

Maternal working hours and the well-being of adolescent children

by

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Abstract

This study investigates how maternal hours of work are related to various indicators of well-being in children aged 11-15, controlling for a wide variety of mother, child and family characteristics. Particularly, I focus on the impact of maternal long hours of work (for mothers in paid employment) on health behaviours (incidence of smoking), and psychological well-being (individual self esteem, life satisfaction, satisfaction with school work, intentions about further education). The analysis uses the sample of mothers, and adolescents in the British Household Panel Survey and the British Youth Panel. I use a panel random effect probit model, allowing for mothers' and children's random effects. Also, various techniques are used to control for potential endogeneity of working hours (including the use of sibling fixed effects estimators) and special attention is paid to maternal preferences over hours of work. Preliminary results suggest that maternal very long hours of work are particularly harmful for children coming from advantaged socio-economic status, especially when the mother is not satisfied with her hours of work, probably because of the negative stress and the difficulty in reconciling work and family life for the mother and because maternal long hours of work reduce the time spent in enriching home environments.

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3.1 Introduction

The aim of this paper is to analyse the relationship between maternal working hours and the well-being of adolescent children. Specifically, I focus on the impact of long hours of work on children's health behaviours (incidence of smoking), and psychological well-being (individual self esteem, life satisfaction, satisfaction with school work, intentions about further education).

Research examining the impact of maternal employment on children has been motivated by the rapid increase of female participation rates and increased shares of children living in female headed or single mother households. Most of the existing literature is focused on the impact of maternal labour supply on young children and generally shows a deleterious effect of maternal labour supply during the child's first year and a less consistent effect of subsequent work. Further, it is not clear whether there are any effects during adolescence and most studies on adolescents do not deal with the problem of heterogeneity of child and family characteristics. Another neglected issue is the role of maternal preferences over hours worked: maternal working hours often are the result of constraints from the labour market, and satisfaction with working times may have a separate or additional effect on the well-being of teen-ager children.

This study addresses both issues. The effect of maternal hours of work on children aged 11-15 is examined using data from the British Youth Panel and the British Household Panel Survey and special attention is devoted to different effects by socio-economic status. Many child's and family's characteristics are used to deal with the problem of unobserved heterogeneity and maternal preferences over hours worked are investigated.

The results show that very long hours of work have a detrimental effect on the well-being of adolescent children and are particularly harmful for children coming from advantaged socio-economic status, perhaps because prolonged maternal absence reduces the time spent in enriching home environments. Labour supply is estimated to have no impact on "disadvantaged" children and even long hours of work are unlikely to harm them. Maternal preferences over hours worked play an important role for mothers working long hours and the most harmful effects for adolescents are found

when mothers work very long hours and would like to decrease their labour supply. One possible interpretation of these results is that the negative effect may also be mediated through low maternal job satisfaction and difficulty to reconcile work and family life.

As with all non-experimental analyses, caution is needed to interpret the causal links of these relationships. Nevertheless, a very rich set of control variables is included and panel data allow taking into account time-invariant and child and family-specific unobserved effects. Some effort has been made to investigate reverse causation (child specific characteristics influencing maternal preferences over hours worked) and changes on maternal preferences over hours worked have been used to investigate unobserved maternal characteristics that can cause correlation between working hours and the well-being of the child. The analysis of different effect between siblings at the same age in different points in time provides an additional sensitivity analysis of the results.

The rest of this paper is organized as follows. Section 2 provides an overview of the existing literature, Section 3 analyses the data and briefly presents well-being indicators. Section 4 discusses the estimation methods and Section 5 presents the main results. Section 6 concludes.

3.2 Overview of existing literature

The relationships between maternal employment and children outcome have received lots of attention in the literature, with a strong focus on cognitive development in early childhood, but it is not clear whether the effects persist during adolescence.

Previous literature on the impact of maternal labour supply in early childhood includes positive effects (Moore and Driscoll, 1997), negative effects (Leibowitz, 1977; Stafford, 1987; Belsky and Eggebeen, 1991) and in most cases results vary with the time of work and the specific group analysed (e.g. Desai et al., 1989; Blau and Grossberg, 1992; Parcel and Menaghan, 1994; Barglow, et al., 1998). More recent literature generally indicates negative consequences of maternal work during the child's first year (see for example Baum, 2003; Ruhm, 2004; Berger et al., 2005; Joshi and Verropoulou 2000)

with a less consistent effect for subsequent work. In reviewing some of the most influential American studies that have examined the effects of early maternal employment on children's early cognitive development, Harvey (1999) underlines that the results of these studies present mixed evidence even if using similar data. This is similar to the results of most of the recent analyses that use British data (see Kiernan 1997; Joshi and Verropoulou 2000, Ermish and Francesconi, 2001).

One of the most relevant contributions to the recent economic literature is Ruhm (2008) who shows that maternal employment has negative consequences on advantaged adolescents' cognitive development and obesity, using data from the NLSY in the US. These results suggest that maternal employment has small average effects but sharply disparate impacts across socio-economic groups. Maternal employment has favourable results for cognitive development of children aged 10-11 from disadvantaged backgrounds but the estimates suggest substantial and uniformly negative consequences of maternal employment for advantaged youths.

The aim of this paper is to contribute in various ways to the strands of literature mentioned above.

First, the impact of maternal long hours of work on the well-being of adolescent children is analysed. This approach is new for at least two reasons: first, most of the existing literature is focused on early childhood outcomes and subsequent effects are usually neglected; further, the small literature on adolescence is limited in terms of the analysed outcomes and generally focuses on cognitive development or obesity. I use a different definition of teen-agers' well-being focusing on healthy behaviours (smoking) and psychological well-being.

Second, results are estimated for two subsamples stratified by socio-economic status, and the role of maternal preferences over hours worked is taken into consideration, in order to understand possible ways through which long hours of work affect the well-being of adolescent children.

Last, the role of maternal preferences over hours of work is separately investigated, in order to understand whether maternal satisfaction with working hours has an impact on the well-being of adolescent children.

A major issue in this analysis is that mothers working long hours may differ from those who do not in ways that are not properly accounted for. Suppose for example that maternal career ambition is likely to affect both maternal decision to work long hours and maternal educational skills, then a very “career-oriented” mum could be more likely to work long hours and to put less effort in her educational role, leading to lower children well-being. If this mechanism is not taken into account in our analysis, the estimates are likely to be biased and it is hard to provide a causality interpretation for our results. This is the reason why some literature in the field suggests that the effects of maternal work on children may entirely depend on the characteristics of mothers and families (see Ruhm 2000 and Brooks-Gunn, et al., 2002 for full review of the literature).

3.3 Data

This paper uses the sample of all children living with mothers in paid employment in the British Youth Panel (BYP). Since 1994, the British Household Panel Survey has contained a section aimed at children 11-16 in each household. The main advantage of this data set is that it may be complemented with information from the main BHPS about the family circumstances. The British Household Panel Survey (BHPS) is a nationally representative sample² of about 5,500 households, recruited in September 1991. The BHPS is an indefinite life panel survey and the longitudinal sample consists of members of original households and their natural descendants.

The BYP is a relatively unexplored data set and contains information directly collected from the child regarding a large set of behavioural, psychological and attitudinal outcomes. I particularly focus on smoking habits and psychological well-being (including self esteem, satisfaction with school work, satisfaction with life as a whole, and intention towards further education).

² Additional samples of 1,500 households in Scotland and another 1,500 in Wales were added to the main sample in 1999, and in 2001 a sample of 2,000 households was added in Northern Ireland, making the panel suitable for UK-wide research. The additional samples are included in this analysis.

The analysed sample contains children born between 1978 and 1995, who were between 11 and 16 years old at the interview date. My sample is limited to children living with their mother at the assessment date. This includes 13,548 observations of children and 4,395 pairs of mother-child, including mothers having more than one child in the survey.

3.3.1 Outcomes

The BYP contains a wide set of outcomes that cover several aspects of adolescents' lives, such as social connections, family relationships, school expectations, health attitudes and self esteem. Research findings on adolescence show contradictory results on the impact of socio-economic factors on children's well-being and a possible explanation for these divergent findings is the difficulty in defining the concept of well-being. Bergman and Scott (2001) conceptualize well-being as a multi-dimensional construct and analyse the impact of various socio-economic conditions on health-risk behaviours and psychological well-being.

Unfortunately, there is no indication about medical conditions or health checks in the BYP, and therefore I decided to concentrate on smoking, as this is one of the most important indicators of health-risk behaviours.

Smoking among adolescents continues to present a major challenge to the public health community and the British governments have put lots of effort in reducing smoking rates among teen-agers. WHO Statistics on Smoking show that among young teens (aged 13 to 15), about one in five smokes worldwide and between 80,000 and 100,000 children worldwide start smoking every day. Evidence shows that around 50% of those who start smoking in adolescent years go on to smoke for 15 to 20 years. Cancer Research UK has shown that trying just one cigarette can make children more likely to start smoking several years later and children who smoke often become regular adult smokers. They also suffer immediate health consequences from smoking, such as coughs, increased phlegm, wheeziness and shortness of breath, and take more time off school. Today, smoking is known to be the single biggest cause of cancer in the world, and accounts for one in four UK cancer deaths.

