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Early maternal employment and children's academic and behavioral skills

in Australia, the United Kingdom, and the United States

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Author Notes

This paper uses confidentialised unit record data from Growing Up in Australia: the Longitudinal Study of Australian Children. The study is conducted in partnership between the Australian Government 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. This research was supported in part by a grant to the first author from the American Educational Research Association which receives funds for its "AERA Grants Program" from the National Science Foundation under Grant #DRL-0941014. Opinions reflect those of the author and do not necessarily reflect those of the granting agencies. Address correspondence to: Dr. Caitlin McPherran Lombardi, Applied Developmental & Educational Psychology, Boston College, Campion Hall 239A, 140 Commonwealth Ave, Chestnut Hill, MA, USA 02467. Phone: 202.365.0466. E-mail address: mcpherrc@bc.edu.

The increase in employment among mothers with young children over the past 40 years has been one of the most significant recent demographic shifts in family life. In the U.S., employment rates among women with newborns rapidly increased from 21% in the labor market in 1968 to over 50% in every year since 1986 (U.S. Bureau of the Census, 2001). Early maternal employment serves many different purposes for families, including supporting women's careers, encouraging more balanced gender roles within families, and increasing families' economic resources (Gornick & Meyers, 2003; Ray, Gornick & Schmitt, 2010; Waldfogel, 1998). Many families rely heavily, or even exclusively, on earnings from mothers' employment due, in part, to declines in male wages and increases in single-mother families (Haskins, 2006; Redd, Karver, Murphey, Moore & Knewstub, 2011). Yet concerns remain that early maternal employment might inhibit children's healthy development by decreasing mothers' time and energy to devote to parenting or increasing parental stress (Becker & Tomes, 1986; Bowlby, 1951; Teti, Gelfand, Messinger & Isabella, 1995). While most industrialized countries have responded to trends in early maternal employment with paid parental leave policies which provide income replacement and job protections while allowing new parents to focus full-time on parenting following childbirth, U.S. policy expansions have been significantly more limited with no federal paid parental leave and a limited federal unpaid parental leave policy (Waldfogel, 2001). Lacking paid leave and job protection options, many new mothers in the U.S. return to work soon after childbirth, juggling the demands of employment and parenthood.

The goal of the current study is to delineate the repercussions of such choices for children's academic and behavioral skills after entry into formal schooling in the U.S. and in two other countries with similar economic structures, but differing cultural expectations and policy environments for young families, most notably more comprehensive parental leave policies. We

focus on these skills due to their importance in setting children up for trajectories of success (Shonkoff & Phillips, 2000). Essential skills after entry into formal schooling include core early literacy and numeracy skills, as well as skills in regulating inappropriate behaviors (Entwisle & Alexander, 1993). Entering school with these early competencies supports the successful transition to schooling, heightens the likelihood of future educational success, and in turn supports positive economic and psychological functioning into adulthood (Heckman, 2000).

Theory and Research Background

Social science theories suggest a variety of hypotheses regarding the potential repercussions of maternal employment for young children. Historically, developmental and economic perspectives have suggested that maternal employment may be harmful because it limits mothers' time and energy to devote to parenting, hampers child-parent attachment, increases parental stress, or leads to the use of alternate care settings less supportive for children's development (Becker & Tomes, 1986; Bowlby, 1951). Yet these models also suggest that maternal employment brings economic and social resources to the family, which should benefit children's development (Hoffman & Youngblade, 1999; Parcel & Menaghan, 1997; Raver, 2003). Taken together, these theoretical perspectives argue for counteracting mediational processes, suggesting that maternal employment will increase economic resources but also reduce mothers' time devoted to parenting and increase their stress as they balance competing demands. Infants, who have high care demands and who are still building secure child-parent attachments, may be most impacted by mothers' limited time, reduced energy, and increased stress due to employment, pushing the balance between these competing forces into a net negative effect.

A sizable body of empirical evidence from the U.S. supports this supposition. A number of large, longitudinal survey studies of U.S. children have found negative links between maternal employment begun in a child's first 9 or 12 months and children's cognitive and socio-emotional development, with neutral associations for maternal employment later in childhood (Baydar & Brooks-Gunn, 1991; Berger, Hill & Waldfogel, 2005; Blau & Grossberg, 1992; Brooks-Gunn, Han, & Waldfogel, 2002; 2010; Desai, Chase-Lansdale, & Michael, 1989; Han, Waldfogel & Brooks-Gunn, 2001; Hill, Waldfogel, Brooks-Gunn & Han, 2005; Ruhm, 2004). For example, assessing a sample of White children from the NICHD-SECC, Brooks-Gunn, Han, and Waldfogel (2002) found that maternal employment begun before the child's 9th month was linked to lower child cognitive skills at 36 months. This pattern continued into the first grade, extending to children's behavioral functioning as well (Brooks-Gunn et al., 2010). Research with a nationally representative sample of mothers, the *NLSY-CS,* has unearthed similar patterns (Han et al., 2001; Hill et al., 2005).

Policy Background

Findings from these samples raise questions about the generalizability of past research to current families and children in the U.S. and also to families and children in other countries with different policy contexts and cultural norms around maternal employment. While most industrialized countries have expanded parental leave laws and public financing of child care in tandem with increasing numbers of new mothers in the labor force, U.S. policy expansions have been significantly more limited with no federal paid parental leave policy and a limited unpaid federal parental leave policy. The Family and Medical Leave Act (FMLA) offers 12 weeks of unpaid, job-protected leave for mothers who have worked an average of 25 hours a week for one year at an employer with 50 or more employers. Due to these restrictions, less than half of

working mothers are eligible (Ruhm, 2011) and, of those eligible, many do not take it because they cannot afford to go without pay (Commission on Family and Medical Leave, 1996; Waldfogel, 2001). Another point of contrast is that American parents of infants and toddlers rely primarily on the private market for child care which research has found to be expensive, limited, and of lower quality than child care for older children (NICHD ECCRN, 2001; Clifford et al., 2005; National Research Council Institute of Medicine, 2000). Limited child care subsidies are available to low-income families (Layzer & Collins, 2000).

In contrast, two other countries similar to the U.S. in economic structure have greatly expanded parental leave laws and child care subsidies: Australia and the U.K. A comparison of the policy context in each of these three countries is presented in Table 1. Australia has long offered 12 months of unpaid parental leave for working mothers along with a generous cash payment to all families upon the birth of a child[1]. Child care is supplied by both public and private providers with the cost of center-based care subsidized by the federal government up to 50% and government quality controls (Australian Government Family Assistance Office, 2011).

The U.K. witnessed a dramatic expansion in services for families with young children starting in the early 2000's. Parents of young children benefited from expanded parental leave rights through the course of several policy changes. From 1999 through 2001, which covers the period of time in which children were born in this study, all mothers were eligible for 18 weeks of paid parental leave and women who had worked for the same employer for a year or longer were eligible for an additional period of 29 weeks of unpaid leave (Waldfogel, 2010).[2] These

[1] Australia implemented a federal paid parental leave policy in January 2011, after the data used in the current study.

[2] Starting in 2002, all working mothers in the U.K. were given 12 months of job-protected maternity leave with 6 months paid after the birth of a child and the right to request part-time or flexible work until their youngest child was 6 years old, which increased to age 16 in 2004 (Waldfogel, 2010). Beginning in 2010, parental leave was further expanded to a full year of job-protected maternity leave with 9 months paid and then, in 2011, further flexibility was given to new parents by allowing fathers to use up to 26 of the total 52 weeks per family (U.K. Government, 2010).

reforms also included an expansion of affordable, quality child care options for parents through increasing the number of child care providers and expanding child care tax credits (Bertram & Pascal, 2000; Waldfogel, 2010).

Related in part to varying policy frameworks for working parents, the cultural norms for working mothers also vary slightly across countries, with the most notable differences occurring in the first year. In all of the countries, employment among fathers has always been common while there has been a rapid growth in the number of working mothers since the 1970's (Jaumotte, 2003). Prior research has identified that British[3] mothers return to work later and at a lower intensity in comparison to American mothers (Crosby & Hawkes, 2007). Similarly, during the first year, Australian mothers are less likely to work at all and to work full-time in relation to American mothers (Coley, Lombardi, Sims & Votruba-Drzal, in press).

Maternal Employment in Australia and the U.K.

