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Early Maternal Employment
and Child Development
in Five OECD Countries

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EARLY MATERNAL EMPLOYMENT AND CHILD DEVELOPMENT IN FIVE OECD COUNTRIES

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This paper uses unit record data from Growing Up in Australia, the Longitudinal Study of Australian Children. The study is conducted in partnership between the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA), the Australian Institute of Family Studies (AIFS) and the Australian Bureau of Statistics (ABS). The findings and views reported in this paper are those of the authors and should not be attributed to FaHCSIA, AIFS or the ABS.

The views expressed in this paper are those of the authors and do not necessarily reflect those of the OECD or its member countries.

ABSTRACT

More mothers with young children are in paid work than in the past. There is a long-running debate on possible negative effects of maternal employment on child development. For the first time, this paper presents an initial comparative analysis of longitudinal data on maternal employment patterns after birth on child cognitive and behavioural development. The paper examines data of five OECD countries with different types and intensity of support provided to families to reconcile work and family life. The evidence suggests that a return to paid work by mothers within six months after childbirth may have negative effects on child outcomes, particularly on cognitive development, but the effects are small and not universally observed. Other factors such as family income, parental education and quality of interaction with children have greater influences on child development than early maternal employment per se.

RESUME

Beaucoup plus mères de jeunes enfants exercent aujourd'hui un emploi rémunéré qu'avant. Un débat ancien existe sur les effets potentiellement négatifs du travail maternel sur le développement de l'enfant. Pour la première fois, cet article présente une analyse comparative de données longitudinales concernant la relation de l'emploi maternel après la naissance sur le développement cognitif et comportemental de l'enfant. Le document examine les données des cinq pays de l'OCDE avec des soutiens aux familles pour concilier travail et vie de famille d'intensité et de types différents. Les résultats suggèrent qu'un retour au travail rémunéré par des mères dans les six mois après l'accouchement peut avoir des effets négatifs sur les résultats de l'enfant, notamment sur le développement cognitif, mais les effets sont petits et observés de façon non universelle. D'autres facteurs comme le revenu de la famille, l'éducation des parents et la qualité de l'interaction avec les enfants ont une plus grande influence sur le développement de l'enfant que le travail maternel en soi.

TABLE OF CONTENTS

ABSTRACT	3
INTRODUCTION	6
1. Background	7
What evidence does the literature hold on the influence of early maternal employment and childcare on child development?	7
Family Policies and Outcomes across 5 OECD countries	12
2. A cross-national analysis of longitudinal data	16
Data	16
Measurement of variables	16
Outcome variables	17
‘Focal’ variables	17
Control variables	18
Methods	18
3. Results	20
Patterns of maternal employment and non-parental childcare	20
Early maternal employment and child outcomes	22
Cognitive scores	22
Conduct and attention problems	25
Participation in formal and informal childcare	27
Child outcomes for different population groups	28
Other factors which affect cognitive outcomes	28
Robustness test	29
4. Conclusions	32
ANNEX 1: BACKGROUND INFORMATION ON COHORT STUDIES	39
ANNEX 2: RESULTS BY FAMILY CHARACTERISTICS	51

Tables

Table 1. Key employment and child outcomes, and family policies compared to OECD average	15
Table 2. Associations between maternal employment (early and at time of survey) and cognitive scores	25
Table 3. Associations between maternal employment (early and at time of survey) and conduct problems	26
Table 4. Associations between maternal employment (early and at time of survey) and attention/hyperactivity problems	27
Table 5. Robustness test for maternal employment (early and at time of survey) and cognitive scores	30
Table 6. Robustness test for maternal employment (early and at time of survey) and behavioural problems	31
Table A1.1 Sample sizes by wave of data collection	39
Table A1.2 Sample details by wave of data collection	39

Table A1.3: An overview of cognitive outcome measures	43
Table A1.4: Descriptive statistics - outcome measures.....	46
Table A1.5: Descriptive statistics – ‘Focal’ Variables.....	47
Table A1.6: Descriptive statistics – Child characteristics.....	48
Table A1.7: Descriptive statistics – Mother’s characteristics	49
Table A1.8: Descriptive statistics – Family characteristics.....	50
Table A2.1. Effect of early maternal employment on child development, by family structure	51
Table A2.2. Effect of early maternal employment on child development, by parental education	52

Boxes

Box 1. Birth Cohort Studies	10
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Charts

Chart 1: About half of the mothers in Anglophone countries are in paid work on the first birthday of their child.....	20
Chart 2. British sole mothers are less likely to be in paid work by the time the child is 6-months old	21
Chart 3. Mothers with high levels of educational attainment are more likely to go back to work early...	21
Chart 4: Main childcare provider in first year of life, around early 2000s.....	22
Chart 5: The effect of maternal employment on cognitive development is small, and only negative and statistically significant in the UK and US	24
Chart 6. Other background characteristics play an important role on children’s cognitive outcomes.....	29

INTRODUCTION

1. Today more mothers with young children are in paid work than before. However, the appropriate time to resume (or start) paid work after childbirth continues to be a subject of debate. Early maternal employment may deprive children of continuity in infant care, time and attention; it may impede the development of secure infant bonding as well as the opportunity of extended breastfeeding, all of which are associated with a number of cognitive, emotional and health benefits. On the other hand, maternal employment means more family income, which has positive effects on child development, especially among children of low-income families, and long leave periods may have a negative effect on future maternal earnings profiles. Hence, finding the right timing for mother's return or entry to work after childbirth is not straightforward as it requires balancing different and potentially opposing effects.

2. The effects of early participation in formal care arrangements on child well-being are not straightforward. In general, the effects will depend on the type and quality of care on offer, and on the situation of the specific child and family. Early formal childcare can have a positive effect for children experiencing significant disadvantage whose parents are stressed or have poor parenting skills. But it may have more negative than positive effects for children from more advantaged backgrounds (Ruhm, 2000; Hill *et al.*, 2005; and Gregg *et al.*, 2005) whose parents are able to provide a safe and nurturing environment. Formal childcare facilitates social interactions with other children as well as learning how to socialise and co-operate with others, but early participation involves the risk of being exposed to stressful interactions with peers when children are too young to deal with this. Also, participation in formal childcare increases the risk of early exposure to infectious diseases (see below).

3. The results presented here are a first cross-national study on the relationship between early maternal employment and child development. By using a common framework and comparable data, this relationship is considered cross-nationally. The analysis is based on information about children born around the year 2000, interviewed close to the time of birth and then followed up during early and mid-childhood in five OECD countries: Australia, Canada, Denmark, the United Kingdom and the United States.

4. These countries were selected because they have collected birth cohort longitudinal data with similar methodological characteristics that allow making cross-national comparisons. In addition, as explained below, these countries differ in the types and intensity of support provided to families to reconcile work and family life. For instance, Denmark has a comprehensive model of family support throughout the first years of childhood, while in Australia and the United Kingdom part-time employment is often used as a solution for reconciling work and family commitments. Differences in policies are likely to influence work and family outcomes.

5. The advantage of using large cohort studies is that we are able to control for background variables that could potentially bias estimates of the relationship between parental employment and child outcomes. Moreover, the richness of the information in these cohort studies provides information about the members of the household prior to the birth of the cohort member (socio-demographic characteristics, educational attainment, and employment during pregnancy) which provides a way for controlling for some of the unobserved heterogeneity (see methods section below). In addition, the analysis here uses information on children born around the turn of the millennium, providing an up-to-date view of the

influence of maternal employment on child development. Finally, the large sample sizes facilitate the analysis on how children in different population groups may be differently affected by maternal employment participation decisions.

6. The evidence from this study suggests that a return to paid work by mothers within six months after childbirth may have negative effects on child cognitive and behavioural outcomes, especially if employment is on a full-time basis, but the effects are small and not universally observed. Other factors such as family income, parental education and quality of interaction with children have greater influences on child development than early maternal employment per se.

7. This working paper is in four parts. The next section sets the background of the study by reviewing the literature and comparing the policies and outcomes of the five OECD countries under analysis. Second, the paper presents information on the data, the variables and the methodology used. The third section describes the results, and the final section concludes.

1. Background

What evidence does the literature hold on the influence of early maternal employment and childcare on child development?

8. Studies on the relationship between maternal employment and children's cognitive and behavioural development have found mixed results. Factors that influence the variation in results include the time of return to work, child and family characteristics, and the quality of childcare arrangements. Evidence based on longitudinal data from the United Kingdom and the United States generally suggests that full-time maternal employment during the first year of a child's life is associated with poorer child outcomes, especially poorer cognitive outcomes (Brooks-Gunn *et al.*, 2002; Ermisch and Francesconi, 2000; Gregg *et al.*, 2005; and, Joshi *et al.*, 2009). However, a recent study in the United States suggests that the negative effects are offset by the positive effects of more use of centre-based care, higher quality home environments, and greater maternal sensitivity (Brooks-Gunn *et al.*, 2010). In any case, most studies show that the measured effects on cognitive development are small.

9. In other countries evidence is less extensive as that in the United Kingdom and the United States. Canadian studies have not looked at maternal employment during the first year of child's life. The available evidence on the relationship between maternal employment and child outcomes refers to maternal employment from the first year onwards. Empirical findings on the latter relationship are however inconclusive. Some studies find a positive relationship between maternal employment after the first year and children's behavioural outcomes (Miller *et al.*, 2002 and Nomaguchi, 2006); others find a negative association between mothers' participation in paid work and socio-emotional adjustment (Lefebvre and Merrigan, 1998); and others find no relationship between current maternal employment and children's vocabulary skills (Gagne, 2003; Lefebvre and Merrigan, 1998, and Nomaguchi, 2006).

10. By contrast, empirical findings from Denmark find no support for a negative effect of maternal employment in the first year of the child's life on children's behaviour (Deding *et al.*, 2007). In fact, this research found that the association of early maternal employment, if any, was positive and stronger for boys than for girls.

11. The association between maternal employment and child outcomes varies according to child and family characteristics. Maternal employment may have more negative effects on child outcomes for children of two-parent families, high income or highly educated families (Gregg *et al.*, 2005; Ruhm, 2004; and Leigh and Yamauchi, 2009). By contrast, early employment is not linked to poorer outcomes of

children in sole-parent families (e.g. Han *et al.*, 2001), nor of children from ethnic minorities such as African-Americans (Brooks-Gunn *et al.*, 2010; Berger *et al.*, 2008).

12. Compared with mothers who are not in work (including "on leave") or in part-time employment, early (within 6 months) maternal employment on a full-time basis is negatively associated with breastfeeding rates and duration (Hawkins *et al.*, 2007; Cooklin *et al.*, 2008). In addition, longer periods of breastfeeding are more likely among women whose employers offer family-friendly or flexible work arrangements including part-time work (Hawkins *et al.*, 2007). Breastfeeding has multiple benefits for the healthy development of young children, in terms of nutritional benefits and protection against diseases, also after controlling for environmental factors that could be confounding this association (Quigley *et al.*, 2007; Ladomenou *et al.*, 2010; and, Liesbeth *et al.*, 2010). Breastfeeding is also related with positive maternal health outcomes such as a reduced risk of breast and ovarian cancer, type-two diabetes and maternal postpartum depression (Ip *et al.*, 2007). However, a review of the role of breastfeeding in promoting mother-child attachment is inconclusive (Jansen *et al.*, 2008). The literature also suggests that breastfeeding has a positive effect on child IQ, but the effects are likely to be small (OECD, 2011a).

13. Beyond the first year, formal childcare participation may have positive effects on cognitive development (Waldfogel, 2002), but some negative effects on behavioural outcomes may be observed if children are in poor-quality care or in care for long hours (Belsky *et al.*, 2007 and Stamm, 2009). Hence, care intensity and quality matter. Long hours in care are associated with poorer developmental outcomes for young children, but effects are small (Belsky, 2003 and Langlois and Liben, 2003) and vary with child characteristics. Nevertheless, there is evidence that long periods in centre-based care are linked with more problem behaviours that manifest themselves through sixth grade (Belsky *et al.*, 2007). Childcare research suggests parents with difficult or sensitive children should consider parental in-home care if they can financially afford it (Langlois and Liben, 2003). On the other hand, all studies that control for quality find that high-quality care is important for children's cognitive development (e.g. NICHD, 2003). In terms of physical health, participation in formal childcare can also lead to increased rates of respiratory diseases, ear infections and gastro-intestinal problems (Gordon *et al.*, 2007; Zutavern *et al.*, 2007; and, Harrison *et al.*, 2010).

14. In France, evidence suggests that attending pre-school (*école maternelle*) from the age of two has no negative effects on later cognitive outcomes (Caille, 2001 and, Goux and Maurin, 2010). On the contrary, there seems to be a small but positive effect on the chances of not repeating the second grade of primary school (CE2 – at age 8). Moreover, this positive association is mainly observed among children from disadvantaged backgrounds. The authors suggest that attending pre-school from age two may help reduce the social inequalities that prevail in elementary schools.

15. Participation in early years programmes is most beneficial for children from disadvantaged backgrounds. Examples of successful interventions include several programmes in the United States such as the Perry Preschool Project, the Abecedarian Program and the Chicago Child-Parent Centres (Carneiro and Ginja, 2008). A recent review on early childhood policies in the United States argues that national randomized data show the impact of Head Start on child development is rather modest (Haskins and Barnett, 2010). Ramey and Ramey (2010) claim that the lack of impact of Head Start is explained by the low quality of many centres. The authors suggest the government should put more efforts on improving the quality of centres and should close failing programmes.

16. Other targeted interventions with a childcare component outside the United States include the *Crece Contigo* Programme in Chile, the *Dream Start* Programme in Korea, the *Programa de Estancias Infantiles para Apoyar a Madres Trabajadoras* in Mexico and the *Sure Start* Programme in the United Kingdom. Evaluations on the performance of these programmes are only available for the *Sure Start* Programme in the United Kingdom. A recent evaluation of this intervention found improvements in seven

out of fourteen outcomes (NESS 2008), in contrast to the mixed results found in earlier evaluations (NESS 2005). This difference in results might stem from differences in research methods, from improvements in services or longer exposure of children and families to these services.

17. The establishment of a universal subsidised childcare programme in the Canadian province of Québec in the late 1990s allowed researchers to compare outcomes of children in this province with other Canadian children (Baker *et al.*, 2008 and Lefebvre *et al.*, 2008). The Québec Family Policy began in 1997 with the extension of full-time kindergarten to all 5-year-olds and the offer of childcare subsidies to all four-year-olds. The subsidies were extended to all three-year-olds in 1998, all two-year-olds in 1999, and finally all children younger than two in 2000. Evaluations found that, in the aftermath of these changes, child socio-emotional outcomes (including hyperactivity, anxiety and aggressiveness), physical health measures as well as parental interactions with pre-school children worsened in the Canadian province of Québec. However, this Québec policy offered subsidies that parents could take to a range of providers, and it is not clear that the quality of providers was high. Also the policy increased the number of hours in formal childcare. Long hours in care together with the uneven quality of care may explain the poor outcomes observed. It is important to note that the quality of childcare facilities in Québec varies widely across providers (Giguere and Desrosiers, 2010). Hence, to better understand the association between non-parental care and child development, studies need also to control for the quality of providers.

18. In Australia, evidence shows that non-parental childcare can have a positive rather than a negative effect on children's social and emotional well-being (Harrison, 2008). Moreover, the quality of formal childcare seems to play an important role in enhancing positive social and emotional outcomes (Harrison, 2008) - smaller group sizes positively affect children's behavioural outcomes (Leigh and Yamauchi, 2009 and, Harrison *et al.*, 2010). These findings differ, at least in part, from those observed in Canada¹ and the United States because Australia through its national system of quality assurance has managed to set minimum standards that guarantee a uniform level of quality across childcare centres.

19. Denmark is generally thought to have one of the highest quality universal child-care systems in the OECD. Gupta and Simonsen (2007) find that centre-based care (centres that serve up to 60 children, have highly qualified staff and are regularly monitored by municipalities) is not statistically different from parental care, but family-day care (carers at home with a maximum of five children, directly employed and supervised by the municipality) results in worse behavioural outcomes at age 7. However, the same authors observe that at age 11 the negative effect of family-day care on behavioural outcomes is no longer evident (Gupta and Simonsen, 2010).

20. There is little evidence on the influence of father's employment on child development. Traditionally, the role of fathers in providing personal care for children is limited and there are data constraints (defining fathers -biological or step-father-, locating fathers of children in sole-parent families, and gaining collaboration). The few studies that exist on paternal employment find that father's employment has a weaker influence on child development than maternal employment (Ermisch and Francesconi, 2000) and that the small effects are either neutral or positive (Ruhm, 2004 and, Baxter and Smart, 2011).

