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First-Year Maternal Employment and Child Development in the First Seven Years

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Abstract

Using data from the first 2 phases of the NICHD Study of Early Child Care, we examine the links between maternal employment in the first 12 months of life and cognitive, social, and emotional outcomes for children at age 3, age 4½, and first grade. Drawing on theory and prior research from developmental psychology as well as economics and sociology, we address three main questions. First, what associations exist between first-year maternal employment and cognitive, social, and emotional outcomes for children over the first seven years of life? Second, to what extent do any such associations vary by the child's gender and temperament, or the mother's occupation? Third, to what extent do mother's earnings, the home environment (maternal depressive symptoms, sensitivity, and HOME scores), and the type and quality of child care mediate or offset any associations between first-year employment and child outcomes, and what is the net effect of first-year maternal employment once these factors are taken into account?

We compare families in which mothers worked full time (55%), part time (23%), or did not work (22%) in the first year for non-Hispanic white children (N=900) and for African-American children (N=113). Comparisons are also made taking into account the timing of mothers' employment within the first year. A rich set of control variables are included. OLS and SEM analyses are constructed.

With regard to cognitive outcomes, first, we find that full-time maternal employment in the first 12 months of life (but not part-time employment) is associated with significantly lower scores on some, but not all, measures of cognitive development at age 3, 4½, and first grade for non-Hispanic white children, but with no significant associations for the small sample of African-American children. Part-time employment in the first year is associated with higher scores than full-time employment for some measures. Employment in the second and third year of life is not associated with the cognitive outcomes. Second, we examine the role of the child's gender and temperament and the mother's occupation in moderating the associations between first-year maternal employment and cognitive outcomes, but find few significant interactions for either child characteristics or mother's occupation. Third, we examine the role of an extensive set of potential mediators – the mother's earnings, the home environment, and the type and quality of child care. We find that mothers who worked full time have higher income in the first year of life and thereafter, that mothers who worked part time have higher HOME and maternal sensitivity scores than mothers who did not work or worked full time, and that mothers who worked either full time

or part time were more likely to place their children in high-quality child care by age 3 and 4 ½ and their children spent more time in center-based care by age 4 ½ than in families where mothers did not work in the first year of life. However, we also find some links between first-year maternal employment and elevated levels of maternal depressive symptoms thereafter. Turning to results from structural equation modeling, we find that the overall effects of first-year maternal employment on the cognitive outcomes are neutral. This occurs because significantly negative direct effects of full-time first-year employment are offset by significantly positive indirect effects working through more use of center-based care and greater maternal sensitivity by age 4 ½.

Regarding social and emotional outcomes, several findings, again limited to non-Hispanic white children, stand out. First, we find no significant associations between first-year maternal employment and later social and emotional outcomes (including attachment security) when comparing children whose mothers worked full-time or part-time in the first year with the reference group of children whose mothers did not work in the first year, although in models that take the timing of employment within the first year into account, we find some significant associations between full-time maternal employment in the first year and higher levels of caregiver- or teacher-reported externalizing problems at age 4 ½ and first grade. Second, part-time maternal employment by 12 months tends to be associated with fewer externalizing problems at age 4 ½ and first grade than full time maternal employment by 12 months. These results are unchanged when we allow for the possibility of moderation by child characteristics or maternal occupation. Third, the results from SEM models indicate that, while neither full-time nor part-time first-year employment has significant total effects on children's externalizing behavior problems at age 4 ½ or first grade, part-time first-year employment has indirect positive effects, working primarily through differences in the home environment and maternal sensitivity. Another important finding from the SEM models is that center-based care, which is often associated with maternal employment, is not significantly associated with elevated levels of child behavior problems.

Taken together, our findings provide new insight as to the net effects of first-year maternal employment as well as the potential pathways through which associations between first-year maternal employment and later child outcomes, where present, come about. Our SEM results indicate that, on average, the associations between first-year maternal employment and later cognitive, social, and emotional outcomes are neutral, because negative effects, where present, are offset by positive effects. These results confirm that maternal employment in the first year of life may confer both advantages and disadvantages and that for the average non-Hispanic white child, those effects balance each other.

I. INTRODUCTION

The links between maternal employment in the first year of a child's life and later child development have received a great deal of attention from developmental psychologists as well as researchers from other disciplines. Yet, many questions remain about whether and how maternal employment in the first year of life affects children's later outcomes. In this monograph, we provide an intensive examination of this topic, drawing on interdisciplinary theory and research and taking advantage of a unique longitudinal data source, the NICHD Study of Early Child Care.

In this chapter, we review the theory and prior research on the links between first-year maternal employment and child development, identifying the key hypotheses and findings as well as the unanswered questions that motivate this research. This review, and the analyses that follow, draw on several disciplines. We review theory from developmental psychology (on issues such as attachment, parenting, and the home environment), sociology (on issues such as time allocation, role strain, and family stress), and economics (in particular, drawing on models of investment, human capital, specialization, and selection). We also draw on empirical research from each of these disciplines, as well as the fields of demography, public health, and public policy.

We should say a word at the outset about why our focus here is on maternal employment, rather than both maternal and paternal employment. There are two distinct but related reasons for this. The first is that patterns of fathers' employment have not altered substantially in recent years, in contrast to the situation for mothers, whose employment rates have increased dramatically, particularly when children are young. As we discuss below, the normative American family, which used to have a stay-at-home mother, now has a mother who works in the labor market, often beginning shortly after giving birth. This change has occasioned much concern and prompted numerous analyses. In contrast, paternal employment continues to be a stable feature of family life (in families where a father is present), and thus how young children are affected by having a father who works has not been a subject of inquiry. Second, and relatedly, existing data sources do not allow us to estimate the effects of paternal employment, because they do not provide sufficient numbers of fathers who are present in the home but do not work and because the few fathers who do not work tend to be highly selected. Thus, although our analyses will take into account the influence of fathers' characteristics (including their earnings), we will not be focusing on the effect of their decisions to work or not work. In addition, although we are keenly aware of the juggling that both mothers and fathers experience in trying to balance the demands of work and family, examining such processes is beyond the scope of this study.

Theoretical Perspectives

Developmental psychology is a natural starting point for identifying theories as to how maternal employment in the first year of life might affect child development, because in order to understand how maternal employment (or any other factor) might affect child outcomes, it is important to begin with an understanding of how child development normally unfolds and the social factors that influence it in the early years (Bronfenbrenner, 2005; Bornstein, 2002; Maccoby & Martin, 1983; Shonkoff & Phillips, 2000; Sroufe, 1979; Thompson, 2006).

The importance of relationships in development is stressed by almost all theorists. Attachment, phenomenology, psychoanalytic, and family theorists, while using different frames, consider how and why enduring relationships are critical for developing a sense of self, of other, and of trust (Ainsworth et al., 1978; Bowlby, 1969, 1973; Cooley, 1912; Hinde & Stevenson-Hinde, 1987; Lewis & Brooks-Gunn, 1979; Mead & Morris, 1934; Parke & Buriel, 2006; Sroufe & Waters, 1977; Thompson, 2006). These early trusting relationships give children a secure base from which to explore, learn, and develop, and also

lay the groundwork for future relationships. Thus, attachment is important to cognitive, social, and emotional development.

But parenting goes beyond providing security. Parents are also children's first teachers and play an important role in cognitive and language development; parents provide language input, provide enriching materials and activities, directly teach skills, and offer the scaffolding needed to solve cognitive tasks (Bradley, 2002, 2004; Brooks-Gunn & Markman, 2005; Collins et al., 2000; Hart & Risley, 1992, 1995; Huttenlocher et al., 2002, 2004; Maccoby, 1992; Weizman & Snow, 2001). Parents also provide the context in which emotional regulation develops, so that children are able to inhibit pre-potent responses (age appropriately), comply with certain requests, learn persistence in the face of sometimes frustrating challenges, and delay gratification (Blair, 2000; Eisenberg & Valiente, 2002; Gunnar & Quevedo, 2007; Kochanska, 1995; Raver, 2002; Sroufe, 1979; Thompson, 2000). Parental harshness and punishment as a method of managing behavior (sometimes seen as the flip side of sensitivity but also viewed by some as a separate construct) as well as intrusiveness also contribute to children's behavior (most notably aggression but also withdrawal and anxiety; Deater-Deckard et al., 1996; Gershoff, 2002; Halgunseth et al., 2006; Ispa et al., 2004; Maccoby & Martin, 1983; McLoyd & Smith, 2002).

Given the role that parents play, it is not surprising that psychological theory has a lot to say about the influence that parental employment in early childhood might have on subsequent child development. In particular, concerns have been raised about employment in the first year of life, when children are so dependent on their parents for care. Indeed, until relatively recently, the typical child reared in the U.S. was cared for exclusively or primarily by his or her mother for the first year of life. Theory took for granted that infants would have an exclusive maternal caregiver.

As this pattern changed, and more women began working in the first year of their child's life, theorists had to address how this might affect child development (see, e.g., Erel, Oberman, & Yirmiya, 2006; Gottfried & Gottfried, 1988; Gottfried, Gottfried, & Bathurst, 2002; Hoffman, 1979; Hoffman & Youngblade, 1999). The initial response from psychologists was that maternal employment in the first year of life was cause for concern, primarily because of the threat it posed to the establishment of a secure attachment relationship (Belsky, 1988; but see also Clarke-Stewart, 1989 for an alternative view). Debates about links between maternal employment and attachment raged for many years (Thompson, 1998, 2006), but the best current evidence, from the landmark NICHD Study of Early Child Care, is that the use of non-maternal child care in the early years of a child's life does not necessarily affect attachment (aNICHD Early Child Care Research Network [NICHD ECCRN], 1997a, 2001). In the most comprehensive study to date, the NICHD ECCRN group found no significant main effects of early child care on attachment security or avoidance at 15 months, although long hours in early child care did affect attachment for boys, and more hours in care, as well as poor quality care or multiple arrangements, did affect attachment security for infants whose mothers were rated low in sensitivity (NICHD ECCRN, 1997a). Following up the same children at 36 months, the NICHD ECCRN group again found no significant main effects of early child care on attachment security, and found that only one of the three interaction effects – less secure attachment for children

experiencing more hours in early child care along with a mother rated low in sensitivity – persisted (NICHD ECCRN, 2001; see also NICHD ECCRN 2006b). However, links between maternal employment per se (rather than use of non-maternal child care, since the two are not analogous; Lamb, 1998) have not been examined directly using this data set (so that our understanding of such links is mainly due to small samples of families, often seen prior to the rapid rise in maternal employment in children's first year of life, with results being mixed across these studies; Barglow, Vaughn, & Molitor, 1987; Belsky & Rovine, 1988; Chase-Lansdale & Owen, 1987; Hoffman, 1989; Stifter, Coulehan, & Fish, 1993; Thompson, 1991).

Moreover, parents do more in the first year than promote attachment, and there is still concern among developmental psychologists about possible deleterious effects of parents working in the first year (see, for example, Belsky, 2001). Two of the most likely possible mechanisms by which parental employment in the first year might adversely affect later child outcomes are that parents who work might provide lower quality parenting and home environments, or might place their children in poor quality care. (It is also possible of course that parents who work might provide improved quality parenting and home environments, or might place their children in care that benefited their development). One hypothesis has to do with sensitivity, in that working outside the home might be linked with less responsive maternal parenting. If this were the case (and there is little evidence to support or refute this premise), then infants of working mothers might be less likely to be securely attached, given the links between responsivity (or sensitivity) and attachment classification (Bakermans-Kranenburg, van IJzendoorn & Juffer, 2003; Berlin, Ziv, Amaya-Jackson, & Greenberg, 2007; Bretherington & Waters, 1985; de Wolff & van IJzendoorn, 1997). Another hypothesis has to do with the provision of cognitively stimulating activities for the child (Bradley, 2002; 2004). If mothers who work are less likely to talk to their infants, to take them on outings, or to provide teaching through play activities, then one might find a link with cognitive development. Both premises are investigated here.

Other hypotheses that emerge from psychological as well as sociological theory relate to time (Bianchi, 2000). First, do mothers who work spend appreciably less time with their infants than mothers who do not work outside of the home? If mothers do spend less time with the infant, this might result in less provision of stimulating activities, talking, holding, or responding sensitively to the child's needs; alternatively, mothers might reduce time spent in routine care of the child but not their more intense interaction time (talking, playing). These hypotheses were explored in a recent study using the NICHD-SECC (see Huston & Aronson, 2005); mothers who worked did spend less time with their 7-month olds, and time spent with children was associated with HOME scores, but not sensitivity scores or child outcome scores (see also Sayer, Bianchi, & Robinson, 2004, for a comparison of time spent with children from the 1960s to the 1990s by mothers and fathers, and Bianchi & Wight, 2010 for contemporary evidence on this question). Another hypothesis is that mothers who work would have difficulty juggling roles and would as a consequence be more distressed and harsher in their parenting. This premise has been explored by psychologists in small studies of low-income mothers who left welfare and entered the work force when their children were preschoolers or infants (Chase-Lansdale et al., 2005; Gyamfi, Brooks-Gunn, & Jackson, 2001; Smith et al., 2001; Zaslow & Emig, 1997; see also studies by sociologists

discussed below) although in general, links between working and harsh parenting are not found in these samples.

It is important to note that psychological theory as to the effects of parental employment is often very nuanced, taking into account differences having to do with child and family characteristics (Hoffman, 1979; Hoffman & Youngblade, 1999). The implication of this theory is that analysts should consider the possibility that any effects of parental employment are not uniform. An excellent example of this kind of nuanced analysis, with particular attention to child gender, is provided by the article by the NICHD Early Child Care Research Network that appeared in *Child Development* in 2003, reporting links between more time in child care and externalizing behavior problems in the kindergarten and first grade years, and several thoughtful articles and commentaries that were published along with it (Langlois & Liben, 2003; Love et al., 2003; Maccoby & Lewis, 2003; Miller et al., 2003; Newcombe, 2003). In addition to child gender, which was a focus in the above-mentioned article as well as in many prior studies of maternal employment or early child care, theorists have also called for attention to child temperament as a possible moderating factor (Kagan & Fox, 2006; Rothbart & Bates, 2006). As we discuss further below, it is possible that maternal employment may have differential effects for children with more difficult temperaments who may be more vulnerable to the instability or tensions associated with changes in maternal employment.

Psychological theory is also increasingly pointing to the importance of race and ethnicity as possible moderating factors. While it is certainly true that the process of human development unfolds in similar ways across race and ethnic groups, theorists are also increasingly calling attention to the fact that childrearing practices and contexts do vary considerably across racial/ethnic groups and recommending that analysts should take this variation into account (Brooks-Gunn & Markman, 2005; Garcia Coll et al., 1996; Mistry, Vandewater, Huston, & McLoyd, 2002; Parke & Buriel, 2006; Raver, Gershoff, & Aber, 2007; Roosa, Dumka, Gonzalez, & Knight, 2002; Quintana et al., 2006). With regard to the effects of maternal employment, it may be important to take into account that African-American women have historically had higher levels of employment than white or Hispanic women, and thus working by 12 months may be seen as more normative in African-American families than it is in white or Hispanic families (Berger, Brooks-Gunn, Paxson, & Waldfogel, 2008; Blau, Ferber, & Winkler, 2006). It is also possible that maternal employment leads to fewer changes in the home environment or child care arrangements for the typical African-American child than it does for the typical white or Hispanic child. Researchers have long noted the greater involvement of kin in the rearing of African-American children (see, e.g., Chase-Lansdale, Zamsky, & Brooks-Gunn, 1994; Stack, 1974). If friends and family members are already caring for children part of the time, alongside the mother, the impact on the child of the mother going to work in the first year may be less consequential than in situations where the mother was providing sole or primary care with less involvement on the part of kin (Berger et al., 2008).