Due to these differences in policy supports for parents with young children and cultural norms surrounding mothers' work, it is possible to hypothesize that the implications of early maternal employment may differ across countries however there is relatively little research on early maternal employment from the U.K. or Australia. In the U.K., there are a handful of existing studies have identified a similar pattern to that of the U.S. research, finding maternal employment to be harmful for infants but neutral for older children (Ermisch & Francesconi, 2000; Gregg, Washbrook, Propper & Burgess, 2005; Joshi & Verropoulou 2000). For example, Gregg et al. (2005) analyzed longitudinal survey data of 12,000 children born in the Avon area of the U.K. in 1991 and 1992 with results suggesting that full-time employment in the first 18

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[3] Due to the lack of a term that refers to all citizens of the United Kingdom, the term British is used here. In this paper, it refers to all citizens of the United Kingdom; specifically England, Scotland, Wales and Northern Ireland.

months after birth combined with informal child care led to poorer long-term cognitive outcomes for children, particularly for children from more affluent families or whose mothers had higher educations. Research on maternal employment among Australian families is even sparser with no known studies examining the relationship between the timing of return to work and later child outcomes.

In sum, there is little research on early maternal employment in contemporary British and Australian families. The research that does exist suffers from some of the same limitations as described earlier in relation to the U.S. literature, including reliance on older, non-representative samples of children and use of limited statistical techniques to address selection bias. Rarely have cross-national comparative methods been used to examine how maternal employment might operate differently across countries with varying early employment rates and greater access to paid and unpaid leave benefits. Cross-national comparative research seeks to observe a social phenomenon across countries, examine similarities and differences, and assess both the causes and consequences, making this type of research particularly well-suited for studying contextual factors that are influenced by policy, such as maternal employment (Hantrais, 1999).

Prior Cross-national Comparative Research

Cross-national comparative research examining children's outcomes has begun to emerge in numerous arenas of the family context. Several studies have examined differential associations between parental income and education with children's outcomes across countries with similar economic contexts (e.g. Bradbury, Corak, Waldfogel & Waskbrook, 2010, Waldfogel & Washbrook, 2009; 2010). Comparative and non-comparative studies also have examined the impact of parental leave laws on maternal and child health. Using U.S. data, Chatterji and Markowitz (2004) found that longer maternity leaves, both paid and unpaid, were associated

with declines in maternal depressive symptoms, a reduced likelihood of severe depression, and overall improved maternal health. Comparative research examining changes in parental leave policies over time across many countries has shown beneficial effects of longer leave policies, finding that longer maternal leave policies have resulted in lower infant mortality rates, increased maternal mental health, and increased child preventative health measures such as well-baby visits and immunizations (Ruhm, 2000; Tanaka, 2005).

Maternal employment patterns and predictors have been examined using recent comparative birth cohorts studies from the U.S. and U.K. (the same datasets used in this study). Crosby and Hawkes (2007) found that mothers in the U.S. were found to engage in paid work much sooner after childbirth than British mothers. Greater financial and human capital predicted higher rates and earlier entries of employment after childbirth for mothers in both countries. This study used a single wave of data collection and did not link maternal employment with child outcomes over time.

A recent unpublished study examined the relationship between the timing of mother's return to work in the first year and later child outcomes across five countries: the U.S., U.K., Australia, Canada, and Denmark. Huerta and colleagues (2011) found that the relationship between the timing of maternal employment after birth and children's later outcomes varied across countries. Negative implications for children's cognitive outcomes were found for children in the U.K. and U.S. whose mothers returned to work within 6 months, particularly if these mothers worked full-time. Few associations were found for socioemotional outcomes in any of the countries or for cognitive outcomes in Australia, Canada, and Denmark.

This study offers an important starting point from which to consider how to assess the relationship between early maternal employment and child outcomes across countries while

leaving several methodological and conceptual gaps to be filled. First, this study only examined maternal employment begun in the child's first 11 months. With the exception of the U.S., each of these countries has a maternal leave policy that provide the majority of employed mothers with 11 or 12 months of unpaid or paid leave with high percentages of mothers utilizing this benefit, as described earlier. Thus findings may be biased by selection effects whereby the mothers who return to work before 11 months may differ in important ways from those who take advantage of their full parental leave. Second, the selection of datasets utilized raises questions about the temporality of variable selection. Specifically, the study measured the child, mother, and family characteristics used as controls concurrently with child outcomes thus inviting concerns about potential bidirectionality. Ideally, controls would be measured prior to or at the same time as mother's entry into employment in order to isolate the association between the maternal employment and child outcomes and avoid over controlling for potential mediators such as maternal depression or family income. Third, although the researchers attempted to address selection bias by including controls for child, mother, and family characteristics in the statistical models, they did not employ causal inference techniques such as propensity score matching to further adjust for selection bias, as has become common in maternal employment literature (Berger et al., 2008; Coley & Lombardi, 2013; Hill et al., 2005). Finally, the study did not impute missing data due to non-response or attrition, a common problem in child development research which relies on in-home child assessments often onerous for parent and child participants. As this study eliminated cases with missing values, samples may be been biased by deletion of cases with missing data.

In sum, little cross-comparative research has examined the relationship between early maternal employment and child outcomes across countries. Findings of existing research suggest

that links between the timing of maternal employment and child outcomes may indeed differ across countries, however the direction and magnitude of such effects are not clear. Thus, the goal of this study is to provide evidence regarding the implications of early maternal employment for children's cognitive and behavioral skills in three countries.

The Present Study

The purpose of the current study was to delineate the repercussions of early maternal employment for children's early developmental competencies in nationally representative birth cohort samples of children born in the U.S., Australia, and U.K. between 2000 and 2004. The first goal was to describe the patterns of employment across countries and the characteristics of children and mothers linked to these patterns. Using robust statistical methods to address selection bias, the second goal was to assess associations between the timing of early maternal employment after childbirth and children's cognitive and behavioral skills after entry into formal schooling in each country. Results will provide important new information regarding the implications of early maternal employment in contemporary families from the U.S., Australia, and the U.K.

Method

Sampling and Data Collection

Data for this study came from three datasets: (1) the U.S.'s *Early Childhood Longitudinal Study-Birth Cohort* (ECSL-B), (2) Australia's *Longitudinal Study of Australian Children Birth Cohort* (LSAC-B), and (3) the U.K.'s *Millennium Cohort Study* (MCS). These datasets are unique in that they contain a breadth of information on a representative sample of children in each country with data measured across comparable time points; children in each dataset were an average age of 8-10 months at wave 1, 24-38 months at wave 2, and have all entered formal

schooling by wave 4 (average age ranging from 6 years in the U.S. to 7.4 years in the U.K.).[4] Moreover, each sample is large and diverse, with children from families across the income distribution from very low-income to economically advantaged. Each wave includes detailed information provided by the most knowledgeable caregiver, nearly always the biological mother, on the child, caregiver, and household. In addition to the strengths of the sampling, each dataset contains very strong measurement. At wave 4, children's development was assessed using reliable and well-validated instruments. Helping to reduce analytic concerns over shared method variance, data were collected from direct assessments, parent reports, and teacher reports. The use of probability weights makes each of these samples nationally representative.

United States. The U.S.'s Early Childhood Longitudinal Study– Birth Cohort (ECLS-B) is a longitudinal, multi-method study of a nationally representative cohort of approximately 10,700[5] children born in the United States in the year 2001 (Flanagan & West, 2004). Births were sampled from 96 core primary sampling units (PSU), which were geographic regions consisting of counties or groups of counties. Children who died or were adopted prior to the age of 9 months were excluded from the sample as were children born to mothers younger than 15 years of age. The ECLS-B collected four waves of data on the birth-cohort at 9 months (wave 1), 2 years (wave 2), 4 years (wave 3), and at kindergarten entry (wave 4 or wave 5)[6]. Designed to

[4] Despite children being slightly older in comparison to American children, assessment data were drawn from wave 4 for the Australian and U.K. datasets because the majority of children were not yet in formal schooling at wave 3 in both datasets. Wave 4 (or wave 4/5 in the U.S.) represents the first wave for all datasets in which children have entered formal schooling, have assessments of both reading and math skills, and have both teacher and parent reports of behavioral functioning.

[5] ECLS-B secure data rules require that all Ns be rounded to the nearest 50.

[6] Not all children had entered kindergarten at the time of assessment at wave 4. Accordingly, the ECLS-B reassessed those children the following year to capture their development at the start of kindergarten. Depending on the wave of entry into kindergarten, wave 4 or 5 is used for all ECLS-B measures described as being measured at wave 4.

provide information on how children are prepared for school in the U.S. (Flanagan & West, 2004), the study collected data from in-home parent interviews, direct child assessments, teacher surveys, child care observations, and data records. See Burns, Wang and Henning (2011) for further details about the ECLS-B. The response rate for the initial 9-month wave of data was 74%; this is consistent with response rates from other large national surveys and an evaluation of respondents and nonresponents has found very small differences that would be unlikely to result in nonresponse bias (Bethel, Green, Nord, Kalton & West, 2005). From the baseline 9-month sample, the response rates for the 2 year, 4 year, and 5 year waves of data were 93%, 91%, and 92%, respectively. The analytic sample consisted of all children from the wave 1 sample with survey weights and whose biological mother was the survey respondent at wave 1 (94% of the sample), resulting in an analytic sample of 10,100 children.