Psychological well-being has also been analysed and I choose four different indicators of this: self esteem; life satisfaction; satisfaction with school work and intentions toward further education. I decided not to concentrate on cognitive development and test scores, because the stronger impact of maternal employment on these is likely to be observed earlier in the child's life and therefore it would be hard to interpret the results, without having enough information on earlier indicators of child development and without controlling for maternal working hours across the entire child's life.

The wellbeing of children in the UK is currently of major public and Government interest. In 2003, the Government's vision for childhood wellbeing was articulated in Every Child Matters (ECM), a national agenda to build services around the needs of children and young people. The ECM framework identified five outcomes as important for child wellbeing: being healthy; staying safe; enjoying and achieving; making a positive contribution and achieving economic wellbeing. Concern was sharpened in 2007 by a UNICEF 'report card' ranking the UK in the bottom third of developed countries for child wellbeing, although more recent OECD statistics locates the UK about mid-table overall.

A variety of questions regarding the smoking behaviour of the child are asked in the survey. Particularly, the BYP contains information about: whether the child has ever tried a cigarette; how often she/he smokes; and the number of cigarettes smoked in the last week. I define a child as a smoker if she/he has smoked at least one cigarette in the last 7 days or if she/he self-categorises as someone who sometimes smokes but not every week. Whilst there may be obvious concerns about children accurately reporting their smoking behaviour, the children's surveys are designed to be fully confidential, with the questionnaire being completed independently by the child using questions taped on a personal headset rather than answering directly to an interviewer.

The BYP contains a rich set of information about the adolescents' subjective psychological well-being. I construct a continuous measure of self-esteem combining the following items: 'I feel I have a number of good qualities', 'I certainly feel useless at times', 'I am a likeable person', 'I am inclined to feel I am a failure' and 'at times I feel

no good at all' (see Ermish et al. 2001). Individuals can answer to these questions on a scale from 1 to 4, with 1 equal to "strongly agree" and 4 equal to "strongly disagree". The self esteem score is calculated by adding the number of times the child places himself or herself in the fairly negative or highly negative category. This measure goes from 0 to 5, with 5 representing the lowest level of self-esteem. In my analysis, I also use a binary indicator of low self esteem, equal to 1 if the continuous measure of self esteem is greater or equal to 3.

Life satisfaction and satisfaction with school work are measured through the answers to the questions: Can you describe how you feel about your life/school work. Answers are on a scale from 1 to 7, where 1 is completely happy and 7 is completely unhappy. In order to compare results on these indicators with the previous ones, I construct two binary variables equal to 1 for children giving a score greater or equal to 5.

Lastly, at each wave children are asked about their intentions about schooling at the age of 16 and I investigate the relationship between maternal working hours and this attitudes.

3.3.2 Maternal employment

This analysis is based on the sample of children living with mothers in paid employment. In this way, my results are conditional on mothers being employed and I do not compare these children with those having mothers who are self employed or out of the labour force. This means I am not modelling the process of selection into maternal employment. The decision of limiting the sample to mothers in paid employment is driven by the fact that self employed mothers have a greater flexibility in choosing their working hours and I am particularly interested in looking at the impact of potential mismatch between actual and desired labour supply. Therefore the analysis is cleaner if we only look at mothers in paid employment, especially when looking at preferences over hours worked. A few sensitivity analyses have been run including self employed mothers or those outside the labour force and results are similar to the main model.

I distinguish maternal hours of work in 4 groups: less than 15 hours per week, 16-25 hours per week, 26-35 hours per week, more than 35 hours per week. In a few models, I change the definition of the last two groups and distinguish mothers working more than 40 hours per week. Paternal employment is included as a control variable in some specifications of the model, with the same categories of maternal employment, but is never found to have an impact on the well-being of children (and this is consistent with previous findings in the literature, see for example Ruhm, 2009).

In addition, some models control for the interaction between maternal working hours and maternal preferences over hours worked. At each wave, individuals in paid employment are asked: “Thinking about the hours you work, assuming that you would be paid the same amount per hour, would you prefer to: work fewer hours, work more hours, and continue the same amount of hours”. Using the answers to this question, I construct three binary variables that are interacted with the 4 hours groups.

3.3.3 Other explanatory variables

This analysis exploits the extensive information available in the BHPS. Family’s and child’s characteristics included in the main model are: child’s sex, mother’s, father’s and child’s age, mother’s age at birth, maternal and paternal education, maternal occupation, the sector of employment (private/public), and whether the mother is on a temporary contract, household non labour income, region of residence, year of interview, number of children in the household, parents’ smoking status, child’s fear of bullying, hours of television watched during a school day and number of close friends. Appendix Table 1 lists the explanatory variables used in the empirical model. The choice of regressors follows the literature and includes an extensive set of individual’s and family’s characteristics.

3.3.4 Socioeconomic status

Following Ruhm (2008), I evaluate differential effects for advantaged and disadvantaged youths using a multivariate indicator of socioeconomic status,

constructed by regressing total family income on mother’s age at birth, education and marital status. Youths are then ordered by predicted incomes and classified as “advantaged” (“disadvantaged”) if in the upper (lower) half of the distribution. This SES index simultaneously accounts for a larger number of determinants than simple income and removes some sources of endogeneity.

3.3.5 Descriptive statistics

Table 1 presents the distribution of maternal working hours in the estimation sample. More than one woman over four in this sample works more than 35 hours per week and around one in three works part time (16-25 hours per week). Figure 1 presents kernel density estimates for weekly maternal employment, There are spikes at 20 and 40 hours per week, and low rates of labour supply beyond 40 hours a week. Labour supply slightly increases with socioeconomic status. High SES mothers work on average more than 26 hours per week, versus 25 for the low SES group. There are a higher percentage of women working part time (especially 16-25 hours per week; 34% vs. 30%) in disadvantaged families, while the percentage of women working long hours is very similar across the two sub-samples (around 27%).

Table 1 – Distribution of maternal hours of work

| Weekly work hours | Full sample | Advantaged children | Disadvantaged children |
|----------------------------------|-------------|---------------------|------------------------|
| 1-15 | 18.47% | 18.34% | 18.58% |
| 16-25 | 31.90% | 30.43% | 33.78% |
| 26-35 | 22.53% | 23.73% | 21.01% |
| >35 | 27.10% | 27.50% | 26.63% |
| | 100,00% | 100,00% | 100,00% |
| Sample size (n. observations) | 8261 | 4611 | 3650 |

Figure 1 – Weekly maternal hours of work

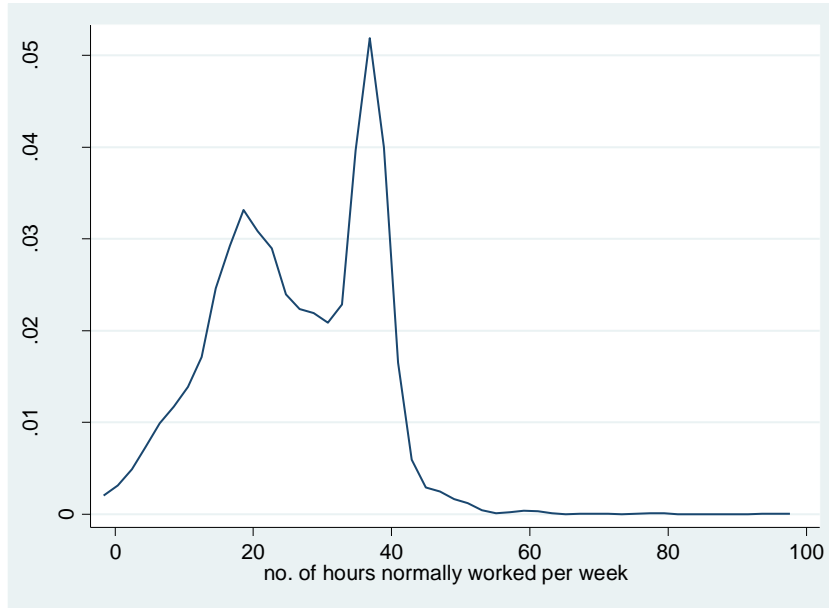


Table 2 presents various mothers' and family's characteristics by maternal weekly working hours. Women working more than 35 hours per week do not look different from the others in terms of age and age at child birth. They more often attended university than those working 1-15 hours (49% vs. 35%), have less children (1.78 vs. 2.21) and are more likely to have a managerial or professional occupation (29% vs. 16%). Their family income is also higher (£ 37,255.68 vs. £ 31,028.35). On the other hand, it is worthwhile noticing that the percentage of women with manual occupation is the highest among those working long hours.