21. Most of the evidence described above comes from longitudinal studies of children born twenty or more years ago. For example, findings from the United States come mainly from studies using data of the National Longitudinal Survey of Youth (NLSY) or the NICHD Study of Early Childcare (NICHD-SECC). Children in these longitudinal studies were born in the early 1980s and early 1990s, respectively. On the

¹ The little information available on the quality of Canada's child care services suggests that the quality of care varies considerably across different types of care (Cleveland, *et al.*, 2008).

other hand, evidence from the United Kingdom comes from data drawn from either the British Household Panel with children born between 1970 and 1981, the British cohort of 1958 (NCDS), the British cohort of 1970 (BCS70), from children born to any of the previous cohorts born in the 1990S or the ALSPAC study of children born in 1991. A major drawback from these studies is that there have been major changes in the economy, society and public policy that may not reflect the experiences of children born in the 21st century.

22. Birth cohort studies are increasingly being developed in OECD countries (see Box 1). However, more investment is needed to better understand the factors associated with child developmental outcomes - what happens in one country cannot be generalised to others. This study uses information of five OECD countries which have collected data on recent birth cohort studies and which shared similar survey methods. The main requirements considered for inclusion were: 1) cohort members born around the same year (around 2000); 2) children are being followed up during early and mid-childhood; 3) a nationally representative sample; 4) comparable information on key outcome and focal variables: child cognitive and behavioural outcomes, maternal employment and use of childcare services; and, 5) comparable information on background family characteristics.

Box 1. Birth Cohort Studies

Birth cohort studies follow the experiences of individuals born around the same time. They collect data from birth (or before birth) and continue to do so at different points in time, sometimes up to late adulthood. The information gathered in these studies facilitates examining the influence of a wide range of factors on outcomes later in life. Evidence based on birth cohort studies has provided important knowledge that has helped policy makers shape their policies. The list below includes national birth cohort studies in OECD countries and enhanced engagement countries.

Australia - *Growing up in Australia*: The Longitudinal Study of Australian Children. This study follows two cohorts of children selected from across Australia: the K-cohort and the B-cohort. Children in the B cohort ("babies" at Wave 1) were born between March 2003 and February 2004, and children in the K cohort ("kindergarten" at Wave 1) were born between March 1999 and February 2000. The survey collects data on children's social, economic and cultural environments as well on a series of child development and wellbeing outcomes. To date, three main waves of the survey have been conducted—in 2004, 2006 and 2008. Wave 4 of data collection started in 2010 and is due to release in 2011. In some waves, a small number of interviews were conducted in the following year in order to maximise sample retention. Website: <http://www.aifs.gov.au/growingup/>.

Canada - the *National Longitudinal Survey of Children and Youth* (NLSCY). This is a long running longitudinal study of Canadian children and youth in the 10 Canadian provinces. The first data collection occurred in 1994/95 (Cycle 1) with information collected every two years since then. The survey collects data on a comprehensive list of items related with children's social environments (family, friends, schools and communities) and on different aspects related with child's development (physical health, learning and behaviour). Website: <http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4450&lang=en&db=imdb&adm=8&dis=2>.

- *Québec Longitudinal Study of Child Development* (1997-98), 2 187 children born to mothers living in the province of Québec. Children have been interviewed annually since 1997, except in 2007 and 2009. The study gather information on factors (such as, family status, economic circumstances, use of child care) associated with children's development and well-being (for example, health, cognitive skills, behaviour, diet, sleeping). Website: www.jesuisjeserai.stat.gouv.qc.ca.

Denmark - The *Danish Longitudinal Survey of Children* (DALSC). This is a representative sample of around 6000 Danish children born within 6 weeks in the fall of 1995. Up to now, four waves of data collection have taken place. The first wave was carried out in 1996 when the babies were about 6 months old. The second wave was collected in 1999, when the children were about 3½ years old. The third wave was carried out in 2003, when the children were about 7½ years old, and the fourth wave was conducted in 2007, when the children were about 11 years old. The fifth wave is taking place during 2011. This study aims to monitor children from birth until adulthood, allowing to examine the relationship between living conditions in early childhood and outcomes later in life. Website: www.sfi.dk/dalasc.

-*Danish National Birth Cohort* (1996-2002) recruitment of 10 000 pregnant women, four waves of data collection: two pre-birth and two post-birth (at age 6 and 18 months) interviews. The cohort will be followed for twenty years. Main focus is to collect health-related data (exposure during pregnancy, blood test, umbilical cord sample) and to link it with their population-based registers on diseases, demography and social conditions. This link can be done at the individual level using the unique ID-number given to all citizens.

Website: <http://www.ssi.dk/English/RandD/Epidemiology/DNBC.aspx>.

France - *Étude Longitudinale Française depuis l'Enfance* (ELFE). This study will gather information of 20 000 children, which will be followed during 20 years. The pilot phase of the study took place in 2007 collecting data of 1 000 families in 12 French departments. ELFE will start collecting data of the entire French territory in March 2011. This study will collect data on the following major topics: demographic characteristics, education, economic conditions, food-nutrition, metabolism and growth, pre-natal development, psychomotor and mental health, infectious diseases, asthma, respiratory diseases, allergies, exposure to chemicals or other pollutants of the environment. Website: <https://www.elfe-france.fr/>.

Ireland- *Growing Up in Ireland*. This study collects data of almost 20,000 children born in Ireland in 2008. The survey collects data on the development and wellbeing of children. It will be conducted over seven years and will follow the progress of two groups of children: 11 000 nine-month-olds and 8 500 nine-year-olds. Website: <http://www.growingup.ie/>.

New Zealand- *Growing Up in New Zealand*. This study gathers information of more than 7 000 kiwi children born in 2009 and 2010 interviewed before birth. Children and their parents will be interviewed regularly until children are 21 years old. Interviewees will be asked about their family circumstances, educational outcomes, psychological development, health, culture, neighbourhood, etc. Website: <http://www.growingup.co.nz/>.

- *Christchurch Health and Development Study*. This is a birth cohort study of 1 265 children born in Christchurch in mid-1977. Children have been studied from infancy into childhood, adolescence and adulthood. It has followed up the cohort for 30 years. Website: <http://www.tepou.co.nz/knowledge-exchange/research/view/listing/102/>.

- *Dunedin Multidisciplinary Health and Development Study*. This study collected data of 1 037 babies born in Dunedin's Queen Mary Maternity Hospital between 1972 and 1973. The babies were studied at birth, then followed up and assessed through childhood and adolescence and into adulthood. The babies were first followed up at the age of 3, and then at 5, 7, 9, 11, 13, 15, 18, 21, 26 and 32. Future assessments are scheduled for age 38, 44 and on into the future. Website: <http://dunedinstudy.otago.ac.nz/>.

Netherlands - *Generation R study*. This cohort study has collected data of children in Rotterdam before birth. The study is designed to identify early environmental and genetic causes of normal and abnormal growth, development and health. Almost 10 000 mothers with a delivery date between April 2002 and January 2006 were enrolled in the study. Of all eligible children at birth, 61% participate in the study. After birth, children have been followed up at least once a year. The last data collection took place when children were 48 months old. However, there are plans to follow them until young adulthood Website: <http://www.generationr.nl/>.

Norway - *Norwegian Mother and Child Cohort study (MoBA)*. This study gathers information of pregnant women since 1999. By 2008, 100 000 women had been recruited and followed across time. The objective of the study is to collect data on major diseases of mothers and children through questionnaires and biological samples (blood tests). The study is able to use record linkage with administrative records to establish a Norwegian birth cohort study. Website: http://www.fhi.no/eway/default.aspx?pid=238&trg=MainArea_5811&MainArea_5811=5903:0:15,3046:1:0:0::0:0

Sweden -*Stockholm Birth Cohort Study*. This study includes all children born in 1953 and living in the greater Stockholm area in 1963 who were matched in 2004/05 to the Swedish Work and Mortality database. The probability matching produced a sample of 14 000 individuals. Website: <http://www.chess.su.se/pub/jsp/polopoly.jsp?d=7822>

All Babies in South-east Sweden (ABIS) included 17 055 new-born babies in South-east Sweden born between Oct 1997 and Oct 1999. Newborn infants have been followed from birth and onwards with regular biological samples and questionnaires. Last survey was conducted in the Fall of 2009, when children were around 11 years old. Website: <http://www.abis-studien.se/>

United Kingdom -*National Survey of Health and Development (NSHD)*. This is the first British national birth cohort study. Initially, it collected data of 9 000 children born in England, Scotland and Wales in a week in March 1946. The original aim of the study was to understand the fall of fertility rates, examine the health of mothers and infants,

identify the use of obstetric services and the factors associated with infant deaths. Subsequent data collections gathered information from a wider set of topics of a sample of around 5 000 single births of married women. Cohort members have been interviewed more than 30 times – data collection was more frequent during infancy and childhood. 2011 is a special year as participants of the study turn 65 years old. Website: <http://www.nshd.mrc.ac.uk/default.aspx>

National Child Development Study (NCDS). – This cohort study started following all children born in England, Scotland and Wales in one week in 1958 – around 17 500 babies. Similar to NSHD, this study was originally designed to examine the social and obstetric factors associated with premature deaths. Subsequently, NCD gathered information of a wide set of socio-economic background characteristics and outcomes. Cohort members have been interviewed nine times since birth (at around birth, at ages 7, 11, 16, 23, 33, 42, 46 and 50). In addition, at age 33, information was collected on 3 000 children of one in three cohort members. The last interview took place in 2008, and the next one is planned to take place in 2013. Website: <http://www.cls.ioe.ac.uk/default.asp>

-Birth Cohort study (BCS70) – This study collects data of all children born in England, Scotland and Wales in one week in April 1970 – around 17 200 babies. Similarly, BCS70 has gathered information on a wide range of topics including family characteristics, education, employment, health (physical and mental), parenting and social attitudes. Participants have been interviewed eight times since birth (at around birth, at ages 5, 10, 16, 26, 30, 34 and 38). At age 34, data was also gathered of children of one in 2 cohort members. The next sweep is planned to be conducted in 2012. Website: <http://www.cls.ioe.ac.uk/default.asp>

-Millennium Cohort Study (MCS) – This study follows up 19 000 children born in England, Scotland, Wales and Northern Ireland between September 2000 and January 2002. Children in this study have been interviewed four times since birth (at 9 months, at ages 3, 5 and 7) on diverse topics, including parents' employment and education, parents' income, childcare use, parenting activities, child behaviour and cognitive development, health, among others. The last wave of data collection took place in 2008, and the next round is planned for 2012. Website: <http://www.cls.ioe.ac.uk/default.asp>

-2012 Birth Cohort study – This will be the fifth British national cohort study. It will track the lives of around 90 000 children (by far the UK's largest cohort study) from pregnancy into adulthood. Similar to earlier studies, the study will gather data on multiple areas related with cohort members' development and well-being. Data collections will be more intensive during the early years. Recruitment of mothers is planned to begin in 2012. Website: <http://www.esrc.ac.uk/>

-Growing Up in Scotland (GUS). This study was launched in 2005 and has been following the progress of two groups of Scottish children and their families: 5 000 children born between June 2004 and May 2005 and 3 000 born between June 2002 and May 2003. The study aims to follow this national sample from infancy through to the teenage years. Website: <http://www.growingupinscotland.org.uk/>

United States *-Early Childhood Longitudinal Study (ECLS)* – The birth cohort study has followed 10 700 children born in the US in 2001 from birth through kindergarten entry. The main objective of the study is to provide detailed information on children's early life experiences (health, cognitive and behavioural development, care, and education during). Children were interviewed at birth, and at ages 2, 4 (preschool) and at kindergarten. Website: <http://nces.ed.gov/ecls/Birth.asp>.

-National Children's Study- This will be the largest ever cohort study: 100 000 children born across the United States will be followed before birth until age 21. This study will examine the effects of genetics and the environment (family dynamics, community and cultural influences, among others) on the growth, development, and health of children. In mid-Sept 2010, 37 locations had started to recruit pregnant women or women who could become pregnant. Website: <http://www.nationalchildrensstudy.gov/>

South Africa *- Birth to Twenty* – This study followed 3 273 children born in the metropolitan area of Johannesburg-Soweto in 1990. Participants were followed from pregnancy up to age 20. They were interviewed 16 times, with data collection taking place almost on a yearly basis. Topics covered in the interviews included: education, nutrition, socioeconomic class, cognitive development, physical health and development. Website: <http://sunsite.wits.ac.za/birthto20/index.php?menuvar=0>

Family Policies and Outcomes across 5 OECD countries

23. The decision of parents to return (or resume) to paid work after childbirth is influenced by a complex interplay of factors including: preferences and attitudes towards parenting and work, family's

income and earning capacity, child's characteristics, duration of paid leave entitlements, availability and cost of childcare (both formal and informal), and availability of flexible workplace arrangements. Across the OECD, governments have implemented different policies aimed at providing parents more opportunities to combine work and family responsibilities. However, there is substantial cross-national variation in the provision and generosity of such policies. Empirical cross-national evidence suggests that family policies such as parental leave and childcare support do influence the occurrence and timing of parental employment (Gornick and Meyers, 2003; OECD, 2007).

24. Table 1 shows some key indicators with the most recent data on family policies and outcomes across the five OECD countries under study. Maternal employment rates are highest in Denmark with more than 70% of mothers with very young children (under the age of three) participating in the labour market². In Canada, the United Kingdom and the United States, employment rates of mothers with under-threes is not as high as in Denmark, but more than 50% of mothers are in paid work, a rate above the OECD average. Maternal employment rates increase with children's age, especially when children enter primary school (OECD, 2011b, indicator LMF1.2). Although not shown here, this pattern is clearly observed in the five OECD countries analysed here. However, differences in maternal employment by children's age are smallest in Denmark.

25. Part-time work is a workplace practice used by parents, especially by mothers, to combine work and care. Across the OECD, 25% of women work in part-time jobs (Table 1). Australia and the United Kingdom have high part-time employment rates, with almost 40% of all women working part-time. These figures are even higher when considering mothers of young children - Australian and British mothers tend to reduce hours of work to take care of pre-school children. However, there is a gradual increase in mothers' working hours as children grow older. By contrast, in Canada, Denmark and the United States, part-time work is less common. In the United States, for example, once mothers (re)enter work after childbirth, they generally do so in a full-time basis.

26. Availability and affordability of quality childcare services are key for parents, especially mothers, to engage in paid employment. Public spending on childcare and pre-school services as a percentage of GDP varies considerably across the OECD. Denmark and the United Kingdom are among the countries where public spending in this area is the highest, with expenditure at 0.8% of GDP or above. It is thus not surprising that these countries together with other Nordic countries and France are among those with the highest childcare and pre-school participation rates (Table 1).

27. Childcare costs play an important role on parents' decision to work. Countries with policies that help reduce childcare costs via tax reductions, cash benefits, or subsidised direct delivery of childcare services increase the financial returns to taking up paid work and, thus, are likely to increase maternal employment. Canadian (Ontario), British (England) and US (Michigan) families can face high costs for formal childcare (Table 1). In these countries, the net cost of childcare represents more than 30% of the average wage for a dual earner family. Unless parents in these countries have access to informal care providers, they will opt for staying at home or working a reduced number of hours. In Australia, childcare costs are around the OECD average. Recent estimates suggest that the cost of child care in Australia has a statistically significant negative effect on mother's labour supply and childcare demand (Gong, Breunig and King, 2010). By contrast, net childcare costs represent around 10% of average wages for Danish families (OECD, 2011a), and thus do not represent an obstacle for parental employment.

28. Parental leave policies may also influence mothers' timing to re(enter) work. Almost all OECD countries have ratified the International Labour Organisation (ILO) recommended minimum period of 14

² It is likely that in-work rates for Denmark are slightly overestimated because women on maternity or on statutory paid parental leave are counted as employed (OECD, 2011b, indicator LMF1.2).

weeks of paid leave (ILO, 2010). Leave entitlements around childbirth limit the risk of dismissal during pregnancy and guarantee a return to paid work when leave runs out. On average, across the OECD, the duration of maternity leave is around 19 weeks. Women are entitled to the longest period (52 weeks) in the United Kingdom. However, once payment is considered, the duration of paid leave if women received 100% of their last earnings for the leave period (full-rate equivalent³) is of 13 weeks only. By contrast, maternity leave is shortest in Australia⁴, where women are entitled to 6 weeks only and where until December 2010 this period was unpaid. The United States is the only country in the OECD without federal legislation on paid maternity leave. The Family and Medical Leave Act (FMLA) requires employers with 50 or more employees to provide 12 weeks of job-protected, but unpaid, maternity leave to eligible employees. Nonetheless, some states do have programmes that provide income support during maternity leave (Kammerman and Waldfogel, 2010).