Australia. The LSAC-B is a nationally representative study of a cohort of approximately 5,100 children born in Australia between March 2003 and February 2004. Births were sampled from the Medicare enrollment database with stratification used to ensure proportional geographic representation for each state and territory. The survey sample excluded non-permanent residents, children with the same name as deceased children, and only allowed for one child per household. For more information on LSAC-B, see Sanson et al. (2002) and Soloff et al. (2005). LSAC-B collected four waves of data with in-person interviews and direct assessments when children were on average 9 months (wave 1), 3 years (wave 2), 5 years (wave 3), and 7 years (wave 4) with response rates of 58%[7], 90%, 86%, and 84% respectively. The analytic sample consisted of all children from the wave 1 sample with survey weights and whose biological mother was the

[7] Different response rates have been reported based on different calculations. This response rate includes nonresponse from all sources from the originally drawn sample (see Gray & Sanson, 2005).

survey respondent at wave 1 (99% of the sample), resulting in an analytic sample of 5,093 children.

United Kingdom. The MCS is a nationally representative study of a cohort of approximately 18,552 children born in the U.K. between September 2000 and August 2001. Births were sampled from Child Benefit records thereby excluded families ineligible for the Child Benefit, which for the most part were non-citizens. For further details about the MCS see Shepherd, Smith, Joshi & Dex (2003). MCS collected four waves of data with in-person interviews and direct assessments when children were on average 9 months (wave 1), 3 years (wave 2), 5 years (wave 3), and 7 years (wave 4) with response rates of 68%, 84%, 82%, and 75% respectively. The analytic sample consisted of all children from the wave 1 sample with survey weights and whose biological mother was the survey respondent at wave 1 (99% of the sample), resulting in an analytic sample of 18,497 children.

Within each analytic sample, there were missing observations due to attrition over the waves and missing data on individual measures. Missing data were imputed in Stata 12 (Royston, 2004, 2005) using multiple imputation by chained equations to create 10 complete datasets. All analyses were weighted with sampling weights for each study, which adjust for sampling procedures, nonresponse, and differential attrition and properly adjust standard errors. The use of these weights makes each sample representative of children born in each country in that particular year.

Measures

Across all constructs, measures were created in a parallel fashion for the three datasets, except as noted.

Maternal employment. In all studies, mothers reported on their employment status, history, and intensity at each wave of the study. These data were used to create three mutually exclusive categories: first entry into employment before 9 months, first entry into employment before 2 years, and nonemployed, that is no report of employment before 2 years. These categories capture employment during the first two years after childbirth, which is comparable to the time periods studied in prior literature which have varied from 9 or 12 months (Berger et al., 2008; Brooks-Gunn et al., 2002; Coley & Lombardi, 2013) to the first 2, 3 or 4 years (Baydar & Brooks-Gunn, 1991; Coley & Lombardi, 2013; Desai et al., 1989; Han et al., 2001; Hill, et al., 2005). A limitation of these measures is that mothers may have entered employment prior to 9 months or before 2 years and then quickly exited, not remaining stably employed.[8]

Children's cognitive skills: In the ECLS-B, children's cognitive skills were measured at age 5 using direct assessments to test children's reading and math skills. The reading and math skills assessments were comprised of items drawn from well-validated standardized instruments including the PPVT-III (Dunn & Dunn, 1997), PreLAS 2000 (Duncan & De Avila, 1998), *Preschool Comprehensive Test of Phonological & Print Processing* (Lonigan, Wagner, Torgesen, & Rashotte, 2002), and *Test of Early Mathematics Ability* (3rd ed.; Ginsburg & Baroody, 2003). The early reading assessment (74 items, $\alpha = .92$) assessed letter knowledge, word recognition, print conventions, and phonological awareness. The math assessment (58 items, $\alpha = .92$) assessed number sense, properties, operations, and probability.

In the LSAC-B, teacher reports of child cognitive skills at wave 4 were assessed using the Language and Literacy and Mathematical Thinking subscales from the *Academic Rating Scale*

[8] An additional limitation of the ECLS-B employment measure is that it may be incorrectly classifying mothers who entered employment after 9 months and exited before 24 months as being nonemployed in the first two years.

(ARS; National Centre for Educational Statistics, 2002). The Language and Literacy Scale (α = .96) had 9 items (e.g., conveys ideas when speaking, reads fluently), that rate a child's performance in oral and written language according to a 5-point scale (*not yet=1, beginning=2, in progress=3, intermediate=4, and proficient=5*). The Mathematical Thinking Scale (α = .94) used the same scale to rate a child's performance on 9 spatial and math items (e.g., creates and extends patterns, recognizes shape properties and relationships).

In the MCS, two direct assessments measured children's word reading and number skills. Taken from the British Ability Scales (BAS; Elliott, Smith & McCulloch, 1996; 1997; Hansen, 2012), the measure of word reading assessed children's English reading ability, requiring students to read aloud a series of words presented on a card. The measure of number skills was adapted from the National Foundation for Educational Research (NFER) Progress in Maths test and assessed children's knowledge of numbers, shapes, and measurement (Hansen, 2012).

Children's behavioral skills: Conduct problems were assessed in the ECLS-B at kindergarten entry via parent and teacher reports on items drawn from the Preschool and Kindergarten Behavior Scales-Second Edition (PKBS-2; Merrell, 2003), the Social Skills Rating Scales (SSRS; Gresham, Elliott, & Black, 1987) and items created specifically for the ECLS-B and the Family and Child Experiences Study (FACES). Parents and teachers separately rated the frequency of the child's engagement in behaviors on 5-point scales ("never" to "very often"). Factor analyses of these reports, along with a desire to select parallel items to the other datasets, led to the construction of a composite of conduct problems assessing children's impulsive, disruptive, and aggressive behaviors (parent report, 5 items, $\alpha_{4\text{-}5}$ = .78; teacher report, 4 items, $\alpha_{4\text{-}5}$ = .84).

In both the LSAC-B and MCS, children's conduct problems were reported by parents and teachers using items from the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The SDQ rates children's skills on a 3-point scale (*not true=0, somewhat true=1, and certainly true=2*). Factor analyses run separately by reporter derived the conduct problems subscale (LSAC-B: α_p = .60, α_t = .76; MCS: α_p= .60, α_t = .75) which included 5 items covering children's temper tantrums, obedience, fighting, lying or cheating, and stealing behaviors. Across all datasets, higher scores indicate greater conduct problems.

To help control for the differences in measurement and child age at assessment across the datasets for all of the outcomes, all raw outcome variables were adjusted for age by taking the residuals from a regression of the outcome score on child age in months and then standardized to have a mean of 0 and a standard deviation of 1 so that a one-unit difference represented a one standard deviation (SD) shift, following prior comparative child development research (e.g. Bradbury et al., 2010; Coley et al., in press).

Child characteristics. Child characteristics included age at wave 1 and age at assessment (both in months) and gender. In the ECLS-B an indicator variable designated whether children entered kindergarten at wave 5. Child low birthweight status was represented with an indicator of whether the child was born with low (less than 2500 grams) birthweight. An indicator noted whether the focal child was from a multiple birth. Child race/ethnicity was categorized in the ECLS-B as non-Hispanic White (reference), non-Hispanic African American, Hispanic, Asian, American Indian, and multiracial. Native Hawaiian or other Pacific Islanders were combined with American Indian or Alaska natives. In the LSAC-B, race/ethnicity was indicated with two dummy variables indicating having a parent of Asian origin or having an Aboriginal parent. Child race/ethnicity was captured in the MCS with dummy variables indicating White

(reference), Black, Indian, Pakistani/Bangladeshi, multiracial, or other. In addition to the demographic characteristics, children's behavioral functioning was measured at wave 1. In the ECLS-B, a measure of temperament was used with mother and observer reports on items from the Infant/Toddler Symptom Checklist (ITSC; DeGangi, Poisson, Sickel, & Wiener, 1995) and the Behavior Rating Scale (BSID-II; Bayley, 1993). Fifteen items assessing children's self-regulation, attention, adaptability, and social engagement were standardized and averaged (α = .70), with higher scores indicating more adaptability, engagement, and regulation. In the LSAC-B, child temperament was measured with a shortened version of the Australian revision of the Toddler Temperament Scale (TTS; Fullard, McDevitt & Carey, 1984), with 4 items, rated on a six-point scale, assessing children's abilities in each of three domains: approach, persistence, and reactivity (α = 0.98−0.99). These three domains were combined into a composite measure with higher scores indicating an easier temperament with more approachability, persistence, and regulation. The MCS measure of temperament came from 14 questions from the Carey Infant Temperament Scale used to assess the child's regularity, approachability, adaptability, and mood (α = 0.65; Carey & McDevitt, 1977; 1995).