Table 2– Sample means of selected variables by maternal weekly working hours

| | Full sample | Weekly work hours | | | |
|--|-------------|-------------------|----------|----------|----------|
| | | 1-15 | 16-25 | 26-35 | >35 |
| Mother's age | 40 | 40.11 | 40.14 | 40.86 | 40.41 |
| Mother's age at birth | 26.9 | 27.11 | 27 | 27.63 | 27.1 |
| N. children in the household | 2.12 | 2.21 | 2.02 | 1.82 | 1.78 |
| Single mother (%) | 18.05 | 9.78 | 16.69 | 16.87 | 17.42 |
| Mother has attended university or has another high qualification (%) | 36.36 | 34.95 | 38.84 | 47.3 | 48.97 |
| Mother has low or no qualification (%) | 17.98 | 17.85 | 13.57 | 9.58 | 9.24 |
| Mother has a managerial or professional occupation (%) | 33.33 | 16.33 | 22.53 | 35.61 | 49.65 |
| Mother has a manual occupation (%) | 5.36 | 2.05 | 3.05 | 3.14 | 10.8 |
| Family income (average in £) | 30.353.5 | 31.028.3 | 31.381.8 | 34.855.3 | 37.255.6 |

Table 3 presents some selected children's characteristics by maternal weekly working hours. Children whose mothers work more than 35 hours per week are less likely to intend leaving school at 16 than those whose mothers work 1-15 hours per week and their satisfaction with school work is very similar to their peers. Also, doing well at school is very important for a big majority of the children in our sample, regardless of maternal hours of week (around 94%). The highest percentage of children having experienced physical conflicts with peers and being worried of bullying at school is found among those whose mothers work 1-15 hours per week. Children's self esteem and life satisfaction are slightly lower for children whose mothers work long hours and they are more likely to spend time watching television on a school day. Finally, around 12% of the children in this sample smoke and this percentage is slightly higher for girls than for boys (13% vs. 11%). There is a higher percentage of children smoking among those whose mothers work more than 35 hours per week (13.5% vs. 10% in the sample of 1-15 hours) and these children are more likely to have friends using drugs.

These disparities do not necessarily reflect causal effects and may mainly reflect factors other than maternal employment. As showed in table 4, there are sharp socioeconomic differences in all children's characteristics. Children from disadvantaged backgrounds are more likely to smoke, to intend leaving school at 16, to play truant from school, to have fought with someone frequently in the last month, and to worry a lot about

bullying at school. Their life satisfaction, self esteem and satisfaction with school work is only slightly lower than their advantaged peers and they are more likely to spend long hours watching television during a school day.

Table 3 – Children’s characteristics by maternal weekly working hours

| | Full sample | Weekly working hours | | | |
|---|-------------|----------------------|-------|-------|------|
| | | 1-15 | 16-25 | 26-35 | >35 |
| Child is a smoker (%) | 11.7 | 10.3 | 10.6 | 11.5 | 13.5 |
| Child has ever tried a cigarette (%) | 33.4 | 32.8 | 32.17 | 32.9 | 34.9 |
| Child has low self-esteem (%) | 10.3 | 8.3 | 7.9 | 7.9 | 11.5 |
| Child's life satisfaction (1-7) | 2.1 | 2.02 | 2.09 | 2.07 | 2.2 |
| Child intends to leave school at 16 (%) | 13.8 | 12.8 | 10.7 | 10.3 | 11 |
| Child's satisfaction with school work (1-7) | 2.7 | 2.6 | 2.6 | 2.6 | 2.7 |
| A few or most of child's friends use drugs (%) | 23 | 20.2 | 22.2 | 24.8 | 26.4 |
| Child spends >4 hours watching tv in a school day (%) | 24.6 | 24.8 | 23.7 | 25.0 | 26.6 |
| Doing well at school means a lot to child (%) | 93.9 | 93.9 | 94.8 | 95.9 | 94.7 |
| Child played truant from school several times or often (%) | 4.7 | 3.1 | 3.9 | 3.7 | 4.7 |
| Child fought with someone more than 5 times in the last month (%) | 2.7 | 2.7 | 1.8 | 2.2 | 1.8 |
| Child worries a lot about bullying at school (%) | 6.9 | 7.3 | 5.2 | 5.6 | 6.4 |

Table 4 – Children’s characteristics by socioeconomic status

| | Full sample | Advant. children | Disadv. children |
|---|-------------|------------------|------------------|
| Child is a smoker (%) | 11.7 | 9.3 | 14.2 |
| Child has ever tried a cigarette | 33.4 | 28.3 | 38.6 |
| Child has low self esteem (%) | 10.3 | 8.4 | 12.2 |
| Child's life satisfaction (1-7) | 2.1 | 2.1 | 2.2 |
| Child intends to leave school at 16 (%) | 13.8 | 9.3 | 18.5 |
| Child's satisfaction with school work (1-7) | 2.7 | 2.6 | 2.8 |
| A few or most of child's friends use drugs (%) | 23 | 23 | 23 |
| Child spends >4 hours watching tv in a school day (%) | 24.6 | 22.8 | 26.3 |
| Doing well at school means a lot to child (%) | 93.9 | 95.3 | 92.4 |
| Child played truant from school several times or often (%) | 4.7 | 2.7 | 6.8 |
| Child fought with someone more than 5 times in the last month (%) | 2.7 | 1.9 | 3.4 |
| Child worries a lot about bullying at school (%) | 6.9 | 5.3 | 8.5 |

Finally, table 5 shows maternal preferences over hours worked. Around a half of women working long hours would like to decrease their labour supply (and this percentage is higher for advantaged mothers) while only 22% of those working very short hours would like to increase the hours worked. The highest percentage of women who are happy with their current working time is found among those working 16-25 hours per week (75%).

Table 5 – Preferences over hours worked

| Weekly work hours | Preferences (%) | | | |
|---------------------------|-----------------|-----------------|-----------------|--------------------------|
| | Full sample | Work less hours | Work more hours | Happy with current hours |
| 1-15 | | 7.9 | 22.5 | 69.6 |
| 16-25 | | 12.7 | 11.8 | 75.4 |
| 26-35 | | 32.4 | 5.02 | 62.5 |
| >35 | | 51.5 | 1.5 | 46.9 |
| Advantaged mothers | | | | |
| 1-15 | | 8.7 | 21.0 | 70.3 |
| 16-25 | | 12.6 | 9.7 | 77.6 |
| 26-35 | | 34.0 | 4.5 | 61.2 |
| >35 | | 54.2 | 1.2 | 44.6 |

| Disadvantaged mothers | | | |
|------------------------------|------|------|------|
| 1-15 | 6.9 | 24.4 | 68.6 |
| 16-25 | 12.8 | 14.2 | 72.9 |
| 26-35 | 30.2 | 5.4 | 64.3 |
| >35 | 48.1 | 1.9 | 50.1 |

3.4 Estimation method

In this paper panel data methods are used in order to control for person-specific unobserved heterogeneity as well as for the observed heterogeneity captured by the explanatory factors. The underlying assumption is that there is an individual, unobserved, time-invariant component of the well-being of children that can be accounted for by using panel data estimation. To model the relationship between maternal hours of work and the well-being of their teen-agers children, random effect models have been used on an unbalanced sample. Fixed effect logit model and sibling differences have also been estimated as sensitivity analyses of the main results.

I start the estimation with a very simple model, which only incorporates a maternal unobserved effect. This obviously is a very restrictive model, but allows controlling for unobserved maternal characteristics (e.g. mother's personality, and behaviours) that can affect both her hours of work and the well-being of her children.

The main model relaxes this assumption and includes a child unobserved effect. This allows taking into consideration the specific characteristics of the child that may affect her/his health behaviours and her/his psychological well-being.

According to this specification, various indicators of children's well-being can be modelled as follows:

$$C_{it} = \alpha + \beta_t H_{it} + \gamma_t X_{it} + \varepsilon_{it} + c_i \quad (1)$$

where C_{it} is the outcome variable (risk of smoking; or psychological well-being) for child i at age t , H_{it} is a vector of maternal working hours at time t , X_{it} is a vector of other mother's and child's characteristics at time t , c_i is a child's random effect which takes into account intrinsic differences in well-being and unobservable time invariant

individual characteristics. Random effects are assumed to be normally distributed, with mean zero and a constant variance σ_c^2 and to be uncorrelated with ε_i , for all t. ε_{it} is a time and individual specific error term. ε_{it} is assumed to be normally distributed. The variance of the idiosyncratic error term is normalized to be equal to one.

Model (1) does not take into account the fact that individuals operate within society's and labour market's constraints and that mothers are not completely free to choose their hours of work. The analysis of maternal preferences over hours worked is particularly important in this context, as maternal job satisfaction may have a separate or additional effect on the well-being of children. This is the reason why I estimate an additional model that includes the interaction between maternal hours of work and preferences over hours worked. This model can be written as:

$$C_{it} = \alpha + H_{it} P_{it} \beta_{it} + X_{it} \gamma_t + \varepsilon_{it} + c_i \quad (2)$$

where $H_{it} P_{it}$ represents a set of 12 interactions between the 4 hours groups (less than 15 hours per week, 16-25 hours per week, 26-35 hours per week, more than 35 hours per week) and 3 binary variables representing satisfaction with working hours (would like to continue with current hours; would like to work more/fewer hours).

An important issue is the possibility of endogenous maternal working hours and the resulting difficulty in the identification of causal effects. I expect most of the mothers to be more likely to reduce (and not increase) their working hours if they have a problematic child and therefore the estimates are likely to understate (and not overstate) the negative effect of maternal long hours of work.