29. Once the maternity leave period is over, most OECD countries offer additional employment-protected leave for parents –parental leave. However, in general, income support covers a limited part of the parental-leave period and pay is much lower than that of maternity leave. The duration and generosity of this kind of leave varies substantially across countries. In the 5 countries considered here, parental leave is not available in the United States, it is unpaid in the United Kingdom, it is long but unpaid in Australia, and shorter but paid in Canada⁵ and Denmark.

30. Parental employment helps reduce the risks of poverty and thus contributes to promoting child development and well-being (OECD, 2011a). Poverty during early childhood contributes to a range of problems. Berger *et al.*, (2009) find that low income negatively affects home environments and emotional environments (mothers' stress or depression); more behavioural problems in children were also reported for young poor children by mothers (Kiernan and Huerta, 2008). Duncan *et al.*, (2010) show that early childhood poverty can reduce adult working hours (and so earnings) increasing later poverty risks and welfare dependency.

31. Denmark with high maternal employment rates has the lowest child poverty rate (3.7%) across the OECD (12.7%). In contrast, in Canada, the United Kingdom and the United States, in spite of above average maternal employment rates, child poverty rates are around or above average. This suggests that parental employment is necessary but not always sufficient to reducing poverty risks. Other factors such as financial support for families with children are also important for protecting against poverty risks (Whiteford and Adema, 2007 and, OECD, 2011a).

32. The outcomes and policies presented in Table 1 refer to the most recent data available (mid to late 2000s). Hence, they do not reflect the conditions prevailing at the beginning of the millennium, when children of the cohorts presented here were born. Since the early 2000s, major policy changes have occurred, especially in Australia and the United Kingdom. In these countries, public expenditure on families increased substantially and reforms have put more emphasis on encouraging parents into employment, especially sole parents, and on providing more childcare support to disadvantaged families. On the other hand, in Canada important changes in family policy took place in the 1990s. Hence, the sample examined here would be among the first cohort experiencing these changes.

³ This full-rate equivalent (FRE) is defined as follows: $FRE = \text{Duration of leave in weeks} * \text{payment (as per cent of average wage earnings) received by the claimant}$.

⁴ The *Fair Work Act 2009* included the extension (from 1 January 2010) of the maximum period of unpaid parental leave from 12 to 24 months, subject to employer agreement for any time taken off after the first year. Paid parental leave was introduced on 1 January 2011 (Alexander *et al.*, 2010).

⁵ Canadian paid benefits are conditional on qualifying for Employment Insurance.

Table 1. Key employment and child outcomes, and family policies compared to OECD average

		Australia	Canada	Denmark	UK	USA	OECD - average
Employment outcomes	Maternal employment rate (%), youngest child < 3 years, 2008	48.3	58.7	71.4	54.0	54.2	51.9
	Share of part-time in total women employment (%), 2008 ¹	37.7	26.4	23.1	37.8	17.8	25.0
Child outcomes	Childcare enrolment rates (%), children 0 - 5 years, 2008	39.6	40.4	78.6	64.4	45.2	53.9
	Child poverty rate (%), mid-late 2000s	11.8	14.8	3.7	10.1	21.6	12.7
Public expenditure and support	Public spending family benefits as % of GDP, 2007 ²	2.7	1.4	3.7	3.6	1.2	2.2
	Public spending in childcare and pre-school services as % of GDP, 2007 ³	0.4	-	1.3	1.1	0.4	0.6
	Net cost of childcare in % of average wage for a dual earner family, 2008 ⁴	16.3	32.0	11.2	34.0	38.7	16
Parental leave policies	Total length of Maternity Leave (weeks), 2010 ⁵	6	17	18	52	12	19
	Full-rate equivalent of Maternity Leave (weeks), 2010 ⁶	0	8	9	13	0	13
	Total length of Parental Leave (weeks), 2010 ⁷	52	35	46	13	0	72
	Full-rate equivalent of Parental Leave (weeks), 2010 ⁶	0	19	23	0	0	20
Above the OECD average		Around the OECD			Below the OECD average		

Notes: The OECD average is calculated as the unweighted average for OECD countries for which data is available. Countries are categorised in "above" or "below" groups if they are at least half a standard deviation above or below the OECD average.

1) Part-time employment refers to persons who usually work less than 30 hours per week in their main job.

2) Expenditure includes child payments and allowances, parental leave benefits and childcare support. Spending on health and housing support also assists families, but is not included here. Coverage of spending on family may be limited as such services are often provided, and/or co-financed, by local governments. This leads to large gaps in measurement of spending in Canada.

3) Local governments also play a key role in financing childcare. This can make it difficult to get an accurate view of public support for childcare across a country, especially but not exclusively, in federal countries like Canada and the United States.

4) The childcare cost calculations for Canada reflect the situation of the province of Ontario; for the United Kingdom, England (London); and for the United States, Michigan. Source: OECD (2011c).

5) For Canada, the 17 weeks of maternity leave refer to the situation in most provinces and territories, but, for example, the provinces of Québec and Saskatchewan provide 18 weeks.

6) Full-rate equivalent (FRE) = Duration of (maternity/parental) leave in weeks' payment as a percentage of average wage earnings received by the claimant over this period.

7) Parental leave refers to subsequent prolonged periods of paid and unpaid leave women (and men) can take after maternity (paternity) leave to care for young children. Weeks of maternity leave to be taken after childbirth are deducted from the length of parental leave in countries where entitlements are set up to an age limit of the child. For Canada, the Federal Employment Insurance programme provides for 35 weeks of paid parental leave; unpaid leave periods can be longer. For example, the province of Québec provides up to 52 weeks of unpaid leave, during which period eligible clients can claim benefits under the Québec Parental Insurance Plan.

Source: OECD Family Database (www.oecd.org/els/social/family/database).

33. Overall, among the five countries analysed here, Denmark performs well above the rest; also, it consistently ranks among the best-performing OECD countries in terms of work-family balance and on most dimensions of child well-being. Its generous and comprehensive policies help parents combine work and family responsibilities, which is key for child development and well-being. Australia, Canada and the United Kingdom stand in between. British family policies tend to be in general more generous than those of other Anglophone countries. However, most of its outcomes are still close to the OECD average or just somewhat above. The United States performs less well than the other countries presented here⁶. The leave system provides minimal support, the childcare system is less comprehensive and child poverty rates are the highest.

2. A cross-national analysis of longitudinal data

Data

34. The analysis is based on information of children born around the year 2000 in five OECD countries: Australia, Canada, Denmark, the United Kingdom and the United States. In all studies, parents were interviewed close to the time of birth and cohort members followed up during early and mid-childhood. The cohort studies considered included:

- **Australia:** *Growing Up in Australia: The Longitudinal Study of Australian Children*. The analysis here uses data of the K-cohort only, children who were born between March 1999 and February 2000. The sample size of this cohort at wave 1 was 4,983.
- **Canada:** *National Longitudinal Survey of Children and Youth (NLSCY)*. Here information of two cohorts is considered: 1) children aged 0-1 years by 31st December 2000, and 2) children aged 0-1 years by 31st December 2002. The sample size of the two cohorts is of around 7 000 children.
- **Denmark:** *Danish Longitudinal Survey of Children (DALSC)*. This is a representative sample of Danish children born within 6 weeks in the fall of 1995. The sample size of DALSC is of around 6 000 children.
- **United Kingdom:** *Millennium Cohort Study (MCS)*. This is a multi-disciplinary survey of around 19 000 children born in the four constituent countries of the United Kingdom in 2000-01.
- **United States:** *Early Childhood Longitudinal Study (ECLS)* program. Here the analysis considers data of the Birth Cohort (ECLS-B), a sample of 10 700 children born across the US in 2001.

35. The advantage of using these large cohort studies is that they shared similar methodological aspects that allow carrying out a comparative analysis. In addition, the richness of the data facilitates controlling for background characteristics that could bias estimates of the relationship between maternal employment and child development. However, three caveats should be borne in mind while interpreting the results. First, these results reflect the experiences of individuals born in a specific year and living in a specific context. Second, estimates should be considered as indicative of associations rather than causal effects since it is not possible to completely eliminate individual heterogeneity and reverse causality problems. Third, estimates refer to the average child, which is informative for policymaking. However, what works for the average child does not necessarily work for all children.

Measurement of variables

36. Three group of variables are examined in this analysis: child outcome variables, ‘focal’ variables and control variables. The outcome variables include two important aspects of child development: cognitive ability and behavioural adjustment. The ‘focal’ variables are the control variables of focal

⁶ Figures in Table 1 do not reflect differences in State policies in this area.

interest of this study: maternal employment and child-care arrangements. In addition, a number of control variables capturing other key dimensions of children's background are also included.

Outcome variables

37. **Child developmental outcomes** are assessed using information on cognitive ability, conduct problems and attention-hyperactivity problems. Raw scores from cognitive tests (Annex Table 1) were standardised to a mean of 100 and a standard deviation of 10, with higher scores meaning better outcomes. The cognitive tests vary according to age and, depending on data availability, some countries include more than one measure per wave of data collection.

38. Behavioural outcomes were converted into binary variables, using specific cut-off points for high scores for each outcome; except for the United States (Annex 1). These variables thus take a value of 1 if cohort members are considered to have high conduct or attention-hyperactivity problems. The conduct problems dimension includes reports on whether the child: a) frequently fights with other children; b) often has temper tantrums; c) is often disobedient; d) is often argumentative; and e) is often spiteful. Similarly, the variable measuring attention problems uses reports on whether the child: a) is squirmy or fidgety; b) cannot settle down to anything; c) is very restless; d) is easily distracted; and, e) does not stop to think and does not finish tasks.

'Focal' variables

39. **Maternal employment** is assessed considering both intensity and timing. Outcomes of children whose mothers worked during infancy are compared with those of children whose mothers did not work during this period. In particular, the analysis considers children whose mothers were in paid work by the time the child is six months old, in paid work between six and 11 months, and not in paid work in the first year of the child's life (which is used as the reference category). The reason for comparing employment before and after six months – instead of the broader 12 months interval – is that by six months paid maternity leave is over in most countries and because exclusive breastfeeding is typically recommended for a period of six months. The analysis also examines intensity of work as previous research shows that the effects of early maternal employment vary by whether it is full-time (30 hours per week) or part-time (less than 30 hours per week)⁷.

40. Additionally, maternal employment after infancy is examined by looking at employment status at the time of data collection. This variable was categorized into three groups: children whose mothers were working part-time (less than 30 hours a week), children whose mothers were working full-time (30 hours or more per week) and children whose mothers were not in paid work at the moment of the survey.

41. Father's employment is not considered in this analysis because of data constraints. In the longitudinal surveys considered here, information of fathers is not easy to collect. In particular, father's information is largely missing of children in sole-parent families. The analysis here uses information of all children regardless of their family structure. Thus, father-related characteristics were excluded from the analysis. This is an important drawback that should be considered in future work. It is important to understand how father's employment and involvement in care affects children's development.

42. **Child-care arrangements** are examined to explore a possible link between non-parental childcare and child outcomes. Information on the type of main care provider (who looks after the child most of the time while mother at work or studying) in the first twelve months of life is considered. Three

⁷ US data uses a cut-off point of 35 hours per week for their definition of full-time and part-time employment during and after infancy.

types of care are distinguished: children who use formal care (centre-based, childminder, nannies, babysitters), those who use informal care (grandparents, another relative, friend or neighbour), and those who were taken care of by their parents (mother or father/ resident or non-resident). The intensity of use of formal care providers is examined using a full-time equivalent (FTE) cut-off point by applying a 30 hours per week threshold.⁸ Therefore, the childcare variables include the following categories: formal care less than 30 hours per week; formal care 30 hours or more per week; informal care; and parental care (omitted category).

Control variables

43. A number of child and family background characteristics are included in the analysis to control for possible associations that might independently influence the link between maternal employment and child outcomes. Using findings from previous research as a guiding framework, the analysis includes two types of background characteristics: 1) factors existing previous to the birth of the cohort member that could be correlated with both maternal employment and child outcomes (variables such as mother's age at child's birth, mother's country of origin, educational attainment, mother's employment during pregnancy, number of siblings); and 2) factors measured at the same time as the child outcomes that could be acting as mediators of the link between maternal employment and child outcomes (variables such as family income, living in publicly subsidised housing, parenting activities, maternal depression). Note that, although the construction of control variables was standardised as much as possible, there is some variation in the range and derivation of control variables across countries. The set of factors included in the analysis are described below. Annex 1 provides a more detailed description on variable construction.

Child characteristics include: sex; age in months; ethnicity; foreign language spoken at home; whether child was born prematurely (<37 weeks); whether child was born with low weight at birth (<2.5 kilograms); and number of siblings at birth.

Mother's characteristics include: employment during pregnancy; employment at the time of data collection; age at child's birth; whether she was born outside the country; and mental health.

Family characteristics include: family structure ("intact family"⁹, sole-parent family, and living with separated parents or in a reconstituted family); parental education (highest level of educational attainment of the mother or father – if present); family income; and living in publicly subsidised housing. The model also includes some parenting behaviour measures, which could affect child outcomes: duration of breastfeeding; daily reading to children; having regular sleep or meal schedules; and physical punishment.

Methods

44. Models are estimated using multivariate regression analysis. Models examining cognitive scores are estimated using ordinary least square (OLS) regressions and models for behavioural outcomes are calculated using logistic regressions. The estimation method differs between outcomes because the cognitive measures were considered in its continuous form and the behavioural measures were converted into binary variables for ease of interpretation. Outcomes are regressed on the maternal employment and childcare variables, together with the set of child and family background factors described below. Models are run separately for each outcome variable, each age group and each country. In a second stage, models are estimated by parental education and family structure.

⁸ US data uses a cut-off point of 35 hours per week for their definition of full-time and part-time childcare.

⁹ "Intact family" refers to children growing up with both biological parents since birth.

45. One of the main issues considered when selecting the analytical method was to control for unobserved heterogeneity, that is, for possible associations that might independently influence the link between maternal employment and child outcomes. For example, if mothers who are in employment shortly after childbirth are those with higher educational levels, it is possible that children with mothers in work have better developmental outcomes than those with mothers who are not in work. However, this positive link might be explained by the fact that educational attainment is associated with competence and skills and not with employment. Thus, the positive association might disappear once the model accounts for background characteristics.

46. Several methodological options to control for unobserved heterogeneity were considered including:

- **Fixed effects model at the individual level** – not all datasets have repeated outcome measures across time. For example, the cognitive tests differ from wave to wave as children’s abilities change with age.
- **Fixed effects model at the family level** - few number of cases of twins or triplets in the samples (For example, 208 cases in the Millennium Cohort Study). Thus, the advantage of this approach is limited. The samples were then restricted to one child per family to eliminate the within family variation.
- **Instrumental variable** – it is very difficult to find an IV that works well. What’s more, finding one that can be used in the 5 studies will be even more complicated. The costs of this methodology were much higher than the benefits. Therefore, it was eliminated as a possible method.

47. However, after reviewing the literature, considering the kind of questions to answer and the characteristics of the five cohort studies, the approach selected was OLS regressions that control for a rich set of explanatory variables. Estimates should be considered as indicative of associations rather than causal effects. Although a rich set of control variables were included in the models, it is not possible to completely eliminate individual heterogeneity and reverse causality problems.

48. Other methodological issues considered are attrition and missing data. Attrition is a major issue of longitudinal studies, especially when lost observations have characteristics that differ from those of the rest of the population. However, attrition analyses of cohort studies suggest that, even when cumulative attrition is high, especially among disadvantaged groups, it does not affect the validity of the data (Nathan, 1999 and, Alderman *et al.*, 2001). In addition, missing data because of non-response to some questions can also affect results. To ensure that this is not the case, for each explanatory variable included in the analyses, information is included on whether such data is missing for a particular respondent. For outcome variables, however, only cases that have complete information are included in the analysis.