Early cognitive ability was also assessed in each dataset at wave 1. The ECLS-B used the *Bayley Short Form-Research Edition* (Bayley, 1993; Flanagan & West, 2004) measuring exploration of objects, babbling, early problem-solving, and preverbal communication (α = .80). In the LSAC-B, the *Communication and Symbolic Behavior Scales Developmental Profile: Infant-Toddler Checklist* (Wetherby & Prizant, 2001) was used, a 24-item parent report scale (α = .89) measuring children's early social, language and cognitive skills (Sanson, Misson, Hawkins, & Berthelsen, 2010). Finally, early cognitive ability was measured in the MCS with 8 items from the Denver Developmental Screening Test, assessing communication skills and fine

and gross motor coordination, as well as 5 items from the MacArthur Communicative Development Inventories, identifying early communication gestures (α = .65; Fenson et al., 1993; Frankenburg, Dodds & Denver, 1967).

Maternal and household characteristics. Several maternal and household characteristics were also included as covariates, including wave 1 measures of maternal age and maternal education, categorized as less than high school, high school (omitted), some college, and a college or graduate degree. Two aspects of maternal employment status were included in the models: an indicator designating mothers that were employed during the year before the child was born and an indicator designating mothers' employment status at the wave of child assessments. A dichotomous variable indicated whether the primary language of the household was non-English at wave 1. An additional variable indicated having an immigrant parent. Several time-varying characteristics were measured at each wave of data collection (waves 1, 2, 3, and 4) and aggregated over time by averaging for continuous variables and categorizing for categorical variables. Household income, excluding the mother's income from employment, was measured in units of 10,000 and averaged over all of the waves. Family structure covariates included maternal marital status, measured with indicators of whether respondent was consistently married over the study period or married at some waves (versus never married across the waves); if the mother was cohabitating at any wave; the number of non-partner adults in the household; and three measures of other children in the household: the number of siblings at wave 1, an indicator for a new child born by wave 2, and an indicator for a new child born between wave 2 and wave 4. Two dichotomous variables indicated whether the mother received welfare some or all of the study waves (versus at no waves). Paternal employment was assessed with two dichotomous variables indicating a working partner in the household at some or all of the study

waves (versus at no waves). Finally, mothers' non-employment sources of income using the nonmaternal household income, averaged over waves 1 through 4, was considered.

Results

Characteristics of Children and Mothers Associated with Early Employment Patterns in the U.S., Australia, and U.K.

United States. Table 3 presents descriptive statistics for the ECLS-B. The majority of mothers in the U.S. reported early, full-time employment while later entry into employment was relatively uncommon. Just under 1/3 (31%) of mothers reported no employment in the 2 years following the focal child's birth, while 58% of mothers were first employed prior to the child's 9th month, and 11% were first employed before 2 years.

The second through fourth columns of Table 3 present the sample descriptives for the different employment patterns: non-employed, first employed before 9 months after childbirth, and first employed before 2 years after childbirth. Significant differences between the employment groups are designated with matched superscripts. Numerous differences in mother and family characteristics emerged between employment groups. Several patterns were most prominent. First, earlier re-entry into employment was predictive of later engagement in the labor market; five years later, 63% of mothers employed by 9 months were working, 53% of mothers who entered employment later but before 2 years were working, and only 32% of the mothers who were non-employed for the first 2 years had entered employment. Second, children of mothers who entered employment before 9 months were generally healthier with fewer born low birthweight and higher early cognitive and behavioral scores, though no differences emerged in child age or gender. Employment patterns differed across racial/ethnic groups: early employment was more common among White and African American children with non-

employment being more common among Hispanic children. There were also notable differences when looking at maternal characteristics. Mothers who were employed before 9 months generally were more educated, had the lowest rates of welfare receipt, fewer children, and were less likely to live with additional adults. Those who started employment between 9 months and 2 years were the least likely to be married and have a working spouse at all waves of the data collection while they were the most likely to be cohabitating with a partner. In contrast, non-employed mothers were the most likely to be married and have a working spouse over the entire study as well as having, on average, more children at wave 1 and the highest likelihood of having another child by wave 2. Income from maternal employment was higher among both groups of employed mothers while household income from non-maternal work sources was lower in both employed groups than among families with non-employed mothers. Approximately 3% of non-employed mothers had some income from employment at wave 2, presumably due to paid maternal leave or residual income from prior employment. In sum, these patterns generally suggest that U.S. mothers who entered employment soon after childbirth, before 9 months, were more advantaged with healthier children and more human and financial capital, while those employed after 9 months had the fewest additional sources of support. This highlights the importance of selection factors in understanding early maternal employment.

Australia. Table 4 presents descriptive statistics for the LSAC-B. In contrast to the U.S., the majority of Australian mothers did not report any employment in the 2 years after childbirth while those that did enter, entered later. Almost 2/3s (61%) of mothers reported no employment in the two years following the focal child's birth, while 18% of mothers were first employed prior to the child's 9th month, and 20% were first employed before 2 years.

Similar to the previous table, the second through fourth columns of Table 4 present the sample descriptives for the different employment patterns with significant differences between the employment groups designated with matched superscripts. There was a slightly different pattern of results for Australian families. First, while fewer Australian mothers entered the labor force by two years, more were employed five years later (63% in total) and those who had entered in the first two years were even more likely to be employed long-term. Second, children looked very similar across the three employment groups at wave 1, although children with more adaptable temperaments had mothers who were employed earlier while children with higher early cognitive scores had mothers more likely to be non-employed by 2 years. Finally, mothers in the two employment groups looked very similar and, on average, were older, less likely to be Asian, Aboriginal, immigrant, or non-English speaking, and had greater levels of education, higher marital rates and presence of a working spouse, fewer children, and lower welfare use than non-employed mothers. In sum, these patterns generally suggest that Australian mothers who entered employment anytime in the first two years after childbirth were more advantaged with healthier children and more human and financial capital.

United Kingdom. Table 5 presents descriptive statistics for the MCS. Mothers in the U.K. were most likely to either enter employment early or remain out of the labor force for the first two years. Equal proportions of mothers reported entry into employment by 9 months (42%) as did those who reported no employment during the first two years (42%) with the remaining 1/6 of the sample (16%) entered employment between 9 months and 2 years.

As with the other two countries, numerous differences in mother and family characteristics emerged between employment groups. Regarding later employment patterns, earlier re-entry into employment was most predictive of later engagement in the labor market;

five years later, 83% of mothers employed by 9 months were working, 76% of mothers who entered employment later but before two years were working, and only 46% of the mothers who were non-employed for the first two years had entered employment. Like the U.S., children of mothers who entered employment before 9 months were generally healthier with fewer born with low birthweight. There were also differences across race/ethnic groups with mothers of White children most likely to be employed before 9 months, while racial/ethnic minorities were more likely to be non-employed with the exception of mothers of Indian children who started employment with the greatest frequency between 9 months and 2 years. Turning to maternal characteristics, similar to the U.S., British mothers who were employed before 9 months generally were older and more educated. However, there were also some similarities to Australian mothers in that British mothers in both employment groups were more likely to be married and have a working spouse in comparison to non-employed mothers. Non-employed mothers were more likely to be cohabitating, had more non-partner adults living in their household, and were more likely to be receiving welfare. Non-employed mothers also had more children than employed mothers at each time point. Interestingly, household income excluding mothers' income was higher among both employed groups in comparison to the nonemployed group. In sum, these patterns generally suggest that British mothers who entered employment soon after childbirth, before 9 months, were the most advantaged with healthier children and more human and financial capital. Mothers who entered employment between 9 months and two years were more advantaged in comparison to non-employed mothers.

Maternal Employment Timing: Predicting Child Functioning with Bivariate Models

Bivariate associations between early maternal employment timing and children's cognitive and behavioral skills are presented in the bottom panels of the prior tables. Across all

of the countries, there were many patterns to suggest that maternal employment was significantly associated with children's cognitive and behavioral skills. Results from the U.S., presented in the bottom panel of Table 3, suggested some positive benefits of both very early employment and non-employment for children. Specifically, children of mothers employed before 9 months had higher reading and math skills than children of later- and non-employed mothers. On the other hand, children of non-employed mothers had, on average, lower teacher reported conduct problems in comparison to mothers in the two employed groups.

Findings from Australia, presented in the bottom panel of Table 4, suggested a different pattern of links between early employment and later cognitive and behavioral skills. While there was no significant difference in the cognitive and behavioral skills of children of mothers in the two employed groups, children of employed mothers had higher math and reading skills and lower parent and teacher reported conduct problems in comparison to children of non-employed mothers. In sum, any employment in the first two years was associated with higher cognitive and behavioral skills after school entry for Australian children with employment beginning after 9 months having particularly positive associations with behavioral skills. These findings contrast with the results from the U.S. that has found employment after 9 months linked with lower cognitive skills and higher conduct problems.

