment, family routines and the available behaviors do I examine the impact that controlling for routines and/or behaviors has on the effect of maternal employment on obesity. In the next section I discuss the results from the explorations described above. It is very important, however, to realize that these really should be thought of as mainly descriptive. Even with the range of available background variables, it would still be unwise to interpret the results as reflecting the causal effect of parental employment on family routines, or as reflecting the causal effect of routines on either behaviors or body weight (even controlling for baseline obesity).\(^{16}\)

4. Main results

4.1. Correlates of family routines

I begin by exploring the correlates of family routines. In particular, it is important to determine if maternal employment patterns and/or child care usage are predictive of any of the family routines. If there is no relationship, family routines cannot be a plausible mechanism that explains the consistent finding in the literature of a more intensive maternal work schedule leading to a higher probability of childhood obesity. To the extent that such a relationship can be found, however, further exploration is warranted. Of secondary interest is the relationship of

\(^{15}\) I do not fully exploit the longitudinal nature of the ECLS-K data though the use of fixed effects. The findings of Anderson et al. (2003) indicate that unobservable heterogeneity is unlikely to severely bias estimates of the effect of maternal employment on children’s obesity.

\(^{16}\) Note that I may sometimes use terms such as “effect” or “impact” or “are more likely to” but these should not be interpreted as my arguing for clearly causal relationships.
basic demographics with family routines. Again, it is possible that some of the frequently found differences across groups may be attributable to differences in family routines across groups. Thus, I regress each of the eight routines on maternal hours, along with the family background variables and the child care type variables.\textsuperscript{17}

Turning to the estimates in Tables 2A and 2B, and looking first at the relationship with employment, we see that the mother working more weekly hours is significantly negatively related with all of the routines except those about bedtime. Thus, we see fewer family meals, fewer meals at regular times, and fewer rules about television watching, but no differences in having a regular bedtime or going to bed after 10 pm. These results are promising for thinking of disruption of family routines by long maternal hours as a mechanism for deleterious effects on child weight outcomes. Recall that the literature has typically found family meals to be protective and more screen time to be harmful.

The child care type variables are at least marginally jointly significantly different from zero in all but column (5). While the coefficients are not presented, the comparison group is those with variable care, and the significant effects are generally related positively with the potentially “good” routines and negatively to the “bad” routine of a late bedtime. Thus, the results are supportive of the idea that unstable child care interferes with establishing positive family routines. There are also some interesting relationships between the family background variables and routines. For example, in columns (1) and (2) we see that families with both biological parents, with higher incomes, with higher education, and who are white appear to have breakfast together and at a regular time more days per week. There is a similar relationship with regular bedtimes and going to bed late in columns (7) and (8).\textsuperscript{18} By contrast, when it comes to having dinner together and at a regular time (i.e., columns (3) and (4)) families with higher

\textsuperscript{17} Columns (5)–(8) are actually marginal effects from probit models on the dichotomous dependent variable, scaled to represent percentage point changes.