Another potential moderating factor emphasized by psychological theory is the nature of the parent's job, in particular, its quality and complexity, as well as the income it provides (see review in Repetti, 2005). Job-related factors are emphasized in sociology as well, which also

shares with psychology attention to contextual influences on development, as well as variation across individuals and families (see, for example, Menaghan, 2005; Menaghan & Parcel, 1995; Parcel & Menaghan, 1984; see also overview in Glass, 2005). Together, therefore, both psychological and sociological theory point to the critical role that may be played by moderating factors, whether at the level of the child, family, or job.

Sociologists have also developed theories regarding the roles that individuals play and how roles at home and work may conflict or be complementary (Presser, 2003). This literature nicely overlaps with the literature in psychology on role strain and spillover (see e.g. Barnett & Hyde, 2001). An important implication of this line of theory for our work is the impact that employment may have on the way a parent interacts with his or her family and children. If work is rewarding and challenging, parents may be more sensitive and responsive to their children. Conversely, if work is stressful or numbing, parents may be less sensitive and responsive when they come home. Thus, quality of parenting is likely to be a key mediator for how parental employment affects children's outcomes. And, as discussed above, characteristics of the parent's job or occupation may moderate associations between parental employment and child outcomes.

What can a discipline such as economics add to the already rich body of theories provided by psychology and sociology? Economic theory offers useful concepts that supplement those from psychological and sociological theory on four key points (see overviews in Leibowitz, 2005; Waldfogel, 2005). The first is how parents decide to allocate time within families and households and in particular, the extent to which they specialize in home production versus labor market activity. The classic works on this topic are Gary Becker's (1981) *A Treatise on the Family* (see also Becker, 1965) and articles by Jacob Mincer and co-authors (Mincer, 1962; Mincer & Polachek, 1974; Mincer & Ofek, 1982). Because earnings grow with experience and time at a specific job (and because breaks in employment and part-time hours are penalized in the labor market), economic theory points to the advantages to families of adopting "corner solutions" – whereby one parent specializes in the labor market, while the other specializes in home production. This theory suggests that there will be trade-offs involved in parents' decisions to work or not work in the labor market, or to work full-time versus part-time, and points to the need for our empirical work to distinguish full-time from part-time employment, as well as non-employment.

The second key insight from economic theory has to do with how parents make decisions about investments in children and the impacts of those decisions. Economists emphasize that the direction of effects of parental employment on child health or development is not clear *a priori*. Parental employment may improve child health and development by raising family income and resources available to the child, but at the same time, the effects on the quality of parenting and the quality of non-parental care might be positive, negative, or neutral (Leibowitz, 2005). This is of course a point made by developmental psychology as well (see, e.g. Duncan & Chase-Lansdale, 2002, who offer a perspective informed by both disciplines). This point is crucial for our analysis, as it suggests the importance of looking at the role of key mediators such as income, quality of parenting and the home environment, and quality of non-parental child care.

Third, economic theory offers insights about the process by which human capital accumulates over the lifecycle. Again, there is overlap on this point between the perspective of economists and developmental psychologists, but economists perhaps emphasize more strongly the role that early investments play in boosting the returns to later investments and future learning (see, e.g. Carneiro & Heckman, 2003; Heckman & Lochner, 2000; Heckman & Masterov, 2007). Economic theory, like psychological theory, would lead us to expect the effects of early parental employment to persist over time, and points to the importance of conducting longitudinal analyses such as those we carry out here.

Fourth, economic theory emphasizes processes of selection into behaviors such as employment, and how analysts must address these selection processes if they are not to provide biased estimates in drawing causal inferences. James Heckman (1978) was the first to systematically address the problem of selection bias and to propose a solution to it. Although a large literature on causal inference, featuring numerous methodological advances, has developed since that time both in economics and other disciplines (see reviews by Angrist & Krueger, 1999; Currie, 2005; Heckman & Smith, 1995; Shadish, Cook, & Campbell, 2002; Shonkoff & Phillips, 2000; Winship & Morgan, 1999), the fundamental challenge of addressing selection bias remains. It is widely recognized that few studies will satisfactorily address selection bias, but it is expected that studies will recognize the potential for such bias, take steps to address it, and acknowledge limitations.

Integrating across these various disciplines, several key insights emerge that inform our analyses. The first is that the effects of maternal employment may vary depending on when that employment occurs and for how many hours. To the extent that infants are more dependent on adults than children at later ages, and less able to communicate with different adults, we might expect the effects of employment in the first year to differ from the effects of employment after the first year, and for the effects of full-time employment in the first year to differ from the effects of part-time employment. There may even be differences depending on timing within the first year (although these may be difficult to detect if there is not sufficient variation in the data).

The second insight is that changes in the families' economic resources, changes in the home environment, and changes in child care are likely to be key mediators by which the effects of first-year maternal employment, if any, might operate. Changes in attachment, which were the focus of much early work in this area, may also be potential mediators.

Third, theory suggests that the effects of first-year maternal employment, if any, will not be constant across groups but rather may vary by characteristics of the child, family, or job. In particular, it is likely that any effects of first-year maternal employment may vary by race and ethnic group and thus an important implication for our work is that we should conduct the analyses separately by race and ethnic group. Theory also points to the role of child characteristics such as gender and temperament, and to possible differences by parental job or occupation.

Fourth, theory points to the importance of recognizing and addressing the potential for selection bias. There are many factors that will influence a mother's decision to go to work

in the first year of life, when to go to work, and whether to work full-time or part-time, and some women will have more choice in such matters than others. Selection bias may play a role in explaining differences across racial and ethnic groups as well as within groups. As discussed below, we control for an extensive set of covariates in an effort to control for selection bias, but it is important to state here that we recognize that in the absence of experimental data, we can not be sure that women who work or do not work in the first year, or work at different times or intensities, are otherwise identical. Thus, we can not place a causal interpretation on our results and instead consider them as associational.

Prior Research and the Contribution of the Current Study

Drawing on the theoretical perspectives discussed above and using phase 2 data from the NICHD Study of Early Child Care (NICHD-SECC), following children to first grade, this study provides new evidence on the links between maternal employment in the first year of life and later child outcomes. In the preceding section, we reviewed the theory that informs our research approach. In this section, we summarize the findings from prior research and their implications for our study.

The first question we address is whether there are any associations between first-year maternal employment and cognitive, social, and emotional outcomes for children at age 3, age 4 ½, and first grade. Prior work using the first phase of data from the NICHD-SECC examined cognitive outcomes to age 3 and reported some negative associations between full-time maternal employment during the first year of life and children's performance on the Bracken assessment of school readiness at age 3 for non-Hispanic white children (Brooks-Gunn, Han, & Waldfogel, 2002). However, that study did not examine any social or emotional outcomes, as we do here. A further limitation of the prior study is that it did not explicitly compare the effects of full-time and part-time work, but rather focused on the distinction between the effects of full-time work and no work in the first year. This is an important shortcoming, as theory would suggest that we should distinguish between part-time work and full-time work, as we do here.

Moreover, in the prior study's examination of cognitive outcomes, it was not clear what, if any, associations might be seen between maternal employment in the first year of life and cognitive outcomes beyond age 3 or whether, if found, those associations would be larger or smaller. The prior study was also not able to test very well whether the cognitive associations continued to be present after controlling for an earlier child cognitive test score. (The prior study did test this with a control for an age 2 test score; however, cognitive assessments become more reliable and predictive as children age, so the early control used in that study might understate the possibility that later associations might simply reflect earlier associations, where present).

The theory reviewed above is not clear on this point. One hypothesis is that any differences in cognitive, social, or emotional development associated with children's experiences of maternal employment in the first year will be relatively short-lived and will thus show weaker associations with cognitive outcomes over time, as the influence of early experiences fades out. This perspective is supported by research showing that associations between early experiences in early childhood education programs often diminish over time (Brooks-Gunn,

2003; Karoly et al., 1998; Karoly & Bigelow, 2005). Another hypothesis is that experiences in the first year may alter children's trajectory as well as initial levels, in which case differences in child outcomes might be maintained or even grow over time, if higher initial levels of skills make children more adept at picking up later skills. This latter perspective rests mainly on theory as opposed to empirical evidence at this point (see e.g. Carneiro & Heckman, 2003; Heckman & Lochner, 2000; Heckman & Masterov, 2007; but see the research on parental verbal output and reading as they are associated with child language in young children; Hart & Risley, 1995; Love et al., 2005; Snow, Burns, & Griffin, 1998; Whitehurst & Lonigan, 1998; in addition, if sensitive parenting behavior shows continuity over time, initial trajectory changes are likely to be reinforced; Belsky & Fearon, 2002; Landy et al, 2001). We test these competing hypotheses by comparing the magnitude of the associations at age 3, 4 ½, and first grade. Relatedly, we will also assess whether any associations remain at age 4 ½ or first grade after controlling for the child's score on an earlier measure of the relevant outcome at age 3. These additional models will test whether any associations between first-year maternal employment and later outcomes work mainly through changes in initial levels or whether they also work through changes in later trajectories.

Few previous studies of the links between first-year maternal employment and child outcomes have followed children beyond age 3 or 4. Studies that have done so have primarily relied on data from the National Longitudinal Survey of Youth Child Supplement (NLSY-CS). Work using the NLSY-CS found negative associations between first-year full-time maternal employment and child cognitive outcomes measured as late as age 7 or 8 (Han, Waldfogel, & Brooks-Gunn, 2001; Ruhm, 2004; Waldfogel, Han, & Brooks-Gunn, 2002; but see also Harvey, 1999 who does not find significant associations). Associations between first-year maternal employment and later child behavior scores in the NLSY-CS are mixed. Results from studies conducted in 1980s and early 1990s indicate that maternal employment in the first or second years of a child's life and/or the quantity of non-maternal care (which is highly correlated with the intensity of maternal employment) are associated with more problem behaviors (e.g., Bates et al., 1994; Baydar & Brooks-Gunn, 1991; Belsky, 1986, 1990; Belsky & Eggebeen, 1991; Haskins, 1985; Vandell & Corasaniti, 1990), and that these adverse associations may persist over time (e.g., Vandell & Corasaniti, 1990). At the same time, not all studies report similar findings (e.g., Crockenberg & Litman, 1991; Greenstein, 1993). In one, full-time maternal employment was associated with greater compliance at home and in the lab for 2-year-olds (Crockenberg & Litman, 1991). Using the 1986 and 1988 NLSY sample of 1,657 four-and five-year olds, Greenstein (1993) found that children whose mothers began working sometime following the child's birth and continued through the child's fourth birthday had significantly fewer mother-reported behavior problems than children whose mothers had never been worked, and that use of non-maternal care in the first year was related to fewer behavior problems.

The second question we consider is whether associations between first-year maternal employment and later outcomes, if found, are moderated by family, child, or job characteristics. First, at the level of the family, we consider race/ethnicity as a possible moderator. Because we are concerned that the effects of maternal employment and the other covariates may vary by race/ethnicity, we carry out all our analyses separately for non-

Hispanic white families and for African-American families (regrettably, we have too few Hispanic families or families of other racial/ethnic groups to examine them separately). Thus, effectively, we are estimating fully interacted models, where we allow all the coefficients to vary by race/ethnicity (not just the coefficients on maternal employment) (for a recent example of this approach, see Raver, Gershoff, & Aber, 2007). We do this because theorists (e.g. Greenfield et al., 2006; Parke & Buriel, 2006) increasingly are drawing attention to the fact that childrearing practices and contexts may vary considerably by racial/ethnic group (see Bingenheimer et al., 2005; Leventhal et al., 2004 for examples of racial differences in the HOME scales; see Brooks-Gunn & Markman, 2005 for a review of racial differences in parenting of young children). A second compelling reason for analyzing racial/ethnic groups separately is that we need to take into account the possibility of differential selection into employment across racial/ethnic groups. In particular, it has been hypothesized that African-American women who work in the first year may be positively selected (in terms of factors that are not observed in the data and that are correlated with their child's outcomes) in comparison to those who stay at home in the first year, while the opposite may be true for non-Hispanic white women; if so, the non-working comparison group for non-Hispanic white mothers may be more highly skilled than the non-working comparison group for African-American mothers (Berger et al., 2006; Hill et al., 2005). Support for this hypothesis is provided by research on racial/ethnic gaps in women's employment and earnings (Neal, 2004). An alternative, but not mutually exclusive, hypothesis, drawing on sociological and psychological theory, would predict differential associations between maternal employment and children's outcomes across racial/ethnic groups because of differences in factors that may mediate the links between first-year maternal employment and later child outcomes. If, for example, non-Hispanic white children whose mothers work in the first year are more likely to be moved from exclusive maternal care into (often poor-quality) non-parental child care arrangements, while African-American infants are more likely to stay with kin caregivers who were participating in their care anyway, then it would stand to reason that the links between first-year maternal employment and child outcomes might differ across the two groups.

Prior research has found that the associations between first-year maternal employment and later child outcomes do vary by racial/ethnic group (i.e., significant negative associations have been reported for white but not African-American or Hispanic children in the NLSY-CS, see Han et al., 2001; Hill et al., 2005; Waldfogel et al., 2002; the same has been found in the NICHD-SECC, see Brooks-Gunn et al., 2002). Most recently, analyses of data on a large sample of urban 3-year olds from the Fragile Families and Child Wellbeing Study have found that first-year maternal employment is linked to lower cognitive scores for non-Hispanic white children, but not African-American or Hispanic children, and to higher levels of behavior problems for Hispanic children, but not non-Hispanic white or African-American children (Berger et al., 2008). Therefore, in this study, we carry out all the analyses separately by racial/ethnic group. Due to sample size constraints, our main results are for non-Hispanic white children, but we also provide some selected results for the small sample of about 100 African-American children (as noted above, we do not have sufficient sample size to analyze other groups).

It is important to note that the families of the approximately 100 African-American children differ in many respects from the families of the larger and generally more advantaged sample of white children. We do not have sufficient variation in the African-American sample to construct a sample that would have the same overall characteristics as the white sample. Thus, any differences we find between the white and African-American samples may reflect differences associated with family characteristics as well as differences due to race or ethnicity.

Second, we take into account differences related to child characteristics. As Shonkoff and Phillips (2000) point out, there is no reason to assume that all children will be similarly affected by the same experiences. They particularly emphasize the importance of studies of maternal employment paying more attention to child-specific characteristics as potential moderators.