A second concern with this kind of analyses is that the effect of maternal working hours on children's well-being may be spurious because of the mutual association of hours of work and child outcomes with some unobserved factor. Suppose for example that maternal career ambitions increase hours of work and decrease maternal effort in children's education, then this unobserved characteristics would lead to lower children well-being and greater propensity to smoke. This would lead to overstate the effect of maternal working hours.

It is well-known that random effects estimator rely on the very strong assumption of independence between the unobserved individual characteristics and all the independent variables. In this framework, this means that this model assumes that child's unobserved characteristics (or mother's and child's characteristics) are independent from all the other covariates in the model. This is obviously a very strong assumption and one can easily think to possible violations of it. If this assumption is violated, random effect estimates could be biased. This is the reason why, I provide an additional test of my results, relaxing this assumption and using fixed effects model. On the other hand, fixed effects models only rely on within-person variation and when N is large and T is small, we may get large estimated standard errors and insignificant coefficients (Iwe reduce the bias but we lose efficiency).

Sibling fixed effect models are used to control for time-invariant maternal factors (see for example Ermish and Francesconi, 2001). These models allow controlling for maternal unobserved characteristics that do not vary over time and may affect maternal attitudes toward all children. Specifically, I use this model to compare siblings at the same age in different points in time. For example, the oldest sibling may be a smoker at 15 in 1994 and her younger sibling may not be a smoker at the same age in 1997. I investigate whether this difference in smoking status is in any way related to the change in maternal working hours between 1994 and 1997, controlling for other factors that may have changed over time. By focusing on sibling differences within the household, I implicitly control for household characteristics that do not change over time, like mother's education. For a review of using sibling differences to identify causal effects see Griliches (1979) and for an application of an evaluation of Head Start in the US, see Garces, Thomas and Currie (2002).

Nevertheless, these models are not a panacea: child-specific attributes (uncorrelated with maternal fixed effect) are not held constant and the resulting bias may be larger than in OLS estimates if unobserved differences across children are a key determinant of sibling variations in maternal labour supply. On the other hand, mothers are more likely to reduce their labour supply than to increase it if they have a problematic child and therefore my results are more likely to underestimate the effect than to overestimate

it. In any case, I only use the sibling fixed effect model as a sensitivity analysis of my main results in the analysis of children's smoking.

3.5 Results

The results from the estimation of the impact of maternal hours of work on children's well-being are presented in tables 6-16.

Table 6 summarizes predicted effects of maternal working hours on the probability of child's smoking. Estimation is by pooled and random effect probit model with a child's random effect. In the majority of the presented models, the dependent variable is a binary indicator of child smoking which is equal to 1 if the child has smoked at least one cigarette in the last 7 days or if she/he self-categorises as someone who sometimes smokes but not every week. In a few models, estimation has been done using the number of cigarettes smoked last week as dependent variable. The choice of additional regressors follows the literature and all models control for the assessment year, region of residence, child's and mother's age, child's sex, mother's education, marital and smoking status, number of children in the household, household non labour income.

Additional regressors are detailed at the bottom of the table. Model B includes additional characteristics of the mother's job (occupation, sector and type of contract). Model C also includes additional child's characteristics that give more information about child's social connections, free time and type of school (number of close friends, hours spent watching television during a school day and fear of bullying at school) and some father's characteristics (age, education, and smoking status), for children living in the same household with both parents.

Father's hours of work are not included in the models in table 7 but additional models have been run including these variables and the results do not change significantly (and father's hours of work do not have an effect on children's well-being). Sample size is reduced in specification B and C, as a consequence of the inclusion of additional covariates in the analysis (and more missing values in the new variables). The biggest reduction in specification C is due to the large number of children living with the mother alone.

The impact of maternal work varies with its intensity. Very long hours of work appear to have deleterious impact on adolescent children and the risk of smoking is significantly lower for children whose mother work part-time (less than 15 hours or 16-25 hours per week) with respect to those whose mothers work more than 35 hours per week (omitted group). Mother's part-time working (versus long full time) reduces the risk of child's smoking by around 1.5 to 2 percentage points. In model A, the size of this effect is comparable to the increased risk of child's smoking for girls with respect to boys (around 1.8 p.p) and it is only slightly lower of the increased risk from living in a single mother household versus having married (or cohabiting) parents (around 1.9 p.p).

The size of the effect is a bit lower when random effect are introduced in model A (around 1.1 p.p), but still significantly different from zero. More independent variables are introduced in model B and C and mothers working part-time are still found to have a lower risk of child's smoking than those working full-time. The magnitude of the effects is a bit higher and comparable to the increased risk from low maternal education and single mother status (around 2 p.p in model B with random effects). Model C also includes father's characteristics and, although the sample size is reduced, it is worthwhile noticing that the risk of child's smoking is around 3 p.p lower if the mother works 16-25 hours per week (with respect to more than 35 hours per week) and the size of this effect is similar to the increased risk from paternal smoking (around 3.5 p.p.).

The second panel in table 7 shows results from the estimation of the main model with a different definition of long hours of work. In this case, the omitted group is composed by children whose mothers work more than 40 hours per week. Results are very similar to the main model and confirm that long hours of work are detrimental with respect to part-time work. The reduction of the risk of child's smoking for part-time working mums with respect to those working long hours is almost double than the previous models (between 3 and 4 p.p in model A and around 4 p.p in models B and C with random effects), even if the percentage of mothers working more than 40 hours per week is much lower (around 3%) than the proportion of mothers working more than 35 hours per week (around 27%, see table 2). This is consistent with the idea that the risk

increases quite dramatically with very long hours of work, and this result is stable when more covariates are introduced and with child's random effects.

Small average effects of maternal employment may mask sharp socioeconomic disparities. Following Ruhm (2008), the third and fourth panel in table 7 display results stratified by a multivariate SES index (see paragraph 3.4 for an explanation). Substantial negative impact of long hours of work versus part time work is found for advantaged youths, compared to no impact for children coming from disadvantaged backgrounds.

The risk of children's smoking for part-time working mothers (versus those working long hours) is reduced by around 4-5 p.p. (the size of this effect is twice the effect in the previous model) in advantaged families, while there is virtually no effect for disadvantaged children. Maternal very long hours of work are particularly harmful for children coming from advantaged socio-economic status, perhaps because maternal prolonged absence reduces the time spent in particularly enriching home environments and the maternal ability to discipline the child. Children from disadvantaged backgrounds are not harmed from maternal very long hours of work (even if we must keep in mind that they already have a much higher risk of smoking, due to their socio-economic belonging, as shown in the descriptive statistics section). These results are consistent with the findings of Ruhm (2008) and with several other recent studies (Ruhm, 2004; Loopo, 2004) that provide evidence that high SES children are particularly disadvantaged by maternal employment.

Table 6 – Estimates of the effect of maternal working hours on the child’s smoking status – Pooled probit and Random effects probit model

| | BASE MODEL (A) | | | | (B) | | | | (C) | | | |
|----------------------------------|---------------------------|------------------------|--------------------------|------------------------|---------------------------|-------------------------|---------------------------|-------------------------|---------------------------|--------------------------|---------------------------|-------------------------|
| Hours per week | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | |
| | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE |
| Less than 15 | -0.124 (0.061)* | -0.020 (.11) | -0.126 (0.11) | -0.010 (.01) | -0.205 (0.07)** | -0.035 (.012) | -0.225 (0.12)+ | -0.018 (.01) | -0.333 (0.08)** | -0.052 (.016) | -0.422 (0.14)** | -0.032 (.017) |
| 16-25 | -0.099 (0.05)+ | -0.020 (.09) | -0.147 (0.09)+ | -0.011 (.01) | -0.151 (0.05)** | -0.027 (.011) | -0.232 (0.11)* | -0.018 (.009) | -0.239 (0.07)** | -0.039 (.014) | -0.347 (0.12)** | -0.028 (.015) |
| 26-35 | -0.062 (0.05) | -.011 (.01) | -0.054 (0.09) | -.004 (.01) | -0.083 (0.06) | -.015 (.01) | -.078 (0.098) | -.007 (.009) | -0.151 (0.071)+ | -.026 (.014) | -0.173 (0.121) | -.015 (.012) |
| Sample size | 8261 | | | | 7950 | | | | 5106 | | | |
| Different groups of hours | | | | | | | | | | | | |
| Hours per week | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | |
| | COEFF. | APE | COEFF. | APE | COEFF. | APE | COEFF. | APE | COEFF. | APE | COEFF. | APE |
| Less than 15 | -0.216 (0.11)+ | -0.037 (.02) | -0.329 (0.19)+ | -0.027 (.02) | -0.288 (0.121)* | -0.051 (.023) | -0.433 (0.20)* | -0.037 (.021) | -0.44 (0.15)** | -0.070 (.03) | -0.572 (0.25)* | -0.044 (.03) |
| 16-25 | -0.192 (0.11)+ | -0.033 (.02) | -0.355 (0.19)+ | -0.029 (.02) | -0.237 (0.11)* | -0.042 (.022) | -0.443 (0.19)* | -0.038 (.021) | -0.35 (0.14)* | -0.058 (.027) | -0.501 (0.24)* | -0.040 (.026) |
| 26-40 | -0.127 (0.11) | -.023 (.02) | -0.242 (0.18) | -.021 (.02) | -0.133 (0.11) | -.025 (.02) | -0.267 (0.182) | -.025 (.02) | -0.192 (0.14) | -.035 (.02) | -0.243 (0.22) | -.022 (.02) |
| Sample size | 8261 | | | | 7950 | | | | 5106 | | | |
| Advantaged children | | | | | | | | | | | | |
| Hours per week | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | |
| | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE |
| Less than 15 | -0.283 (0.09)** | -0.042 (.01) | -0.287 (0.14)* | -0.018 (.01) | -0.370 (0.09)** | -0.054 (.017) | -0.441 (0.16)** | -0.029 (.016) | -0.431 (0.11)** | -0.0593 (.021) | -0.533 (0.18)** | -0.038 (.022) |
| 16-25 | -0.215 (0.07)** | -0.033 (.01) | -0.297 (0.12)* | -0.019 (.01) | -0.278 (0.08)** | -0.043 (.015) | -0.418 (0.13)** | -0.028 (.015) | -0.346 (0.01)** | -0.049 (.018) | -0.503 (0.15)** | -0.036 (.020) |
| 26-35 | -0.070 (0.078) | -.012 (.01) | -0.109 (0.122) | -.008 (.01) | -0.078 (0.079) | -.013 (.014) | -0.129 (0.127) | -.011 (.011) | -0.104 (0.094) | -.0170 (.016) | -0.157 (0.144) | -.014 (.014) |
| Sample size | 4611 | | | | 4452 | | | | 3444 | | | |
| Disadvantaged children | | | | | | | | | | | | |
| Hours per week | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | |
| | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE |
| Less than 15 | 0.047 (0.092) | .009 (.02) | 0.138 (0.168) | .013 (.01) | -0.016 (0.101) | -.003 (.020) | 0.108 (0.187) | .0105 (.019) | -0.134 (0.144) | -.024 (.027) | -0.098 (0.277) | -.008 (.025) |
| 16-25 | 0.045 (0.075) | .008 (.01) | 0.072 (0.14) | .006 (.013) | 0.008 (0.08) | .0017 (.016) | 0.05 (0.015) | .0047 (.014) | -0.027 (0.121) | -.005 (.023) | -0.027 (0.239) | -.0025 (.0224) |