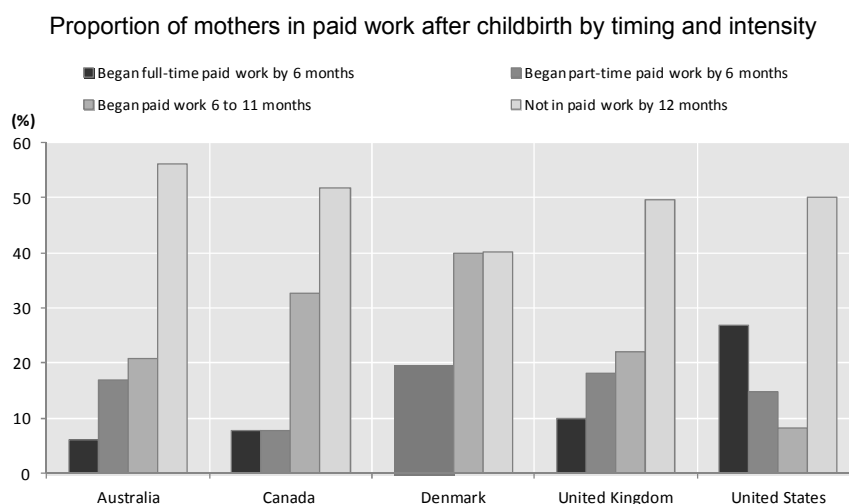
49. Finally, a robustness test was carried out to examine whether the association of maternal employment changes once the model accounts only for pre-birth characteristics. The reason for carrying this test is that some of the factors included in the model might themselves be affected by maternal employment, in ways that might be associated with better or worse child outcomes. For example, mothers who return to work earlier will be less likely to breastfeed but at the same time their families will be more likely to have higher incomes. By including an extensive set of factors in the model, the analysis presents estimates of the effects of maternal employment assuming all else is equal. Hence, a model that controls only for factors that cannot be affected by maternal employment after childbirth was estimated. This test was run with data for the US and UK only because these were the countries with a statistically significant association between early maternal employment and child outcomes.

3. Results

Patterns of maternal employment and non-parental childcare

50. Chart 1 shows that in the early 2000s about half of mothers returned to (or started) work during their child's first year of life. There is, however, considerable cross-national variation in the timing and intensity of resuming (starting) work after childbirth. In the United States, 42% of mothers were in paid work by the time the child was 6-months old and most were working full time (more than 30 hours). By contrast, in Canada few women were in paid work before their child was aged 6 months (16%) and, among those who were working during this period, there was no difference in the number of working hours (around 8% in full-time and 8% in part-time). In Denmark, only 20% of women were in paid work by 6 months. However, an additional 40% started work between six and 11 months. In Australia and the United Kingdom, around 25% of mothers (23% and 28%, respectively) were working by the time children were six months old, working more in part-time jobs (17% and 18%, respectively) than in full-time jobs (6% and 10%, respectively). In addition, around 20% of Australian and British mothers (21% and 22%, respectively) who had not worked by 6 months were working by the time their child was aged 6 to 11 months.

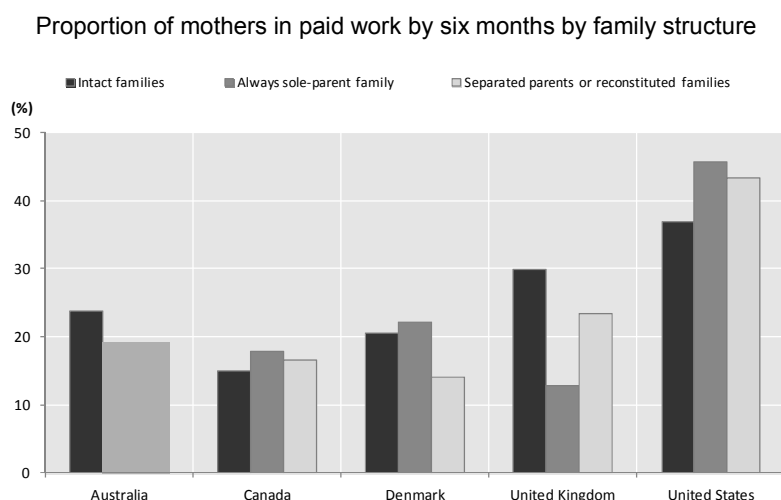
Chart 1. About half of the mothers in Anglophone countries are in paid work on the first birthday of their child, around early 2000s¹



Notes: 1. Years of reference are the following: Australia: 2000/01; Canada: 2001/03; Denmark: 1996; UK: 2001/02; and the US: 2001/02. Data for Denmark do not distinguish between full-time and part-time work. Data for the United States define full-time work as working 35 hours or more per week.

51. Maternal characteristics play an important role in decisions to work after childbirth. In some countries, however, maternal characteristics have a stronger influence than in others. For example, Chart 2 shows that family structure in the United Kingdom has a clear association with early maternal employment. Sole mothers in the United Kingdom are less likely to be in paid work six months after childbirth than mothers in intact families (13% and 30%, respectively). By contrast, in the United States sole mothers are more likely to be in paid work six months after childbirth than mothers always in intact families (46% and 37%, correspondingly). In Australia, Canada and Denmark, differences in maternal employment by family structure are less marked.

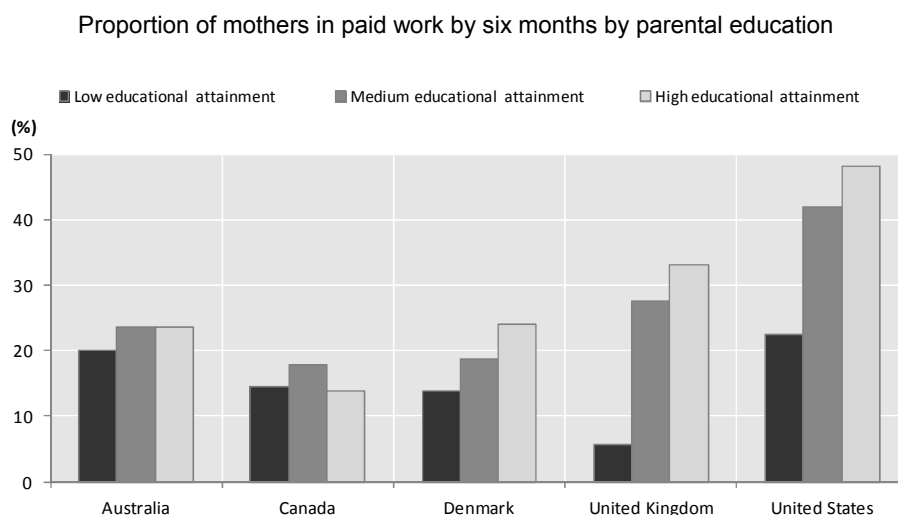
Chart 2. British sole mothers are less likely to be in paid work by the time the child is 6-months old, around early 2000s¹



Note: 1) Years of reference are the following: Australia: 2000/01; Canada: 2001/03; Denmark: 1996; UK: 2001/02; and the US: 2001/02. The value of bars does not add to 100%. Sample sizes in Australia did not allow distinguishing children living always in sole-parent families from children in broken or reconstituted families.

52. Chart 3 shows maternal employment rates by parental education among women in the different samples. In most countries, the higher the educational level of the parents, the more likely it is for children to have their mother in work by the time they are 6-months old. Mothers with higher levels of educational attainment are more likely to face higher opportunity costs when staying at home; they are most likely to have better jobs and to be more motivated to return to work.

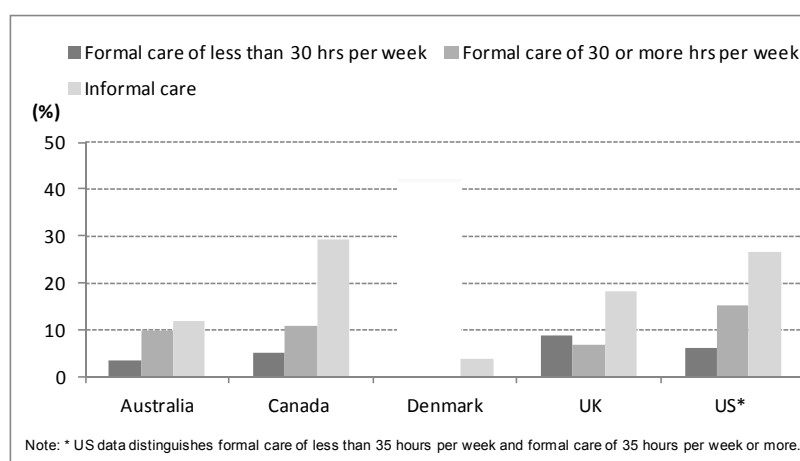
Chart 3. Mothers with high levels of educational attainment are more likely to go back to work early, around early 2000s¹



Note: 1) Years of reference are the following: Australia: 2000/01; Canada: 2001/03; Denmark: 1996; UK: 2001/02; and the US: 2001/02.

53. Similarly, the main childcare provider¹⁰ during the first year of life varies widely across countries. Whereas in Denmark 42% of children under the age of one were taken care of by a formal provider, in the other countries this was less than 20% (Chart 4.).By contrast, the proportion of children mainly cared for by an informal provider (grandparent, other relative, friend or neighbour) is largest in Canada and the United States, with more than 25% of children in this category of care. In the case of Australia and the United Kingdom, a low proportion of children were mainly cared for by either a formal or an informal provider during their first year of life. Children in these countries were mainly cared for by their parents (75% and 66%, respectively).

Chart 4: Main childcare provider in first year of life, around early 2000s



54. The cross-country differences described above reflect variations in a wide range of factors influencing maternal employment decisions. These include not only family policies (tax-benefit, parental leave systems and formal childcare systems) but also cultural attitudes towards maternal employment and childcare outside home. For example, in Denmark the comprehensive parental leave and childcare support systems help explain the high proportion of mothers with young children in employment and the small differences in employment outcomes by educational attainment or family structure. It is very atypical for Danish mothers not to be working, “staying-at-home-mothers” are the minority. In addition, childcare is of relatively high quality.

Early maternal employment and child outcomes

Cognitive scores

55. Chart 5 presents the relationship between maternal employment and cognitive scores for 4-5 year olds, except for Denmark where such information is not available before age 11. The bars represent estimates of the associations between maternal employment and cognitive scores. Results indicate how much test scores are expected to increase (if the sign of the coefficient is positive) or to decrease (if the sign of the coefficient is negative) relative to children whose mothers were not in employment during the child's first year of life (the benchmark or omitted category). The mean value of the test scores is 100 and the standard deviation 10. Hence, coefficients can be divided by 10 to represent effect sizes (i.e. the magnitude of the effect relative to the standard deviation of the outcome variable in question). Only the parameter estimates for which there is evidence that the result did not occur by chance – statistically significant - are presented.

¹⁰ As defined above, the main childcare provider is the one children spent most time with.

56. In general, maternal employment by the child's first 6 months of life was associated with somewhat lower cognitive scores on some items relative to mothers not working during the child's first year, even after holding constant a wide range of child, mother and family factors, including several that would be affected by maternal employment. However, these negative associations mainly concerned full-time employment, were of small size and marginally significant (at the 10% level) in the United Kingdom and the United States.

57. For children in the United States, full-time employment at 6 months was negatively associated with vocabulary test scores and reading scores of children aged 4 years old, but the effects were very small (an effect size of 0.069 standard deviations), and only marginally significant (at the 10% level). In the United Kingdom, early maternal employment (full-time and part-time) appeared to have a small negative association with vocabulary test scores for children age 4-5 (an effect of 0.074 and 0.051 standard deviations, respectively). However, the association persists, and is somewhat larger for reading and maths scores of children aged 7 (see first section of Table 2).

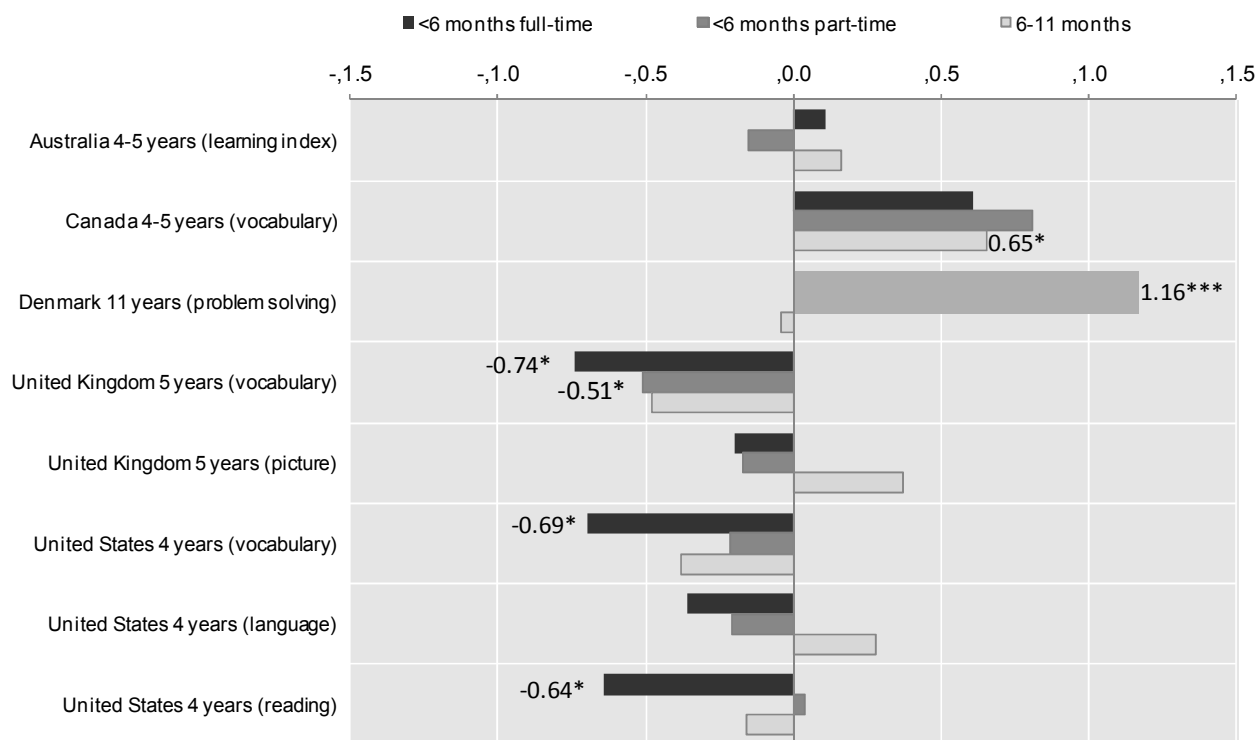
58. Chart 5 also shows that maternal employment by 6 months seems to have a positive relationship with cognitive scores of Danish children at age 11, compared with children of the same age whose mother was not in paid work when the child was 1 year old. Few Danish women are in paid work by 6 months. Hence, it is likely that those who are back in work at such an early stage are those with higher employment attachment, with higher opportunity costs of staying at home. Additionally, in Canada, positive links were also observed. Children whose mother were in paid work by the time they were between 6 and 11 months old had marginally significantly higher scores (an increase of 0.065 standard deviations) than children whose mothers were not in paid work by their first birthday.

59. The first section of Table 2 presents estimates of the link between early maternal employment and cognitive scores across all available ages. The results indicate that only in the United Kingdom was the association between maternal employment and child cognitive scores significant outside the age group 4 to 5. In the United Kingdom, children at ages 3, 5 and 7 whose mothers were in full-time work by 6 months reported slightly lower cognitive scores than children whose mothers were not in work during children's first year of life. These estimates are however, small (ranging from a reduction of 0.059 to 1.18 of a standard deviation) and observed for some but not all test scores.

60. The second section of Table 2 presents estimates for the association between maternal employment at the time of data collection and children's cognitive scores for all available ages and test scores. Results indicate that, in general, after controlling for all background characteristics, there is a weak association between maternal employment after infancy and children's cognitive scores. However, when the association is statistically significant, the parameter estimates are positive and somewhat stronger when employment is on a part-time basis than on a full-time basis. These significant results are observed in two countries (United Kingdom and United States) and for a few test scores.

Chart 5: The association between maternal employment and cognitive development is small, and only negative and statistically significant in the UK and US

Associations between maternal employment and cognitive scores: benchmarked against "mothers not in paid work during the child's first year"^{1,2}



Notes:

1. * p<.10; ** p<.05; ***p<.01

2. This Chart presents estimates from multivariate regressions on cognitive scores at age 4-5. Although not presented here, estimates belong to models that control for child-related factors (sex; age in months; ethnicity; whether child was born prematurely; weight at birth; and, number of siblings at birth), maternal characteristics (employment during pregnancy; employment at time of data collection; age at child's birth; born outside the country of study; and, post-partum depression), family-related factors (family structure, parental education, family income and, living in publicly subsidised housing) and parenting behaviour measures (duration of breastfeeding; daily reading to children; having regular sleep or meal schedules; and physical punishment). The control variables included varied slightly across countries.

Table 2. Associations between maternal employment (early and at time of survey) and cognitive scores.