We examine two potential child characteristics as moderators here. The first is *gender*. Theory and prior research suggest that, compared to girls, boys may be more affected by early experiences (see, e.g., Rutter, 1979; Zaslow & Hayes, 1986) and by non-maternal child care as well (see Bornstein et al., 2001, 2006; Bornstein & Hahn, 2006; Crockenberg, 2003; Miller Brotman et al., 2003; Tout et al., 1998; Watamura et al., 2003; Weinberg et al., 1999). Although our focus is on maternal employment rather than child care, the two are related, and so we draw on both literatures to inform our research design and hypotheses; however, it should be kept in mind that maternal employment in the first year is not synonymous with child care in the first year, because some children whose mothers work do not use any non-maternal child care, while some children use non-maternal child care even though their mothers do not work. One reason cited in the child care literature as to why early child care might have different effects on boys and girls is that boys may be less likely than girls to form secure attachments to child care providers (Ahnert & Lamb, 2003; Ahnert, Pinquart, & Lamb, 2003). Second, boys may be less able than girls to self-regulate and cope with negative arousal (Crockenberg, 2003; Weinberg, Tonick, Cohn, & Olson, 1999). Third, girls may be better-equipped than boys to adapt to the large group sizes that often characterize non-parental child care, or may benefit more from group experiences in terms of developing behaviors that are more often expected of girls than boys (Bornstein & Hahn, 2006; Bornstein et al., 2006; Maccoby, 1988). A fourth potentially relevant distinction between the experience of boys and girls in non-maternal child care is the children with whom they play, and the nature of their play (Fabes, Hanish, & Martin, 2003; Maccoby, 1998; Maccoby & Lewis, 2003). By the age of 30 to 36 months, children begin to play mostly with others of the same sex, and the play of boys is more aggressive and rough than the play of girls. However, because this difference does not emerge until the third year of life, it is not likely to explain gender differences in the effects of non-maternal child care experienced in the first year of life.

A number of prior studies of first-year maternal employment or child care have reported differential effects by gender; in particular, studies have tended to find larger associations between early and extensive child care and behavior problems for boys than for girls (see reviews by Belsky, 2001, and Crockenberg, 2003; although see also the NICHD ECCRN, 2003, which did not find significant gender interactions). However, this pattern has not

always been found in studies of cognitive outcomes, and prior work with the NLSY-CS has produced contradictory results (Desai et al., 1989; Han et al., 2001; Ruhm, 2004; Waldfogel et al., 2002). However, the NLSY-CS may be inadequate for studying such gender differences, if boys and girls whose mothers work experience different types or quality of child care, which can not be controlled for in the NLSY-CS (Waldfogel et al., 2002).

Prior work with the NICHD-SECC, which was able to control for child care type and quality as well as maternal sensitivity, found that the association between first-year full-time maternal employment and school readiness at age three was more negative for boys than girls (Brooks-Gunn et al., 2002). In this study, we estimate models interacting first-year maternal employment with child gender to explore whether that gender difference is also observed for cognitive outcomes at age 4 ½ and in first grade. We hypothesize, based on the theory and prior research reviewed above, that to the extent associations between first-year maternal employment and later cognitive outcomes are found, they should be larger for boys, at least at early ages. As discussed above, prior evidence on social and emotional outcomes suggests that we should expect larger effects for boys for these outcomes as well. Therefore, we hypothesize that, if associations are found, they may be larger for boys.

The second potential child-level moderator we examine is *child temperament*. Differential associations between first-year maternal employment and later cognitive or social and emotional outcomes by child temperament have not been studied, but theory and prior research on related topics provide ample reasons to think that such differences may be important (see, for example, Crockenberg, 2003; Shonkoff & Phillips, 2000). A recent illustration of the potentially important role that temperament might play as a moderating factor comes from the work of Watamura et al. (2003), who found that infants and especially toddlers who attended full-day center based child care had higher levels of cortisol (a stress-related hormone) in the afternoon during the days they were at child care than during days when they were at home. However, cortisol levels were significantly lower for toddlers who were more socially competent and less socially fearful, which suggests that some pre-school age children may find child care more stressful than others (see also Dettling et al., 2000; discussion by Crockenberg, 2003; Langlois & Liben, 2003; and recent work by Li-Grining et al., 2004). Examining the moderating role of temperament is also important, because when links between gender and child care or maternal employment are found, such associations may be due to hypothesized gender differences in temperament (Rothbart & Bates, 2006).

Prior work on first-year maternal employment or child care using the NLSY-CS was not able to take child temperament into account. Prior work using the NICHD-SECC did examine whether child temperament moderated the association between early child care and child social and emotional outcomes, but did not find any significant interactions (NICHD ECCRN, 1997a, 1998). We are aware of no prior studies that examine the role of child temperament as a moderator of the links between first-year maternal employment and child cognitive outcomes. In this study, we estimate models where first-year maternal employment is interacted with child temperament to test whether the associations between first-year maternal employment and child outcomes, if found, vary by temperament (with links being stronger for children with more difficult temperaments). Further, we examine

gender and temperament as joint moderating factors, hypothesizing that associations will be strongest for children who are boys *and* have difficult temperaments.

Finally, we consider *mother's occupation* as a possible moderator. The theory reviewed above makes a compelling case for how the nature of the mother's job could affect the way that employment influences her and her interactions with the child. And prior empirical work on parental employment provides supportive evidence that features such as job quality do make a difference in how parental employment affects parents and children (see e.g. Hoffman & Youngblade, 1999; Menaghan & Parcel, 1995; Parcel & Menaghan, 1984; Scheider & Waite, 2005). In light of the direction from theory, it is striking that, although prior studies of first-year maternal employment have considered several types of maternal or family characteristics as moderators (factors such as maternal education or family income), no prior study of the effects of first-year employment on child outcomes has considered maternal occupation as a moderator. In this study, therefore, we break new ground by testing for whether the associations between first-year maternal employment and child outcomes, if any, vary by maternal occupation. In particular, we focus on the distinction between women who are in professional positions, and women who are in non-professional positions. Even holding maternal earnings constant, we would hypothesize, based on theory and prior research, that first-year maternal employment by women in professional jobs would be less detrimental to child outcomes than would be first-year maternal employment by women in non-professional jobs, because women in professional jobs would be more likely to be in positions that are challenging and satisfying and that afford flexibility to address child and family needs.

The third question we analyze has to do with mediation. A common limitation of the prior NLSY-CS studies is that they could not establish to what extent observed links between first-year maternal employment and later outcomes, where present, were due to features of the home or child care environment for which the studies could not control and for which we can, using the rich NICHD-SECC data. As indicated earlier, findings have also been mixed with respect to attachment classification, based on small samples of children.

Thus, the third focus of this study is to examine in detail the role of several potential mediators, which theory points to as possibly explaining the associations between maternal employment in the first year of life, where found, and later child outcomes. The prior study did control for a variety of child and family background factors (including child gender, presence of older siblings, family income the year before the birth, whether the family was ever in poverty after the birth, the mother's PPVT-R score, the mother's age, education, and marital status at the time of the birth, and the mother's depressive symptom score 1 month post-birth; Brooks-Gunn et al., 2002). However, the prior study did not explicitly test the extent to which associations between maternal employment and later outcomes, if any, worked through specific mediators (such as poorer quality home environment or child care), or were offset by changes in specific factors (such as increased earnings).

Following Baron and Kenney's (1986) suggestions for mediation analysis, in this study we first examine whether maternal employment in the first year of life is associated with each of our potential mediators and offsetting factors, and then add the potential mediators and

offsetting factors to models examining the links between first-year maternal employment and subsequent child cognitive, social or emotional outcomes. If a factor is associated with later outcomes, and coefficients associated with first-year maternal employment are reduced by the introduction of that variable, then mediation is occurring. So, for example, higher levels of maternal depressive symptoms associated with employment could mediate negative associations, where present, between employment and child outcomes, if depressive symptoms are also associated with those outcomes. Conversely, if a factor is associated with later child outcomes, but coefficients associated with first-year maternal employment are increased when we introduce the variable, then mediation is not occurring and instead this variable is playing an offsetting role. So, for example, higher income associated with employment could offset negative associations, where present, between employment and child outcomes, if income is positively associated with child outcomes.

Although estimating a series of ordinary least squares regression models has been the classic method used in developmental psychology to test for mediation as recommended by Baron and Kenney (1986), more recently developmental psychologists as well as sociologists have been using an alternative analytic approach, structural equation modeling (SEM). In SEM, the paths linking independent variables to outcomes via mediating and offsetting variables are specified and models are then estimated to test which of those paths are significant links as well as the overall magnitude of the direct and indirect effects of the independent variable(s) on the outcome(s) of interest (Biddle & Marlin, 1987). An advantage of SEM models, therefore, is that they yield an estimate of a variable's total, direct, and indirect effects. They also explicitly take into account the covariance between the independent variable(s) and the mediating and offsetting variables(s) of interest. This is important given that different types of employment in the first year, in particular, full-time versus part-time employment, and the other covariates, are correlated. Therefore, in assessing mediation, we carry out SEM analyses for the second step of the classic Baron and Kenney (1986) two-step approach. However, we did also carry out a full set of OLS analyses. For the sake of brevity, we do not report those results here, but they are available from the authors on request.

Drawing on the theory reviewed above, we examine three sets of potential mediators. The first is *the mother's earnings*. Mothers who work in the first year of life, and particularly those who work full-time, will all else equal have higher earnings in the first year than mothers who do not work that year. Moreover, it is likely that their earnings will be higher in subsequent years as well, since mothers who did not work in the first year of life often face a wage penalty that can take several years to attenuate (due to the loss of work experience and tenure on the job; see Waldfogel, 1998). Few studies have specifically examined the links between mother's earnings and child outcomes, but there is a large literature showing that higher income in early childhood is positively associated with children's cognitive outcomes in later childhood and adolescence (for an overview, see Duncan & Brooks-Gunn, 1997; Duncan et al, 1998; for recent evidence from the NICHD study, see Dearing, McCartney, & Taylor, 2001). Parents in low-income families may experience greater financial strain and hardship, which are in turn associated with poorer parental psychological functioning and parenting behavior (Conger et al., 1992; Elder, Conger, Foster, & Ardelt, 1992; Jackson, Brooks-Gunn, Huang, & Glassman, 2000; Linver,

Brooks-Gunn & Kohen, 2002; McLoyd, 1990, 1999; Raver et al., 2007). Families with lower incomes may be less able to provide resources in the home to stimulate their children's cognitive and language development (Votruba-Drzal, 2003; Yeung, Linver, & Brooks-Gunn, 2002). In addition, low-income families may be less able to purchase high-quality and stable child care than more affluent families (NICHD ECCRN, 1997a). These considerations lead us to expect there to be positive associations between mothers' earnings and child outcomes. At the same time, however, these associations may be tempered by the fact that mothers' earnings are typically only one component of family income. Particularly in couple families with working fathers, mothers' earnings will make up only a portion of the overall family income and thus their effects on child outcomes may be attenuated.

Prior research on the role that income plays in the associations between first-year maternal employment and child outcomes is limited. Studies to date have mainly used data from the NLSY-CS and have examined family income, rather than mother's earnings per se (see, for instance, Baydar & Brooks-Gunn, 1991; Desai et al., 1989; Greenstein, 1995; Han et al., 2001; Waldfogel et al., 2002). Prior work examining first-year maternal employment and child cognitive outcomes at age 3 in the NICHD-SECC (Brooks-Gunn et al., 2002) controlled for family income only by including a control for whether the family had been in poverty up to the time of the assessment. Here we control for income in a more detailed manner than in any prior studies on this topic, controlling for mothers' earnings separately from fathers' earnings and other family income, and we also examine maternal earnings as a mediator of links between employment and child outcomes. We hypothesize that mothers who work in the first year, and particularly full-time, will have higher earnings, and that those higher earnings will be associated with better child outcomes. Thus, mother's earnings are a potential mediator for positive associations between first-year maternal employment, where found, and later child outcomes. Conversely, if there are any negative associations between first-year maternal employment and later child outcomes, we would expect mother's earnings to play an offsetting role.

The second set of potential mediators suggested by theory has to do with *the home environment*. Specifically, we look at maternal depressive symptoms, maternal sensitivity, and the overall quality of the home environment as measured by the HOME scale. There are large literatures linking each of these aspects of the home environment with child cognitive, social, and emotional outcomes (for evidence on the links between maternal depressive symptoms and poorer child cognitive outcomes, see NICHD ECCRN, 1999; Peterson & Albers, 2001; Teti et al., 1995; for evidence on maternal sensitivity and improved child cognitive outcomes, see Berlin et al., 2007; Bretherington & Waters, 1995; NICHD ECCRN, 1999; Thompson, 2006; and for evidence on the home environment as measured by the HOME scale and improved child cognitive outcomes, see Bradley, 1995; Bradley et al., 1989; Bradley et al., 2001a and b; Brooks-Gunn, Klebanov, & Duncan, 1996; Huston & Aronson, 2005). Prior studies have provided some evidence that these aspects of the home environment may be affected by maternal employment in the first year of life. For instance, in prior analyses of the NICHD-SECC for children up to age 3, children whose mothers worked full-time by age nine months had mothers who were rated as providing less sensitive care by age 3 than children whose mothers had not worked at all in the first nine months

(Brooks-Gunn et al, 2002), while analyses of maternity leave found that women who worked earlier in the first year had higher subsequent levels of depressive symptoms (Chatterji & Markowitz, 2005). It is likely however that the links between first-year maternal employment and aspects of the home environment are complex and will depend on factors such as the quality of that employment and how satisfying and rewarding it is for the mother (Menaghan, 2005; Menaghan & Parcel, 1995; Parcel & Menaghan, 1984) as well as the mother's preferences (Hock & DeMeis, 1990). And, prior research has not examined this set of factors together as mediators for outcomes beyond age 3. Thus, we can not hypothesize in what way full-time maternal employment in the first year might be associated with later levels of maternal depressive symptoms, maternal sensitivity, and quality of the home environment as measured by the HOME scale, or the extent to which these factors in turn might be associated with different scores on later measures.

The third set of potential mediators that theory points to have to do with *child care*. We look at both the type of care and its quality. With regard to type, prior studies including analyses with the NICHD-SECC (see NICHD ECCRN, 2002, 2004b, 2006a; see also analyses of the Early Childhood Longitudinal Study-Kindergarten Cohort by Magnuson et al., 2004; Loeb et al., 2005) have found that children who attend center-based care have higher cognitive scores than otherwise comparable children. High-quality care has also been found to be associated with children's cognitive development, although the size of these links varies across studies (e.g. Burchinal et al., 2000; NICHD ECCRN, 2002, 2005, 2006a; Vandell & Wolfe, 2000). We hypothesize that if there are associations between maternal employment in the first year and later child cognitive outcomes, child care type or quality may play a role in mediating or offsetting those associations. The links between child care and social and emotional outcomes also have been studied, although the findings are mixed (Belsky et al., 2007; Bornstein et al., 2001, 2006; Langlois & Liben, 2003; Loeb et al., 2005; Love et al., 2003; Maccoby & Lewis, 2003; Magnuson et al., 2007; Miller et al., 2003; Newcombe, 2003; NICHD ECCRN 2003, 2004b, 2005b, 2006a).

In summary, drawing on the rich body of theory reviewed earlier, this study extends prior research on first-year maternal employment and child outcomes in several ways. First, we follow children to first grade, utilizing data from phases 1 and 2 of the NICHD Study of Early Child Care (NICHD-SECC). Second, we examine whether any associations between first-year maternal employment and child outcomes, where present, are moderated by family race/ethnicity, child gender or temperament, or maternal occupation. Third, taking advantage of the rich data on mothers' earnings, the home environment, and child care, we analyze potential mediators that might explain or offset associations between first-year maternal employment and later child outcomes, using SEM models.