| | | | | | | | | | | | | |
|-------------|-------------------|-----------------|------------------|-----------------|-------------------|-----------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| 26-35 | -0.033 (0.083) | -.006 (.016) | 0.038 (0.144) | 0.006 (.013) | -0.063 (0.087) | -.012 (.017) | 0.016 (0.154) | .0015 (.0143) | -0.238 (0.136) | -.0414 (.0263) | -0.197 (0.249) | -.0171 (.0241) |
| Sample size | 3650 | | | | 3498 | | | | 1662 | | | |

Note: Standard errors (in brackets) are robust to correlation across time for the same households.

+ indicates that the underlying coefficient is significant at 10% level, ** at 5% and *** at 1%.

Additional regressors are: mother's occupation, type of contract and employment in private or public sector. (B); all covariates in B plus father's age, education and smoking status, child's number of close friends, hours of television during a school day, and fear of bullying at school (C).

One of the objectives of this paper is to explore the role of maternal preferences over hours worked, distinguishing the degree of maternal satisfaction with working times. This is the reason why I estimate a model in which I interact the binary variables for hours of work <15; 16-25; 26-35; >35 with three binary variables indicating whether the mother is happy with her current working hours, or would like to work more/fewer hours. Results are presented in table 11. Preferences over hours worked seem to be particularly important for women working very long hours. The omitted group is constituted by children whose mothers work more than 35 hours per week and would like to work fewer hours. These children have a significantly higher risk of smoking than those in all the other groups. In the model including children's random effect, the risk of smoking for children whose mothers work part-time (both less than 15 hours per week or 16-26 hours per week) and are happy with current working hours is around 2.5 p.p lower than the omitted group. It is worthwhile noticing that children whose mothers work long hours but are happy with their choice are also less likely to smoke and this difference is around 2 p.p. As we already noticed, results are more noticeable for children from advantaged backgrounds, while disadvantaged children do not seem to be harmed. Further, short hours of work are associated with an increased risk of children's smoking for disadvantaged families, even if the coefficients are not significantly different from zero.

Table 11 - Estimates of the effect of maternal working hours and preferences over hours worked on the child's smoking status – Pooled probit and Random effects probit model

| | BASE MODEL (A) | | | | ADVANTAGED CHILDREN | | | | DISADVANTAGED CHILDREN | | | |
|---------------------|------------------|--------------------|--------------------------------|------------------------------|---------------------|------------------|---------------------------------|--------------------------------|------------------------|------------------|-----------------|------------------|
| Hours per week | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | |
| | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE |
| Less than 15 *More | -.101 (.107) | -.018 (.0194) | -.094 (.176) | -.008 (.01) | -.392 (.168)* | -.0590 (.024) | -.426 (.257)+ | -.0284 (.018) | .183 (.148) | .039 (.034) | .409 (.266) | .046 (.036) |
| Less than 15 *Same | -.244 (.08)** | -.042 (.0143) | -.311 (.137)* | -.024 (.01) | -.350 (.111)** | -.0539 (.018) | -.385 (.184)* | -.026 (.015) | -.101 (.118) | -.019 (.023) | -.111 (.216) | -.009 (.019) |
| Less than 15 *Fewer | -.236 (.194) | -.0410 (-.031) | -.258 (.294) | -.021 (.02) | -.535 (.305)+ | -.074 (.034) | -.588 (.389) | -.035 (.022) | .094 (.261) | .0196 (.056) | .229 (.483) | .023 (.055) |
| 16-25 *More | -.1769 (.111) | -.0316 (-.0.01) | -.321 (.179)+ | -.025 (.01) | -.339 (.175)+ | -.052 (.025) | -.562 (.285)* | -.0344 (.018) | -.004 (.148) | -.0008 (.030) | -.044 (.251) | -.004 (.02) |
| 16-25 *Same | -.202 (.06)** | -.0358 (.0124) | -.297 (.115)* | -.024 (.01) | -.319 (.089)** | -0.050 (.016) | -.424 (.154)** | -.028 (.015) | -.038 (.0986) | -.007 (.019) | -.063 (.182) | -.0056 (.016) |
| 16-25 *Fewer | -.167 (.116) | -.030 (.020) | -.246 (.181) | -.020 (.01) | -.319 (.176)+ | -.0499 (.026) | -.496 (.258)+ | -.0317 (.018) | .0391 (.163) | .008 (.033) | .096 (.275) | .009 (.027) |
| 26-35 *More | .008 (.190) | .0016 (.037) | .178 (.269) | .018 (.03) | .068 (.235) | .0130 (.046) | .333 (.371) | .0352 (.047) | -.006 (.323) | -.001 (.064) | .101 (.406) | .009 (.041) |
| 26-35 *Same | -.166 (.074)* | -.0299 (.013) | -.230 (.122)+ | -.019 (.01) | -.214 (.101)** | -.0355 (.017) | -.391 (.165)* | -.0267 (.015) | -.0778 (.109) | -.0150 (.021) | .014 (.191) | .0013 (.018) |
| 26-35 *Fewer | -.152 (.094)+ | -.027 (.0168) | -.192 (.146) | -.016 (.02) | -.125 (.121) | -.0217 (.021) | -.119 (.187) | -.009 (.015) | -.182 (.143) | -.033 (.026) | -.347 (.244) | -.0267 (.020) |
| >35*More | -.492 (.386) | -.0750 (.045) | -1.07 (.531) | -.054 (.02) | -.415 (.507) | -.0616 (.06) | -.989 (.880) | -.046 (.026) | -.482 (.534) | -.0770 (.067) | -.813 (.686) | -.0485 (.032) |
| >35* Same | -.195 (.07)** | -.034 (.013) | -.271 (.116)* | -.022 (.01) | -.244 (.101)** | -.0398 (.017) | -.320 (.158)* | -.0229 (.013) | -.125 (.108) | -.0238 (.021) | -.195 (.181) | -.0163 (.016) |
| Sample size | 8212 | | | | 4579 | | | | 3633 | | | |

Note: Standard errors (in brackets) are robust to correlation across time for the same households. Hours of work are interacted with binary variables indicating whether the mother is happy with her current working hours (Same), or would like to work more(More)/fewer hours (Fewer). + indicates that the underlying coefficient is significant at 10% level, ** at 5% and *** at 1%. Additional regressors are: mother's occupation, type of contract and employment in private or public sector. (B); Father's age, education and smoking status, child's number of close friends, hours of television during a school day, and fear of bullying at school (C).

One hypothesis in the interpretation of these results is that there are two sources of negative effect on children: one is constituted by maternal absence *per se* and the other one is mediated through maternal stress and difficulties in reconciling family and work life and in coping with very demanding work and family responsibilities. Maternal low satisfaction with hours of work seems to have particularly harmful effects only when it

is associated with long hours of work. Women who are happy with their working times are more likely to have found satisfying solutions for them and their families (eg. substitute care from a relative or professional, sports or other recreational activities for the kids, more support from the partner), while the more detrimental effects are found for those who would like to decrease their labour supply.