COGNITIVE SCORES		Early maternal employment			Maternal employment at time of survey	
		<6 months in full-time work	<6 months in part-time work	6-11 mths in paid work	Full-time	Part-time
Age 2-3	Denmark	0.83 [0.12]		0.96 [0.11]	0.07 [0.18]	-0.18 [0.11]
	UK - BAS	-0.02 [0.39]	-0.49 [0.31]	-0.20 [0.31]	-0.16 [0.31]	-0.02 [0.23]
	UK- Bracken	-0.81* [0.43]	-0.52 [0.34]	-0.38 [0.33]	0.19 [0.33]	-0.23 [0.23]
	US	-0.31 [0.38]	0.26 [0.47]	0.48 [0.58]	0.69 [0.43]	0.33 [0.43]
Age 4-5	Australia	0.11 [0.78]	-0.15 [0.52]	0.26 [0.46]	0.11 [0.46]	0.61 [0.39]
	Canada	0.61 [0.74]	0.81 [0.65]	0.65* [0.40]	-0.14 [0.469]	0.30 [0.481]
	UK - vocabulary	-0.74* [0.38]	-0.51* [0.31]	-0.48 [0.31]	-0.39 [0.29]	0.15 [0.23]
	UK - picture	-0.20 [0.42]	-0.17 [0.34]	0.37 [0.33]	0.24 [0.31]	0.35 [0.25]
	US - language	-0.36 [0.45]	-0.21 [0.51]	0.28 [0.58]	0.04 [0.32]	0.37 [0.36]
	US - communication	-0.37 [0.47]	-0.15 [0.49]	-0.56 [0.54]	0.64* [0.36]	0.84* [0.43]
	US- reading	-0.64* [0.35]	0.04 [0.48]	-0.16 [0.44]	-0.10 [0.36]	-0.12 [0.37]
	US- mathematics	-0.49 [0.41]	-0.27 [0.51]	-0.30 [0.43]	0.39 [0.36]	0.02 [0.35]
	US - vocabulary	-0.69* [0.37]	-0.21 [0.50]	-0.38 [0.50]	0.11 [0.37]	0.26 [0.42]
Kindergarten	US - reading	0.60 [0.49]	0.05 [0.48]	0.14 [0.61]	0.75* [0.43]	1.00*** [0.43]
	US - language	-0.67 [0.54]	-0.71 [0.71]	0.52 [0.61]	0.56 [0.46]	0.68 [0.47]
	US - mathematics	0.03 [0.49]	-0.58 [0.57]	-0.22 [0.56]	0.71* [0.38]	1.64*** [0.41]
Age 6-7	Australia	-0.80 [0.76]	0.09 [0.50]	0.02** [0.47]	-0.59 [0.46]	0.03 [0.40]
	UK - reading	-1.18*** [0.41]	-0.95** [0.34]	-0.59* [0.32]	-0.41 [0.29]	0.09 [0.24]
	UK - maths	-0.90** [0.42]	-0.59* [0.34]	-0.40 [0.34]	0.59** [0.30]	0.14 [0.24]
Age 8-9	Australia	-0.25 [0.86]	0.08 [0.50]	-0.34 [0.49]	-0.64 [0.51]	-0.08 [0.46]
Age 11	Denmark	1.16** [0.44]		-0.04 [0.36]	0.80 [0.64]	0.40 [0.48]

Notes: 1) * p<.10; ** p<.05; ***p<.01

2) The benchmark for early maternal employment is "mothers not in paid work during the child's first year" and for maternal employment at time of survey is "not in paid work"

3) This Table presents estimates from multivariate regressions on cognitive scores at different ages. Although not presented here, estimates belong to models that control for child-related factors (sex; age in months; ethnicity; whether child was born prematurely; weight at birth; and, number of siblings at birth), maternal characteristics (employment during pregnancy; age at child's birth; born outside the country of study; and, post-partum depression), family-related factors (family structure, parental education, family income and, living in publicly subsidised housing), and parenting behaviour measures (duration of breastfeeding; daily reading to children; having regular sleep or meal schedules; and physical punishment).

Conduct and attention problems

61. Tables 3 and 4 present estimates for the relationship between maternal employment and behavioural outcomes (conduct problems and attention problems, respectively). The results represent odds ratio. An odds ratio with a value of one indicates that experiencing behavioural problems is equally likely in both groups, i.e. children in the employment category examined and children whose mothers were not in employment (the omitted category). An odds ratio greater than 1 suggests that experiencing behavioural problems is more likely for children in the category examined than for children in the omitted category. An odds ratio smaller than 1 indicates that experiencing behavioural problems is less likely among children in the category examined than among children in the omitted category. Similarly, only the odds ratios for which there is evidence that the result did not occur by chance – statistically significant- are presented.

62. There is little evidence that conduct problems are more likely amongst children of mothers returning early to work (first section of Table 3.). Only in the United Kingdom is there some evidence that maternal employment by the time the child is 6 months old may have a small negative association with children's behaviour: the odds of experiencing conduct problems are significant only for children aged 5 and 7. By contrast, maternal employment when children are older (second section of Table 3) shows

mixed results across countries. On one hand, Canadian children whose mother is in paid work when they are 4 years old are more likely (1.4 and 1.6 times in part-time and full-time employment, respectively) of experiencing conduct problems than children whose mother is not in employment. On the other, British children whose mother have part-time jobs at the time they are 4-5 and 6-7 have lower odds (0.76 and 0.83, respectively) of experiencing conduct problems than their peers whose mothers are not in employment.

Table 3. Associations between maternal employment (early and at time of survey) and conduct problems.

CONDUCT PROBLEMS		Early maternal employment			Maternal employment at time of survey	
		<6 months in full-time work	<6 months in part-time work	6-11 mths in paid work	Full-time	Part-time
Age 2-3	UK	1.18 [0.14]	1.15 [0.11]	1.10 [0.10]	0.92 [0.09]	0.97 [0.06]
Age 4-5	Australia	1.26 [0.26]	1.12 [0.16]	1.04 [0.13]	1.09 [0.14]	1.13 [0.12]
	Canada	0.87 [0.24]	0.77 [0.20]	0.95 [0.14]	1.63*** [0.24]	1.42*** [0.20]
	UK	1.37* [0.26]	1.42** [0.20]	1.16 [0.17]	0.86 [0.11]	0.76*** [0.07]
	US	1.13 [0.19]	0.96 [0.16]	1.03 [0.19]	1.15 [0.20]	0.98 [0.17]
Kindergarten	US	1.12 [0.22]	1.06 [0.21]	1.08 [0.27]	1.01 [0.15]	0.89 [0.15]
Age 6-7	Australia	1.33 [0.43]	1.32 [0.28]	1.18 [0.26]	1.47* [0.30]	0.89 [0.15]
	Denmark	1.04 [0.17]		0.88 [0.13]	1.01 [0.21]	0.82 [0.13]
	UK	0.96 [0.18]	1.31* [0.18]	1.16 [0.16]	0.97 [0.12]	0.83*** [0.08]
Age 8-9	Australia	0.69 [0.30]	1.21 [0.32]	1.10 [0.29]	1.50 [0.36]	1.07 [0.23]
Age 11	Denmark	0.84 [0.21]		0.78 [0.16]	1.08 [0.34]	0.96 [0.22]

Notes: 1) * p<.10; ** p<.05; ***p<.01

2) The benchmark for early maternal employment is "mothers not in paid work during the child's first year" and for maternal employment at time of survey is "not in paid work"

3) This Table presents estimates from a logistic regression on conduct problems at different ages. Although not presented here, estimates belong to models that control for child-related factors (sex; age in months; ethnicity; whether child was born prematurely; weight at birth; and, number of siblings at birth), maternal characteristics (employment during pregnancy; age at child's birth; born outside the country of study; and, post-partum depression), family-related factors (family structure, parental education, family income and, living in publicly subsidised housing) and parenting behaviour measures (duration of breastfeeding; daily reading to children; having regular sleep or meal schedules; and physical punishment).

63. Likewise, there is little evidence that attention-hyperactivity problems are negatively associated with maternal employment in the first year after childbirth (either full-time by 6 months, part-time by 6 months or in work between 6 and 11 months) (first section of Table 4). In general, results are not significant, except in Canada and the United Kingdom, where results are marginally significant and not observed in all waves of data collection (at ages 4-5 in Canada and at ages 3 and 7 in the United Kingdom). On the other hand, the relationship between maternal employment at the time of survey and attention problems (second section of Table 5) is somewhat different. In the United Kingdom, for example, there is some evidence that children whose mother is in part-time employment at older ages (age 3 and age 7) are less likely to experience attention problems. Similarly, in the United States, maternal part-time employment when children are in Kindergarten is associated with lower odds (0.75) of attention problems. However, this is not the case for full-time employment: children whose mother works full-time when they are in kindergarten are 1.3 times more likely of attention problems than their peers whose mothers are not in employment.

Table 4. Associations between maternal employment (early and at time of survey) and attention/hyperactivity problems.

ATTENTION PROBLEMS		Early maternal employment			Maternal employment at time of survey	
		<6 months in full-time work	<6 months in part-time work	6-11 mths in paid work	Full-time	Part-time
Age 2-3	Canada	1.24 [0.53]	0.59 [0.58]	1.00 [0.23]	1.00 [0.28]	0.80 [0.22]
	UK	1.23 [0.21]	1.15 [0.15]	1.25* [0.16]	0.70*** [0.09]	0.78*** [0.07]
Age 4-5	Australia	1.21 [0.50]	1.21 [0.30]	0.91 [0.23]	1.09 [0.14]	1.13 [0.12]
	Canada	1.48 [0.54]	2.2** [0.69]	1.10 [0.24]	1.63 [0.29]	1.42 [0.26]
	UK	1.18 [0.20]	1.11 [0.15]	1.02 [0.14]	0.94 [0.12]	0.91 [0.08]
	US	0.98 [0.14]	1.03 [0.17]	1.13 [0.23]	0.95 [0.10]	0.85 [0.12]
Kindergarten	US	1.18 [0.26]	0.75 [0.20]	0.94 [0.21]	1.30*** [0.16]	0.75** [0.11]
Age 6-7	Australia	1.56 [0.51]	1.42 [0.36]	1.30 [0.29]	1.11 [0.26]	0.99 [0.19]
	Denmark	0.98 [0.17]		1.07 [0.15]	0.87 [0.21]	1.03 [0.17]
	UK	1.19 [0.18]	1.23* [0.15]	1.06 [0.13]	0.89 [0.09]	0.75*** [0.06]
Age 8-9	Australia	0.78 [0.34]	0.91 [0.25]	1.44 [0.39]	1.38 [0.39]	1.18 [0.29]
Age 11	Denmark	0.99 [0.20]		0.87 [0.15]	0.88 [0.24]	0.88 [0.17]

Notes: 1) * p<.10; ** p<.05; ***p<.01

2) The benchmark for early maternal employment is "mothers not in paid work during the child's first year" and for maternal employment at time of survey is "not in paid work"

3) This Table presents estimates from multivariate logistic regression on attention/hyperactivity problems at different ages. Although not presented here, estimates belong to models that control for child-related factors (sex; age in months; ethnicity; whether child was born prematurely; weight at birth; and, number of siblings at birth), maternal characteristics (employment during pregnancy; age at child's birth; born outside the country of study; and, post-partum depression), family-related factors (family structure, parental education, family income and, living in publicly subsidised housing), and parenting behaviour measures (duration of breastfeeding; daily reading to children; having regular sleep or meal schedules; and physical punishment).

Participation in formal and informal childcare

64. It was not possible to control for quality of care because not all cohort studies collect this information. This is an important gap because good (bad) quality of care arrangements is likely to affect the relationship between maternal employment and child outcomes. However, a consistent finding among studies that control for quality of services is that high-quality care is important for children's cognitive and social development, though the size of the association varies across studies (Waldfogel, 2002; Langlois and Liben, 2003 and, Vandell *et al.*, 2010).

65. Child-care arrangements are an important factor in considering children's cognitive and behavioural outcomes. Participation in formal care does not seem to have a negative effect on cognitive development. In fact, formal childcare participation seems to have a positive and statistically significant association with cognitive scores in the United Kingdom and the United States (for some age-groups). However, associations are small and non-significant in Australia, Canada or Denmark. As for the intensity of participation in formal care, there is no clear pattern showing larger effects for either short or long hours care.

66. The evidence also suggests that informal care during infancy is not necessarily negatively related with child cognitive outcomes. For example, in Australia children in informal care had somewhat higher scores on cognitive outcomes than children who were mainly cared for by their parents. Grandparents are the most common provider of childcare in Australia when children are young. However, children being

looked after grandparents tend to spend fewer hours per week in care than children in formal childcare (Gray *et al.*, 2005). It is possible that the result observed is related with intensity-of-care effect.

Child outcomes for different population groups

67. The relationship between maternal employment and child outcomes may differ across family types and families with different overall levels of parental education attainment. However, linkages between early maternal employment and child outcomes do not appear to differ within groups of family types in Australia and Denmark. By contrast, there are some differences in results for Canada, the United Kingdom and the United States.

68. In general, outcomes of children in intact families are more likely to be negatively related with early maternal employment than children in sole-parent families (Table A2.1). Early maternal employment is also negatively associated with cognitive scores of children of parents with high educational attainment in the United Kingdom and the United States, and it is positively linked with behavioural problems amongst children whose parents have high levels of educational attainment (Table A2.2). In general, the size of the associations is modest for both behavioural outcomes and small for cognitive scores. These findings are in line with recent studies on American and British children (Joshi *et al.*, 2009 and Brooks-Gunn *et al.*, 2010).

Other factors which affect cognitive outcomes

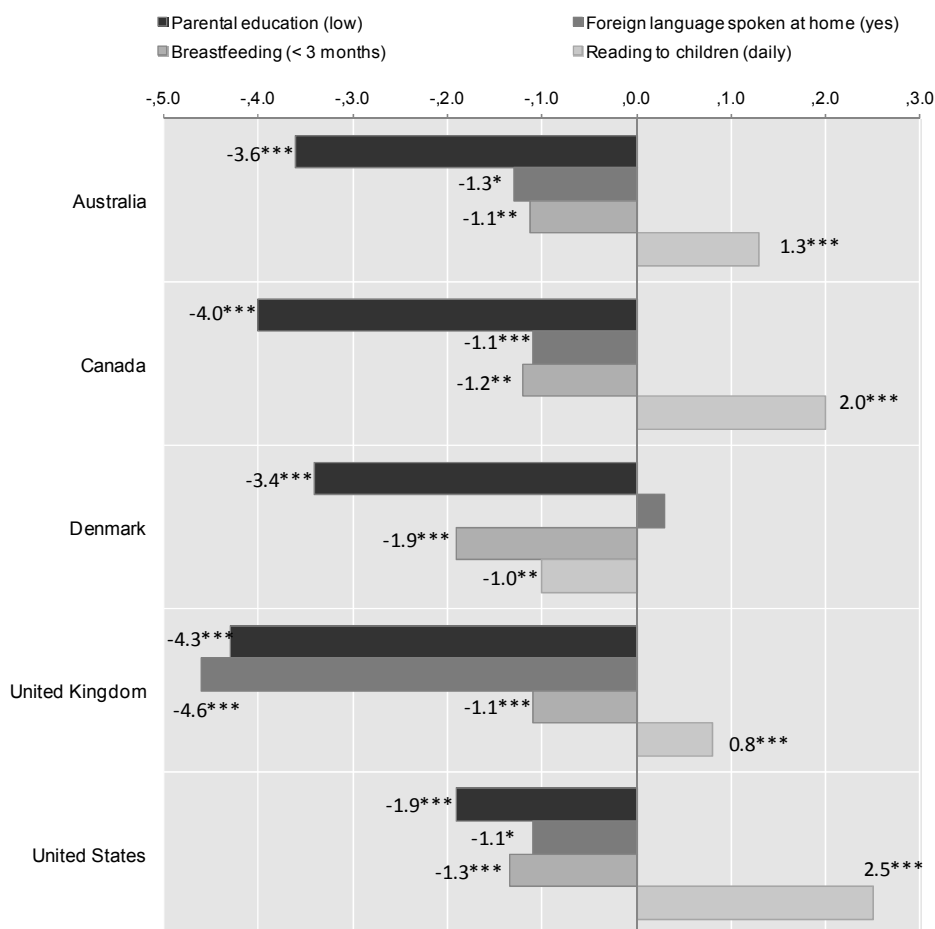
69. Other individual and family characteristics included in the model specifications appear to be more important predictors of child outcomes than maternal employment, although some of these factors could themselves be affected by maternal employment. Factors with stronger associations than maternal employment include gender, ethnicity, parental education, family's economic circumstances, maternal depression (for behavioural outcomes) and some parenting activities (breastfeeding duration and reading). Chart 6 shows that parental education is significantly associated with children's cognitive performance: on average, children whose parents had low levels of education obtained significantly lower test scores (a reduction between 4.3 and 1.8 standard deviations) than children whose parents had high educational levels. Speaking a foreign language at home is also negatively related to children's cognitive scores, except in Denmark. However, scores for Danish children were measured at a later age (age 11) than elsewhere, and older children will have had more time to catch up with their native peers.