II. METHODS

This chapter introduces the data and measures we use, and presents the analytic techniques to be used in the empirical chapters (Chapters IV–VII).

Data

The NICHD Study of Early Child Care (NICHD-SECC) is a longitudinal study of 1,364 children born in 1991 (see NICHD ECCRN, 2000a, 2002). Two phases of data that have been released for public use are analyzed in this paper – phase 1 which followed children to age 3, and phase 2 which followed children to first grade. The sample was drawn from 10 sites around the nation and, although not nationally representative, is fairly diverse (NICHD ECCRN, 2002). Families who were living in difficult circumstances (e.g., mothers under 18, families who anticipated moving, infants who were multiple births or had health problems or disabilities, mothers who did not speak English, mothers with medical problems or substance abuse problems, or families living in a dangerous neighborhood) were excluded from the study; 1,525 families were deemed eligible for inclusion in the study and agreed to be interviewed; of these, 1,364 completed an interview and became participants in the study.

The NICHD-SECC conducted home visits to the children in the sample at 1, 6, 15, 24, 36, and 54 months, and first grade, supplemented by phone interviews every three months (up until 60 months for the 80% of children who went into kindergarten in the fall of 1996 and until 66 months for the other 20% of children who went into kindergarten in the fall of 1997) to track maternal employment and child care use. The study also conducted visits to the children's child care settings at 6, 15, 24, 36, and 54 months (if children were in care more than 10 hours per week). In addition, the children were assessed at home and in the laboratory at age 15, 24, 36, and 54 months (later visits and assessments have been conducted, but those data had not yet been released for public use or were still in the field at the time of this writing).

The phase 2 follow-up sample (after age 3) is smaller than the original phase 1 sample (N=1,364). Data are available for about 1,081 children at age 4 ½ and 1,040 children at first grade. These children differ from those children who were lost to follow-up. For example, mothers who continued to be in the study are on average more educated, more likely to have a husband or partner, and have higher family income, and the children are less likely to be African-American (NICHD ECCRN, 2003). If the associations between first-year maternal employment and child outcomes differ across these groups, then this selective attrition could bias our estimates. However, we test for this by estimating models at age 3 for both the full sample and for the smaller sample of children who can be followed to first grade, to see whether the associations at age 3 differed across the two groups, and the results (not shown, but available from the authors on request) generally indicate that they do not.

At each assessment point, we include in our analysis all the children in the NICHD-SECC dataset whom we can follow longitudinally with no missing data on our outcome and independent variables (although we do include children for whom observations of child care quality are missing, as noted below). There are 1,074 such children at age 3. Of these, 84% (N=900) are non-Hispanic white, 10.5% (N=113) are African-American, and 5.5% (N=61) are Hispanic. The number of children available for analysis after age 3 depends on the age and the measure, but generally is around 900 (and again, 84% or more are non-Hispanic white). Because we estimate some models at age 4 ½ and first grade including a control for the Bracken School Readiness Scale at age 3, we drop any children who are missing the Bracken (there are 23 such children at age 4 ½ and 22 at first grade).

As discussed in the prior chapter, we conduct separate analyses for children by race and ethnicity. As detailed above, we have a large analysis sample for non-Hispanic white children, and this is the group we mainly focus on in this study. The available sample sizes for other racial/ethnic groups are very small. We report some results for African-American children (N=113), but note that those results should be interpreted with caution in light of the small sample size and also due to the fact that these children differ considerably in terms of their family characteristics from the larger and more advantaged sample of non-Hispanic white children. Regrettably, we do not have sufficient sample size to carry out analyses for the Hispanic children.

Measures

Child cognitive outcomes—We use an extensive set of eight cognitive outcome measures from age 3 to 1st grade, as detailed below. All are widely used and well-respected measures of children's cognitive ability. (As discussed below, we do not use all the outcome measures available in the NICHD dataset because the analyses would be too lengthy).

The Bracken School Readiness Scale, administered at age 3, is part of the Bracken Scale of Basic Concepts (Bracken, 1984). The Bracken consists of 51 items that assess children's knowledge of color, letter identification, number/counting, comparisons, and shape recognition (Bracken, 1984). In our sample, the mean percentile rank on the Bracken at age 3 is 45.19 (SD 26.00). Other measures available at age 3 in this dataset include the Reynell Developmental Language Scale and the Peabody Picture Vocabulary Test-Revised (PPVT-R); although potentially interesting, we do not analyze these in the interests of space. The dataset also includes some measures prior to age 3, but we do not analyze those because these scores, while potentially interesting as a proximate measure, are less strongly linked with later cognitive test scores (Lewis & McGurk, 1972; McCall, Appelbaurn, & Hogarty, 1973).

The Preschool Language Scale (PLS-3; Zimmerman, Steiner, & Pond, 1979), administered at age 4 ½, assesses a range of vocabulary, grammar, morphology, and language reasoning. This test is comprised of two parts – the auditory comprehension scale that measures what children “know” or understand, but may not “say,” and the expressive communication scale that assesses what children actually say or produce. Total scores were standardized to have a mean of 100 and a standard deviation of 15. In our sample, scores ranged from 50 to 137 with a mean of 100.73 (SD 19.84). The scale has been shown to have good concurrent reliability and validity (NICHD ECCRN, 2002).

The Woodcock Johnson Achievement and Cognitive Batteries (WJ-R; Woodcock & Johnson, 1989) is a wide-range, comprehensive set of individually administered tests designed to obtain an assessment of the child's cognitive aptitude and achievement. We use the Language Skills Composite and the Applied Problems test, both administered at age 4 ½ and first grade, in this study. As its name indicates, the Language Skills Composite is a composite of several subtests given in the WJ-R: the Incomplete-Words test, a tape-recorded test which measures auditory processing and closure; the Picture Vocabulary test, a verbal comprehension test which measures the ability to recognize or to name pictured objects; and the Letter-Words Identification test, which measures the ability to match a pictographic

representation of a word with an actual picture of the object (i.e., symbolic learning) as well as the subject's reading identification skills. The Language Skills Composite standardized score was constructed by taking the average of the standardized scores of the above three scales. The Applied Problems test measures the children's skill in analyzing and solving practical problems in mathematics. Overall, the WJ-R has been shown to have good reliability and validity (McGrew, 1993; McGrew, Werder, & Woodcock, 1991). In this study, total standardized scores were used. In our sample, the Language Skills Composite standardized scores ranged from 10 to 141 with a mean of 99.32 (SD 11.09) at age 4 ½ and from 68 to 133 with a mean of 105.22 (SD 10.65) at first grade; the Applied Problems standardized scores ranged from 41 to 157 with a mean of 104.05 (SD 15.49) at age 4 ½ and from 46 to 163 with a mean of 112.68 (SD 16.86) at first grade. (In the interests of space, we do not use the other WJR subtest, the Memory for Sentences administered at age 4 ½ and first grade, because the Language Skills Composite gives us an overall rating of verbal ability.)

The Social Skills Rating System (SSRS; Gresham & Elliott, 1990) reported by teachers at first grade consists of three scales: Social Skills, Problem Behaviors, and Academic Competence. The Academic Competence scale, which concerns students' academic functioning, was used as a cognitive outcome measure in this study. This scale includes nine items measuring the teacher's judgment of the child's academic or learning behaviors in the classroom (reading and math performance, motivation, parental support, and general cognitive functioning), rated on a 5-point scale that corresponds to percentage clusters of the students in a class with 1 the lowest 10% and 5 the highest 10%. Good reliability and validity have been documented in Gresham and Elliott (1990). In our sample, the SSRS Academic Competence raw scores ranged from 65 to 115 with a mean of 99.01 (SD 11.34) at first grade. The SSRS as well as measures of Academic Skills are also available at kindergarten but in the interests of space we do not analyze these measures, since the first-grade measures allow us to follow children to a later age, and also since several of our potentially mediating variables are not assessed at kindergarten but are assessed at first grade.

The Current School Performance reported by teachers at first grade is one of the three subscales of the Child Evaluation scale (Gresham, Elliott, & Evans-Fernandez, 1993) (the other two are Work Habits and Social Skills with Peers). The Current School Performance subscale obtains information about the child's academic grades, rated on a 5-point scale with 1 below grade level and 5 excellent in each of six subjects (i.e., reading, oral language, written language, math, social studies, and science). Reliability of .93 has been reported (Vandell & Pierce, 1998), as well as acceptable validity (Gresham et al., 1993). The total score of the Current School Performance was obtained by averaging the six items. In our sample, the scores ranged from 1 to 5 with a mean of 3.46 (SD 0.82).

Child social and emotional outcomes—The mother-reported Child Behavior Checklist (CBCL; Achenbach, 1991) was used to assess children's behavioral outcomes at age 3, age 4 ½, and first grade. A series of behaviors (about 100 items per version) are rated on a 3-point scale from 0 (not true of the child) to 2 (very true of the child). We use the subscale for externalizing behavior problems. Previous research has identified that CBCL

has good test-retest reliability and concurrent and predictive validity (Achenbach, 1991). In our sample, the mean score on the mother-reported externalizing CBCL score at age 3 is 13.47 (SD 7.14). The corresponding figures are: 51.69 (SD 9.39) at age 4 ½, and 48.64 (SD 9.79) at first grade.

The NICHD-SECC dataset also contains a caregiver- or teacher-reported CBCL at age 3, age 4 ½, and first grade to supplement the information on children's behavior reported by mothers. Reports from caregivers and teachers are important because they may view children's behaviors differently than mothers do, and also children may have different behaviors in child care and school settings than they do at home. Due to information from caregivers only being available for children spending 10 or more hours per week in non-maternal care, only about half of our sample is available for analysis when using caregiver-reported behavioral measure at age 3. In our sample, the mean score on the caregiver-reported CBCL at age 3 is 9.92 (SD 8.10) for the externalizing sub-scale. The corresponding figures are 50.12 (SD 9.56) at age 4 ½ and 50.67 (SD 8.72) at first grade.

Our main analyses of children's problem behaviors use these continuous scale scores, but we also report some results using dichotomous measures of whether a child's score exceeded a specific cut-off (Achenbach & Edelbrock, 1978). As other analysts of these data have pointed out (see e.g. NICHD ECCRN 2003), it is of practical relevance to know whether early experiences are associated with children being more likely to be above a specific threshold of problem behavior, as well as whether they are associated with higher scores. Thus, we also consider whether children are more likely to have scores greater than or equal to 63 for the externalizing subscale, which is viewed as representing a clinically meaningful level of problem behaviors (NICHD ECCRN, 2003). In our sample, 6% of children are above this cut-off on the caregiver reported measure at age 3 on the externalizing subscale; the corresponding figures are 10% at age 4 ½ and 9% at first grade. With regard to the mother-reported measure, 6% of children are above the clinical cut-off at age 3 on the externalizing subscale; the corresponding figures are 9% at both age 4 ½ and first grade.

Subscales of the Social Skills and Peer Competence were derived from the SSRS reported by teachers at first grade. The Social Skills include 30 items that are rated for frequency and contain three dimensions (Cooperation, Assertion, and Self-Control). Cooperation includes behaviors such as paying attention to the teacher's instructions and putting away work materials properly. Assertion includes initiating behaviors, such as starting conversations with peers, introducing oneself, and volunteering to help peers with classroom tasks. Self-control includes behaviors that emerge in conflict situations, such as responding to teasing or peer pressure appropriately, receiving criticism well, and controlling temper. Teachers rated how often a social behavior occurs on a 3-point scale (0 = never, 1 = sometimes, 2 = very often). The Peer Competence subscale includes 10 items from the SSRS including items related to whether the child cooperates with peers, makes friends easily, and so on. It is correlated with the Social Skills subscale, but is a separate construct, so we use both in our analyses. The mean score on the Social Skills at first grade is 103.22 (SD 13.65 with a range of 61 to 130) and on the Peer Competence at first grade is 15.30 (SD 3.61 with a range of 4 to 20).

We also considered attachment, making use of data from age 15 months (the first time it is measured in this dataset) and age 36 months. The NICHD-SECC assesses attachment using the classic Strange Situation (for details, see NICHD ECCRN, 1997a). The resulting profile for the child is then correlated with the profile of a prototypically secure child, as determined by experts in the field, yielding a score for security. (Means for attachment scores at 15 months and 36 months in our sample, by maternal employment category, are presented in the next chapter). In results not shown, we also tested for associations between first-year maternal employment and the child's compliance on a clean-up task, a videotaped observation lasting a maximum of 5 minutes where a mother was instructed to involve her child in picking up the toys in the room, at age 24 and 36 months, but no significant associations were found.

Maternal Employment—Mothers' employment status is defined using data from the home visits and telephone interviews. Taking advantage of the detailed data in the NICHD-SECC, we distinguish three categories: full-time (FT) maternal employment (defined by whether the mother was ever working 30 or more hours per week by a given point in time; 55% of our sample); part-time (PT) employment (defined by whether the mother only worked fewer than 30 hours per week by that point in time; 23%); and no employment (the omitted category, defined by whether the mother did not work at all in the labor market by that point in time; 22%). We do not use a continuous variable for work hours because it would not be correct to assume that moving from no hours to any hours is the same as increasing work by one hour elsewhere in the distribution. We estimated other models using a different hours cut-off for full-time employment and found that the results (not shown) were much the same as those reported here.

For the most part, we focus on analyses of whether mothers worked FT by 12 months post-birth, worked PT by 12 months post-birth, or did not work by 12 months post-birth. The theory reviewed earlier suggests the importance of distinguishing employment in the first year from employment thereafter. We focus on these measures of first-year employment because they are the most comprehensive measures of employment in the first year and also the most consistent with those that have been used in prior research. As detailed below, we use these variables to examine whether there are any associations between a mother working FT or PT by a particular point in time and later child outcomes.

However, because there might be differential associations having to do with timing within the first year of life, we also estimate some supplemental models examining timing. We approach these timing models in two different ways. First, following the approach utilized by Brooks-Gunn et al. (2002), we estimate a series of models examining the links between working FT or PT by 3 months, 6 months, 9 months, or 12 months and later child outcomes. The 3-month model estimates the effect of working FT or PT by 3 months, as compared to working later in the first year or not at all in the first year; the 6 month model estimates the effect of working FT or PT by 6 months, as compared to working later in the first year or not at all in the first year; and the 9 month model estimates the effect of working FT or PT by 9 months, as compared to working later in the first year or not at all in the first year. The results of these models will tell us whether the associations we estimate for working by 12 months are also present if we instead look at working by 3 months, or 6 months, or 9

months. Second, in the spirit of the approach utilized by the NICHD Early Care Research Network in their analyses of child care usage (see, e.g. NICHD ECCRN, 1997b), we estimate a model in which we allow the effect of FT or PT first-year employment to vary by whether that employment began by 6 months, or began sometime between 7 and 12 months. In these models, rather than including two mutually exclusive controls – for FT employment by 12 months or PT employment by 12 months – we instead include 4 mutually exclusive controls – for FT employment begun by 6 months, PT employment begun by 6 months, FT employment begun between 7 and 12 months, or PT employment begun between 7 and 12 months. We also experimented with estimating models allowing for finer distinctions in employment timing; however, the results suggested that finer distinctions between, for instance, 3 and 6 months did not make a notable difference to the results.