There are various reasons why these mothers work long hours even if they would like to work fewer hours: this can be due to family income needs but another possibility is that these women work long hours because of the specific nature of her job or because there is not similar part-time job available. These issues need to be further investigated and possible developments of this analysis involve the use of other indicators of maternal happiness and satisfaction with her work and family life, as well as well as the investigation of reasons for choosing the current job over possible alternatives.

As I mentioned above, one of the major issues in this analysis is the possibility of a selection effect. In other words, there may be some unobserved characteristics in advantaged families that affect both maternal working hours and mother's educational skills and therefore cause a higher risk of smoking for the children. For example, a very career-oriented woman could have poor educational skills and this may increase her labour supply and decrease her children's well-being at the same time: her hours of work are more likely to be long while and her children's well-being is more likely to be low. Results from table 11 seem to show this is not the case, because I find a significant higher risk of smoking for children whose mothers work long hours but are not happy with this.

I explored this issue further and I constructed a model in which I use transition with preferences with working hours from t-1 to t. Mothers are separated in the following groups:

- women switching from less than 35 hours per week to more than 35 hours per week because they wanted to increase their labour supply (in t-1 they declared they would have liked to work more hours)

- women switching from less than 35 hours per week to more than 35 hours per week but they didn't want so (in t-1 they declared they were happy with current hours or would have liked to decrease)
- women who have always worked long hours and:
 - have never been happy with their hours of work
 - have always been happy with their hours of work
 - have changed their preferences between t-1 and t
- women who have never worked more than 35 hours per week

Results from this model are presented in table 12. In this case, the omitted group is constituted by children whose mothers have always worked part-time (between 16 and 25 hours per week). Children whose mothers have always worked long hours and have never been happy with their hours are found to have a significantly higher risk of smoking (around 6 p.p higher than those whose mothers have always worked part-time), as well as those who switched to long hours, even if they wanted so. This coefficient is significant in the pooled probit model only, but the size of the effect is high (around 7 p.p in the random effect specification). This suggests that the insignificance can also be driven by the small size of this group. Results are shown for the base model only, but those from model B and C are very similar and are available on request. I also estimated a similar model, only including transition in working hours between two subsequent periods (and not preferences) and results confirm that children who have been exposed to long maternal working hours for longer periods have a significantly higher risk of smoking than those whose mothers work part-time. Results from this model are not presented for parsimony but are available on request.

Table 12 - Estimates of the effect of maternal working hours and transition in preferences over hours worked on the child's smoking status – Pooled probit and Random effects probit model

| Hours per week | BASE MODEL (A) | | | |
|--|----------------|---------------|-----------|---------|
| | POOLED PROBIT | | RE PROBIT | |
| | COEFF. | APE | COEFF. | APE |
| Transition to >35 hrs per week (wanted in t-1) | .461 | .1110 | .568 | .0721 |
| | (.248)+ | (.070) | (.414) | (.069) |
| Transition to >35 hrs per week (NOT wanted in t-1) | -.124 | -.0245 | -.259 | -.0208 |
| | (.136) | (.024) | (.221) | (.0170) |
| Always worked >35 hrs per week & satisfied in t | .0917 | .0174 | .035 | .003 |
| | (.163) | (.035) | (.243) | (.023) |
| Always worked >35 hrs per week & always satisfied | .0614 | .0112 | -.092 | -.0081 |

| | | | | |
|---|------------------|----------------|-----------------|----------------|
| | (.107) | (.0225) | (.187) | (.0161) |
| Always worked >35 hrs per week & satisfied in t-1 | .0268 | .0041 | -.0275 | -.002 |
| | (.153) | (.0312) | (.240) | (.0218) |
| Always worked >35 hrs per week & never satisfied | .3308 | .0743 | .475 | .0575 |
| | (.0927)** | (.0245) | (.166)** | (.0277) |
| Sample size | 5167 | | | |

Note: Standard errors (in brackets) are robust to correlation across time for the same households. + indicates that the underlying coefficient is significant at 10% level, ** at 5% and *** at 1%.

Another important issue in the analysis of maternal preferences over hours worked is the risk of reverse causality: in other words, these results may be driven from mothers who work long hours and would like to decrease their labour supply because they have a problematic child (who is more likely to smoke). If this is the case, my results are likely to overestimate the impact of maternal hour of work (and low satisfaction with this arrangement) on the well-being of children. There are at least two arguments that lead to think that this is unlikely to be a major issue:

- As I have shown in table 5, almost a half of mothers working more than 35 hours per week would like to work fewer hours and this percentage is even higher for advantaged mothers (more than 54%). It is unlikely that the majority of them wish to reduce their labour supply primarily because they have a problematic child.
- Results from table 12 show that the risk of smoking increases for those children whose mothers increased their labour supply because they wanted to do so. These women are unlikely to have a problematic child, given that they wanted to increase their labour supply in t-1. Results from the estimation of this model show that the risk of child's smoking is significantly higher for this group, even if the mother actually wanted to increase her labour supply. Of course, in order to compare these results with the ones from the main model in table 11, it would be interesting to split those mothers looking both and past and current preferences (in other words, looking at their satisfaction both in t-1 and t). Unfortunately, this would cause an extreme reduction in the size of various groups and it would become very difficult to interpret the results.

Lastly, I provide an additional test of the stability of my results using a sibling differences fixed effect estimator. This eliminates the influence of all unmeasured persistent mother, family and community characteristics that do not differ by siblings

(see Ermish, Francesconi 2001). The main assumption underlying this model is that the effect of maternal working hours on the well-being of children can be identified with sibling differences if maternal working hours do not respond to “idiosyncratic endowments” of children that may also affect their propensity to smoke. This assumption is plausible only if we assume that there are strong constraints on the labour market that make it hard for the mother to switch from full-time to part-time work or vice versa. On the other hand, mothers are more likely to reduce rather than increase their working hours if they have a problematic child, and therefore these estimates represent a lower bound of the possible unbiased estimators.

Children’s endowments include children’s traits and characteristics such as temperament, personality, motivation and innate ability but also differences over time in parental attitudes and behaviours. For example, a parent may develop a strong disease or an alcohol or drug addiction when the second child is a teen-ager and the first one has already left the family to go to university and this may affect maternal labour supply, thereby causing correlation between idiosyncratic endowments and hours of work. Thus, the assumption of such no correlation is quite strong and this model is only used as a sensitivity analysis of the main results.

In practice, I regress differences in smoking status between siblings within a household at the same age in different points of time on differences in maternal working hours. In order to perform this analysis, it is essential to have enough variation in the smoking status across siblings. Unfortunately, this is not the case for the dependent variable I used in the main model (see the definition of smoking child in paragraph 3.1) and therefore I performed this analysis using a different dependent variable, based on the answers to the question: “Have you ever smoked?” .

The dependent variable is equal to the difference in smoking between the younger and the oldest sibling (if there are more than two siblings in the same family, I compare various pairs of closest siblings, i.e. number 1 with number 2 and number 2 with number 3). This variable can therefore be equal to -1 (younger sibling has never smoked, but older sibling has), 0 (either siblings have tried smoking or neither have) and 1 (younger sibling has tried smoking but older sibling has not). There are 2264 observations

of siblings at the same age in this sample and we observe 266 cases (11.7%) in which the younger sibling has never tried smoking whereas the older sibling has, and 328 cases (14.5%) that the younger sibling has smoked whereas the older sibling has not. Other control variables include: differences in age, sex, and number of friends between siblings, and differences in household non labour income and mother's age.

This variable is regressed against changes in maternal hours of work in the same period of time. I construct a set of binary variables indicating whether the mother has worked long hours with neither or both children or whether she has worked long hours (more than 35 per week) with the youngest sibling but not with the oldest or vice versa. The omitted group is constituted by mothers who never worked more than 35 hours per week. If transition from long hours of work to fewer hours decrease children smoking propensity, we would expect negative coefficient for the variable indicating that the mother worked long hours only with the older child. Results from table 13 confirm this hypothesis and show a negative but not significant coefficient for this variable and, more interestingly, an increased risk of smoking for those youngest children whose mothers have always worked very long hours (with both siblings).

These results are consistent with the findings presented in table 12 and seem to indicate an accumulation effect of the negative impact: the first child may somehow be able to cope with maternal long hours of work but the negative effect becomes more pronounced for the youngest children, who are exposed to the most detrimental effect. This is also consistent with the idea of additional difficulties in reconciling long hours of work and family needs when there is more than one child in the household. Lastly, this result is unlikely to be biased because of potential adjustments of maternal labour supply to children's specific characteristics, as this shows that children who are exposed to the higher risk of smoking are those whose mothers have always worked more than 35 hours per week (so they have never changed or adjusted their labour supply). It would be interesting to perform a sibling difference analysis using the interactions between hours and preferences over hours worked, but the limited sample size does not allow this analysis.

Table 13 - Estimates of effect of maternal working hours on the sibling differences in smoking status – Sibling differences fixed effects model

| Hours per week | COEFF. (C) |
|---|-----------------------------------|
| More than 35 (only with youngest child) | .015167 (.03569) |
| More than 35 (only with oldest child) | -.05472 (.0500) |
| More than 35 (both children) | .07093 (.02738)* |
| Sample size | 2265 |

+ indicates that the underlying coefficient is significant at 10% level, ** at 5% and *** at 1%.