70. Chart 6 also shows that parenting activities such as breastfeeding and reading daily to children have a positive influence on children's cognitive development. The importance of parenting activities is in line with other studies. For example, Belsky *et al.*, (2007) observed that parenting is a stronger and more consistent predictor of child development until at least age 12 (sixth grade) than early childcare experiences. It is possible that maternal employment shows a relatively small association with child outcomes because when mothers are in work this association is offset by fewer mother-child interactions (Nomaguchi, 2006).

71. The growing evidence of the crucial role of parenting activities supports policies that promote family involvement in child development. Denmark, for example, strongly supports parental involvement in the development and supervision of childcare services. Parents' participation thus contributes to making sure the quality centres is of high standard.

Chart 6. Background characteristics play an important role on children's cognitive outcomes, around early 2000s

Cognitive scores (omitted category: not in paid work in child's first 12 months of life)^{1,2}



Note: * p<.10; ** p<.05; ***p<.01.

1. Estimates presented here were drawn from multivariate regressions on cognitive scores at age 4-5. Although not presented here, estimates belong to models that control for child-related factors, maternal characteristics and family-related variables.

2. Coefficients for parental education here refer to children whose parents had low levels of education compared with children with parents in the high level category. Coefficients for foreign language spoken at home refer to children who spoke a foreign language at home compared with children who did not. Coefficients for breastfeeding refer to children who were breastfed for less than three months compared with children who were breastfed for six months or more. Coefficients for daily reading refer to children whose parents read to them daily compared with those of children who were read in a more sporadic basis. In Denmark, the latter variable is talking with children. This is because the sample concerns children at age 11.

Robustness test

72. A robustness test was carried out to examine whether the association of maternal employment with child cognitive and behavioural outcomes changes once the model accounts only for characteristics measured closed to the time of birth. The reason for running this test is that some of the factors in the model might themselves be affected by maternal employment, in ways that might be associated with better or worse child outcomes. For example, mothers who return to work earlier will be more likely to have higher incomes, and a higher family income is likely to be positively associated with child outcomes.

Hence, models that control only for factors that cannot be affected by maternal employment after childbirth were estimated. These tests were run with data for the United Kingdom and United States only because these were the countries which showed a statistically significant association between early maternal employment and child outcomes. The models were estimated for both cognitive and behavioural outcomes for all ages under study.

73. Tables 5 presents the results of the robustness test ran for cognitive scores. Estimates for the United Kingdom suggest a somewhat larger association between maternal employment and cognitive development once the models control for a reduced number of factors. In general, the size of the coefficients is slightly larger and the level of statistical significance is higher (at or above 5%). For example, at age 3 children whose mothers were in full-time work by 6 months had a reduction of 1.49 standard deviations on their readiness to school (“Bracken scores” (Bracken, 2002)). This compares with a reduction of 0.81 standard deviations when models were estimated with the more comprehensive model. Despite these differences, the size of the coefficients remains small and the overall conclusion is the same: maternal employment by 6 months, especially full-time, is negatively related with some but not all cognitive outcomes, small negative effects are observed at ages 3, 5 and 7.

Table 5. Robustness test for maternal employment (early and at time of survey) and cognitive scores.

COGNITIVE SCORES		Early maternal employment			Maternal employment at time of survey	
		<6 months in full-time work	<6 months in part-time work	6-11 mths in paid work	Full-time	Part-time
Age 2-3	UK - BAS	-0.42 [0.40]	-0.59* [0.30]	-0.33 [0.29]	0.14 [0.33]	0.35 [0.25]
	UK - Bracken	-1.49*** [0.39]	-0.79*** [0.30]	-0.61** [0.29]	0.77** [0.32]	0.39* [0.23]
	US	0.10 [0.36]	0.71 [0.47]	1.05* [0.61]	1.03** [0.37]	0.52 [0.45]
Age 4-5	UK - vocabulary	-0.88** [0.34]	-0.33 [0.27]	-0.41 [0.27]	0.16 [0.28]	0.55** [0.22]
	UK - picture	0.16 [0.37]	0.10 [0.31]	0.89*** [0.33]	0.76** [0.30]	0.58** [0.24]
	US - language	-0.10 [0.43]	0.15 [0.46]	0.63 [0.58]	0.37 [0.30]	0.49 [0.39]
	US - communication	-0.26 [0.36]	0.06 [0.43]	-0.12 [0.50]	0.97*** [0.38]	1.04** [0.43]
	US - reading	-0.59* [0.32]	0.19 [0.50]	0.17 [0.47]	0.31 [0.35]	0.06 [0.38]
	US - mathematics	-0.21 [0.35]	0.20 [0.48]	0.31 [0.45]	0.99*** [0.35]	0.33 [0.37]
Kindergarten	US - vocabulary	-0.76** [0.32]	-0.19 [0.48]	-0.18 [0.50]	0.11 [0.33]	0.21 [0.43]
	US - reading	0.02 [0.48]	-0.26 [0.45]	0.12 [0.62]	0.78** [0.38]	1.13*** [0.44]
	US - language	-0.21 [0.44]	-0.52 [0.60]	0.91 [0.60]	0.78** [0.37]	0.76 [0.49]
Age 6-7	US - mathematics	-0.26 [0.45]	-0.68 [0.54]	-0.04 [0.51]	0.97** [0.37]	1.87*** [0.41]
	UK - reading	-1.40*** [0.37]	-0.87*** [0.30]	-0.52* [0.28]	0.47* [0.28]	0.57** [0.24]
	UK - maths	-0.73** [0.38]	-0.40 [0.30]	-0.10 [0.29]	0.92*** [0.29]	0.26 [0.24]

Notes: 1) * p<.10; ** p<.05; ***p<.01

2) The benchmark for early maternal employment is "mothers not in paid work during the child’s first year” and for maternal employment at time of survey is “not in paid work”.

3) This Table presents estimates from multivariate regressions on cognitive scores for models that control for child-related factors at birth (sex; age in months; ethnicity; whether child was born prematurely; weight at birth; and, number of siblings at birth), maternal characteristics (employment during pregnancy; age at child’s birth; born outside the country of study), and family-related factors (family structure at birth, parental education at 9 months, family income at birth and, living in publicly subsidised housing at birth).

74. Results for the United States remain pretty much unchanged: children whose mothers were in full-time work by 6 months had slightly lower cognitive scores than children whose mothers were not in work by the time they were one year old. However, once again, estimates were only statistically significant at pre-school (ages 4-5), for two (vocabulary and reading) out of 5 cognitive tests.

75. Results from the robustness test for maternal employment at time of survey confirm previous findings. Children in both the United Kingdom and the United States whose mother was in work from the time they were 2-3 years old showed moderately higher cognitive scores than children whose mother was

not in paid work. The main difference with previous models is that estimates from these models are highly significant (at least at 5% level) for the majority of the cognitive tests.

76. Table 6 shows results of the robustness test for behavioural problems. In general, these estimates suggest a slightly stronger association between early maternal employment and children's behavioural adjustment than models controlling also for post-birth factors. Maternal employment by 6 months was associated with somewhat higher odds of conduct problems in the United Kingdom not only at age 5 as mentioned above but also at ages 3 and 7. In addition, in the United States, full-time employment by 6 months is associated with higher odds of conduct problems for children aged 4-5. However, once again these associations are in general marginally significant. Hence, the overall conclusions do not change much.

Table 6. Robustness test for maternal employment (early and at time of survey) and behavioural problems.

BEHAVIOUR PROBLEMS		Early maternal Employment			Maternal employment at time of survey	
		<6 months in full-time work	<6 months in part-time work	6-11 mths in paid work	Full-time	Part-time
Age 2-3	UK- conduct	1.24* [0.14]	1.09 [0.09]	1.08 [0.09]	0.84* [0.08]	0.91 [0.06]
	UK- attention	1.23 [0.20]	1.07 [0.13]	1.14 [0.14]	0.70*** [0.09]	0.81** [0.08]
Age 4-5	UK- conduct	1.38* [0.24]	1.33** [0.17]	1.08 [0.14]	0.79* [0.10]	0.74*** [0.07]
	UK- attention	1.22 [0.19]	1.06 [0.13]	0.95 [0.12]	0.88 [0.11]	0.88 [0.08]
	US - conduct	1.29* [0.17]	1.03 [0.16]	1.05 [0.17]	0.83* [0.09]	0.74** [0.10]
	US -attention	1.11 [0.13]	1.05 [0.15]	1.11 [0.21]	0.92 [0.09]	0.80 [0.12]
Kindergarten	US - conduct	1.21 [0.20]	1.06 [0.20]	1.08 [0.24]	0.94 [0.14]	0.78 [0.13]
	US -attention	1.14 [0.18]	0.88 [0.18]	1.05 [0.21]	1.20 [0.16]	0.68** [0.11]
Age 6-7	UK- conduct	0.97 [0.16]	1.26* [0.15]	1.14 [0.14]	0.80** [0.09]	0.73*** [0.07]
	UK- attention	1.25* [0.17]	1.19* [0.13]	1.05 [0.11]	0.88 [0.09]	0.72*** [0.06]

Notes: 1) * p<.10; ** p<.05; ***p<.01

2) The benchmark for early maternal employment is "mothers not in paid work during the child's first year" and for maternal employment at time of survey is "not in paid work".

3) This Table presents estimates from multivariate logistic regression on behavioural problems for models that control for child-related factors (sex; age in months; ethnicity; whether child was born prematurely; weight at birth; and, number of siblings at birth), maternal characteristics (employment during pregnancy; age at child's birth; born outside the country of study), and family-related factors (family structure at birth, parental education at 9 months, family income at birth and, living in publicly subsidised housing at birth).

4. Conclusions

77. Parental employment is essential to reducing income poverty risks. However, there have long been concerns that parental employment when children are very young may have negative effects on child development. This first cross-national study of longitudinal data on this issue shows that mothers' return to work within six months after childbirth may be negatively related to children's cognitive outcomes, especially if employment is on a full-time basis, but the association is small and not universally observed.

78. The relationship between maternal employment and behavioural outcomes varies across countries. British children whose mothers were back to work by the time they were 6 months old (either full-time or part-time) were more likely to experience conduct problems. However, in other countries this relationship was not significant. As for attention problems, only Canadian children at age 5 showed higher chances of experiencing this kind of problem if their mother was in part-time employment by 6 months. For other countries, no consistent pattern emerged.

79. Maternal employment after infancy shows a weak but if anything positive association with children's cognitive scores, particularly if this is on a part-time basis. In addition, part-time employment after infancy may have a positive effect on children's behavioural outcomes. However, this is not necessarily the case in all countries.

80. The small negative associations of early maternal employment with children's outcomes are largely observed among children in intact families or in families with parents with high levels of education. Children in these families are more likely to have parents who engage in stimulating parenting activities. Hence, they have more to lose when parents are in paid work than children from less advantaged backgrounds. On average, parents with low levels of educational attainment are less likely to engage in such parenting activities and the smaller negative relationship between maternal return to work and children's outcomes in such households is more likely to be counter-balanced by the positive association of maternal employment with maternal income and formal childcare participation.

81. Formal childcare and pre-school participation generally is positively associated with cognitive development of children, but in some countries it is negatively related with behavioural outcomes. These associations are generally small but can be long-lasting; as they persist into compulsory education.

82. The evidence also suggests that maternal employment is only one of many factors influencing child development, and by no means the most relevant. Both formal childcare participation and parenting activities are often more significant than maternal employment in determining cognitive and behavioural outcomes of children. The evidence here suggests that the impact of maternal employment on kids varies with the institutional arrangements -- the degree and quality of support -- of each country. This emphasizes the importance of investing in good-quality childcare and promoting parenting activities that contribute to child development. Many OECD countries have implemented work-family policies as a means to providing parents with more options for finding a good family-work balance. In doing so, they contribute to promoting the well-being of families and children.

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ANNEX 1: BACKGROUND INFORMATION ON COHORT STUDIES

1. Data

Data for **Australia** have been taken from *Growing Up in Australia: The Longitudinal Study of Australian Children*. This study follows two cohorts of children. The analysis here uses data of one cohort only: children born between March 1999 and February 2000 (K cohort). This cohort has been followed up at three waves of data collection: 1) in 2004, when children were aged 4 to 5; 2) in 2006, when children were aged 6 to 7; and 3) in 2008, when children were aged 8 to 9. The sample was limited to children in couple-parent or sole mother families, excluding a small number of families (children living in single father families or in families headed by persons other than parents). The sample size is around 4 000 children.

Table A1.1 Sample sizes by wave of data collection

	At age 4-5 years (wave 1)	At age 6-7 years (wave 2)	At age 8-9 years (wave 3)
Sample size total	4 924	4 404	4 258
With learning outcome index	4 873	4 383	4 227
With SDQ measures	4 911	4 284	3 742

Data for **Canada** come from the *National Longitudinal Survey of Children and Youth* (NLSCY). This is a long running longitudinal study of children and youth in the 10 Canadian provinces. The first data collection occurred in 1994/95 (Cycle 1). Here information of two cohorts are considered: 1) children aged 0-1 years by 31st December 2000 (first introduced in Cycle 4), and 2) children aged 0-1 years by 31st December 2002 (first introduced in Cycle 5). Cohorts have been followed every two years: at ages 2-3, ages 4-5 and ages 6-7 (only available for cohort first introduced in Cycle 4). The sample size of the two cohorts combined is of around 7 000 children. A top-up sample has also been added in some cycles to account for drop outs.

Table A1.2 Sample details by wave of data collection

Age (years)	0-1 Cycle 4	2-3. Cycle 5	4-5. Cycle 6	6-7. Cycle 7
Cohort 1				
Original Sample	4008	3475	2974	2882
Top Up (Added in C6)	-	-	558	558

Age (years)	0-1 Cycle 5	2-3. Cycle 6	4-5. Cycle 7
Cohort 2			
Original Sample	3252	2866	2740
Top Up (Added in C6)	-	610	610
Top Up (Added in C7)	-	-	265

Data for **Denmark** have been taken from the *Danish Longitudinal Survey of Children* (DALSC). This is a representative sample of Danish children, all born within 6 weeks in the fall of 1995. The sample size of DALSC is of around 6 000 children. This cohort has been followed up during four sweeps of data collection: 1) in 1996, when babies were about 6 months old; 2) in 1999, when children were about 3½ years old; 3) in 2003, when children were about 7½ years old; and 4) in 2007, when children were about 11 years old. Survey data has been merged with information from administrative registers at Statistics Denmark. The information used here comes from all four waves as well as from registers. For example, parental education, household income and household tenure come from the registers.

The sample sizes per wave of analysis are the following: DALSC at age 3 – 4 456 children; DALSC at age 7 – 4 418 children; and, DALSC at age 11 – 4 253 children.

However, these sample sizes are further reduced because only cases with complete information on the outcome variables are examined. Missing values are controlled for all explanatory variables by including a dummy variable when missing. The DALSC is representative and not stratified, hence sampling weights have not been used.

Data for the **United Kingdom** come from the *Millennium Cohort Study* (MCS). This is a multi-disciplinary survey of children born in the four constituent countries of the United Kingdom between September 2000 and November 2001. The first sweep was carried out at age 9 months and contained information on 18,819 babies. Successive interviews have been conducted at ages 3, 5 and 7. The information collected at these surveys was gathered from face to face interviews to parents and from cognitive tests administered to cohort members. Full details on the survey, its origins, objectives, sampling and content of the surveys are contained in the documentation attached to the data deposited with the UK Data Archive at Essex University (UK Data Archive, 2004, 2006, 2008 and 2010).

The analysis was restricted to one child per household, twins and triplets were not included (267 children). The response rates at waves 2, 3 and 4 were around 80% (84%, 82% and 75%, respectively). The working sample is somewhat smaller because we restrict our analysis to information of children with complete information in cognitive or behavioural assessments. These restrictions lead to a working sample of not less than 12 500 children. Given the stratified nature of the sample, we used sampling weights in all the analyses.

Finally, the **United States** data come from the *Early Childhood Longitudinal Study* (ECLS) program. ECLS gathers nationally representative data of three longitudinal samples of children. Here the analysis considers data of the Birth Cohort (ECLS-B), a sample of 10 700 children born in 2001 who were followed up when they were 9 months old (2001-02), 2 years old (2003-2004), 4 years old (2005-06) and while in kindergarten (fall of 2006 or fall of 2007). The sample analysed here excludes multiple births (e.g., twins and triplets). Of the children sampled at baseline, 9 050 were included into our analysis at wave one. The wave two sample, following up parents and children when the child was two years old, consists of 8 300 children. The wave three (preschool) assessment of children and surveys of their parents were carried out when the children approximately 4 years old and contained data on 7 550 children. The final kindergarten wave of assessments and surveys were conducted from fall 2006 through spring 2007. Approximately 75% of the children who entered kindergarten in fall 2006 were eligible for the 2006 assessment while the rest of the children, who entered kindergarten in 2007, were included in the 2007 assessment. Because the kindergarten wave was separately measured in 2006 and in 2007, we created the fourth wave by compiling cases of the 2006 and 2007 assessments. The total number of children in the kindergarten wave was 5 450. In our analysis, these sample sizes are further reduced because we only include cases that had complete information on the outcome variables.