Findings from the U.K., presented in the bottom panel of Table 5, suggest a pattern in which any employment in the first two years was associated with higher cognitive and behavioral skills after school entry. This pattern was even more pronounced than it was for Australian children, extending across every outcome.

Overall, these bivariate results suggest that there are significant bivariate associations between mothers' employment timing and children's cognitive and behavioral skills after school

entry in all three of the countries. These results also suggest that the links between employment timing and later outcomes may vary across the countries. Specifically, any employment before two years was associated with positive outcomes for Australian and British children in comparison to non-employment during the first two years. This pattern was particularly strong across all of the outcomes for British children. Later employment, that is after 9 months and before 2 years, was generally associated with best outcomes for Australian children's behavioral skills. For American children, employment before 9 months was associated with higher cognitive skills while non-employment had positive links with conduct problems. Cognitive and behavioral skills after school entry were the lowest among American children of mothers employed between 9 months and 2 years.

Maternal Employment Timing: Predicting Child Functioning while Addressing Potential Selection Bias Using Covariates and Propensity Scores

Given the notable differences between employed and non-employed mothers across all three countries, a concern for the present study is that selection processes rather than maternal employment per se may explain any associations with children's school cognitive and behavioral skills. To address this significant concern, three techniques were used in the analyses. First, propensity score weighting (PSW) techniques were used to help adjust for potential selection bias (Imbens, 2000; Rosenbaum & Rubin, 1984). Propensity score (PS) techniques restructure correlational data to mimic randomized experimental data where a treatment group and control group are equated on observed, pre-existing characteristics (Rosenbaum & Rubin, 1983). Adjusting for the propensity to be in the "treatment" group has been shown to remove as much as 90% of selection bias in nonexperimental research (Leon & Hedeker, 2006), although it is

important to note that PS techniques cannot control for unobserved factors, the influence of which may even be magnified by matching on observables (Pearl, 2009).

PSW techniques were incorporated using the three step procedure described by Imbens (2000). Propensity score weights were estimated separately for each indicator of maternal employment: the timing of first employment (before 9 months, before 2 years, and never in the first 2 years). The first step involved estimating the propensity of mothers to be in each employment group. Multinomial logistic regression models were used to estimate the propensity of being in each of the timing groups as a function of all observed pretreatment covariates (e.g., all time-invariant covariates and time-varying covariates assessing child and parent characteristics at or prior to wave 1). Second, propensity score weights were created by taking the inverse of the child's conditional probability of receiving the early maternal employment treatment that the child actually received (Imbens, 2000). Third, regression models predicting cognitive and behavioral skills were run, weighted with the early maternal employment treatment-specific propensity score weights multiplied by the sample weights, to generate the average treatment effect of maternal employment, as shown in Equation 1.

1. $\text{Child Outcomes}_{4/5i} = B_0 + B_1\text{Maternal Employment}_1 + B_2\text{Maternal}_{1\text{-}4/5i} + B_3\text{Child}_{1i} + B_4\text{Child Outcomes}_{1i} + \varepsilon_i$

Second, as an additional protection against the influence of selection bias, a large set of child and parent characteristics were included as statistical covariates in the analytic models, including time-varying variables assessing parent and family characteristics from waves 1 through 4/5. The covariates that were included (listed in Tables 3, 4, and 5) have been shown to be associated with selection into employment in prior research (e.g., Hill et al., 2005), although even the most thorough set of covariates leaves open the potential for omitted variable bias

(Duncan, Magnuson, & Ludwig, 2003). As a third mechanism helping to control for unmeasured variable bias, the models were run as lagged regressions, incorporating a wave 1 measure of cognitive ability (for models predicting cognitive skills) or a wave 1 measure of child temperament (for models predicting conduct problems) as additional covariates to control for unmeasured, time-invariant factors that had a consistent effect on children's functioning (Cain, 1975), thus further reducing concerns of omitted variable bias.

These results of these models (shown in Table 6) indicated that once selection effects were accounted for, early maternal employment had few significant associations with children's cognitive and behavioral skills after school entry across all three countries. No significant associations emerged in relation to children's reading and math skills. There were also no links between the timing of early maternal employment and children's conduct problems in the U.S. or U.K. Australian children whose mothers were employed before 2 years received lower reports of conduct problems from teachers than their peers whose mothers were nonemployed during the first two years, although the difference was very small in size (.12 SDs) and were not significantly lower than children of earlier employed mothers. There was no association between the timing of mothers' entry into employment and mother reports of later conduct problems in Australia.

Discussion

Mothers returning to work soon after childbirth is the norm in modern families, serving to sustain women's career trajectories, encourage more balanced gender roles within families, and increase families' economic resources (Gornick & Meyers, 2003; Ray et al., 2010; Waldfogel, 1998). Recognizing this, nearly all industrialized countries have implemented parental leave policies to provide income replacement and job protections for mothers after childbirth

(Kamerman, 2000; Ray et al., 2010). These policies have been found to support mothers' employment continuity after childbearing and thus, while encouraging some time off, promote maternal employment rates among mothers with young children (Pettit & Hook, 2005; Ruhm, 1998; Waldfogel, 1998). In the U.S., policy expansions have been significantly more limited with no federal paid parental leave and a limited federal unpaid parental leave policy (Ruhm, 2011; Waldfogel, 2001). Lacking paid leave and job protection options, many new mothers in the U.S. return to work soon after childbirth, juggling the demands of employment and parenthood.

This trend has spurred a substantial body of research on mothers' labor force participation and its associations with children's well-being which has pointed to one relatively consistent finding: that maternal employment begun early in infancy appears to pose a small but statistically significant threat to children's development (Baydar & Brooks-Gunn, 1991; Berger et al., 2005; Blau & Grossberg, 1992; Brooks-Gunn et al., 2002; 2010; Desai et al., 1989; Han et al., 2001; Hill et al., 2005; Ruhm, 2004). Little research has addressed this question in more recent cohorts of American children or in other countries. This gap is notable given the range of unpaid and paid maternal leave policies that have been implemented across countries (Australian Government Department of Education, Employment and Workplace Relations, 2013; Jaumotte, 2003; Kamerman, 2000). Using nationally representative samples of children born between 2000 and 2004 from three countries, the goal of this study was to examine associations between early maternal employment and children's cognitive and behavioral skills in three countries.

Selection into Early Maternal Employment

The first goal was to describe the patterns of employment across countries and the characteristics of children and mothers linked to these patterns. Results suggested that the

patterns of employment across countries largely mapped onto the policy and cultural norm differences between countries. Early returns to employment were most common by American mothers with nearly 60% employed within the first 9 months; not until 2 years after childbirth were that proportion of British mothers back at work. Early employment was less common among Australian mothers although almost 40% were employed by two years after childbirth. The intensity of work also varied dramatically. Full-time re-entry was the overwhelming majority in the U.S. while part-time work was reported 2 to 1 by British mothers and 3 to 1 by Australian mothers. Interestingly, the pattern shifts over early childhood; about 2/3s of British mothers (67%) and Australian mothers (63%) were employed after their children entered formal schooling while only 52% of American mothers were in the labor force at this time. Although, it is important to note that the American data were collected nearly a year before the Australian and British data and employment rates may have risen slightly in the year after children entered kindergarten. Overall, these results replicate prior comparative literature (Huerta et al., 2011; Coley et al., in press; Crosby & Hawkes, 2007) and suggest that policy differences and cultural norms between the three countries may promote very different decisions about the timing and intensity of when to return to work after childbirth.

Associations between child characteristics and the timing of mothers' post-birth employment revealed few characteristics of children that selected mothers in employment differentially across the three countries. Children of mothers employed in the first 9 months had the most adaptive temperaments across all of the countries in comparison to later employment or non-employment. Among children from the U.S. and U.K., children of mothers employed in this early time period were the healthiest and had the highest early cognitive skills whereas children of non-employed mothers in Australia had the highest early cognitive skills and there was no

difference across low birthweight status. Overall, results appear to say that mothers with healthier children return to work earlier in all three countries.

Turning to characteristics of mothers, there was more evidence of differences across the countries. Mothers across all countries who returned to work in the first 9 months were generally the most advantaged with the highest rates of pre-birth employment, highest levels of education, and lowest use of welfare. However, there were few differences between mothers employed before and after 9 months in Australia and the U.K. while American mothers employed after 9 months had the lowest levels of education, marital rates, and presence of a working partner. This suggests that paid and unpaid leave policies in Australia and the U.K. may allow for more gradual returns to work over the first two years resulting in few demographic differences between mothers employed earlier versus later. American mothers who enter employment later appeared to be doing so out of necessity because of lack of other household resources, a spouse, or a working partner.