Appendix table 2 presents the impact of the other control variables on the risk of children’s smoking in the main model (see table 6). All these results are consistent with previous findings in the literature. The risk of smoking increases steadily with age and girls are more likely to smoke than boys. There is a clear gradient in the effect of mother’s education on their children’s smoking status with children of low educated mothers having a higher probability to smoke, while household non labour income is not relevant. Single and younger mothers are more likely to have a child who is a smoker and the presence of a smoking parent in the household also increases the risk of child’s smoking. There also are clear regional and time effects: the probability of smoking decreased from 1994 to 2004 (and this is consistent with the effect of strong government and media campaign on the risk of smoking) and youths living in Scotland and Wales seem less likely to smoke than their peers living in England. When maternal job’s characteristics are introduced in the model, there are not significant differences between mothers having high skilled and low skilled occupations. In the last specification of the model, I also introduce additional child’s and father’s characteristics. The probability of smoking increases with the number of friends (smoking often is a social phenomenon or the result of peer-imitation, especially for teen agers) and the effect of paternal education and smoking status is similar to the one of mother’s similar characteristics.

The last three tables present results from the estimation of the impact of maternal hours of work on other indicators of the well-being of children. As explained above, I use a multi-dimensional concept of well-being, in order to get a broader view of the potential effects of maternal long hours of work on teen agers children. The estimated models are random effect probit with child’s effects and pooled probit and both a model with hours of work binary variables (1-15; 16-25; 26-35 and more than 35 hours per week) and a model with

interactions between hours of work and maternal preferences have been estimated. The models are also estimated by socio-economic status.

Table 14 presents results from the estimation of the impact of maternal hours of work on children’s psychological well-being. Results show that children whose mothers work very long hours are more exposed to the risk of low psychological well-being than those whose mothers work part-time (especially 16-25 hours per week), even if the size of these effects is smaller than the magnitude of results on smoking propensity. Results are stable when child’s random effects are introduced. The risk of low self-esteem, life satisfaction and satisfaction with school work is around 1.5-2 p.p higher for children whose mothers work more than 35 hours per week than for those whose mothers work part-time.

The analysis of the results by socio-economic status confirms the findings on smoking propensity: maternal work is estimated to have very low or no effect on disadvantaged children but has more deleterious consequences on children from advantaged backgrounds. As shown in the descriptive statistics, children from disadvantaged backgrounds already have a lower psychological well-being and maternal long hours of work are unlikely to leave them worst off.

Table 14 – Estimates of effect of maternal working hours on the child’s psychological well-being – Random effects model and Fixed effects Linear Probability Model

| | Self esteem | | | | Life satisfaction | | | | Satisfaction with school work | | | |
|----------------------------|-------------------|-------------------|-------------------|---------------|--------------------|-----------------|------------------|-----------------|-------------------------------|-----------------|-------------------|-----------------|
| Hours per week | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | |
| | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE |
| Less than 15 | -.211 (.063)** | -.035 (.011) | -.303 (.094)** | -.02 (.01) | -.255 (.0769)** | -.025 (.009) | -.273 (.115)* | -.008 (.005) | -.132 (.0674)* | -.016 (.008) | -.174 (.089)* | -.013 (.007) |
| 16-25 | -.240 (.052)** | .011 (-.04) | .298 (.079)** | -.02 (.01) | -.216 (.0626)** | -.022 (.007) | .246 (.096)* | -.007 (.004) | -.101 (.056)* | -.013 (.007) | -.122 (.0743)+ | -.009 (.006) |
| 26-35 | -.208 (.058)** | .010 (-.035) | -.244 (.084)** | -.02 (.01) | -.258 (.071)** | -.025 (.008) | -.278 (.103)* | -.008 (.004) | -.073 (.0602) | -.009 (.008) | -.0871 (.0788) | -.007 (.006) |
| Sample size | 8132 | | | | 8283 | | | | 8257 | | | |
| Advantaged children | | | | | | | | | | | | |
| | Self esteem | | | | Life satisfaction | | | | Satisfaction with school work | | | |
| Hours per week | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | |
| | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE |
| Less than 15 | -.236 (.086)** | -.0358 (.0144) | -.383 (.136)** | -.02 (.01) | -.354 (.105)** | -.032 (.013) | -.456 (.176)* | -.009 (.007) | -.197 (.0914)* | -.024 (.012) | -.250 (.121)* | -.018 (.010) |

| | | | | | | | | | | | | |
|-------------------------------|--------------------------|--------------------------|--------------------------|----------------------|--------------------------|------------------------|--------------------------|------------------------|--------------------------------------|------------------------|-------------------------|------------------------|
| 16-25 | -.286 (.074)** | -.0420 (.0138) | -.387 (.116)** | -.02 (.01) | -.324 (.088)** | -.030 (.012) | -.442 (.148)** | -.009 (.007) | -.222 (.078)** | -.026 (.011) | -.249 (.102)* | -.018 (.009) |
| 26-35 | -.259 (.079)** | -.0387 (.0139) | -.357 (.121)** | -.02 (.01) | -.378 (.094)** | -.033 (.013) | -.428 (.153)** | -.009 (.007) | -.164 (.082)* | -.020 (.011) | -.183 (.106)+ | -.014 (.009) |
| Sample size | 4534 | | | | 4621 | | | | 4624 | | | |
| Disadvantaged children | | | | | | | | | | | | |
| | Self esteem | | | | Life satisfaction | | | | Satisfaction with school work | | | |
| Hours per week | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | | POOLED PROBIT | | RE PROBIT | |
| | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE | COEF. | APE |
| Less than 15 | -.179 (.092)+ | -.033 (.018) | -.219 (.138) | -.02 (.01) | -.083 (.115) | -.008 (.012) | -.081 (.155) | -.003 (.007) | .051 (.100) | .006 (.013) | -.0801 (.138) | -.006 (.011) |
| 16-25 | -.177 (.075)* | -.033 (.015) | -.202 (.11)+ | -.021 (.014) | -.068 (.091) | -.007 (.010) | -.059 (.129) | -.0029 (.006) | .024 (.082) | .0034 (.0117) | .003 (.113) | .0002 (.0092) |
| 26-35 | -.164 (.086)+ | -.031 (.017) | -.156 (.122) | -.01 (.01) | -.105 (.106) | -.011 (.011) | .121 (.141) | -.005 (.007) | .026 (.089) | .0038 (.013) | .011 (.122) | .0009 (.010) |
| Sample size | 3598 | | | | 3662 | | | | 3633 | | | |

Note: Standard errors (in brackets) are robust to correlation across time for the same households.
+ indicates that the underlying coefficient is significant at 10% level, ** at 5% and *** at 1%.

Caution is needed in interpreting the causal relationship between maternal hours of work and children's psychological well-being but a possible interpretation of these results could be that maternal prolonged absence is detrimental for adolescent children who benefit from psychological support and guidance from the mother and tend to spend more time alone when she is not there. They may have less opportunities of dialogue and interaction with their mother and this may have a negative effect on their psychological stability and life satisfaction. Also, long hours of work may result in increased stress for the mother herself (especially if she is unhappy with these working arrangements) and this may convey negative feelings within the family.

In summary, my results show that there is some disadvantage for children whose mothers work very long hours with respect to children whose mothers work part-time, especially in terms of increased propensity to non-healthy behaviours and low psychological well-being. School satisfaction and intentions towards further education do not seem to be affected. These results are stronger for children coming from advantaged background, while there seem to be no effect in disadvantaged families. Further, long hours of work seem to be particularly detrimental when associated with

low satisfaction with working hours, possibly because of increased stress for the mother or difficulty in reconciling work and family life. A causal interpretation of level and differences estimators rely on very strong assumption and therefore it is safest to interpret all these sets of estimates as suggestive associations, with the sibling difference estimates controlling for more aspects of the family background than the level estimates.

6. Conclusion

This paper investigates the relationship between maternal working hours and the well-being of their adolescent children. The existing literature on this issue is very limited and mostly focused on the impact of maternal employment on very young children. I analyse various indicators of children's well-being and particularly focus on health behaviours (smoking) and psychological well-being.

Data from the British Youth Panel and the British Household Panel Survey is used and the analysis is limited to children living with mother in paid employment. Following Ruhm (2008), I distinguish children on the basis of their socio economic status and separately analyse the effect on youths coming from advantaged and disadvantaged backgrounds.

The results show that very long hours of work have a detrimental effect on the well-being of adolescent children and are particularly harmful for children coming from advantaged socio-economic status, perhaps because prolonged maternal absence reduces the time spent in enriching home environments. Maternal labour supply is estimated to have no impact on "disadvantaged" children.

These results are consistent with Ruhm (2008), showing that maternal labour supply has strong deleterious impact on cognitive development and obesity of high SES adolescents. His results are tested using various sensitivity analyses, including sibling difference fixed effects and the main findings are confirmed. In the last part of his paper, Ruhm tests for various sources of SES disparities, but concludes that it is very hard to fully understand why maternal job holding is particularly detrimental for high

SES youths. A tentative conclusion is that much of the cognitive impact occurs because employment pulls these children out of very productive home environments, which are particularly conducive to learning and cognitive development.