\textsuperscript{18} Recall that for regularly going to bed late, a “similar” relationship means a coefficient of the opposite sign as for the presumed beneficial routines.
Table 2A
Correlates of family routines.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td># Days/wk family brkfst</td>
<td>-0.109***</td>
<td>-0.019***</td>
<td>-0.046***</td>
<td>-0.074***</td>
</tr>
<tr>
<td>Black or Hispanic</td>
<td>-0.486***</td>
<td>-0.242**</td>
<td>-0.157***</td>
<td>-0.022</td>
</tr>
<tr>
<td>Asian</td>
<td>-0.090</td>
<td>-0.160**</td>
<td>0.130***</td>
<td>0.335***</td>
</tr>
<tr>
<td>Age</td>
<td>-0.001</td>
<td>-0.080*</td>
<td>-0.015</td>
<td>-0.111***</td>
</tr>
<tr>
<td>Male</td>
<td>0.025</td>
<td>0.048</td>
<td>-0.025</td>
<td>-0.010</td>
</tr>
<tr>
<td>Mother's current age</td>
<td>0.005</td>
<td>0.002</td>
<td>-0.008***</td>
<td>0.001</td>
</tr>
<tr>
<td>Lives w/both bio parents</td>
<td>0.311***</td>
<td>0.110***</td>
<td>-0.042</td>
<td>0.68***</td>
</tr>
<tr>
<td>Income (10ks)</td>
<td>0.029***</td>
<td>0.015***</td>
<td>-0.019***</td>
<td>-0.009**</td>
</tr>
<tr>
<td>Parent HS education only</td>
<td>0.072</td>
<td>0.104*</td>
<td>-0.003</td>
<td>-0.065</td>
</tr>
<tr>
<td>Parent &gt; HS education</td>
<td>0.362***</td>
<td>0.287***</td>
<td>-0.114</td>
<td>-0.199***</td>
</tr>
<tr>
<td>Parent college education only</td>
<td>0.772***</td>
<td>0.425***</td>
<td>-0.201***</td>
<td>-0.146***</td>
</tr>
<tr>
<td>Parent &gt; college education</td>
<td>0.973***</td>
<td>0.308***</td>
<td>-0.128</td>
<td>0.011</td>
</tr>
<tr>
<td>p-Value for test of joint significance of child care variables</td>
<td>0.000</td>
<td>0.003</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Mean of Dep Var</td>
<td>4.231</td>
<td>5.417</td>
<td>5.609</td>
<td>5.225</td>
</tr>
<tr>
<td>(Std Dev)</td>
<td>(2.477)</td>
<td>(1.697)</td>
<td>(1.750)</td>
<td>(1.948)</td>
</tr>
<tr>
<td>Observations</td>
<td>58.129</td>
<td>58.129</td>
<td>58.129</td>
<td>58.129</td>
</tr>
</tbody>
</table>

Notes: Marginal effects from probit models shown for columns (5)–(8), scaled to interpret as percentage points. Child care controlled for with 7 care type dummies. All models also include wave effects. Standard errors are robust to heteroskedasticity and within-school correlation.

* p < 0.1.
** p < 0.05.
*** p < 0.01.

incomes, and with higher education are less likely to do so, and Asians are more likely to. Finally, while more educated parents are more likely to have some rules about television viewing, Asians are less likely to, and only the most educated families are significantly more likely to have rules about hours, white families less likely to have them.

It is interesting to compare the size of the estimated impacts of maternal employment with those of the demographics.\(^{19}\) Even when the relationship with employment is significant, it tends to be relatively small. Thus, in column (1) we see that the effect of going from zero hours work to full time work (40 h) would decrease the number of days the child has family breakfast by about 0.436 days (0.109\(^4\)), which is similar to the difference that comes from being Black or Hispanic, instead of white. Having a parent with more than a college education would increase the number of days with family breakfast by twice that, at 0.973. The significant negative effect of maternal employment on having rules on TV hours in column (6) is negligible compared to the significant demographic effects. Again, going from no work to full time work, the estimate implies a 3.32 percentage point decrease in the probability of having rules on TV hours, while having a parent with more than a college education increases the probability by twice that, at 6.94 percentage points. Being nonwhite has an even larger impact, with a 13.7 percentage point higher probability for Blacks and Hispanics and a 12.9 one for Asians.

4.2. Family routines, maternal employment and real behaviors

The relationships that we saw between family routines and maternal employment in the previous subsection points to the real possibility that higher work intensity by mothers impacts daily routines in a way that results in worse body composition outcomes for children. Of course, body weight is really just a function of calories consumed and calories expended, so unless these routines have a relationship with real behaviors, it will be difficult to label the routines themselves as the mechanisms by which maternal employment effect obesity. That said, it is possible that the routine measures are capturing something unobserved about the child’s environment that impacts body weight (e.g., a family that sets a regular time for breakfast or that sets rules about TV watching is a family that is more attuned to health considerations in all

\(^{19}\) While the results are not shown, the demographic effects are little changed when not including the maternal employment variable.
Table 28
Correlates of family routines.