Non-employed mothers also looked very different across the three countries. Non-employed American mothers had the highest rates of marriage and other household income. It is possible to hypothesize that with little or no maternity leave, American mothers with greater economic supports may choose non-employment while similar mothers in Australia and the U.K. with the benefit of long paid and unpaid leave policies may choose to re-enter the labor force at some point during the first two years. Indeed, other research has found that maternal leave policies promote job continuity, the likelihood that a woman returns to her pre-birth job, and women's labor market success (Hofferth, 1996; Glass & Riley, 1998; Pettit & Hook, 2005; Ruhm, 1998; Waldfogel, 1998).

Meanwhile, non-employed British and Australian mothers were the most disadvantaged with the lowest rates of marriage and other household resources. These differences may be due in part to welfare policy differences which require American mothers to work immediately or within months of childbirth (policies vary by state but generally ranged from 3 to 12 months during the study period) while Australian and British mothers have much longer (until their youngest child is 6 years old in Australia and 7 years old in the U.K.) Further, welfare benefits are time-limited in the U.S. (Australian Government Department of Families, Housing, Community Services, and Indigenous Affairs, Programs and Services, 2011; Waldfogel, 2008; 2010). Greater proportions of mothers in Australia, and to a lesser extent the U.K., reported receiving welfare benefits during the study; limited benefits in the U.S. may have pushed some economically disadvantaged mothers into the labor force in the second year while similar mothers in Australia and the U.K. continued to receive benefits supporting them and their children. Evidence from experimental welfare programs has found that the welfare work requirements in the U.S. increase employment rates particularly for mothers of young children (Michalopoulos, Schwartz & Adams-Ciardullo 2000; Grogger & Michalopoulos 2003).

Timing of Early Maternal Employment

The second goal was to incorporate robust statistical methods to address selection bias in analyses assessing associations between the timing of early maternal employment after childbirth and children's cognitive and behavioral skills after entry into formal schooling and replicate these analyses across all three countries. Findings suggested that maternal employment in the first two years after childbirth had few links with the cognitive and behavioral skills of American, Australian and British children. No significant associations emerged in relation to children's reading and math skills in any of the countries. The findings for behavioral skills were

also nearly all neutral, although there was one finding that suggested employment before 2 years was linked to lower teacher reported conduct skills for Australian children. This finding is likely simply due to chance as it was not part of a pattern of significant findings.

The overall pattern of results found replication across the U.S., Australia, and the U.K., suggesting that early maternal employment had limited discernible links with children's long-term development across all three countries. These results contradict results from the prior study by Huerta and colleagues (2011) that found negative associations between early maternal work and children's cognitive outcomes in the U.S. and U.K. while corresponding to their results that found few associations with behavioral outcomes across all three countries. There are numerous differences between this study and their work that could explain the discrepancy including our measure of early maternal work (we used before 9 months and between 9 months and two years while Huerta and colleagues used before 6 months and between 6 and 11 months), the timing of the outcome variables (after school entry versus age 4) and the steps that we took to attend to selection bias, specifically imputing missing data, measuring covariates prior to with child outcomes, and using causal inference techniques.

The results also differ from prior literature which has found a fairly consistent negative link between maternal employment begun in a child's first year of life and later child cognitive and socio-emotional development, particularly for middle-class and White children in the U.S. (Baydar & Brooks-Gunn, 1991; Berger et al., 2005; Blau & Grossberg, 1992; Brooks-Gunn et al., 2002; 2010; Desai et al., 1989; Han et al., 2001; Hill et al., 2005; Ruhm, 2004). These results have held even for studies that have used similarly rigorous methods with correlational data, such as structural equation modeling (Brooks-Gunn et al., 2010) or propensity score matching (Hill et al., 2005). One possible explanation for the neutral findings of the current study is that

the implications of early maternal employment for children have changed, driven by greater public acceptance of mothers' work, greater paternal engagement in caregiving, and other unmeasured factors. It is also possible the statistical techniques used in this study did a more thorough job of reducing the role of selection factors. Although it was not possible to control for all possible biasing factors, these analyses included a rich array of child, maternal and family characteristics that might predispose mothers into employment patterns, including low-birth weight; mothers' education and previous employment; and the availability of alternate sources of support from other sources of household income and welfare. Furthermore, these analyses were weighted by mothers' propensity to be employed, further reducing the role of selection factors.

Limitations

In interpreting the significance and implications of the results from this study, it is essential to first acknowledge the limitations. It is important to note that the employment variables only measured mothers' first job following childbirth and did not address mothers' full employment histories and the consistency of mothers' employment over the course of the study. Descriptive results suggest that the consistency of mothers' employment varied between countries, with more Australian and British mothers staying in the labor force than American mothers. These models also did little to address other factors such as employment satisfaction or quality. Second, although the variables in this study are fairly objective (e.g. demographic characteristics and the timing of employment after birth) and all of the studies used well-validated direct assessments with reports of children's behavioral skills from multiple reporters, there may still be issues of equivalency and measurement bias across the datasets due to cultural norms and expectations. Finally, although the statistical models controlled for a range of measured characteristic of children, mothers, and families that might predispose women into

employment patterns and also affect child functioning, the models were nonetheless correlational.

Conclusions

As seen in the descriptive findings from this study, early maternal employment is a norm in all three countries and an important contributor to both families' economies and national economies. The majority of contemporary mothers in the U.S. (nearly 70%) and U.K. (nearly 60%) return to work within the first two years after childbirth and, while a smaller percentage, more than 1/3 of Australian mothers are working by the time their child is two years old. These early employed mothers are the most likely to remain in the labor market five years later, suggesting that employment decisions made in the time period immediately after childbirth are pivotal to determining mothers' long-term employment trajectories.

The findings from the present study suggest that these early movements into employment following childbirth may not be associated with developmental risks or benefits for most modern children in the U.S., Australia, and U.K. These results were replicated across multiple statistical models and in contemporary birth cohort studies from three countries.

Findings suggesting that early maternal employment poses no risks for children's long-term development are good news. The majority of mothers are in the labor force and it appears, from this study, that most children are not being harmed by this work. Families and societies benefit from mothers' work; it supports women's careers, encourages balanced gender roles, and increases families' economic resources (Gornick & Meyers, 2003; Ray et al., 2010; Waldfogel, 1998). Furthermore, many families rely heavily, or even exclusively, on earnings from mothers' employment due, in part, declining male wages and increasing single-mother families (Haskins, 2006; Redd et al., 2011). Given this and given the lack of associations between employment and

children's development unearthed in this study, public policies should seek to encourage maternal employment, particularly around the time of childbirth when women make decisions about whether and how to stay engaged in the labor market. Prior research from the U.S. and other countries have shown that paid and unpaid leave maternal leave policies promote job continuity, the likelihood women return to their pre-birth job, and women's long-term labor market success (Hofferth, 1996; Glass & Riley, 1998; Pettit & Hook, 2005; Ruhm, 1998; Waldfogel, 1998). In this study, descriptive results indicated that while American mothers returned to the labor force quickly after childbirth, higher numbers of British and Australian mothers were working long-term. Thus, this study suggests that paid and unpaid leave policies may benefit mothers, families, and society by promoting maternal employment with the understanding that it has few implications children's development.

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Table 1

*Federal family policies in three countries at time of wave 1 data collection**

	U.S.	Australia	U.K.
Paid maternal leave	None	None	18 weeks paid leave; 6 wks at 90% of full pay, remainder at flat rate
Unpaid maternal leave	12 weeks if worked an avg of 25 hrs/wk for 12+ months for employer with 50+ employees	52 weeks unpaid leave for mothers who have worked 12+ months for employer	Mothers employed by same employer for year+ eligible for additional 29 weeks unpaid leave
Paternal leave	12 weeks if worked an avg of 25 hrs/wk for 12+ months for employer with 50+ employees	3 weeks of unpaid leave	None
Child care benefits	Some limited subsidies for low-income families; tax credits for low- and middle-income families	Child care benefit provides payment to help with costs; child care rebate covers up to 50% of costs	Provided to all low-income children < 3 years
Health insurance	Insurance for low-income families	Universal insurance	Universal insurance
Child cash payments	Child Tax credit provides $1000 annually to families with < $130,000 annual income	Baby Bonus provides $5000 one time payment; Family Tax Benefit offers annual support to low-income families	The Child Tax credit and a payment upon the birth of a child are available for low-income families
Minimum wage (annual wage in US $)	$15,080	$22,148	$13,658

*Within each country, wave 1 data collection occurred between: U.S. (01-12/2001), Australia (03/2003-02/2004), U.K. (09/2000-01/2002).