In addition, we created variables to control for the mother's employment after the first year, using controls for whether she was employed at 15 months, 24 months, and 36 months, and, at age 4 ½ and first grade, whether she worked between 42 months and the time of the assessment. Controlling for subsequent employment is important because mothers who work in the first year of life are also more likely to work in subsequent years (see Appendix Table 1). Among those working FT by 12 months, 87%, 85%, 84%, 85%, and 84% were working at 15 months, 24 months, 36 months, age 4 ½ and first grade, respectively, while among those working only PT by 12 months, the percentages working at those time points are 73%, 73%, 67%, 73%, and 73%, respectively. In contrast, among those who did not work by 12 months, only 10%, 23%, and 30% were working at 15, 24, and 36 months, respectively, although the share working increased to 39% at age 4 ½ and 52% at first grade.

Mother's earnings, fathers' earnings, and other family income—Family income is measured in several different ways. First, in all our models, we control for family income prior to the birth. This income control captures families' financial resources pre-birth. In addition, in the models where we examine mothers' earnings as a potential mediator, we use data on mothers' annual earnings from the interviews at 15 months, 24 months, age 3, age 4 ½, kindergarten, and first grade to categorize mothers' earnings in the prior year as in the bottom, middle, or top third of the distribution for all mothers' earnings that year. (Women with no earnings by definition fall into the bottom third; women missing data on earnings are placed into a separate category). In our sample, the cut-off at 15 months for mother's annual earnings at the bottom third is below \$12,500; the cut-off for the middle third is greater than or equal to \$12,500 and less than \$27,500; and the cut-off for the top third is greater than or equal to \$27,500. Cut-offs for maternal earnings groups at 24 months, ages 3 and 4 ½, and first-grade are similar. All income variables are expressed in 1990 dollars.

We use data from the same time points to measure fathers' earnings and other annual family income and control for those in all models where mothers' earnings are included. Mean values for fathers' annual earnings are \$34,177 at 15 months, while other family income (apart from mothers' and fathers' earnings) averages about \$1,000 (values at 24 months, ages 3 and 4 ½ and first-grade are similar).

Home Environment—We use three measures for the child's home environment. The first is the Home Observation for Measurement of the Environment (HOME) scale, which has

been widely used and consistently found to have important effects on children's development (e.g., Bradley, 1995; Bradley et al, 1989; Klebanov et al., 1998). HOME scores are available for the NICHD-SECC sample at 6, 15, 36, and 54 months (scores are not available at 24 months or after 54 months). We use the total HOME score, rather than sub-scales; the HOME scale is able to differentiate between parents who have low scores and others; it does not do well at distinguishing between parents who have moderate to high scores, in line with the stated purpose of the developers (Bradley, 2004; see Bingenheimer et al., 2005; Leventhal et al., 2004, for a presentation of measure equivalence and IRT scaling for discrimination within scales using the HOME). Consistent with prior research by the NICHD Early Child Care Research Network (1997, 1998, 2000a), we use the mean of the child's HOME scores by the assessment date as a measure of the home environment experienced to date (thus, at 54 months or at age 4 ½, we use the average of the 15, 36, and 54 month score). The cumulative mean score in our sample is 39.75 at age 3 (SD 5.13) and 41.63 (SD 4.95) at age 4 ½.

Our second measure of the home environment is the rating of maternal sensitivity, which was derived from assessments conducted of mother and child interactions at 6, 15, 24, 36, 54 months and again at first grade (scores are not available at kindergarten) (see Vandell, 1979; NICHD ECCRN, 2002 for details). These assessments were designed to measure the extent to which maternal behavior and interaction are appropriate to the child's age and sensitive to the child's needs. Assessments were videotaped and the tapes were then scored at a central location by teams of five or six coders unaware of other characteristics of the children and families, yielding a maternal sensitivity score based on the positive valence of the mother's sensitivity to child non-distress, intrusiveness (reversed), and positive regard (at 6, 15, and 24 months) and supportive presence, hostility (reversed), and respect for autonomy (at 36 and 54 months and at first grade). Scores ranged from 3 to 12 at months 6, 15, and 24, from 4 to 21 at month 36 and 54, and from 5 to 21 at first grade. Cronbach's alphas ranged from .70 to .78 over the six assessment periods; the inter-rater reliability, which was established by assigning one fifth of the videotapes to two raters, ranged from .83 to .87 over the six assessment periods (NICHD ECCRN, 2003). Consistent with prior research by the NICHD Early Child Care Research Network (1997, 1998, 2000a), we use the mean of the sensitivity scores by the assessment date as a measure of the sensitivity of maternal parenting experienced to date (thus, for example, at age 4 ½ and first grade, we use the average of the 15, 24, 36, and 54 month scores). The cumulative mean scores in our sample are 12.06 (SD 1.61) at age 3, 13.16 (SD 1.76) at age 4 ½, and 13.78 (SD 1.92) at first grade.

Finally, our third measure of the home environment is maternal depressive symptoms, as measured using the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), a widely used measure of depressive symptoms. It was administered at months 1, 6, 15, 24, 36, and 54 and at first grade (but not at kindergarten). Depressive symptom scores were moderately correlated over time from month 1 to first grade (correlations range from .38 to .60). This scale has been shown to have good reliability in this sample (e.g., NICHD ECCRN, 1999). In all our analyses, we control for the mother's score on the CES-D at 1-month post-birth, since this is a potentially important family background factor and one not primarily determined by a mother's employment. In analyses examining factors related to the home environment as potential mediators, we add controls for the cumulative mean of

the mother's score on the CES-D between 15 months and the assessment date (we do not use the 6-month score to avoid making assumptions as to how that is temporally or causally related to maternal employment in the first year). The mean of the first-month score is 11.36 (SD 9.02). The mean cumulative scores in our sample are 8.91 (SD 6.72) at age 3, 9.02 (SD 6.45) at age 4 ½, and 8.86 (SD 6.31) at first grade.

These scores measure the number of depressive symptoms that a mother reports. In addition, it is possible to use the CES-D to identify mothers whose scores place them above a clinically meaningful cut-off. In supplemental analyses, we define a dichotomous variable for clinical levels of depressive symptoms, defined as 1 if a mother's score is greater than or equal to 16 (and 0 otherwise) (Radloff, 1977) and analyze whether our results as to the mediating role played by depressive symptoms change when we define depressive symptoms in this way rather than using a continuous score.

Child Care—The NICHD-SECC collected very detailed data on child care. Mothers were asked about the current child care arrangements for their child approximately every three months between birth and age 3 and approximately every four to six months after age 3. We use these data to categorize the child's primary care arrangement (the arrangement where the child spent the most time) at each of these points in time as one of the following six types: (1) cared for by mother, (2) father care, (3) relative care (this could be in the child's home or not), (4) in-home non-relative care, (5) family day care by non-relative, and (6) child care centers. Following the NICHD Early Child Care Research Network (2000a), we combined the type of child care with the number of times a child was observed in that type of care (yielding values between 0 and 18 for each type of care by month 66 before they start kindergarten) and used the resulting six variables to control for the type of child care in which the child had been placed to date. In this monograph, we focus primarily on center-based care, which as discussed earlier has been found to be associated with better cognitive scores but also more behavior problems, but we also include controls for other types of child care.

The NICHD-SECC also gathered data on quality of care, for children who were in a care arrangement more than 10 hours per week. Between birth and age 4 ½, measures of child care quality were collected 5 times (at 6, 15, 24, 36, and 54 months), using the Observational Record of the Caregiving Environment (ORCE), which was designed specifically for the NICHD Study of Early Child Care to assess the quality of caregiver-child interaction experienced by an individual child, in terms of cognitive stimulation, emotional warmth, and sensitivity (NICHD ECCRN, 1996, 2000a). These assessments consisted of four separate cycles of data-gathering spread over two different days and were conducted by trained observers who visited the child care setting and coded the frequency of specific caregiver behaviors and also rated the quality of the care provided in terms of: 1) sensitivity to the child's non-distress, 2) stimulation of cognitive development, 3) positive regard for the child, 4) emotional detachment (reversed), 5) flatness of affect (reversed), and, at 36 months, 6) fostering child's exploration and 7) intrusiveness (reversed); composite quality scores for the child care setting were then constructed by summing the scores from the five (i.e., 1, 2, 3, 4, and 5) 4-point quality ratings (prior to 36 months), from the seven 4-point quality ratings at 36 months (Cronbach alpha = .83), and from the four (1, 2, 4, and 7) 4-point

quality ratings at 54 months (Cronbach alpha = .72) and then averaging these over the total number of cycles of observation for each assessment period. The inter-observer reliability ranged from .81 to .90 over the five assessment periods (NICHD ECCRN, 2002). Consistent with prior research by the NICHD Early Child Care Research Network (1999, 2000a, 2002), we use the mean of the child's quality of child care ratings since 15 months up to the time of the assessment as an indicator of the average quality of child care experienced to date. The cumulative mean quality of child care rating in our sample is 16.33 at age 3 (SD 2.92) and 14.67 (SD 2.49) at age 4 ½. We use these data to categorize children as having been in above average quality (cumulative mean score at or above the mean) or below average quality (cumulative mean score below the mean).

Because the quality measure focused on assessing the quality of caregiver-child interaction experienced by an individual child, this measure is likely to produce higher quality ratings for settings where children are alone with an individual caregiver, or in a small group, and lower ratings for settings such as centers where children are in large groups (see, for instance, NICHD ECCRN, 2000b; Smolensky & Gootman, 2003). It should also be noted that some of the eligible children were not observed in their child care setting because of the caregiver's refusal, the child's absence, or recent changes in the child care setting (see NICHD ECCRN, 1996). The share of eligible children observed was 79 percent at six months, 77 percent at 15 months, 86 percent at 24 months, 90 percent at 36 months (NICHD ECCRN, 2000a), and 79 percent at 54 months (authors' calculations). Comparing those who were eligible but not observed in child care, children who were observed in child care had higher family incomes, had mothers with more education, experienced more hours of care, and were more likely to be in less formal child care; all these differences were significant at $p < .01$ (NICHD ECCRN, 1999). As the children who were eligible but not observed in child care differ significantly from those who were observed, we include them in our sample, and use a dummy variable to identify that data for their quality of child care are missing. (Because of this, we do not control for child care quality as a continuous measure but rather as noted above use a set of dummy variables for quality at or above the mean, or below the mean.) We note also that some children were not observed in child care because they were in care less than 10 hours per week. We also retain those children in our sample, and identify them with a separate dummy variable.

Child Temperament—The rating of child temperament was measured by using 55 6-point items from the Infant Temperament Questionnaire completed by mothers at 6 months (Medoff-Cooper, Carey, & McDevitt, 1993). The composite measure was created by calculating the mean of the non-missing items with appropriate reversal of scales, thus higher scores reflect a more “difficult” temperament (i.e., a child is seen as more intense, less positive in mood, and less adaptable to daily routines). The Cronbach alpha for this measure is .81 (NICHD ECCRN, 2003). In our sample, the score ranged from 1.5 to 4.7 with a mean score of 3.16 (SD 0.40). We classify children who scored in the upper half of the distribution of composite scores as having more difficult temperaments; we classify children in the lower half as less difficult.

Maternal Occupation and Parental Job Characteristics—We consider the role of mother's occupation as a potential moderator in our analyses. The occupation of the last job the mother held prior to the birth is coded into 4 major occupational categories following the definitions used by the Census Bureau in its Current Population Survey: managers and professionals; technical, sales and administrative support; service; and operators, fabricators, and laborers. We use these categories to distinguish women in professional versus non-professional occupations. The professional category includes professional or managerial jobs. The non-professional category includes all other occupations (i.e. technical, sales, or administrative support, service, or operator, fabricator, or laborer jobs). Descriptive statistics for the occupational variables, by maternal employment group, are provided in the next chapter.

We also consider several other characteristics of parents' jobs, presenting descriptive information on these in the next chapter. These characteristics include: the father's occupation (coded in the same way as the mother's, as described above); the mother's and father's report of how much flexibility they have on their job (measured 6 months post-birth); the mother's and father's average weekly work hours (at 12 months post-birth); and whether the mother took paid maternity leave (as reported at 12 months).

Maternal and Family Characteristics—As discussed earlier, selection bias is a concern in estimating the links between first-year maternal employment and later child outcomes, since women who work earlier may be positively or negatively selected in terms of characteristics that matter for their children's development (see, for instance, Currie, 2003; Hill et al., 2005; James-Burdumy, 2005; Neidell, 2000; Ruhm, 2004). Prior studies have identified an extensive set of characteristics that are likely to be correlated both with maternal employment and child outcomes, including: the child's gender; whether the child has any older siblings; the mother's cognitive capability; the mother's age, education, and marital status; the mother's depressive symptoms post-birth; and pre-birth family income. Failure to control for such characteristics could lead us to estimate biased associations between maternal employment and child outcomes.

Therefore, we include in our regression models an extensive set of child, mother, and family characteristics: whether the child is male; whether the child has any older siblings; mother's cognitive capability (measured by the PPVT-R); mother's age at the birth of this child; mother's education at birth; mother's marital status at birth; mother's depressive symptoms at 1-month post-birth (CES-D); and family income in the year before birth. We then augment our models by including additional variables as mediators, in particular, more detailed controls for income. In the next chapter, we provide descriptive statistics on how the mothers who worked FT, PT, or not at all in the first year differed in terms of these characteristics. We do not control in our models for which of the 10 sites the family resided in (however, in supplemental models, we added controls for site and found that our results were unchanged).

Additional Measures Used—Drawing on the theory reviewed earlier, we also consider a few other characteristics of mothers that may distinguish those who worked FT or PT in the

first year from those who did not. In particular, we examine some data regarding maternal separation anxiety and maternal time use.

Maternal separation anxiety is measured in the NICHD-SECC dataset at both 1 month and 6 months post birth, using the Maternal Separation Anxiety Scale (Hock, Gnezda, & McBride, 1983; Hock, DeMeis, & McBride, 1988). The maternal separation anxiety subscale includes 21 items assessing the mother's "level of worry, sadness, and guilt when separated from her infant; her beliefs about the importance of exclusive maternal care; her beliefs that her child prefers her care and is better off in her care; and her beliefs about her child's abilities to adapt to non-maternal care", measured using a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5) (DeMeis, Hock, & McBride, 1986, p. 628). The internal consistency for this subscale (Cronbach's alpha) is .90 (DeMeis et al., 1986). (Means for this subscale, by maternal employment group, are provided in the next chapter).

Maternal time use is measured in the NICHD-SECC dataset at 7 months post-birth. Mothers are surveyed twice using a time diary procedure (Juster & Stafford, 1985). For most mothers, the days that were sampled represent one weekday and one weekend day; and, for employed mothers, the days mainly represent one workday and one non-workday (with the exception of a small number of employed mothers for whom both days were workdays). The time diary measure asks mothers about all their activities in the preceding 24 hours and codes them into distinct categories. Of particular interest here, mothers report the total time they spent in child care activities and also the time they spent in instrumental care as opposed to time spent in social interactions with the infant. Following Huston and Aronson (2005), we analyze the number of minutes spent in social interactions and also the time spent in social interactions as a proportion of total child care time. (Means for these time use variables in our sample, by maternal employment group, are presented in the next chapter).