<table>
<thead>
<tr>
<th></th>
<th>(5) Have rules on TV at all?</th>
<th>(6) Have rules on TV hours?</th>
<th>(7) Have a reg bedtime?</th>
<th>(8) Go to bed after 10 pm?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s h/wk (10s)</td>
<td>-0.253</td>
<td>-0.829</td>
<td>0.021</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.133)</td>
<td>(0.213)</td>
<td>(0.122)</td>
<td>(0.147)</td>
</tr>
<tr>
<td>Black or Hispanic</td>
<td>-0.729</td>
<td>13.701</td>
<td>-4.674</td>
<td>5.335</td>
</tr>
<tr>
<td></td>
<td>(0.564)</td>
<td>(1.044)</td>
<td>(0.469)</td>
<td>(0.584)</td>
</tr>
<tr>
<td>Asian</td>
<td>-3.753</td>
<td>12.912</td>
<td>-5.531</td>
<td>9.818</td>
</tr>
<tr>
<td></td>
<td>(0.913)</td>
<td>(1.597)</td>
<td>(0.747)</td>
<td>(0.893)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.059</td>
<td>-2.244</td>
<td>0.817</td>
<td>0.073</td>
</tr>
<tr>
<td></td>
<td>(0.596)</td>
<td>(1.070)</td>
<td>(0.645)</td>
<td>(0.767)</td>
</tr>
<tr>
<td>Male</td>
<td>0.399</td>
<td>1.373</td>
<td>0.226</td>
<td>0.478</td>
</tr>
<tr>
<td></td>
<td>(0.476)</td>
<td>(0.768)</td>
<td>(0.427)</td>
<td>(0.521)</td>
</tr>
<tr>
<td>Mother’s current age</td>
<td>-0.079</td>
<td>0.256</td>
<td>-0.042</td>
<td>0.129</td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td>(0.062)</td>
<td>(0.030)</td>
<td>(0.038)</td>
</tr>
<tr>
<td>Lives w/both bio parents</td>
<td>0.876</td>
<td>0.856</td>
<td>-0.500</td>
<td>0.887</td>
</tr>
<tr>
<td></td>
<td>(0.510)</td>
<td>(0.837)</td>
<td>(0.480)</td>
<td>(0.575)</td>
</tr>
<tr>
<td>Income (10ks)</td>
<td>0.004</td>
<td>-0.244</td>
<td>0.273</td>
<td>-0.323</td>
</tr>
<tr>
<td></td>
<td>(0.057)</td>
<td>(0.082)</td>
<td>(0.065)</td>
<td>(0.073)</td>
</tr>
<tr>
<td>Parent HS education only</td>
<td>5.015</td>
<td>-1.447</td>
<td>3.156</td>
<td>-3.558</td>
</tr>
<tr>
<td></td>
<td>(0.806)</td>
<td>(1.676)</td>
<td>(0.784)</td>
<td>(0.990)</td>
</tr>
<tr>
<td>Parent &gt; HS education</td>
<td>6.809</td>
<td>-2.435</td>
<td>5.763</td>
<td>-6.733</td>
</tr>
<tr>
<td></td>
<td>(0.803)</td>
<td>(1.631)</td>
<td>(0.750)</td>
<td>(0.969)</td>
</tr>
<tr>
<td>Parent college education only</td>
<td>7.868</td>
<td>1.106</td>
<td>5.757</td>
<td>-7.213</td>
</tr>
<tr>
<td></td>
<td>(0.985)</td>
<td>(1.844)</td>
<td>(0.957)</td>
<td>(1.153)</td>
</tr>
<tr>
<td></td>
<td>(1.021)</td>
<td>(2.067)</td>
<td>(1.056)</td>
<td>(1.295)</td>
</tr>
</tbody>
</table>

p-Value for test of joint significance of child care variables
Mean of Dep Var 0.605 0.124 0.031 0.004
Mean of Dep Var (Std Dev) 0.896 0.466 0.012 0.126
Mean of Dep Var (Std Dev) (0.305) (0.499) (0.284) (0.332)
Observations 58,129 58,129 53,336 53,336

Notes: Marginal effects from probit models shown for columns (5)–(8), scaled to interpret as percentage points. Child care controlled for with 7 care type dummies. All models also include wave effects. Standard errors are robust to heteroskedasticity and within-school correlation.
* p < 0.1.
** p < 0.05.
*** p < 0.01.

Aspects of daily life). In this subsection, I look more closely at the correlates of family routines, maternal employment and diet and activity behaviors. In particular, I start with separate regressions for each of six real behaviors in 3 positive (times per week eating healthy foods like salads, carrots and veggies; weekly glasses of milk drank; times per week getting 20 min of aerobic exercise) and 3 negative (times per week eating fast food; times per week buying snack foods in school; daily weekday hours of television).20

The explanatory variables in these regressions are identical to those that were in the regressions on routines in the previous subsection. I then add the family routines to these behavioral regressions.