In the discussion of his results, Ruhm uses a HOME score, providing information on observational and parent-reported items assessing emotional support and cognitive stimulation for children through the home environment. The data confirm that home environment varies systematically with SES and heterogeneity in home environments explains a large portion of the SES disparity in maternal employment effects on cognitive development (even if this does not explain results for obesity).

Following Ruhm's approach, I firstly investigated the possibility that particularly deleterious consequences for advantaged children occur because the benefits provided by the mother's earnings are different for these families. When added in the regressions, the coefficients of family or maternal income (either non-labour or labour), were close to zero and those on hours of work were virtually unaffected. Therefore, other factors may be driving these results. Unfortunately, a variable similar to the HOME score does not exist in the BHPS, but it would be interesting to compare various characteristics of family environments, in order to further investigate these mechanisms. Further developments of this paper may use family's characteristics similar to those who constitute the HOME score (e.g. frequency with which the child eats meals with both parents, parental control over child's outings at night, parental involvement in children activities, discipline and rules around the family, relationships and dialogues with both parents), trying to understand if these elements may be driving differences in the effect of maternal hours of work.

In summary, the analysis of SES disparities certainly is of interest and deserves further development, in order to understand the major sources of these effects and to develop potential welfare implications of this analysis. Policy implications of this analysis are also interesting: generally, the attention of policy makers have been focused on the lower part of the income distribution, but this study shows that negative effects of very long hours of work may affect families and children in the upper half of the distribution more noticeably. This certainly shows the need of adequate socio-economic policies,

helping mothers to reconcile work and family life and facilitating increased working time flexibility for women with family responsibilities.

As with all non-experimental analyses, caution is needed to interpret the causal links of these relationships. Nevertheless, a very rich set of control variables is included and panel data allow to control for time-invariant and child and family-specific unobserved effects. Some effort has been made to investigate reverse causation (child specific characteristics influencing maternal preferences over hours worked) as well as possible selection bias, both exploiting changes on maternal preferences over hours worked and analysing different effects between siblings at the same age in different points in time, in order to provide an additional sensitivity analyses of the results.

Appendix

Table 1 – Variable definition

| | |
|---------------------------------|--|
| Degree | 1 if highest academic qualification is a degree or a higher degree (omitted group) |
| HND/A | 1 if highest academic qualification is HND (including teaching qualification, nursing or other higher qualification) or GCE A level (Upper high school graduate) |
| O/CSE | 1 if highest academic qualification is GCE O level or CSE (lower high school graduate) |
| No qualification | 1 if no academic qualification |
| Age | Age in years at 1 st December of current wave |
| Smoker (parent) | 1 if the parents answer yes to the question: Do you smoke cigarettes? |
| Household non labour income | Current household non labour income (in 0,000 £; base year = 2005) |
| Hours of tv during a school day | N. of hours spent watching television during a school day. 3 groups (0-3; 4-6; 7 or more) |
| N. close friends | How many close friends do you have? |
| Fear of bullying | 1 if the answer to the question: How much do you worry about being bullied at school? Is “A lot” or “A bit” |
| Occupations | Binary variables based on the major groups of the Standard Occupation Classification (SOC) ³ : manager & administrators, professional occupations, associate professional & technical occupations, clerical & secretarial occupations, craft & related occupations, personal & protective service occupations, sales occupations, plant & machine operatives, other occupations (not included in the estimation of spouse’s probability of poor mental health) |

³ See BHPS User Guide and *Quarterly Labour Force Survey, March-May 1992: User Guide*, September 1992.

Table 2 – Results from other independent variables in the main model (see table 7)

| | MODEL A PROBIT | MODEL A XTPROBIT | MODEL B PROBIT | MODEL B XTPROBIT | MODEL C PROBIT | MODEL C XTPROBIT |
|---------------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|-------------------------------|
| Age of the child | 0.347981 (0.015)** | 0.553218 (0.026)** | 0.345932 (0.016)** | 0.547494 (0.026)** | 0.355288 (0.021)** | 0.551775 (0.035)** |
| male | -0.117683 (0.039)** | -0.166732 (0.076)* | -0.114960 (0.039)** | -0.161057 (0.077)* | -0.176689 (0.053)** | -0.230170 (0.098)* |
| Mother's age | -0.009098 (0.004)* | -0.010604 (0.008) | -0.007041 (0.004) | -0.007605 (0.008) | -0.013308 (0.007)+ | 0.002188 (0.0136) |
| HH Non lab income | 0.70809 (3.7272) | -3.8503 (6.703) | 1.7164 (3.968) | -2.525 (7.004) | 5.162 (5.354) | 2.531 (8.975) |
| Number of children in household | -0.041589 (0.0264) | -0.058461 (0.047) | -0.035894 (0.028) | -0.042963 (0.048) | -0.052018 (0.035) | -0.039439 (0.061) |
| Mother's education | | | | | | |
| HND- A level | 0.127410 (0.063)* | 0.202425 (0.116)+ | 0.094639 (0.067) | 0.136128 (0.121) | 0.057497 (0.087) | 0.093976 (0.148) |
| CSE | 0.087085 (0.048)+ | 0.084979 (0.090) | 0.049050 (0.053) | 0.015737 (0.096) | 0.023432 (0.069) | -0.013332 (0.119) |
| No qualification | 0.239994 (0.060)** | 0.333569 (0.115)** | 0.166285 (0.069)* | 0.206623 (0.125)+ | 0.102690 (0.092) | 0.100014 (0.164) |
| Mother is a smoker | 0.211672 (0.043)** | 0.300644 (0.078)** | 0.211541 (0.045)** | 0.308064 (0.081)** | 0.084781 (0.063) | 0.116483 (0.112) |
| Single mother | 0.120379 (0.053)* | 0.219085 (0.095)* | 0.114218 (0.055)* | 0.211535 (0.097)* | | |
| Mother's occupation | | | | | | |
| Professional | | | -0.209100 (0.107)+ | -0.315980 (0.174)+ | -0.279458 (0.146)+ | -0.611591 (0.228)** |
| Ass. Prof. | | | -0.043307 (0.096) | -0.049912 (0.151) | -0.044213 (0.123) | -0.136276 (0.192) |
| Clerk | | | -0.078614 (0.086) | -0.027171 (0.137) | -0.119438 (0.111) | -0.165367 (0.173) |
| Craft | | | 0.112608 (0.146) | 0.216758 (0.254) | 0.170716 (0.201) | 0.318775 (0.363) |
| Personal services | | | 0.016910 (0.089) | 0.092750 (0.144) | 0.038582 (0.115) | 0.030523 (0.184) |
| Sales | | | 0.075706 (0.100) | 0.123332 (0.160) | -0.021475 (0.126) | -0.090780 (0.207) |
| Machine operator | | | -0.274351 (0.138)* | -0.194601 (0.226) | -0.484626 (0.181)** | -0.574974 (0.298)+ |
| Other occup. | | | 0.137093 (0.102) | 0.242667 (0.162) | 0.133800 (0.131) | 0.165031 (0.206) |
| Private sector | | | 0.030263 (0.047) | 0.027744 (0.081) | 0.105907 (0.0611)+ | 0.107456 (0.104) |
| Mother temporary job | | | -0.012784 | -0.120797 | 0.116889 | 0.077012 |

| | | | | | | |
|--|----------|----------|-----------|-----------|------------------|------------------|
| | | | (0.082) | (0.141) | (0.105) | (0.183) |
| Father's age | | | | | 0.002564 | -0.011059 |
| Father's education | | | | | (0.005) | (0.0102) |
| HND- A level | | | | | 0.198454 | 0.271117 |
| | | | | | (0.083)* | (0.148)+ |
| CSE | | | | | 0.066493 | 0.091962 |
| | | | | | (0.067) | (0.122) |
| No qualification | | | | | 0.169994 | 0.259741 |
| | | | | | (0.081)* | (0.149)+ |
| Father is a smoker | | | | | 0.237906 | 0.325071 |
| | | | | | (0.061)** | (0.107)** |
| Fear of bullying at school | | | | | 0.105916 | |
| | | | | | (0.072) | |
| N. close friends | | | | | 0.032275 | |
| | | | | | (0.005)** | |
| Tv hours during a school day (0-3) | | | | | 0.074397 | 0.073247 |
| | | | | | (0.079) | (0.121) |
| Tv hours during a school day (>7) | | | | | -0.045648 | -0.078711 |
| | | | | | (0.061) | (0.095) |
| Constant | -5.33 | -8.6374 | -5.290007 | -8.566304 | -5.412 | -8.7122 |
| | (0.23)** | (0.50)** | (0.312)** | (0.533)** | (0.407)** | (0.71)** |
| Observations | 8261 | 8261 | 7950 | 7950 | 5106 | 5106 |
| Number of cross-wave person identifier | | 3010 | | 2827 | | 1962 |

Note: Region and year binary variables are omitted for parsimony. Results are available on request. Standard errors (in brackets) are robust to correlation across time for the same households. + indicates that the underlying coefficient is significant at 10% level, ** at 5% and *** at 1%.

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