Sources: Australian Government Family Assistance Office, 2011; Early Childhood Development, 2011; OECD Family Database, 2011; U.K. Government, 2011; Waldfogel, 2010

Table 2
Overview of the datasets

	U.S.	Australia	U.K.
Survey name	Early Childhood Longitudinal Study Birth Cohort (ECLS-B)	Longitudinal Study of Australian Children Birth Cohort (LSAC)	Millenium Cohort Study (MCS)
Year of birth	01/2001 - 12/2001	03/2003 - 02/2004	09/2000 - 01/2002
Exclusions to sample	Children born to mothers < 15 yrs old; children adopted prior to 9 mths old	Non-permanent residents; children with same name as deceased children	Families ineligible for Child Benefit (mostly non-citizens)
Total N	10,700*	5,107	18,552
Analytic sample N	10,100*	5,093	18,497
Age (months) wave 1	10.47(3.01)	8.85(2.57)	9.22(0.53)
Age (months) wave 2	24.39(1.21)	34.04(2.93)	38.66(2.57)
Age (months) wave 4	75.08(9.19)	81.98(3.51)	89.17(3.06)

* Rounded to nearest 50 per NCES reporting requirements for ESCL-B data.

Table 3

United States: Maternal Employment and Demographic Characteristics of the Sample (n=10,100)

	Full sample *n=10,100*	Non-employment, *n=3,200*	First emp before 9 mths, *n=5,850*	First emp before 2 yrs, *n=1,050*
Employment Timing[a]				
Never employed	31.63	-	-	-
First emp before 9 mths	57.83	-	-	-
First emp before 2 yrs	10.54	-	-	-
Employment History Covariates				
Employed year before birth[a]	73.30	41.96*ab*	89.50*ac*	59.53*bc*
Employed at W4/5[a]	52.06	31.95*ab*	62.93*ac*	52.76*bc*
Child Characteristics				
Age of child W1 (in months)	10.47(3.01)	10.45(3.06)	10.46(2.93)	10.59(3.20)
Age of child W4/5 (in months)	75.08(9.19)	75.16(9.35)	74.91(9.11)	75.73(9.11)
Kindergarten assessment W5[a]	37.15	37.22	37.02	37.72
Boy[a]	51.14	50.86	50.93	53.11
Child was low birthweight[a]	1.28	1.57*a*	1.00*ab*	1.94*b*
Twin[a]	2.92	3.58*a*	2.46*ab*	3.46*b*
Race[a]				
White	53.54	50.89*a*	54.83*a*	51.78
Hispanic	25.51	30.64*ab*	22.62*a*	25.90*b*
African American	13.73	10.67*ab*	16.00*a*	15.42*b*
Asian	2.76	3.69*ab*	2.24*a*	2.79*b*
Native American	0.64	0.65	0.62	0.73
Multi-race	3.82	3.15*a*	4.32*a*	3.15
Adaptive temperament W1	0.06(0.49)	0.03(0.51)*a*	.08(0.48)*ab*	0.02(0.51)*b*
BSF-R mental score W1	50.23(14.96)	49.74*a*	50.60*ab*	49.66*b*
Maternal Characteristics				
Age of mother (in years)	28.21(6.39)	28.29(6.55)*a*	28.35(6.25)*b*	27.18(6.50)*ab*
Education[a]				
Less than high school	19.58	28.29*a*	13.99*ab*	24.08*b*
High school graduate or GED	29.59	27.50*a*	29.59*b*	35.94*ab*
Some college or Associate degree	26.55	22.51*a*	29.38*ab*	23.14*b*
Bachelor's or graduate degree	24.28	21.70*ab*	27.04*ac*	16.84*bc*
Non-English speaking household[a]	36.37	44.61*ab*	31.83*a*	36.52*b*
Married all waves[a]	58.77	64.61*ab*	56.78*ac*	52.11*bc*
Married some waves[a]	17.34	13.48*ab*	18.91*a*	20.34*b*
Never married[a]	23.89	21.91*a*	24.31	27.56*a*
Cohab any waves[a]	5.36	4.43*a*	5.40*b*	7.92*ab*
Number of non-parter adults in hh W1-4/5	0.41(0.77)	0.40(0.75)*a*	0.41(0.72)*b*	0.49(0.76)*ab*
Number of siblings W1	0.99(1.15)	1.17(1.22)*ab*	0.88(1.07)*ac*	1.05(1.25)*bc*
New sibling W2[a]	19.52	23.87*ab*	17.65*b*	16.70*a*
New sibling W3-W4/5[a]	49.27	49.04	49.46	48.95
Welfare all waves[a]	1.17	2.12*a*	0.62*a*	1.40
Welfare some waves[a]	15.65	18.35*a*	13.28*ab*	20.53*b*
No welfare[a]	83.18	79.53*a*	86.09*ab*	78.07*b*
Working parter all waves[a]	52.37	57.69*ab*	51.16*ac*	42.97*bc*
Working parter some waves[a]	35.44	32.04*ab*	36.08*bc*	42.19*ac*
No working partner[a]	12.19	10.27*ab*	12.76*a*	14.84*b*
Non-mother hh inc avg W1-4/5 (10,000s/yr)	3.24(3.27)	4.00(3.85)*ab*	2.92(3.44)*a*	2.68(2.84)*b*
Child Characteristics W4/5				
Reading Skills	0.00(1.00)	-0.08(1.03)*a*	0.07(0.97)*ab*	-0.09(1.00)*b*
Math Skills	0.04(1.00)	-0.03(1.03)*a*	0.10(0.97)*ab*	-0.07(1.02)*b*
Conduct Problems, Parent report	-0.03(1.00)	-0.05(1.02)	-0.03(0.99)	0.03(1.02)
Conduct Problems, Teacher report	-0.01(1.00)	-0.07(0.99)*ab*	0.02(1.00)*a*	0.08(1.04)*b*

[a]Proportions

Note: Within each row, lowercase letters denote differences between never employed, first employed before 9 months, and first employed before 2 years at the p<.05 level. Percentages may not add up to 100 due to rounding.

Table 4

Australia: Maternal Employment and Demographic Characteristics of the Sample (n=5,093)

	Full sample *n=5,093*	Non-employment, *n=2,101*	First emp before 9 mths *n=1,912*	First emp before 2 yrs *n=1,080*
Employment Timing[a]				
Never employed	61.89	-	-	-
First emp before 9 mths	17.83	-	-	-
First emp before 2 yrs	20.28	-	-	-
Employment History Covariates				
Employed year before birth[a]	61.64	45.95*ab*	91.32*ab*	83.41*bc*
Employed at W4[a]	63.05	54.09*ab*	79.99*ab*	75.51*bc*
Child Characteristics				
Age of Child at W1 (in months)	8.85(2.57)	8.87(2.60)*a*	8.64(2.44)*ab*	8.96(2.58)*b*
Age of Child at W4 (in months)	81.98(3.51)	82.05(3.54)*a*	81.58(3.40)*ab*	82.12(3.51)*b*
Boy[a]	51.17	51.50	52.91*a*	48.63*a*
Child was low birthweight[a]	5.95	6.57	5.19	4.76
Twin[a]	3.13	3.19	2.59	3.41
Adaptive temperament W1	4.45(0.62)	4.43(0.63)*a*	4.53(0.59)*ab*	4.45(0.61)*b*
Child CSBS score W1	25.87(9.70)	26.12(9.99)*a*	25.17(9.02)*a*	25.69(9.46)
Maternal Characteristics				
Age of Mother (in years)	30.89(5.41)	30.21(5.81)*ab*	31.93(4.62)*a*	32.06(4.53)*b*
Education[a]				
Less than high school	21.30	28.23*ab*	9.03*a*	10.92*b*
High school graduate or GED	12.46	5.52*a*	2.97*b*	4.03
Some college or Associate degree	37.07	37.74	38.27	33.98
Bachelor's or graduate degree	29.17	20.50*ab*	43.03*a*	43.43*b*
Parent Asian[a]	8.52	9.88*ab*	5.63*a*	6.91*b*
Parent Indigenous[a]	4.50	6.37*ab*	2.08*a*	0.92*b*
Immigrant household[a]	31.49	33.01*a*	28.85*a*	29.17
Non-English speaking household[a]	15.62	18.14*ab*	9.65*ac*	13.20*bc*
Married all waves[a]	62.15	55.40*ab*	71.20*a*	74.78*b*
Married some waves[a]	17.14	18.85*ab*	16.12*a*	12.82*b*
Never married[a]	20.71	25.75*ab*	12.67*a*	12.39*b*
Cohab any waves[a]	22.19	25.55*ab*	18.01*a*	15.61*b*
Number of non-parter adults in hh W1-4	0.16(0.42)	0.18(0.50)*ab*	0.12(0.36)*a*	0.13(0.40)*b*
Number of siblings W1	0.99(1.07)	1.13(1.17)*ab*	0.75(0.89)*a*	0.76(0.81)*b*
New sibling W2[a]	35.01	36.81*a*	34.38*b*	30.05*ab*
New sibling W3-W4[a]	38.52	41.16*ab*	35.77*a*	32.90*b*
Welfare all waves[a]	7.86	11.61*ab*	1.36*a*	2.14*b*
Welfare some waves[a]	44.88	52.52*ab*	32.69*a*	32.29*b*
No welfare[a]	47.26	35.87*ab*	65.95*a*	65.57*b*
Working parter all waves[a]	57.91	54.07*ab*	65.53*a*	62.94*b*
Working parter some waves[a]	35.19	37.00*ab*	31.35*a*	33.02*b*
No working partner[a]	6.90	11.78*ab*	3.33*a*	4.74*b*
Non-mother hh inc avg W1-4/5 (10,000s/yr)	5.69(3.68)	5.31(3.70)*ab*	6.22(3.58)*a*	6.39(3.60)*b*
Child Characteristics W4				
Reading Skills	-0.03(0.99)	-0.10(1.01)*ab*	0.14(0.99)*a*	0.16(0.91)*b*
Math Skills	-0.02(0.98)	-0.08(0.99)*ab*	0.13(1.01)*a*	0.13(0.93)*b*
Conduct Problems, Parent report	-0.00(1.00)	0.10(1.03)*ab*	-0.12(0.94)*a*	-0.04(0.94)*b*
Conduct Problems, Teacher report	0.00(1.00)	0.06(1.04)*a*	-0.01(0.98)	-0.09(0.90)*a*