Turning to the top panel of Table 3, we see that the only behavior with a significant relationship with maternal hours is the child’s weekly aerobic exercise, and that relationship is positive. Thus, there is no evidence here that the mechanism for the previously found positive role for maternal employment on children’s obesity is through one of these observed real behaviors, since getting more exercise should reduce obesity. One possibility for the positive relationship with exercise may be that participation in organized sports activities is used by working mothers as a form of child care. It is possible to explore this idea a bit further with these data. While I focus on overall physical activity, there are a series of questions about the type of activities the child is engaged in. When I estimate similar models using each individual activity as the dependent variable, one of the few significant relationships with maternal employment is for participation in group sports. This result points to a possibility for future research in this area – perhaps the deleterious employment effect is actually being somewhat offset by this increase in organized activity.

Note that while employment hours are rarely significant, the type-of-child-care dummies are at least marginally jointly significant in all but column (4). When significant, the care variables generally imply that more variable care is related positively to harmful behaviors and negatively to positive behaviors. An exception is buying junk food in schools, where the relationship is negative, albeit only marginally significant. It is worthwhile to point out that the available information on diet and activity behaviors are relatively weak. The diet behaviors are only observed in 5th and 8th grade, are self-reported by the child, and are very coarse measures of nutrition. It is perhaps not especially surprising then, that only the more frequently reported (by a parent) exercise behavior has a significant relationship with maternal employment. Ultimately, it is not entirely clear that I can rule out a role for

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20 Recall that only aerobic exercise and television watching are available before the last two years of the data set.
employment intensity in determining real behaviors by using these data.

The lower panel of Table 3 adds in the family routines. First to note is that there are no real changes to the estimates for maternal employment or the significance of child care. While not shown, there are also no important changes to the effects of family background. The question, however, is whether the routines are related to actual behaviors in the manner suggested above. We see that more frequently having breakfast at a regular time is indeed related positively to the good behaviors of drinking more milk and exercising more, and negatively to the bad behaviors of buying junk food in school and watching more hours of television. More family dinners are also positively related to more exercise and less television and less fast food. Perhaps reflecting what children are doing with their time when staying up late, regularly going to bed after 10 pm goes hand in hand with watching more hours of television. It also has a negative relationship with exercise. The relationships of rules about television with behaviors are a bit more mixed. Having any family rule about television is positively related to milk drinking, but also to consumption of junk food from school, while having rules specifically about hours of television is negatively related to milk drinking, and not surprisingly to actual hours of television watched.

Overall, while there are some interesting relationships revealed in this table, it is difficult to use them to draw any firm conclusions about the mechanisms behind the positive effect of maternal employment on obesity that has been found in the past. The only real behavior with which maternal hours is related is exercise, and in that case the relationship is positive, which should result in leaner children. At the same time, many of the presumably “good” routines are indeed positively related to healthy behaviors and negatively related to unhealthy behaviors. However, with the exception of the relationship between TV watching and rules on TV hours, it seems more likely that the presence of these routines is capturing something unobserved about the family that results in better behaviors, rather than the routines directly effecting behavior.