Empirical Approach

The primary analytic method used for our first and second research questions is multiple regression, estimated using ordinary least squares (OLS). For the most part, our outcome variables are continuous and thus OLS is the most appropriate method. In a few instances (e.g., whether child care quality is above average), our outcome variables are dichotomous and we potentially could have used modeling techniques specifically developed for such variables (e.g., logistic regression or probit). However, linear probability models estimated using OLS provide a very good approximation of the results that would be obtained from logit or probit models (Moffitt, 1999) and have the advantage of making the results from all models readily comparable. Thus, to make the results more accessible to the reader, we report only OLS results in Chapters IV to VI. We have re-estimated the models that have dichotomous outcomes using logit or probit and the results, not shown, are not different from those reported here.

Our analyses focus on three main questions. First, we examine whether there are any associations between maternal employment in the first year and child outcomes at age 3, 4 ½, and first grade, controlling for an extensive set of child and family characteristics. Second, we look at whether any associations differ for particular sub-groups of children (including interactions terms defined by gender, child temperament, and gender as well as

temperament) or for groups defined by maternal occupation (including interaction terms to distinguish women in professional occupations from those in non-professional occupations). Third, we examine the role of mothers' earnings, the home environment, and child care, in potentially mediating or offsetting any associations between first-year maternal employment and later child outcomes.

In examining the role that factors such as mother's income, the home environment, and child care may play in mediating or offsetting the links between first-year maternal employment and later outcomes, we follow the classic Baron and Kenney (1986) approach, first estimating the associations between first-year maternal employment and the mediators (in Chapter VI) and then adding the mediators to models estimating the associations between first-year maternal employment and the outcomes (in Chapter VII). This approach has been widely used in prior developmental studies and offers many advantages. In particular, it makes very clear what the associations are at each stage and how strong they are. However, although traditionally both stages of these models have been estimated using OLS, many psychologists and sociologists are increasingly using an alternative approach, structural equation modeling (SEM), which is the approach we use in Chapter VII. This method, although increasingly popular, has not been used to examine the links between first-year maternal employment and child outcomes (although it has been used to study the links between child care and child outcomes; see NICHD ECCRN, 2004a), and thus it is of interest to see what results it yields as to the extent to which the associations between first-year maternal employment and child outcomes, where present, are direct or indirect, and, if indirect, by what pathways they occur, and also what the total effects are. We discuss in more detail how we implement SEM in Chapter VII.

III. WHAT DISTINGUISHES WOMEN WHO WORK FT, PT, OR NOT AT ALL IN THE FIRST YEAR?

As discussed in the previous chapter, we control for an extensive set of characteristics that may be associated with selection into FT or PT employment in the first year and that may also be associated with children's later outcomes. In this chapter, we provide some descriptive information about how these characteristics differ between first-year maternal employment groups, as well as some descriptive information about other ways in which these groups differ.

Child and Family Characteristics, and Child Outcomes

We provide descriptive information on the key independent and dependent variables in Table 1, where we show summary statistics for children broken out by their mother's employment status in the first 12 months. As discussed earlier, we analyze non-Hispanic white and African-American children separately, because selection into employment and/or the implications of maternal employment may differ across these groups. The table shows mean values for the key control and outcome variables for each group (defined by maternal employment in the first year) and also indicates where differences across groups are statistically significant. (Summary statistics for key mediating variables are provided in the

next chapter. The correlation matrix for all the analyzed variables is provided in Appendix Table 1).

The descriptive results in Table 1 point to some differences between children whose mothers worked FT, PT, or not at all the first year. Looking at Panel A, for the non-Hispanic white children (N=900), children whose mothers worked FT by the 12th month, as compared to those who did not work in the first 12 months, have significantly fewer older siblings, higher incomes, better-educated mothers, and less depressed mothers at one month post-birth. The characteristics of children whose mothers worked PT in the first year are even more favorable: they share almost all the advantages of the children of mothers who worked FT but compared to this group they have mothers who have higher cognitive capability (measured by Peabody Picture Vocabulary Test-Revised; PPVT-R), are more likely to be married, and are more educated (these children, however, are more likely to have older siblings). The advantages of the children whose mothers worked PT in the first year are reflected in their having significantly higher scores on three outcome measures (the Bracken at age 3 and the PLS and WJR-Language Skills Composite at age 4 ½) than children whose mothers did not work in the first 12 months, as well as significantly higher scores on three outcome measures (the PLS and WJR Applied Problems at age 4 ½ and the SSRS Academic Competence subscale at first grade) than children whose mothers worked FT.

These descriptive results confirm the presence of differences in key child and family characteristics, which will be important to control for in our multivariate analyses. The descriptive results also point to different patterns of selection into employment between non-Hispanic white mothers and African-American mothers. As we have seen, the results in Panel A for non-Hispanic white children suggest that children whose mothers worked in the first year, and especially those who worked PT, are more advantaged in several ways than children whose mothers did not work in the first 12 months.

There are also pronounced differences within the small sample of African-American children (N=113), as we can see in Panel B of Table 1. Children whose mothers worked FT by the 12th month, as compared to those whose mothers did not work at all by 12 months, have significantly higher family incomes pre-birth, mothers who are more likely to be married at the time of the birth, more educated mothers, and older mothers; they are also much more likely to be boys. In contrast to the non-Hispanic white sample, the relative advantages of children whose mothers worked FT by the 12th month are reflected in higher scores on two of the cognitive outcome measures (the WJR Language Skills Composite at age 4 ½ and the measure of Current School Performance at first grade) and lower levels of mother-reported externalizing behavior at age 4 ½ and first grade. A further point of contrast with the non-Hispanic white sample is that in the African-American sample there are no advantages for children whose mothers worked PT in the first year, as compared to those whose mothers did not work in the first 12 months, and only one advantage relative to those who worked FT (a lower level of caregiver-reported externalizing behavior at age 3). Thus, to the extent that women are positively or negatively selected into first-year employment (and first-year FT vs. PT employment), these selection processes may be operating differently for non-Hispanic white women as compared to African-American women. This

finding confirms the importance of estimating separate regression models for non-Hispanic white children and African-American children.

Job Characteristics

To further explore the differences between women who work FT, PT, or not at all in the first year and factors that may be associated with women's selection into those categories of employment, we also examined the occupational distribution of the non-Hispanic white sample, utilizing data on the occupation of the job they held prior to the birth. We use information from the pre-birth job because the post-birth job is potentially endogenous (i.e. influenced by the birth) and also because not all women will have data on a job post-birth. This information is available for 763 of the non-Hispanic white women (the remaining 137 did not report a pre-birth occupation). (We did not have sufficient sample size to carry out this analysis for the African-American sample).

As detailed in the prior chapter, we use the occupational data in the NICHD-SECC dataset to distinguish between women who were in professional occupations and those who were in non-professional occupations. The former group represents just under 40% of the non-Hispanic white mothers and includes women working in professional, managerial, or executive occupations. The non-professional group, which represents 61% of the non-Hispanic white mothers, includes women working in sales, clerical, or service occupations.

As shown in Table 2, we find that women working FT or PT in the first year are more likely to be professionals than those who did not work at all in the first year, with women working PT most likely to be professionals. Specifically, 54% of the non-Hispanic white women who worked PT in the first year were in professional occupations, as compared to 39% of those who worked FT in the first year and only 27% of the women who did not work that year. (As noted above, 137 women did not report a pre-birth occupation. If we include those women, then the distribution by first-year employment categories is as follows: among women working FT by 12 months, 38% were professionals, 60% non-professionals, and 2% occupation not reported; among women working PT by 12 months, 46% were professionals, 40% non-professionals, and 14% occupation not reported; and among those not working by 12 months, 14% were professionals, 38% non-professionals, and 48% occupation not reported).

Women working PT in the first year are also the most likely to be married to husbands who are also professionals (although only the contrast with women working FT is statistically significant on this measure). As such, the families of women who work PT in the first year may enjoy a higher level of flexibility on the job than the families of women who work FT in the first year. Indeed, 75% of women working PT in the first year reported they had fairly or completely flexible jobs at 6 months, as opposed to 46% of women working FT in the first year. However, the husbands of women working PT in the first year had the lowest levels of reported job flexibility, whereas the husbands of women who did not work in the first year had the highest reported levels of flexibility.

Another indicator of flexibility – this one favoring the women who worked FT in the first year -- is that mothers who worked FT or PT by 12 months were more likely to have taken

paid maternity leave (72% and 36% respectively) than women who were not working by 12 months (11%). Nevertheless, the women working FT in the first year also reported working fairly long hours (averaging 28 hours per week), as did their husbands (averaging 40 hours per week). In contrast, women working PT in the first year averaged 12 hours per week (with only about one sixth working 20 or more hours per week), while their husbands averaged 45 hours per week. Husbands whose wives were not working in the first year averaged 40 hours per week.

Maternal Separation Anxiety and Social Interaction with Children

Another factor that may influence a mother's decision about whether and when to work is her anxiety about separating from her child. As detailed earlier, the NICHD-SECC dataset measures maternal separation anxiety at 1 month and 6 months post-birth. Whether we look at maternal separation anxiety at 1 month or 6 months, we find this varies significantly depending on whether the mother worked FT by 12 months, PT by 12 months, or not at all in the first year. As shown in Table 3, mothers who did not work at all in the first year of life had significantly higher levels of separation anxiety at 1 and 6 months than mothers who worked FT or PT by 12 months. This result suggests that anxiety about separating from the child may be a factor in a mother's decision to not work in the first year.

We also find that maternal separation anxiety varies considerably by the mother's occupation pre-birth. As shown in the bottom panels of Table 3, mothers who were professionals had lower levels of separation anxiety at 1 month than women in other occupations, regardless of whether they eventually worked FT, PT, or not at all in the first year, and mothers' separation anxiety did not vary greatly among professionals by whether they worked FT, PT, or not at all in the first year. But, among those who were not professionals, the mother's level of separation anxiety at both 1 month and 6 months was significantly higher among those who did not work by the end of the first year than it was among those who worked FT or PT that year.

Another point of difference between women who work FT, PT, or not at all in the first year has to do with the amount of social interaction they have with their children as recorded in the time diary data (which is available for 785 (87%) of the 900 non-Hispanic white women in our sample). As discussed earlier, this is first measured in the NICHD-SECC dataset at 7 months post-birth, so we can not be certain how much the differences we observe at this age reflect pre-existing differences between the mothers versus effects of different employment patterns. However, it is clear that at 7 months the mothers who do not work in the first year are spending significantly more time in social interaction with their children than the mothers who work FT or PT in the first year. As shown in Table 3, the most striking difference is in the number of minutes in social interaction on weekdays, which ranges from about 96 for the women who work FT in the first year to 125 for the women who work PT in the first year to 165 for the women who do not work in the first year. In large part, this reflects the lesser amount of time that working mothers spend with their children, so that if we instead look at the proportion of their time with the children that is spent in social interaction, we see that that the share is about the same across groups. It is also noteworthy that if we look at weekend days, the pattern shifts, with mothers who work FT spending

more minutes (157 on average) and a higher share of their total child care time (44 percent on average) in social interaction than do the other groups (comparable figures are about 130 minutes and 40 percent of total child care time for mothers who work PT as well as for those who do not work in the first year). Differences in time use are apparent in both occupational groupings but are most pronounced among the non-professionals, where the time spent in social interaction on weekdays range from 96 minutes (41% of total child care time) for the non-professional women who work FT in the first year to 128 minutes (42% of total child care time) for those who work PT in the first year to 198 minutes (49% of total child care time) for those who do not work in the first year (and where the time spent on weekends is about equal across groups). These findings point to another way in which mothers who do not work in the first year may be different from those who do, particularly among non-professionals.

Differences by Timing of Employment in the First year

Tables 1–3 provide a broad overview of the differences in the raw data between women who worked FT, PT, or not at all in the first year. In supplemental analyses, we also examined the extent to which these women can also be distinguished by the time at which they began work.

Prior analyses of the NICHD-SECC data found sharp differences between women who began using child care at different points in time within the first year (see, e.g., NICHD Early Child Care Research Network, 1997b). In supplemental analyses, we examined descriptive statistics for groups defined in a similar spirit, distinguishing those who began work by 6 months and worked FT in the first year (N=468, or 52% of the non-Hispanic white sample), the small group who began work between 7 and 12 months and worked FT in the first year (N=28, or 3%), those who began work by 6 months and worked PT in the first year (N=168, or 19%), and those who began work between 7 and 12 months and worked PT in the first year (N=40, or 4%), versus those who did not work by 12 months (N=196, or 22%).

The results (not shown) indicate that women who go to work earlier and work FT in the first year do differ significantly from those who go to work later and work FT in the first year or do not work at all in the first year. Those who work by 6 months and work FT in the first year have higher pre-birth incomes, are more likely to be married, have more education, and have fewer depressive symptoms than those who begin work after 6 months and work FT in the first year or those who do not work in the first year. In addition, their parenting is rated as more sensitive at 6 months and they report less separation anxiety at both 1 month and 6 months than those who began work FT or PT after 6 months or did not work in the first year. These groups of women also differ in terms of their pre-birth occupation, with the women working by 6 months and working FT in the first year more likely to be professionals, and the women beginning work between 6 and 12 months and working FT in the first year, or not working by 12 months, more likely to be non-professionals. It is thus perhaps not surprising that those who began work by 6 months and work FT in the first year are more likely than the other two groups to report that were able to take some paid maternity leave.

Among the women who worked PT in the first year, in contrast, we see few differences in characteristics between those who began work by 6 months and those who began work between 7 and 12 months. For instance, both groups are more likely to be in professional occupations (compared to those who work FT in the first year), confirming the impression in the earlier descriptive statistics that these women are a relatively more advantaged group.

In results not shown, we also examined more finely delineated groups, but found that characteristics were quite similar across those who worked by 1 month (11% of the sample), between 2 and 3 months (44% of the sample), and between 4 and 6 months (16% of the sample). We also examined 8 distinct first-year employment groups defined on the basis of whether the mother worked FT or PT by 3 months (54%), 6 months (71%), 9 months (76%), or 12 months (78%) (as in Brooks-Gunn et al, 2000), but in the interests of space, we do not report those descriptive statistics because they become very cumbersome and because the overall timing differences are well-illustrated in the results reported above.

Conclusion

The descriptive statistics presented in this chapter point to some important differences between women who work FT in the first year, PT in the first year, or not at all in the first year. The overall patterns in the raw data suggest that non-Hispanic White children whose mothers work PT in the first year are the most advantaged in terms of family background, followed by children whose mothers work FT, and finally by those whose mothers do not work. These advantages are reflected in higher scores on some of the cognitive measures. However, the raw data also suggest that children whose mothers do not work in the first year may be better off on some social and emotional outcomes than those whose mothers work FT that year (those whose mothers worked PT continue to look the best). But, given that these are descriptive statistics only and do not control for pre-existing differences across families, it is difficult to project from the raw data what the effects of first-year maternal employment might be, once other differences between the children and families are controlled for. We therefore turn to multivariate estimates in the next chapter.

IV. FIRST-YEAR MATERNAL EMPLOYMENT AND CHILD COGNITIVE DEVELOPMENT

This chapter presents the results of multivariate regression models that analyze the associations between first-year maternal employment and child cognitive development assessed at age 3, 4 ½, and first grade. The regression models are estimated using ordinary least squares (OLS) and regress the child's cognitive outcome score at age 3, 4 ½, and first grade on the set of child, mother, and family background variables (described in Chapter II), together with a set of variables (also described in Chapter II) for the mother's employment in the first year and subsequent to the first year. The analyses reported in this chapter focus on two main questions. First, we examine whether there are any associations between maternal employment in the first year and child cognitive outcomes at age 3, 4 ½, and first grade, controlling for an extensive set of child and family characteristics, including an earlier measure of cognitive development (in residual change models). Second, we look at whether any associations differ for particular subgroups of children, examining subgroups

defined by gender, child temperament, and gender and temperament, as well as by maternal occupation.