[a]Proportions

Note: Within each row, lowercase letters denote differences between never employed, first employed before 9 months, and first employed before 2 years at the $p<.05$ level. Percentages may not add up to 100 due to rounding.

Table 5

United Kingdom: Maternal Employment and Demographic Characteristics of the Sample (n=18,497)

	Full sample *n=18,497*	Non-employment *n=7,748*	First emp before 9 mths *n=7,813*	First emp before 2 yrs *n=2,936*
Employment Timing[a]				
Never employed	41.89	-	-	-
First emp before 9 mths	42.24	-	-	-
First emp before 2 yrs	15.87	-	-	-
Employment History Covariates				
Employed year before birth[a]	66.64	47.10*ab*	89.94*ac*	76.55*bc*
Employed at W4[a]	66.82	46.46*ab*	83.37*ac*	76.48*bc*
Child Characteristics				
Age of Child at W1 (in months)	9.22(0.53)	9.21(0.53)	9.23(0.54)	9.21(0.53)
Age of Child at W4 (in months)	89.17(3.06)	89.25(3.06)	89.10(3.01)	89.14(3.14)
Boy[a]	51.29	51.66	51.71	49.19
Child was low birthweight[a]	6.78	7.85*a*	5.17*ab*	8.23*b*
Twin[a]	1.44	1.59*a*	0.97*ab*	2.31*b*
Race/ethnicity[a]				
White	87.08	81.24*ab*	92.29*ac*	88.70*bc*
Black	2.50	2.90*a*	2.00*ab*	2.77*b*
Indian	1.81	1.81*a*	1.45*b*	2.75*ab*
Pakistani/Bangladeshi	4.14	8.34*ab*	0.92*ac*	1.62*bc*
Multiracial	3.15	3.67*a*	2.73*a*	2.84
Other	1.32	2.03*ab*	0.61*ac*	1.32*bc*
Adaptive temperament W1	0.03(0.48)	-0.05(0.51)*ab*	0.08(0.44)*ac*	0.06(0.47)*bc*
Social & communication skills W1	-0.01(0.21)	-0.01(0.23)*a*	-0.00(0.20)*ab*	-0.01(0.21)*b*
Maternal Characteristics				
Age of Mother (in years)	29.60(5.96)	28.30(6.22)*ab*	30.70(5.32)*ac*	30.09(5.93)*bc*
Education[a]				
Less than high school	9.95	15.22*ab*	5.48*ac*	7.94*bc*
High school graduate	37.62	44.04*ab*	31.94*ac*	35.78*bc*
Some college or Associate degree	12.87	12.15*a*	13.53*a*	13.04
Bachelor's or graduate degree	39.56	28.60*ab*	49.05*ac*	43.24*bc*
Immigrant household[a]	14.21	18.57*ab*	10.25*ac*	13.24*bc*
Non-English speaking household[a]	10.36	15.59*ab*	5.93*ac*	8.38*bc*
Married all waves[a]	49.51	40.49*ab*	57.23*ac*	52.76*bc*
Married some waves[a]	22.60	23.29	22.33	21.51
Never married[a]	27.89	36.22*ab*	20.43*ac*	25.73*bc*
Cohab any waves[a]	30.89	33.13*a*	28.65*a*	30.92
Number of non-parter adults in hh W1-4	0.14(0.47)	0.19(0.54)*ab*	0.11(0.39)*ac*	0.13(1.63)*bc*
Number of siblings W1	0.92(1.09)	1.12(1.24)*ab*	0.71(0.87)*ac*	0.90(0.99)*bc*
New sibling W2[a]	34.33	41.23*ab*	32.30*ac*	21.78*bc*
New sibling W3-W4[a]	46.09	53.01*ab*	41.96*ac*	38.80*bc*
Welfare all waves[a]	2.74	5.85*ab*	0.38*ac*	0.79*bc*
Welfare some waves[a]	27.39	47.05*ab*	9.68*ac*	22.66*bc*
No welfare[a]	69.87	47.10*ab*	89.94*ac*	76.55*bc*
Working parter all waves[a]	58.13	43.23*ab*	71.20*ac*	62.69*bc*
Working parter some waves[a]	30.90	36.84*ab*	25.03*ac*	30.83*bc*
No working partner[a]	10.97	19.93*ab*	3.78*ac*	6.48*bc*
Non-mother hh inc avg W1-4/5 (10,000s/yr)	2.26(1.55)	2.13(1.52)*ab*	2.36(1.55)*a*	2.36(1.63)*b*
Child Characteristics W4				
Reading Skills	-0.04(0.85)	-0.18(0.87)*ab*	0.08(0.80)*a*	0.04(0.81)*b*
Math Skills	-0.05(0.85)	-0.19(0.87)*ab*	0.06(0.81)*a*	0.01(0.83)*b*
Conduct Problems, Parent report	-0.11(0.84)	0.01(0.89)*ab*	-0.22(0.77)*a*	-0.18(0.81)*b*
Conduct Problems, Teacher report	-0.17(0.76)	-0.10(0.80)*ab*	-0.23(0.71)*a*	-0.23(0.73)*b*

[a]Proportions

Note: Within each row, lowercase letters denote differences between never employed, first employed before 9 months, and first employed before 2 years at the p<.05 level. Percentages may not add up to 100 due to rounding.

Table 6

Influence of Mothers' Employment After Birth on the Development of School Readiness Skills in the U.S., Australia, and U.K.

	Cognitive Skills		*Conduct Problems*	
Independent Variables	Reading	Math	Parent report	Teacher report
Model 1: United States, *n=10,100*				
First emp before 9 mths	0.05(0.04)	0.04(0.04)	0.08(0.05)+	0.03(0.04)
First emp before 2 yrs	0.03(0.05)	0.01(0.05)	0.05(0.06)	0.04(0.06)
F of model	22.91**	27.77**	7.28**	8.68**
R^2	0.21	0.23	0.10	0.13
Model 2: Australia, *n=5,093*				
First emp before 9 mths	0.02(0.06)	0.01(0.07)	-0.01(0.06)	-0.03(0.06)
First emp before 2 yrs	0.07(0.05)	0.06(0.05)	-0.02(0.06)	-0.12(0.06)*
F of model	7.99**	4.78**	4.72**	3.38**
R^2	0.13	0.12	0.07	0.06
Model 3: United Kingdom, *n=18,497*				
First emp before 9 mths	-0.03(0.03)	-0.03(0.03)	0.02(0.03)	0.03(0.04)
First emp before 2 yrs	0.02(0.03)	0.03(0.03)	-0.01(0.03)	-0.01(0.03)
F of model	14.32**	17.14**	18.33**	9.27**
R^2	0.14	0.10	0.10	0.07

Note: +p<.10, *p<.05, **p<.01. Employed groups are compared to the omitted category of no employment. All models were estimated using OLS regression and weighted with propensity score weights. All analyses controlled for the W1 value of child age, gender, race/ethnicity, low-birthweight status, lag of the DV, number of siblings and twin status as well as new siblings W2, new siblings W3-4, and child age at assessment. All models also controlled for the W1 value of mother age, education, English speaking household as well as averages over W1-4 of the average number of non-partner adults living in the household, cohabitation, marital status, welfare recipient status, working partner, and household annual income not including mother's income.