Despite the fact that routines and maternal employment are significantly related, there is no evidence in Table 3 that controlling for routines has an impact on the relationship between maternal employment and diet and activity behaviors. Recall, however, that these behavior measures are not ideal, so future research may benefit from using better data to further explore this idea. Thus, even without a finding here of a relationship between maternal employment intensity and diet and activity behaviors, it remains possible that including routines and/or behaviors in an obesity model may alter the relationship between maternal employment and obesity. I turn to this possibility in the next subsection.
Table 4
Effect of maternal employment, family routines and behaviors on obesity.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s h/wk (10s)</td>
<td>0.396***</td>
<td>0.236*</td>
<td>0.216***</td>
<td>0.561***</td>
<td>0.663*</td>
<td>0.707***</td>
</tr>
<tr>
<td># Days/wk have family brkfst</td>
<td>-0.129</td>
<td>0.088</td>
<td>-0.317***</td>
<td>0.121</td>
<td>0.009</td>
<td>0.123</td>
</tr>
<tr>
<td># Days/wk have brkfst reg time</td>
<td>-0.317***</td>
<td>-0.102***</td>
<td>-0.317***</td>
<td>0.121</td>
<td>0.109</td>
<td>0.126</td>
</tr>
<tr>
<td># Days/wk have family dinner</td>
<td>0.074</td>
<td>0.129</td>
<td>0.074</td>
<td>0.129</td>
<td>0.009</td>
<td>0.123</td>
</tr>
<tr>
<td># Days/wk have dinner reg time</td>
<td>0.074</td>
<td>0.129</td>
<td>0.074</td>
<td>0.129</td>
<td>0.009</td>
<td>0.123</td>
</tr>
<tr>
<td>Have a regular bedtime?</td>
<td>0.919</td>
<td>-1.486</td>
<td>-1.179</td>
<td>-1.179</td>
<td>0.191</td>
<td>-1.263</td>
</tr>
<tr>
<td>Go to bed after 10 pm?</td>
<td>2.053***</td>
<td>3.631***</td>
<td>2.053***</td>
<td>3.631***</td>
<td>2.053***</td>
<td>3.631***</td>
</tr>
<tr>
<td>Have rules on TV at all?</td>
<td>0.077</td>
<td>-3.570</td>
<td>0.077</td>
<td>-3.570</td>
<td>0.077</td>
<td>-3.570</td>
</tr>
<tr>
<td>Have rules on TV hours?</td>
<td>-0.689</td>
<td>-1.252</td>
<td>-0.689</td>
<td>-1.252</td>
<td>-0.689</td>
<td>-1.252</td>
</tr>
<tr>
<td># Times/wk eat healthy foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Times/wk drink milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Days/wk with vigorous exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Times/wk eat fast food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Times/wk eat snacks at school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Hours/wkday watch television</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographic controls?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Base period obesity?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>p-Value for test of sig of child care variables</td>
<td>0.043</td>
<td>0.696</td>
<td>0.684</td>
<td>0.261</td>
<td>0.279</td>
<td>0.206</td>
</tr>
<tr>
<td>Mean of Dep Var</td>
<td>0.096</td>
<td>0.096</td>
<td>0.096</td>
<td>0.138</td>
<td>0.138</td>
<td>0.138</td>
</tr>
<tr>
<td>(Std Dev)</td>
<td>(0.295)</td>
<td>(0.295)</td>
<td>(0.295)</td>
<td>(0.345)</td>
<td>(0.345)</td>
<td>(0.345)</td>
</tr>
<tr>
<td>Observations</td>
<td>58,129</td>
<td>58,129</td>
<td>58,129</td>
<td>9588</td>
<td>9588</td>
<td>9588</td>
</tr>
</tbody>
</table>

Notes: Marginal effects from probit models shown, scaled to interpret as percentage points. Demographic controls are those from Tables 2A and 2B. Child care controlled for with 7 care type dummies. All models also include wave effects. Standard errors are robust to heteroskedasticity and within-school correlation.

* p < 0.1.
** p < 0.05.
*** p < 0.01.

4.3. Family routines as a mechanism for maternal employment effects on children’s obesity

In order to further investigate whether family routines can be the mechanism by which maternal employment affects obesity, I must first ensure that an employment effect can be found in these data. Thus, I start by recreating past results on the effect of maternal employment intensity on child body weight. I use an indicator for being obese as the measure of body weight, but there are no important differences that arise when using z-scores for body mass index (BMI) instead.21 Table 4 starts with a basic probit model (reporting marginal effects scaled to be interpreted as percentage point changes) estimating the impact of maternal employment hours on the probability of a child being obese, with just demographic and child care controls. The magnitude of the estimate implies that an additional 20 h per week (i.e., moving from part-time to full-time work) would increase the probability of being obese by almost 1 percentage point (0.396^2 = 0.792). It is worth noting that Anderson et al. (2003) used average weekly hours over the child’s life, not just current weekly hours, so it is not too surprising that their estimates are a bit higher, implying about a 1.4 percentage point increase from a 20 h increase in the most similar specification.22

21 I determine whether a child is obese using international cutoff points recommended by the Childhood Obesity Working Group of the International Obesity Taskforce, and base BMI z-scores on the 2000 US CDC Growth Reference. See Vidmar et al. (2004).