2. Measurement of variables

This section describes the measurement of the main variables used in the analysis. The selection of variables was done by trying to include items that were available in all surveys. In a second stage, the construction of variables was done following a similar methodology. However, it was not always possible to use the exact same set of variables. Below is a detailed description of the outcome variables as well as of those items with some discrepancies between countries

2.1 Cognitive outcome measures

Cognitive outcomes were assessed using the following measures:

Australia

Learning/Academic Outcome Index - this index incorporates measures of language and literacy with items varying according to children's age:

- Wave 1: Australian Council for Educational Research (ACER) Who Am I?; Peabody Picture Vocabulary Test (PPVT); Teacher-rated numeracy
- Waves 2 and 3: PPVT; Wechsler Intelligence Scale for Children (WISC); Matrix Reasoning subscale; Academic Rating Scale (ARS); Language and Literacy; and, Mathematical Thinking.

These indices were standardised to a mean of 100 and a standard deviation of 10, with higher scores denoting better child outcomes.

Canada

Picture Peabody Vocabulary Test (PPVT) – this test is designed to measure the receptive or hearing vocabulary of a child aged 4-5 years. In this assessment, the child is shown pictures on an easel and is asked to identify the picture that best represents the meaning of the word read out by the interviewer.

Denmark

Children's Problem Solving test (CHIPS) – this is a multiple choice test of cognitive skills consisting of 40 question. It is a non-math test that asks children to choose among a range of possible figures to complete a logical sequence.

United Kingdom

Bracken Basic Concept Scale (BBCS) - at the three-year-old interview, children's cognitive development was assessed via six tests of the BBCS which assessed comprehension of colours, letters, numbers, sizes, comparisons of objects and shapes. These provide an indication of the child's readiness for formal schooling (Bracken, 2002).

British Ability Scale (BAS) naming vocabulary– at ages 3 and 5, children were assessed using a subtest of the BAS that included a Naming Vocabulary test. This test consists of a booklet with pictures of objects which the child is asked to name. The assessment is used to evaluate children's spoken vocabulary. At age 7, children were given a BAS reading test that examines children's reading ability.

BAS Picture Similarity – at age 5, children were asked to identify from a set of pictures the one that looks more similar (similar element or concept). This test is also used to evaluate children's non-verbal reasoning ability.

BAS Word Reading – at age 7, children were asked to read aloud a series of words presented on a card. This test is used to evaluate children's reading ability on single word recognition.

NFER progress in maths- at age 7, cohort members were given a test by the National Foundation for Educational Research that provides a diagnostic of individuals' strengths and weaknesses in mathematics.

United States

The Bayley Short Form – Research Edition (BSF-R)

This is a standardized measure for developmental status of children from birth to 42 months old. The mental scale of BSF-R is composed of 19 items to measure children's cognitive development, including memory, means-end behaviour, exploratory competence, and communication (Nord et al., 2006). The ECLS-B 2-year data file provides the total scale scores. Total scores were standardised by converting them into z-scores. Higher scores indicate higher cognitive development. The mean value of the standardised BSF-R score at age 2 is 101.6 (SD = 9.6).

Early reading

The early reading assessment at preschool (age 4) originally included several items to measure language and literacy skills. However, the final dataset provides one unidimensional assessment at both preschool (age 4) and kindergarten (age 5-6) that represents various language-based items. These include receptive language, Peabody Picture Vocabulary Test (PPVT) items and literacy items (Snow et al., 2009). The scores were standardised. The mean scores of the early reading assessment are 99.8 (SD = 9.6) in the preschool wave and 99.5 (SD = 9.6) in the kindergarten wave.

Expressive language

The expressive language assessment was measured by using the Let's Tell Stories subset of PreLAS. To measure expressive language the field interviewer read two stories to the child, recorded the child's response and scored the response with a range from 0 to 5 (Snow et al., 2007). The ECLS-B data set provides the average score across both stories, and these were standardized. The mean of the expressive language score for the preschool wave is 100.6 (SD = 9.9), and 100.5 (SD = 9.8) for the kindergarten wave.

Vocabulary growth

The MacArthur Communicative Development Inventory (M-CDI) was used to measure children's vocabulary at the preschool wave. Parent respondents reported whether their children could say the target 25 words (Snow et al., 2007). The vocabulary growth variable was constructed by adding up the 25 items and standardising the total score. The total score has a high degree of reliability (alpha = .77), and yields a mean score of 100.9 (SD = 9.6).

Communication skills

The measure for children's communication skills was based on Leventhal's (1998) study. Parent respondents answered 6 items relevant to their children's general communication skills (Snow et al., 2007). The communication skill scale for the preschool wave was constructed by adding the 6 items and standardizing the summed score. The mean of the standardized score is 100.9 (SD = 9.4) and the scale has a moderately high degree of reliability (alpha = .69).

Mathematics

The mathematics measure administered at the preschool and kindergarten waves included the following items: counting, number sense, properties and operations (Snow *et al.*, 2007; Snow *et al.*, 2009). The scores were standardised. The mean score of the mathematics scale is 100.0 (SD = 9.6) for the preschool wave and 99.9 (SD = 9.7) for the kindergarten wave.

Table A1.3: An overview of cognitive outcome measures

Australia ¹	Canada	Denmark	United Kingdom	United States
			Age 3 -Bracken Basic Concept Scale (child's readiness for formal schooling); - British Ability Scale (naming vocabulary)	Age 2 - Bayley Short Form-Research Edition(cognitive development)
Age 4-5 Learning outcome index: -Australian Council for Educational Research (ACER) Who Am I?; - Peabody Picture Vocabulary Test	Age 4-5 -Peabody Picture Vocabulary Test		Age 5 -British Ability Scale (naming vocabulary); - Pattern construction and picture similarity.	Age 4 -early reading; -language development; -mathematics; -vocabulary; -communication skills.
Age 6-7 Learning outcome index: - Peabody Picture Vocabulary Test; -Wechsler intelligence scale (matrix reasoning subscale); -Academic Rating Scale (language, literacy, and mathematics).			Age 7 -British Ability Scale (word reading); - NFER progress in maths (numeracy test)	Age 5-6 -early reading; -language development; -mathematics.
Age 8-9 Learning outcome index: - Peabody Picture Vocabulary Test; -Wechsler intelligence scale (matrix reasoning subscale); -Academic Rating Scale (language, literacy, and mathematics).		Age 11 -Children's Problem Solving test (CHIPS)		

Notes: 1) Australia calculates a learning outcome index that incorporates measures of language and literacy, which varies according to age. For further information, refer to Misson *et al.*, (in press).

2.2 Behavioural outcome measures

Two measures of behavioural problems are examined: conduct problems and attention (or hyperactivity) problems. Both were examined using parental reports on children's behaviour. In most of the surveys considered here, the instrument used to examine these aspects of child development is the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997), a 25 item behavioural screening questionnaire. The conduct problems dimension includes reports on whether the child: (a) frequently fights with other children, (b) often has temper tantrums, (c) is often disobedient, (d) is often argumentative and (e) is often spiteful. Similarly, the variable measuring inattention problems uses reports on whether the child: (a) is squirmy or fidgety, (b) cannot settle down to anything, (c) is very restless, (d) is easily distracted and (e) doesn't stop to think and doesn't finish task. Each attribute was rated by parents using a

scale from 0 to 2 (not true, somewhat true, and certainly true). Responses were added to obtain a total score for each dimension, with higher scores indicating more problems. Total scores of each dimension were then converted into binary variables, considering cut-off points recommended by Goodman (Goodman 1997): 4 or more on the conduct problem scale and 7 or more on the attention-hyperactivity scale. These variables take a value of 1 if cohort members have high scores of conduct or attention issues.

Danish data on behavioural adjustment (conduct and attention-hyperactivity measures) at ages 7 and 11 were constructed using information from the SDQ questionnaire, which was answered by the mother.

Data for the United States was classified differently: children with behavioural scores located at the top 15% of the distribution of the total score were considered as having conduct or attention problems. The classification was done differently as the US data did not include exactly the same items as those in the SDQ. Previous research by Waldfogel using ECLS-B has shown that the top 15% of scores represents high levels of behaviour problems. The conduct problems measure included five items asked of parents about the following socio-emotional behaviours: (a) temper tantrums, (b) aggressiveness, (c) annoyance, (d) destructiveness and (e) angry behaviours. The conduct problem measure was constructed by taking the sum of parents' report of the 5 items. The attention/hyperactivity measure included the following items: 1) "child acts impulsively without thinking", 2) "child keeps working until finished" (reverse coded), 3) "child pays attention well" (reverse coded), and 4) "child is overly active" with a 5-point Likert scale (1 = "never" to 5 = "very often"). Two additional questions were asked of the teacher – "child had difficulty concentrating or staying on task" and "child is restless and fidgety." Likewise, children with the top 15% of the total scores were categorized as having hyperactivity or inattention problems.

2.3 Maternal depression

Australia: Based on K6 assessment of mental health (Kessler *et al.*, 2002) (6 items, scored from 0 to 4)—scores averaged and rescaled, so higher scores represent better mental health. The measure then has a range of 1 to 5, and is entered as a continuous variable.

Canada: Depression level was gauged through a scale that was administered to the Person Most Knowledgeable (PMK) as part of the parent questionnaire. The 12 questions for this scale are a shorter version of the depression scale (CES-D), comprising 20 questions, developed by L. S. Radloff of the Epidemiology Study Center of the National Institute of Mental Health in the United States.

Denmark: Depression - with a value of 1 if been hospitalized due to psychiatric problems or seen psychologist/psychiatrist since the last wave.

United Kingdom: The questionnaire includes several measures to examine maternal depression. Here we included a variable where mothers were asked if they had ever being diagnosed as depressed by a doctor.

United States: The Center for Epidemiological Studies - Depression Scale (CES-D) was used to measure maternal depression. The CES-D scale includes 12 items asking about mothers' depression symptoms. Four responses were provided for each of the 12 items: "rarely or never" (with a value of 0), "some or little" (with a value of 1), "occasionally or moderate" (with a value of 2), and "most or all" (with a value of 3). These answers were added up to obtain the total score for the depressive symptoms that ranged from 0 to 36. Following the CES-D categorization, respondents with scores equal to or less than 4 were considered as having no depressive symptoms, those with scores ranging between 5 and 9 were considered as having mild depressive symptoms, those with scores ranging from 10 to 14 were considered to having moderate depressive symptom, and those with scores equal to 15 or higher were considered to having severely depressive symptom. A binary variable was created with a value of 1 if the total score was

equal to or higher than 5 and 0 otherwise. Because the ECLS-B does not provide this information at wave 2 (assessment point of 2-year-old), the depression variable for wave 2 was constructed by taking the average of the scores from the 9-month and the preschool waves' total scores.

2.4 Parental education

Parental education was constructed using the highest degree of either mother's or father's (if present) education and classified into three categories: low (below secondary education: ISCED 0 to 2), medium (secondary education: ISCED 3 to 4) and high (tertiary education and above: ISCED 5 to 6). In Denmark, the low parental educational category included elementary and high school, the medium category vocational and short post-secondary, and the high category medium and long post-secondary.

2.5 Family income

Household income at each of the assessments was converted into a categorical variable by converting the equivalised income into quartiles. In the case of the UK, household's income was asked using banded categories in waves two and three. Thus, it was not possible to divide the sample into quartiles. For this reason, at these waves of data collection, banded responses were grouped into four categories. At wave 2: (a) "£0 - £11 000", (b) "£11 000.01 - £22 000" (c) £22 000.01 - £33 000 and (d) £33 000.01 or more. At wave 3: a) "£0 - £10400", (b) "£10400.01 - £20 800" (c) £20 800.01 - £31 200 and (d) £31 200.01 or more. Grouping varies as questions changed across assessments.

2.6 Parenting activities

This set of variables was collected using different measures across countries. However, the models for each country control for at least two parenting behaviours. In the case of Australia, the measures incorporated in the analysis include daily reading to the child, consistent parenting (making sure child follows instructions, punishing for not obeying, frequency with which child gets away without being punished, frequency with which child ignores punishment), and angry parenting (frequency with which parent gets angry when punishing child, frequency with which parent has problems managing child, frequency with which parent tells child is bad or not as good as others). Canadian data included two parenting activities: reading and taking the child to the park on a daily basis. For Denmark, two parenting measures were included in the analysis: talking daily to the child about the child's activities (whether school or childcare, friends, teachers) and physical upbringing (use of physical methods (like smacking)). For the UK analysis, the parenting activities considered: were reading daily to the child, regular bed times (child always go to bed at same time) and never using corporal punishment (smacking). The US data incorporated daily reading a book daily to the child, regular bed times (if child always goes to bed at the same time) and never using physical punishment (spanking).

Table A1.4: Descriptive statistics - outcome measures

Australia		Age 4-5	Age 6-7	Age 8-9
Cognitive outcomes				
Learning outcome index	mean	100.5 (0.1)	100.9 (0.1)	101.0 (0.1)
Behavioural outcomes				
Conduct problems	%	27.9	9.4	8.7
Inattention /hyperactivity	%	5.7	5.8	5.6

Canada		Age 2-3	Age 4-5	Age 6-7
Cognitive outcomes				
PPVT vocabulary test	mean	100.1		
Behavioural outcomes				
Conduct problems	%	-	14.4	10.8
Inattention /hyperactivity	%	4.9	5.3	8.0

Denmark		Age 7	Age 11
Cognitive outcomes			
Children's Problem Solving	mean		100.2
Behavioural outcomes			
Conduct problems	%	7.9	3.9
Inattention /hyperactivity	%	7.7	5.8

United Kingdom		Age 3	Age 5	Age 7
Cognitive outcomes				
Bracken school readiness	mean	101.1 (0.1)		
BAS naming vocabulary	mean	101.0 (0.1)	101.2 (0.1)	
BAS picture similarity	mean		100.1(0.1)	
BAS word reading	mean			100.9(0.1)
Mathematics	mean			100.6 (0.1)
Behavioural outcomes				
Conduct problems	%	30.0	8.5	9.2
Inattention /hyperactivity	%	13.4	9.8	12.3

United States		Age 2	At preschool	At kindergarten
Cognitive outcomes				
Bayley Short Form-Research E	mean	101.5 (0.2)		
Early reading	mean		99.8 (0.2)	99.8 (0.3)
Language development	mean		100.6 (0.2)	100.7 (0.2)
Mathematics	mean		100.0 (0.3)	100.2 (0.2)
Vocabulary growth	mean		100.9 (0.3)	
Communication skill	mean		100.8 (0.2)	
Behavioural outcomes				
Conduct problems	%		15.9	13.8
Inattention/Hyperactivity	%		16.0	12.9

Table A1.5: Descriptive statistics – ‘Focal’ Variables

Focal variables	Australia			Canada			Denmark			United Kingdom			United States		
	Age 4-5	Age 6-7	Age 8-9	Age 2-3	Age 4-5	Age 6-7	Age 2-3	Age 4-5	Age 6-7	Age 3	Age 5	Age 7	Age 2	At preschool	At kindergarten
Child's age when mother returned to work by type of work															
Began full-time paid work by 6 months	6.2	6.3	6.1	7.6	7.8	8.8									
Began part-time paid work by 6 months	16.9	16.9	17.4	7.7	7.7	9.8	19.8	20.3	20.1	17.9	18.2	18.3	14.7	14.9	14.6
Began paid work 6 to 11 months	20.8	21.4	21.8	32.0	32.8	39.9	39.9	39.9	40.6	22.2	22.1	22.7	8.3	8.4	8.2
Not in paid work by 12 months	56.2	55.4	54.7	52.7	51.7	41.4	40.3	39.8	39.3	50.1	49.7	48.7	50.0	49.8	49.9
Main carer during first ~ 12 months															
parental care (ref)	74.8	73.9	73.6	54.3	55.2	53.7	53.7	53.5	53.9	66.2	65.8	65.2	52.0	51.8	51.8
informal care	11.8	12.3	12.2	29.4	29.1	31.7	3.9	3.8	3.9	18.0	18.4	18.3	26.7	26.7	26.4
formal care < 30hr per week	9.9	10.2	10.5	5.3	4.9	6.1	42.0	43.0	42.4	8.9	9.0	9.3	6.0	6.2	5.7
formal care >= 30hr per week	3.6	3.6	3.7	11.1	10.8	8.5				6.9	6.9	7.2	15.3	15.3	16.2
Mother's working status at time of survey															
Not in work	46.8	38.6	30.6	25.9	23.8	20.1	32.9	17.7	13.3	45.6	40.3	37.6	34.7	39.6	43.0
Working part-time (<30 hours per week)	18.9	23.5	29.6	20.4	22.1	23.4	10.0	12.1	10.6	37.9	41.0	40.5	20.4	19.9	20.0
Working full-time (>=30 hours per week)	34.4	37.9	39.8	53.7	54.1	56.5	57.1	70.2	76.1	16.5	18.8	21.9	44.9	40.5	37.0
Main childcare provider at time of survey															
parental care (ref)	56.8	62.2	64.4	43.7	48.1	53.6	6.4	1.8	-	51.3			19.6	19.9	59.2
informal care	16.5	21.0	19.6	27.4	24.3	25.1	2.0	0.8	-	24.9	47.4	48.3	8.0	13.7	17.0
formal care < 30hr per week	26.7	16.8	16.0	10.1	15.9	20.9	20.4	97.4	-	18.3	20.2	34.5	19.4	66.3	23.8
formal care >= 30hr per week				18.8	11.8	0.5	71.2	-	-	5.5			53.0		
preschool - ever attended	76.0	89.1	94.6	-	72.8	75.4	-	-	-	-	26.1	26.5	-	54.3	61.4