Associations between First-Year Maternal Employment and Children's Later Cognitive Outcomes

Table 4 presents coefficients for first-year full-time and part-time maternal employment (with standard errors in parentheses, and effect sizes in brackets) from a set of models estimating the associations between FT or PT maternal employment in the first year and an array of cognitive outcomes assessed at age 3, age 4 ½, and first grade. Each model also controls for the child, mother, and family characteristics described earlier (i.e., child's gender, whether the child has an older sibling, the log of family income in the year prior to the birth, the mothers' PPVT-R score, the mother's marital status at birth, the mother's education at birth, the mother's age at birth, the mother's depressive symptom score on the CES-D at 1 month post-birth, and subsequent maternal employment). Coefficients (and standard errors) for these other covariates are not shown in the Table but are available on request. Results shown in Panel A are for non-Hispanic white children; results shown in Panel B are for the small sample of African-American children. The Table also indicates for each coefficient whether it is statistically significant and if so, at what level ($p < .05$, $.01$, or $.001$).

Overall, the results allow us to distinguish whether children whose mothers were employed FT by 12 months or PT by 12 months have significantly different cognitive outcomes at age 3 and thereafter than children whose mothers were not employed at all by 12 months (the reference group). We also show in the table the results of tests for significant differences between the coefficients on FT employment in the first year and PT employment in the first year. So three contrasts are estimated: FT vs. no employment in the first year; PT vs. no employment in the first year; and FT vs. PT employment in the first year. As discussed earlier, we focus on results for FT or PT employment by the 12th month, because these are our most comprehensive measures (since they include all the women who worked FT or PT in the first year, regardless of when they began work within that year) and are also the most comparable to the ones used in most prior studies. (We discuss results from some supplemental analyses that look at timing within the first year below.)

Looking first at Panel A, for non-Hispanic white children, the results indicate that FT maternal employment by the 12th month is associated with significantly lower scores on all eight cognitive outcome measures, compared to the reference group of mothers who did not work in the first year. Effect sizes (shown in brackets in the table) are modest, ranging from $-.10$ on the Bracken at age 3 to $-.18$ on the Current School Performance Scale in first grade. The pattern of results for PT employment is different. For the most part there are no significant associations between PT employment by 12 months and later child outcomes (only the coefficient for Current School Performance at first grade is significant with an effect size of $-.12$). Reflecting this, tests of significance (results shown in the table) find that the coefficient on FT employment by 12 months is significantly different from the coefficient on PT employment by 12 months in four of the eight outcome models,

suggesting that FT employment by 12 months is associated with significantly worse cognitive scores than PT employment by 12 months on these four outcome variables.

Do these results vary by timing?—Results from models analyzing whether these associations vary by timing are shown in Appendix Table 2. First, we estimated separate models that control for FT or PT work begun by 3 months (N=327 and 165 respectively, or 36% and 18% of our sample), FT or PT work begun by 6 months (N= 430 and 206 respectively, or 48% and 23% of our sample), FT or PT work begun by 9 months (N=473 and 206 respectively, or 53% and 23% of our sample), or FT or PT work begun by 12 months (N=496 and 208, or 55% and 23% of our sample). In these models, full-time maternal employment by the 3rd or 6th month is significantly associated with only one or two outcomes respectively. The results for FT employment by 9 months – with significant associations for seven of eight outcomes -- are comparable to those for FT employment by 12 months. These results are not sufficiently robust to tell us to what extent timing within the first year matters.

Second, we estimated models dividing those who worked in the first year into 4 mutually exclusive categories: FT by 12 months and worked by 6 months (N=468, or 52% of our sample); FT by 12 months and started work between 7 and 12 months (N=28, or 3%); PT by 12 months and worked by 6 months (N=168, or 19%); or PT by 12 months and started work between 7 and 12 months (N=40, or 4%). The results of those models, shown in the bottom portion of Appendix Table 2, indicate that the most consistently significant associations are for FT employment in the first year begun by 6 months (significant in 7 of the 8 models). However, the magnitudes of the coefficients on FT employment in the first year begun between 7 and 12 months are in each case larger, although only 4 (out of 8) of these are statistically significant (reflecting the smaller sample size in that group) and the difference in coefficients is statistically significant for only 1 (out of 8) outcomes. (The PT coefficients are mostly not significant, but in several instances are significantly different from their counterpart FT coefficients). Again these results are not sufficiently robust to tell us to what extent timing within the first year may matter.

Are the associations between first-year maternal employment and later outcomes weaker or stronger over time?—Comparing the effect sizes for the coefficients on FT employment by 12 months across the outcome variables, there is no indication in Table 4 that the associations become weaker over time. The effect sizes are if anything larger at age 4 ½ and in first grade than at age 3. However, the differences in magnitude are small and the safest conclusion would be that the associations are relatively stable over time.

To address the question of whether the associations are increasing or decreasing over time more directly, we repeated the models for outcomes at age 4 ½ and first grade but including a control for the child's Bracken score at age 3. To the extent that the Bracken measures the same competencies as the later assessments, controlling for the Bracken will tell us whether, and to what extent, the later associations work through an initial association with the Bracken at age 3 or whether they represent associations that occur subsequent to that time (i.e. through altering children's trajectories of learning). The results, shown in Panel A of

Table 5, indicate that some although not all of the association between FT maternal employment in the first year and later cognitive outcomes for non-Hispanic white children works through the association between FT maternal employment in the first year and the Bracken. After including the control for the Bracken at age 3 in our models for the seven outcomes at age 4 ½ and first grade, four of the seven coefficients on FT maternal employment by 12 months are no longer statistically significant. The effect sizes are reduced by about a third, from $-.12$ to $-.18$ before controlling for the Bracken, to $-.08$ (not significant) to $-.14$ after controlling for the Bracken. This pattern of results suggests that FT maternal employment in the first year is linked to later cognitive outcomes to some extent through its links with cognitive development in the pre-school years, but also to some extent through the trajectory of development thereafter, or through competencies measured on later assessments but not on the Bracken.

The role of subsequent employment—As mentioned earlier, we include in all our models controls for maternal employment subsequent to the first year (i.e. dummy variables for whether the mother was working at 15 months post-birth, at 24 months, at 36 months, and between 42 months and first grade). The results for these variables (not shown) indicate that maternal employment after the first year generally tends to be positively associated with later cognitive outcomes. However, these associations are mostly not significant (across 8 models with a total of 31 coefficients for subsequent employment variables, only 5 (about one-sixth) are statistically significant).

Results for African-American children—The results for African-American children, shown in Panels B of Tables 4 and 5, are quite different from those for the non-Hispanic white children. None of the coefficients for FT (or PT) work in the first year are statistically significant for the African-American sample (Table 4) and adding a control for the Bracken (Table 5) does not change this overall pattern of results. These results strongly suggest that the links between first-year maternal employment and later cognitive outcomes are different for African-American children as compared to non-Hispanic white children. As discussed above, these results may reflect differential patterns of selection into employment or different contexts in which children of different racial/ethnic groups are raised. For instance, they might reflect the fact that African-American mothers are less likely to be married, and thus their children may gain more from the mother's employment; however, when we tested this by splitting sample of African-American children by mother's marital status, we found in results not shown that the associations between first-year maternal employment and later outcomes were not different for families with married mothers as compared to those with single mothers. It may also be the case that our sample of African-American children is simply too small to detect any significant effects.

Taken together, this evidence suggests that where there are significant negative associations between first-year FT maternal employment and later child cognitive outcomes, these are present for non-Hispanic white children, but not African-American children. Thus, in the remainder of the analyses presented in this chapter, we restrict our sample to the non-Hispanic white children.

Do Child Characteristics or Maternal Job Characteristics Moderate the Associations between First-Year Maternal Employment and Later Child Cognitive Outcomes?

The second question we address in this chapter is whether the links between first-year maternal employment and later child cognitive outcomes differ for children with different characteristics – specifically, differences by gender, by child temperament, and by gender and temperament – or for children whose mothers are in different types of occupations – specifically, professional versus non-professional.

We begin with estimates examining differences by child characteristics. We include the same set of controls as in Table 4 – thus we include the full set of child and family background characteristics -- and analyze the same set of 8 cognitive outcomes measures. To see whether the links between first-year maternal employment and later outcomes vary by child gender, child temperament, or gender and temperament combined, we estimate interaction models, allowing each first-year maternal employment coefficient to vary by gender, or temperament, or gender and temperament combined. In these models, the main coefficient for a given maternal employment category (for example, FT work by 12 months) tells us the main association of that employment category with the outcome for all children, while the interaction term (for example, FT work by 12 months and the child is a boy) tells us the additional association, if any, of that employment category for that child characteristic group (in this example, the additional association, if any, of FT work by 12 months for boys as opposed to girls). If the interaction term is statistically significant, then the employment category has a significantly different association with the outcome for that group than it does for children overall; if the interaction term is not statistically significant, then the association for that group is not significantly different than it is for children overall.

The results of the analyses by gender for non-Hispanic white children (not shown) suggest that with very few exceptions, the associations between first-year FT or PT employment and child cognitive outcomes do not vary significantly by gender. Across the 8 cognitive outcomes, there is only one outcome (current school performance at first grade) where the association with FT employment by 12 months differs significantly for boys, and only two (current school performance and SSRS academic competence at first grade) where the association with PT employment by 12 months differs significantly for boys. Each of these three significant interaction terms is negative, indicating that the negative associations with first-year maternal employment are more negative, where present, for boys than for girls, and it is interesting to note that all three are for teacher reports at first grade, suggesting that perhaps teachers are perceiving these boys differently even though their cognitive scores do not differ. But again, we note that the overall pattern (for 13 of the 16 interaction terms) indicates no significant differences in associations by gender.

The results of the analyses by child temperament for non-Hispanic white children (not shown) are similar. Here we categorize children into two groups, children who were rated by the mother at 6 months of age as having a more difficult temperament (scored above average on the scale) and children who were rated as having a less difficult temperament (scored at or below average) and test for interactions between having a more difficult temperament and FT or PT maternal employment in the first year. In these interaction models, we find no significant interactions between temperament and first-year maternal employment.

To examine the joint associations by gender and temperament, we also estimated models in which we categorized our sample of non-Hispanic white children both by gender and temperament, and then tested for interactions between gender, temperament, and first-year maternal employment. Results (not shown) again indicate few significant interactions (13 of the 16 interaction terms are not statistically significant). The 3 that are significant are a negative interaction for FT work by 12 months and being a boy and having a difficult temperament in the model for SSRS academic competence at first grade, and negative interactions for PT work by 12 months and being a boy and having a difficult temperament in the models for SSRS academic competence and current school performance at first grade. Again, these results apply to teacher ratings at first grade, suggesting that teachers are perceiving these children as different.

Taken together, these results suggest that the links between first-year maternal employment and later child outcomes for non-Hispanic white children, where present, do not vary substantially by child characteristics, although we note an interesting pattern of results for teacher-reported outcomes at first grade. In results not shown, we repeated these models for the small sample of African-American children but continued to find no significant associations between FT or PT work in the first year and later child outcomes.

We next examined whether maternal occupation moderates the associations between first-year employment and child cognitive outcomes. Again, we include the same set of controls as in Table 4 and analyze the same set of 8 cognitive outcomes measures. To see whether the links between first-year maternal employment and later outcomes vary by maternal occupation, we estimate interaction models, allowing each first-year maternal employment coefficient to vary by whether the mother is in a professional occupation (as opposed to a non-professional occupation). The results of these interaction models (not shown but available on request) indicate that there are no significant interactions between first-year maternal employment and professional status.

Conclusion

The analyses presented in this chapter have allowed us to answer our first two analytic questions with regard to child cognitive outcomes – whether there are associations between first-year maternal employment and later child cognitive outcomes, and whether any associations vary by child characteristics or maternal occupation. In our models, we have controlled for an extensive set of child and family characteristics. We have also examined whether the associations vary by child gender and temperament or by maternal occupation.

In the next chapter, we carry out a parallel set of analyses for child social and emotional outcomes. As highlighted in Chapter II, theory and prior research point to a somewhat different set of hypothesized links between first-year maternal employment and these outcomes. We examine those links next.

V. FIRST-YEAR MATERNAL EMPLOYMENT AND CHILD SOCIAL AND EMOTIONAL DEVELOPMENT

This chapter presents results of regression models similar to those estimated in Chapter IV but here estimated for child social and emotional outcomes at age 3, age 4 ½, and first grade. The 10 outcome variables analyzed include: mother-reported and caregiver- or teacher-reported child externalizing behavior problems as measured on the CBCL as well as measures of social adjustment and child's attachment.

Associations between First-Year Maternal Employment and Children's Later Social and Emotional Outcomes

In Table 6, we present coefficients for first-year maternal employment (with standard errors in parentheses, and effect sizes in brackets) from a set of models estimating the associations between FT or PT maternal employment in the first year and a set of social and emotional outcomes assessed at age 3, age 4 ½, and first grade. The 10 outcomes considered include: attachment security, observed at 15 months and age 3; mother reported externalizing behavior problems at age 3 and 4 ½ and first grade; caregiver-reported externalizing problems at age 3 and 4 ½; and teacher-reported social skills, peer competence, and externalizing problems at first grade. As in our cognitive models, we distinguish FT employment in the first year from PT employment in the first year, comparing both to the reference category which is not working by 12 months. We also show in Table 6 the results of tests for significant differences between the coefficients on FT employment in the first year and PT employment in the first year. So three contrasts are estimated: FT vs. no employment in the first year; PT vs. no employment in the first year; and FT vs. PT employment in the first year. Each model controls for the child, mother, and family characteristics described earlier. Results shown in Panel A are for non-Hispanic white children; results shown in Panel B are for the small sample of African-American children.

Looking first at Panel A, for non-Hispanic white children, the first striking finding is that there are no significant differences between children whose mothers worked FT in the first year and the reference group of children whose mothers did not work in the first year for any of the 10 child social and emotional outcomes considered. Nor are there any significant differences in outcomes between children whose mothers worked PT in the first year and the reference group of children whose mothers did not work in the first year.

However, the second striking finding in Table 6 is that in 7 of the 10 models, the coefficient for FT employment in the first year is significantly different from the coefficient for PT employment in the first year, and in each of these cases, the contrast indicates that children whose mothers work FT in the first year have significantly poorer social and emotional outcomes than those whose mothers work PT in the first year. Thus, at age 3, children whose mothers worked PT in the first year have significantly lower levels of externalizing behavior problems – both according to mother report and to caregiver report -- than children whose mothers worked FT in the first year; the same is true at age 4 ½ for caregiver-reported problems. Effect sizes (Cohen's *d*) for these contrasts are moderate to large, ranging from 0.31 to 0.58. The same pattern holds for mother-reported and teacher-reported externalizing

problems in first grade; but here the effect sizes are quite small, at 0.07 and 0.12 respectively. Relatively few children are above a clinical cut-off for CBCL externalizing behavior (T-score of 65). On maternal-reported behavior, at age 3 2% of those whose mothers had worked FT in the first year are above the cutoff as compared to 1% of those whose mothers had worked PT; the corresponding figures at age 4 ½ are 4% and 2%, and at first grade, 3% and 1%. With regard to caregiver-reported behavior, the corresponding figures for those above a clinical cut-off are 3% and 0% at age 3, 5% and 1% at age 4 ½, and 5% and 0.5% at first grade.