22 The Anderson et al. (2003) sample is also slightly more likely to be obese, with a mean rate of 10.6 percent compared to the mean of 9.6 here. Thus, their work implies an increase of 20 h per week over the child’s life increases obesity by 13 percent, while my estimate implies that an increase of 20 h per week this year increases obesity by 8 percent.
Importantly, while they were able to use several econometric techniques to allow for unobserved heterogeneity, they ultimately concluded that such heterogeneity was not leading to any important bias in the maternal employment estimates. Thus, it is not unreasonable to think of the estimate in column (1) as plausibly causal. Nonetheless starting with column (2) and for the rest of the table, I control for baseline obesity to account for unobserved determinants of obesity. Thus, the estimates are best thought of as reflecting the impact on the increase in the probability of being obese.

It is worth noting that while type of child care is significant in column (1), once I control for baseline obesity, child care is never significant. When care is significant, it is generally the case that most care types are protective of obesity relative to unstable care arrangements. Additionally, unlike the findings of Herbst and Tekin (2011) maternal employment is significant even controlling for child care type. While the estimated impacts of the demographics are not shown, they are generally as expected (e.g., children are less likely to be obese if they are white, live in a higher-income household, or have more educated parents). Also worth noting, the estimated effects of demographics are not really sensitive to controlling for maternal employment, family routines or behaviors.

Having demonstrated that there is a positive impact of maternal employment and child care usage on the probability of obesity in these data, I now turn to investigating the role of family routines on obesity. Column (3) includes the set of all eight routine variables. There are two variables relating to each of breakfast, dinner, bedtime, and television watching. As can be seen, employment remains significant, even while controlling for routines, and is of a magnitude very similar to the previous column without the routines. Nonetheless, several of the routines are significant, with estimated effects in the expected direction. Each additional day of eating breakfast at a regular time reduces the probability of obesity by 0.317 percentage points. Thus, going from no days of breakfast at a regular time to having breakfast every day at a regular time would decrease the probability of being obese by over 2 percentage points. However, if a child regularly goes to bed after 10 pm, the probability of being obese would increase by that same 2 percentage points. Having any rules about TV watching has a much smaller effect – reducing the probability of obesity by just 0.689 percentage points – and is only marginally significant.

I next investigate the role of diet and activity behaviors. Recall, however, that all behaviors are only available for the last two waves of data. Thus, I first recreate the model of column (3) using only the subsample with data on all behaviors. The point estimate of the employment effect is quite a bit larger, but more imprecise. Note, however, that the obesity rate is higher for the subsample (given the older age of the children in later waves), so relative to the mean, the increase in the employment effect is not as stark. The coefficient of 0.216 in column (3) implies that a 10 h increase in maternal employment intensity would result in a 2.6 percent increase in obesity, while using the smaller (and older) sample in column (4) implies a 4 percent increase. Interestingly, some of the routines appear more important in this older subsample. In particular, every day having breakfast at a regular time now decreases the probability of being obese by a full percentage point. This is a 7.5 percent decline in obesity at the mean, compared to just a 3.3 percent decline for the larger (and younger) sample in column (3).

Using the smaller subsample and controlling for the behaviors, but not for the routines, does not lessen the effect of maternal employment on obesity: in fact, the point estimate increases slightly. While relatively imprecise (but still marginally significant), column (5) implies that moving from zero hours of work to full-time hours would increase the probability of obesity by 2.65 percentage points (4\*0.663). Recall that the estimate in column (4) implied about a 4 percent increase in obesity for a 10 h increase in maternal employment intensity. When controlling for behaviors instead of routines now implies an almost 5 percent increase. At the same time, while the positive maternal effect is somewhat larger, several of the behaviors are also relatively large and significant. For example, each additional day with vigorous exercise is predicted to reduce the probability of being obese by over 1.5 percentage points, while each daily hour of TV will increase this probability by just over 1 percentage point.

The final column includes both the real behaviors and the routines. First, we see that the estimates for maternal employment and the significant behaviors are fairly similar with and without the routines also included. Similarly, the approximately 1 percentage point decline in the probability of obesity with each extra day of eating breakfast at a regular time remains with the inclusion of the behaviors. However, the once marginally significant effects of going to bed late and having rules about TV are no longer significant (although the point estimates remain fairly similar). While not significant, it is worth mentioning some perverse point estimates of the dietary behaviors. In particular, eating salads, carrots, and other

---

23 While not presented here, the estimated impacts of family routines on obesity when not controlling for maternal hours are essentially the same as those presented here with maternal hours included.

24 Including each routine separately leads to similar conclusions about the relationship between family routines and children's obesity. Additionally, estimating separate regressions does not impact the conclusions about the effect of including routines on the estimated effect of maternal employment. Across the eight behaviors, the point estimate on maternal employment ranges from 0.212 to 0.237, compared to 0.216 in column (2) and 0.236 in column (3).