Table A1.6: Descriptive statistics – Child characteristics

Child characteristics	Australia			Canada			Denmark			United Kingdom			United States		
	Age 4-5	Age 6-7	Age 8-9	Age 2-3	Age 4-5	Age 6-7	Age 2-3	Age 4-5	Age 6-7	Age 3	Age 5	Age 7	Age 2	At preschool	At kindergarten
Sex															
boys	50.9	51.1	51.1	51.3	51.3	51.2	51.1	51.2	50.6	51.0	51.2	50.7	51.3	51.3	51.3
Premature															
<37 weeks	7.3	7.2	7.3	10.8	10.5	10.9	6.1	6.4	6.2	8.3	8.4	8.2	11.5	11.6	11.9
Birth weight															
< 2.5 kg	6.5	6.4	6.4	6.4	5.8	5.7	3.0	3.2	3.0	6.6	6.7	6.5	8.5	8.5	8.7
Breastfeeding duration															
none	9.5	8.9	8.5	16.7	12.2	21.1	4.0	3.9	3.6	41.5	41.3	40.2	31.0	30.8	30.6
<3 months	19.1	18.9	18.7	24.4	28.7	26.8	22.0	21.9	21.4	16.3	16.4	16.6	23.1	22.9	23.0
3-6 months	21.7	21.4	21.5	22.0	25.9	25.5	6.7	6.7	6.6	21.7	21.9	22.3	19.4	19.5	19.5
7 months plus	49.6	50.8	51.3	35.7	33.2	26.6	67.3	67.6	68.4	20.5	20.5	21.0	26.6	26.8	27.0
Ethnic group															
white	-	-	-	82.5	81.4	82.9	-	-	-	88.4	88.4	88.8	53.7	53.9	53.7
black	-	-	-	3.2	3.2	3.0	-	-	-	2.3	2.3	2.3	13.7	13.9	13.9
other	-	-	-	14.3	15.4	14.0	-	-	-	9.4	9.3	9.0	32.6	32.2	32.4
indigenous	3.6	3.2	2.6	-	-	-	-	-	-	-	-	-	-	-	-
Language															
Foreign language spoken at home	11.1	10.0	9.2	13.1	13.1	13.1	1.4	1.2	1.3	9.9	8.6	8.4	18.4	18.3	18.3
Mother born outside country	34.2	33.6	33.0	21.9	22.1	22.2	-	-	-	10.6	10.6	10.6	21.0	20.9	20.8
No of siblings															
none	11.0	8.7	7.8	26.8	18.3	14.2	23.7	11.5	11.8	25.0	16.7	13.3	33.4	19.3	15.5
one	48.6	45.4	44.3	48.2	50.9	50.6	52.8	56.8	55.6	47.7	49.2	48.4	37.7	43.0	42.8
two +	40.4	46.0	48.0	25.0	30.8	35.0	23.5	31.7	32.5	27.3	34.1	38.3	28.9	37.7	41.7

Table A1.7: Descriptive statistics – Mother's characteristics

Mother's characteristics	Australia			Canada			Denmark			United Kingdom			United States		
	Age 4-5	Age 6-7	Age 8-9	Age 2-3	Age 4-5	Age 6-7	Age 2-3	Age 4-5	Age 6-7	Age 3	Age 5	Age 7	Age 2	At preschool	At kindergarten
Mother's age at birth															
<20	6.7	5.8	5.3	3.2	4.1	2.8	1.1	1.1	1.2	6.8	7.0	6.4	11.0	11.0	11.0
20-24	22.4	21.2	20.5	16.5	17.6	17.4	12.8	12.7	12.3	14.8	14.9	14.4	25.2	25.1	25.0
25-29	35.5	36.4	36.9	31.4	33.4	31.5	39.0	38.9	38.9	27.1	27.5	27.4	26.5	26.5	26.5
30-34	26.4	27.2	27.6	31.8	30.0	31.3	33.8	34.0	34.2	32.9	32.4	32.8	23.5	23.6	23.6
35+	9.1	9.3	9.7	17.1	14.9	17.1	13.2	13.3	13.4	18.4	18.3	19.0	13.9	13.9	13.9
Worked while pregnant															
yes	59.1	60.7	62.0	-	-	-	69.5	70.7	71.1	69.9	70.3	71.1	71.8	72.0	71.9
Mother's mental health															
Diagnosed	-	-	-	45.9	41.8	38.6	12.8	18.7	16.7	34.1	38.8	38.7	45.9	41.8	38.6
Kessler (medium or high)	4.3	4.5	4.4	-	-	-	-	-	-	32.7	31.4	30.7	-	-	-
Index score 0-36 (High Score indica	-	-	-	4.1	3.9	3.7	-	-	-	-	-	-	-	-	-

Table A1.8: Descriptive statistics – Family characteristics

Family characteristics	Australia			Canada			Denmark			United Kingdom			United States		
	Age 4-5	Age 6-7	Age 8-9	Age 2-3	Age 4-5	Age 6-7	Age 2-3	Age 4-5	Age 6-7	Age 3	Age 5	Age 7	Age 2	At preschool	At kindergarten
Family structure															
intact family	83.7	82.3	79.2	85.8	57.3	74.4	84.1	78.2	72.5	79.2	73.8	70.0	65.6	63.1	61.9
broken or reconstituted families	13.5	16.1	18.9	6.5	36.8	23.0	13.8	20.8	26.7	12.1	27.9	24.2	10.2	15.8	19.0
always sole-parent family	2.8	1.6	1.9	7.7	5.9	2.7	2.0	1.1	0.8	8.7	27.7	10.0	24.3	21.1	19.2
Parent's education															
low	10.0	10.1	8.5	7.5	6.4	4.6	15.0	11.9	11.3	9.7	9.5	8.8	12.8	10.4	10.5
medium	56.9	56.3	56.2	55.5	41.3	27.6	51.4	51.8	50.9	44.6	44.7	44.3	55.3	56.5	56.0
high	33.1	33.6	35.3	36.9	52.3	67.8	33.6	36.4	37.9	45.6	45.9	46.9	31.9	33.1	33.5
Household's income															
First category	-	-	-	24.8	21.5	19.6	-	-	-	19.3	14.4	15.2	24.8	21.5	19.6
Second category	-	-	-	20.9	21.5	19.1	-	-	-	26.6	25.4	16.7	20.9	21.5	19.1
Third category	-	-	-	31.8	30.4	31.1	-	-	-	23.9	23.5	19.7	31.8	30.4	31.1
Fourth category	-	-	-	22.6	26.5	30.3	-	-	-	30.2	36.7	23.0	22.6	26.5	30.3
Parental gross weekly income, equ	0.54	0.65	0.75	-	-	-	-	-	-	-	-	-	-	-	-
Log household disposable income	-	-	-	-	-	-	12.46	12.65	12.70	-	-	-	-	-	-
Household tenure															
owned	69.9	74.4	75.6	88.1	87.6	85.5	75.2	79.2	80.4	68.4	68.6	70.5	51.9	57.1	59.4
renting	27.1	22.0	21.0	11.9	12.4	14.5	24.8	20.8	19.6	17.9	18.6	17.8	38.3	35.0	33.7
local authority	3.0	3.6	3.4	-	-	-	-	-	-	13.6	12.8	11.8	9.9	7.9	7.0
Parenting behaviour															
Regular bedtimes															
always	-	-	-	-	-	-	-	-	-	42.3	63.6	59.5	85.3	88.3	94.5
Taking child to park everyday	-	-	-	-	47.5	-	88.4	96.6	85.3	-	-	-	-	-	-
Reading															
everyday	47.4	38.4	12.1	-	72.8	64.3	-	-	-	61.5	52.3	43.4	45.3	38.6	40.3
Smacking															
never	-	-	-	-	-	-	-	-	-	33.3	45.1	50.9	63.6	54.6	55.4
sometimes	-	-	-	-	-	-	66.9	42.1	30.0	-	-	-	-	-	-
Consistent parenting (mean value)	4.20	4.30	4.35	-	-	-	-	-	-	-	-	-	-	-	-
Angry parenting (mean value)	2.40	2.31	2.34	-	-	-	-	-	-	-	-	-	-	-	-

ANNEX 2: RESULTS BY FAMILY CHARACTERISTICS

Table A2.1. Effect of early maternal employment on child development, by family structure

COGNITIVE SCORES	Australia (age 4-5)			Canada (age 4-5)			UK (age 5 -vocabulary)			US (age 4- vocabulary)				
	Always sole- parent	Separated or reconstituted	Intact	Always sole- parent	Separated or reconstituted	Intact	Always sole- parent	Separated or reconstituted	Intact	Always sole- parent	Separated or reconstituted	Intact		
Early maternal employment														
<6 months in full-time work	1.56 [2.09]	-0.14 [0.87]		-4.16 [3.90]	3.49** [1.48]	0.77 [0.91]		-0.72 [0.85]	-0.58 [0.45]		0.13 [0.97]	-1.06 [1.07]	-1.24** [0.6]	
<6 months in part-time work	-1.48 [1.45]	-0.05 [0.54]		2.94 [2.79]	1.40 [1.60]	0.52 [0.74]		0.13 [0.72]	-0.61* [0.36]		0.77 [1.]	1.15 [1.17]	-1.08* [0.58]	
6-11 mths in paid work	0.14 [1.37]	0.16 [0.48]		0.70 [1.94]	2.47** [1.05]	0.37 [0.45]		-0.8 [1.30]	0.71 [0.72]	-0.54 [0.36]		-0.25 [1.]	-1.32 [1.37]	-0.56 [0.73]

CONDUCT PROBLEMS	Australia (age 4-5)			Canada (age 4-5)			UK (age 5)			US (age 4)				
	Always sole- parent	Separated or reconstituted	Intact	Always sole- parent	Separated or reconstituted	Intact	Always sole- parent	Separated or reconstituted	Intact	Always sole- parent	Separated or reconstituted	Intact		
Early maternal employment														
<6 months in full-time work	.. [0.74]	1.29 [0.29]	1.26 [0.29]	0.11* [0.13]	0.84 [0.40]	0.11 [0.03]		0.84 [0.33]	1.44 [0.34]		1.23 [0.3]	1.58 [0.51]	0.89 [0.23]	
<6 months in part-time work	.. [0.42]	0.97 [0.17]	1.11 [0.17]	4.81 [7.29]	0.71 [0.36]	0.74 [0.22]		1.10 [0.31]	1.5** [0.26]		0.97 [0.25]	0.42* [0.19]	0.97 [0.24]	
6-11 mths in paid work	.. [0.29]	0.67 [0.15]	1.10 [0.15]	2.02 [2.00]	1.01 [0.56]	0.94 [0.16]		2.0 [1.08]	1.25 [0.36]	1.12 [0.20]		1.21 [0.3]	0.98 [0.54]	0.82 [0.26]

ATTENTION PROBLEMS	Australia (age 4-5)			Canada (age 4-5)			UK (age 5)			US (age 4)				
	Always sole- parent	Separated or reconstituted	Intact	Always sole- parent	Separated or reconstituted	Intact	Always sole- parent	Separated or reconstituted	Intact	Always sole- parent	Separated or reconstituted	Intact		
Early maternal employment														
<6 months in full-time work	.. [1.00]	1.00 [0.66]	1.45 [0.66]	0.01* [0.02]	1.80 [1.24]	1.86 [0.84]		2.3** [0.77]	0.97 [0.21]		1.30 [0.31]	0.69 [0.25]	1.14 [0.22]	
<6 months in part-time work	.. [0.44]	0.67 [0.44]	1.54 [0.44]	0.20 [0.22]	2.49 [1.83]	2.73*** [0.39]		0.96 [0.28]	1.11 [0.18]		1.06 [0.3]	0.74 [0.35]	0.99 [0.25]	
6-11 mths in paid work	.. [0.34]	0.56 [0.34]	1.04 [0.28]	0.77 [0.85]	0.65 [0.36]	1.38 [0.38]		1.3 [0.58]	0.90 [0.29]	0.99 [0.16]		0.93 [0.33]	0.84 [0.41]	1.46 [0.38]

Table A2.2. Effect of early maternal employment on child development, by parental education

Cognitive scores	Australia (age 4-5)			Canada (age 4-5)			UK (age 5)			US (age 4)		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Early maternal employment												
<6 months in full-time work	-1.95 [2.55]	0.15 [1.02]	1.52 [1.06]	2.06 [2.51]	-0.19 [1.12]	0.92 [0.94]	-0.6 [1.62]	-0.01 [0.59]	-1.1* [0.56]	-3.00* [1.65]	-0.23 [0.52]	-1.28* [0.68]
<6 months in part-time work	-0.85 [1.49]	-0.09 [0.69]	0.13 [0.72]	-0.69 [3.09]	2.15** [0.88]	-0.34 [0.94]		0.24 [0.43]	-1.3** [0.48]	-2.56 [2.31]	-0.08 [0.67]	0.20 [0.67]
6-11 mths in paid work	-0.88 [1.36]	0.64 [0.64]	0.24 [0.66]	3.51** [1.41]	0.91 [0.62]	-0.07 [0.53]	-1.7 [1.59]	-0.10 [0.45]	-0.8* [0.47]	-4.09** [2.]	0.35 [0.65]	-0.66 [0.93]

Conduct problems	Australia (age 4-5)			Canada (age 4-5)			UK (age 5)			US (age 4)		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Early maternal employment												
<6 months in full-time work	3.51 [1.95]	0.80 [0.21]	1.95 [0.70]	0.50 [0.47]	0.56 [0.18]	0.50* [0.30]	1.1 [0.61]	2.0*** [0.52]	0.86 [0.29]	0.69 [0.36]	1.25 [0.24]	0.94 [0.31]
<6 months in part-time work	1.06 [0.45]	1.29 [0.26]	1.03 [0.28]	0.56 [0.46]	0.99 [0.28]	0.56** [0.16]		1.7*** [0.30]	1.12 [0.30]	1.68 [0.67]	0.78 [0.17]	0.91 [0.33]
6-11 mths in paid work	0.79 [0.28]	1.05 [0.18]	1.26 [0.27]	0.63 [0.33]	0.50 [0.09]	0.89 [0.18]	1.0 [0.51]	1.18 [0.24]	0.99 [0.26]	1.54 [0.59]	1.18 [0.28]	0.50 [0.24]

Attention problems	Australia (age 4-5)			Canada (age 4-5)			UK (age 5)			US (age 4)		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Early maternal employment												
<6 months in full-time work	5.36 [4.47]	0.42 [0.25]	1.27 [0.76]	0.64 [0.97]	2.51 [1.13]	1.04 [0.64]	1.6 [0.96]	1.43 [0.34]	0.98 [0.28]	1.76 [0.85]	1.14 [0.19]	0.74 [0.2]
<6 months in part-time work	0.85 [0.59]	0.70 [0.26]	1.94 [0.93]	0.18* [0.16]	1.88 [0.77]	2.51** [1.05]		1.06 [0.19]	1.09 [0.25]	2.26* [0.96]	0.96 [0.2]	0.85 [0.3]
6-11 mths in paid work	1.51 [0.72]	0.78 [0.29]	0.47 [0.23]	0.15** [0.02]	1.11 [0.35]	1.04 [0.34]	0.5 [0.40]	1.13 [0.21]	0.88 [0.21]	1.70 [0.87]	1.12 [0.26]	1.27 [0.46]