25 In results not presented, but available upon request, I investigated whether the seemingly more important role for behaviors in the later waves (when the children are older) impacted the interpretation of behaviors as a mechanism by splitting the sample into age 8 and under and above age 8. For the younger group, adding routines changed the effect of a 10 h increase in maternal hours from a 2.3 percent increase to a 2.1 percent increase, while for the older group, the change was from a 2.7 percent increase to a 2.5 percent increase. Thus, the conclusion remains that while routines seem important, they cannot really serve as the mechanism for the maternal employment effect.
vegetables has a positive correlation with the probability of being obese, while eating fast food and buying junk food in school are both negatively correlated. One possibility is that by the older ages when these dietary measures are available, students who feel that they are overweight are actively trying to diet. Thus, we see those who have gained more weight over the years are those who are shunning fast food and junk foods in favor of salads and carrot sticks.

5. Conclusions and directions for further research

While this paper has confirmed the oft-found result that more intensive maternal employment results in a higher probability of child obesity, its success in determining the mechanisms has been much more limited. That said, a range of interesting correlations between maternal employment patterns, family routines and diet and activity behaviors have been presented that may help guide future research. First, it is clear that family routines do vary significantly with maternal employment intensity. Importantly, greater intensity is generally negatively correlated with positive routines, such as regular family meals, regular meal times, and rules about television watching. At the same time, these positive family routines seem to be generally positively correlated with healthy diet and activity behaviors, and negatively correlated with unhealthy ones. It seems unlikely, though, that the routines are having a causal impact on behavior – there is no reason why having breakfast at a regular time each day would cause a child to exercise more frequently, for example. Thus, it may be fruitful for future research to further investigate what is actually behind this correlation between routines and positive behaviors.

Despite the strong correlation between maternal employment and family routines, and between the routines and behaviors, the impact of maternal employment on obesity is not greatly affected when controlling for either. Thus, it does not seem that the presence of poor family routines in the face of high intensity maternal employment is an important mechanism for the employment effect. However, it is worth contemplating the possible role of heterogeneity. Anderson et al. (2003) as well as some of the follow-up studies found that the employment effect was larger for higher socioeconomic status families. While the results are not presented here (but are available upon request), these data also show a larger impact for higher SES families. For example, in a model equivalent to column (2) in Table 4, the estimated coefficient on maternal employment for white families is 0.237, but just 0.113 for nonwhite families. At the same time, when routines are included, there is no real impact on the maternal effect for either family type. Thus, it seems unlikely that routines should in fact be considered a mechanism, but only a mechanism for some types of families. Nonetheless, it may be useful for future research to investigate other types of heterogeneity.

To summarize, then, using the ECLS-K data from kindergarten through eighth grade, I moved beyond the basic exploration of maternal employment and child care to investigate the role of family routines. More hours worked by the mother tend to be negatively related to positive routines, and these relationships are consistent with the relationship between employment and obesity, given that several routines are found to be significantly related to the probability of being obese. However, inclusion of family routines has no appreciable impact on the positive effect of maternal employment hours on obesity. Thus, this investigation into the role of family behaviors, while of interest in its own right, does not appear to help explain the mechanism behind the maternal employment effect on obesity.

Appendix A. Additional key summary statistics

<table>
<thead>
<tr>
<th>By wave</th>
<th># Obs</th>
<th>Obese</th>
<th>Std. Dev</th>
<th>Mom h/wk</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>12,804</td>
<td>0.069</td>
<td>0.254</td>
<td>2.438</td>
<td>1.975</td>
</tr>
<tr>
<td>2</td>
<td>12,612</td>
<td>0.071</td>
<td>0.257</td>
<td>2.441</td>
<td>1.972</td>
</tr>
<tr>
<td>3</td>
<td>11,141</td>
<td>0.086</td>
<td>0.280</td>
<td>2.583</td>
<td>1.956</td>
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<tr>
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References


Pearce, A., Li, L., Abbas, J., Ferguson, B., Graham, H., Law, C., the Millennium Cohort Study Child Health Group, 2010. Is childcare associated with the risk of overweight and obesity in the early years? Findings from the UK Millennium Cohort Study. International Journal of Obesity 34, 1160–1168.


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