In addition, teachers rate children whose mothers worked PT in the first year more highly on social skills and peer competence than they do children whose mothers worked FT in the first year. Of the 10 outcomes considered, the only ones where children whose mothers worked PT in the first year are not rated better than children whose mothers worked FT in the first year are attachment security at 15 months and age 3 and mother-reported externalizing problems at age 4 ½.

Differences by timing—We next explored possible timing differences using the two methods outlined in the prior chapter. First, we estimated a series of models, the first including controls for FT or PT employment by 3 months, the second for employment by 6 months, the third for employment by 9 months, and the fourth for employment by 12 months (as in our main model). The results for non-Hispanic white children are shown in Appendix Table 3. As in our main results, comparing children whose mothers worked FT in the first year with the reference group whose mothers did not work in the first year, there are no significant links between FT employment in the first year and early child attachment security (at age 15 months and 36 months) or child behavior outcomes at age 3 in any of the 4 models. However, these results change after age 3. At age 4 ½, children whose mothers had worked FT by 3 months, or 6 months, or 9 months have significantly more externalizing behavior problems than children whose mothers did not work in the first year as rated by their caregivers, although interestingly these associations are not found in the mothers' reports. A similar pattern is seen at first grade, where children whose mothers worked FT by 3 or 6 months have significantly more externalizing behavior problems than children whose mothers did not work in the first year as reported by their teachers, but not by their mothers. At first grade we also have teacher-reported measures of social skills and peer competence, and for those we mostly see no significant links with FT maternal employment in the first year as compared to mothers who did not work in the first year (with the exception of a link between FT employment begun by 6 months and peer competence at first grade).

Appendix Table 3 also displays the coefficients for PT employment in the first year, by timing, again relative to the reference group of children whose mothers did not work in the first year. With one exception (an association between PT employment in the first year and reduced teacher-reported externalizing problems in first grade), none of these coefficients are significant.

However, as in our main models, although most of the coefficients for FT or PT maternal employment are not significantly different from zero (indicating that they do not differ from the reference group of no employment in the first year), many of them are significantly

different from each other. In just over half of the models (23 of 40) for which coefficients are shown in the top portion of Appendix Table 3, a mother working FT rather than PT in the first year is associated with significantly poorer social and emotional functioning for the child. For example, comparing children whose mothers began work by 3 months, FT vs. PT work is associated with more externalizing problems as reported by the mother at age 3, by the caregiver at age 4 ½, and by both the mother and the teacher at first grade.

Our second approach to timing was to estimate a model where we controlled for 4 mutually exclusive categories of employment in the first-year. The results are shown in the bottom portion of Appendix Table 3. Here we can detect no significant associations between any of the 4 categories of employment and the social and emotional outcomes when the categories are compared to the reference group of no employment in the first year, perhaps because the categories divide the sample into small cell sizes. However, we also see a pattern of significant differences between the coefficients for working FT in the first year and work begun by 6 months and the coefficients for working PT in the first year and work begun by 6 months. These coefficients are significantly different for the same 7 (out of the 10) outcomes as was the case in the main models shown in Table 6: mother- and caregiver-reported externalizing problems at age 3, caregiver-reported externalizing problems at age 4 ½, teacher-reported social skills and peer competence at first grade, and mother-reported and teacher-reported externalizing problems at first grade. In each case, the contrast favors the children whose mothers worked PT in the first year.

Are the associations between first-year maternal employment and child externalizing behavior problems weaker or stronger over time?—To address the question of how any associations might change over time and whether they work through changes in the initial level of behavior problems at age 3, we repeated the models for externalizing behavior problems at age 4 ½ and first grade but including a control for the child's externalizing behavior problem score at an earlier point in time. We estimate two sets of models. In the first, we use the child's score on the same measure at age 3 as our measure of early behavior problems (thus, in models for mother-reported externalizing problems at age 4 ½ and first grade, we use mother-reported externalizing problems at age 3; and in models for caregiver-reported externalizing problems at age 4 ½ and first grade, we use the caregiver-reported measure at age 3). In the second, we use the average of the child's score from the mother-reported measure and the caregiver-reported measure at age 3 as our early measure. (Children who did not have an earlier measure, because they were not in child care at age 3, were not included in these models; hence the sample sizes in Table 7 are smaller than those in Table 6.)

The results of these residual change models, shown in Table 7, indicate that earlier externalizing behavior problems, whether measured as the age 3 score on the same measure (section 1) or the average of the age 3 scores on the mother-reported and caregiver-reported measures (section 2), are significantly correlated with later externalizing behavior problems (whether reported by the mother or the caregiver/teacher). How does controlling for early externalizing behavior problems affect the associations between first-year maternal employment and later externalizing behavior problems? In Table 6, we found no significant differences between FT first year employment and the reference category of no work in the

first year, and that result is unchanged here. The same is true for the difference between PT first year employment and no work in the first year.

Contrasting outcomes for children whose mothers worked FT vs. PT in the first year, in Table 6 there was a pattern of significant differences between the associations of FT versus PT employment in the first year and externalizing behavior problems at age 4 ½ and first grade for the non-Hispanic white children, with 3 of the 4 differences significant (caregiver report at age 4 ½, and mother and teacher report at first grade). After including the control for age 3 externalizing behavior problems, we continue to see some significant differences between the FT and PT employment coefficients in the non-Hispanic white sample, but these differences are greatly attenuated and now only 1 of the 4 (teacher report at first grade) is significant in results using Method 1, and only 2 of the 4 (caregiver report at age 4 ½ and teacher report at first grade) using Method 2 (see Table 7, sections 1 and 2). Thus, it appears that to the extent that FT employment in the first year and PT employment in the first year are differentially associated with later externalizing behavior problems, these associations are due in part to differential associations with externalizing behavior problems as early as age 3.

Results for African-American Children—This set of results is not found for the small sample of African-American children. In Table 6, in the results for the African-American sample, we see no significant associations between FT employment in the first year and later outcomes, and few (i.e. 1 of 8) significant differences between the coefficients for FT versus PT employment in the first year. Nor do these results change when we add measures for earlier behavior problems (Table 7, Panel B). Thus, in the remainder of our analyses, we focus on results for the non-Hispanic white sample.

Do Child Characteristics and Maternal Job Characteristics Moderate the Associations between First-Year Maternal Employment and Later Child Social and Emotional Outcomes?

We next investigate whether the links between first-year maternal employment and later child social and emotional outcomes, where present, vary by child or maternal job characteristics. We include the same set of controls as in Table 6 and analyze the same set of social and emotional outcomes. To see whether the links between first-year maternal employment and later outcomes vary by child gender, child temperament, or maternal occupation, we interact first-year maternal employment and that characteristic.

The results of the analyses for non-Hispanic white children (not shown) indicate that the associations, where present, between first-year maternal employment and the child outcomes do not vary by child gender or temperament. None of the interaction terms (between first-year FT or PT employment and being a boy) are statistically significant, indicating that there is not variation by gender in the differences between children whose mothers worked FT or PT in the first year and those whose mothers did not work in the first year. With regard to the contrast between FT and PT employment in the first year, the interaction results suggest a few instances where the association between FT rather than PT employment in the first year and later behavior problems is significantly larger for boys. This is the case for mother-

reported internalizing problems at first grade and caregiver-reported externalizing problems at first grade.

With regard to possible moderating effects of maternal occupation, none of the interaction terms (between first-year FT or PT employment and the mother being a professional, as compared to the reference group of mothers who did not work in the first year) are statistically significant. Comparing FT and PT employment in the first year, the results suggest some instances where the associations do differ by occupational type. Associations between FT rather than PT employment in the first year and later behavior problems are larger for children of non-professionals in the case of caregiver-reported externalizing behavior at 36 months and first grade as well as mother-reported externalizing behavior at 54 months and first grade. These results hold if we use a cut-off for behavior problems, instead of a continuous score.

Thus, the overall conclusion of these analyses is that the associations between first-year maternal employment and later child sociomoetional outcomes, where present, mostly do not vary by child gender, child temperament, or maternal occupation, although there are some instances where the contrast between FT and PT employment in the first year does vary by gender or maternal occupation.

Conclusion

This chapter reported the results of OLS models examining the links between first-year maternal employment and later social and emotional outcomes. The overall pattern of results for non-Hispanic white children suggests that FT maternal employment in the first year is not associated with poorer outcomes compared to the reference group of children whose mothers did not work at all in the first year. Nor is PT employment in the first year associated with different outcomes, compared to the same reference group.

However, when we compare FT employment in the first year to PT employment in the first year, we find that FT employment in the first year is associated with poorer outcomes (on at least some measures) compared to children whose mothers worked only PT in the first year. Taking advantage of repeated measures of child externalizing behavior problems, we find that the differences between children whose mothers worked FT vs. PT in the first year are evident in higher levels of mother- and caregiver-reported externalizing behavior problems at age 3, and those higher levels of behavior problems help account for the higher levels of behavior problems reported at age 4 ½ and first grade. Thus, whether FT maternal employment in the first year is associated with poorer social and emotional outcomes depends on the counter-factual (i.e. what the alternative employment status of the mother is). Of interest is that where significant differences were found between the effects of FT versus PT work in the first year, these differences were found on measures of child externalizing behavior problems, social skills, or peer competence, but tended not to be found on measures of the child's attachment security.

In analyses testing for moderation, these results for the most part did not vary significantly by child gender, child temperament, or maternal occupation. However, there were some instances where the distinction between FT and PT employment in the first year did vary by

gender or by maternal occupation, with associations tending to be stronger for boys and for children whose mothers are in non-professional occupations.

In the next two chapters, we turn to the question of mediation, first examining how maternal employment in the first year is linked to a set of potential mediators and then investigating the extent to which including those mediators in our analyses helps explain the links between first-year maternal employment and later child outcomes.

VI. ASSOCIATIONS BETWEEN FIRST-YEAR MATERNAL EMPLOYMENT AND INCOME, HOME ENVIRONMENT, AND CHILD CARE

Taking advantage of the rich data in the NICHD-SECC dataset, this chapter reports estimates of the associations between first-year maternal employment and three sets of potential mediators whose importance is emphasized by theory from one or more disciplines: income (psychology, economics, and sociology); quality of the home environment, including measures of maternal depressive symptoms and sensitivity (psychology, economics, and sociology); and the quality and type of child care (psychology, economics). These analyses are of interest in their own right, but are also of interest because the three sets of factors considered are likely mediators of any associations between first-year maternal employment and child outcomes, and in the classic Baron and Kenney (1986) approach to the analysis of mediation, the first step is to estimate the association between the independent variable and the mediator(s). We recognize of course that there are many other determinants of these potential mediators, and we control for such factors in our analyses. But the focus of this chapter is on whether first-year maternal employment is associated with these mediators, and if so, how. That is, to what extent is first-year maternal employment associated with more adverse experiences for children, which might help explain any negative overall associations between such employment and child outcomes, and to what extent is first-year maternal employment associated with more positive experiences for children, which might act to offset any negative overall associations?

Descriptive Statistics

The descriptive statistics in Table 8 provide a first indication as to the possible links between first-year maternal employment and the three sets of potential mediators. Table 8 displays summary statistics for the mediators, by first-year maternal employment group: 1) FT work by the 12th month, 2) PT work by the 12th month; or 3) no work by the 12th month. The table indicates whether differences between groups 1 and 3, 2 and 3, and 1 and 2 are statistically significant, and if so, whether they are significant at the $p < .05$, .01, or .001 level. So, three contrasts are examined: FT vs. no work, PT vs. no work, and FT vs. PT work in the first year.

In the non-Hispanic white sample, the strongest links between first-year maternal employment and potential mediators are with income. We categorize maternal earnings at each time point as being in the top, middle, or bottom third (we also have a category for missing earnings at each time point, but this is not shown in the table). Mothers who worked full-time (FT) by the 12th month have the highest earnings at each assessment point (i.e., age

3, age 4 ½, and first grade), followed by those who worked part-time (PT) by the 12th month, and those who did not work by the 12th month. There are also significant links between first-year employment and the home environment. Interestingly, there are no significant differences in maternal depressive symptoms among the three first-year maternal employment groups. However, there are significant differences in the HOME score and maternal sensitivity, with mothers who worked PT in the first year scoring highest, followed by mothers who worked FT and then those who did not work in the first year. There are also significant differences in child care. Children whose mothers worked FT or PT by the 12th month are more likely to have been in high-quality child care by age 3 or 4 ½, and they have also spent more time in center-based care by age 4 ½. But children whose mothers worked FT by the 12th month are also more likely to have been in low quality care by age 3 (although interestingly, by age 4 ½, children whose mothers did not work in the first year are most likely to be in low-quality care).

The patterns for the small sample of African-American children are somewhat different. For instance, mothers who worked FT by the 12th month have an earnings advantage over the mothers who did not work in the first year, but the same is not true for mothers who worked PT in the first year, whose earnings do not differ significantly from those of mothers who did not work in the first year. Mothers who worked FT by the 12th month also have significantly better HOME scores and are rated as significantly more sensitive than those who did not work in the first year (again, the comparisons between mothers working PT and mothers not working the first year are mostly not significantly different). But, in contrast to the patterns for non-Hispanic white mothers, in the African-American sample, mothers who worked FT in the first year report significantly fewer depressive symptoms than those who did not work in the first year (at age 3, 4 ½, and first grade), as do mothers who worked PT in the first year (at age 3 and 4 ½).

The patterns shown in Table 8 are suggestive, but as these are only descriptive statistics we do not know whether these differences reflect pre-existing variation or effects of first-year employment. Therefore, we next present results from multivariate regression models with extensive controls, to hold constant factors that may have varied prior to the first-year employment. These estimates provide evidence as to whether the first step required for mediation – a link between first-year maternal employment and a potential mediator -- is occurring.

Regression Estimates of the Associations between First-Year Maternal Employment and Income, Home Environment, and Child Care

Panel A in Table 9 shows results of regression estimates of the associations between first-year maternal employment and the potential mediators for non-Hispanic white children (Panel B shows results for African-American children). Section 1 shows the results of 9 separate regressions (for the 9 mediator variables) estimated at 15 months, section 2 shows the results of similar regressions for 24 months, section 3 for age 3, section 4 for age 4 1/2, and section 5 for first grade. The reference group in these regressions is mothers who did not work by 12 months. For each regression, the Table shows the coefficients (and standard errors) for FT employment by the 12th month, and PT employment by the 12th month, as

well as the R-squared and N for the regression. (Full regression results are not shown, but are available on request). The table also indicates for each coefficient whether it is statistically significant and if so, whether it is at the $p < .05$, $.01$, or $.001$ level.

Holding constant an extensive set of child and family characteristics (listed in the note to the Table and also presented in Chapter II), we find that first-year maternal employment is associated with all three sets of mediators for the non-Hispanic white children (results shown in Panel A of Table 9), as discussed below. (We do not discuss results for the small sample of African-American children, shown in panel B of Table 9, as these provide little evidence of any significant links with first-year employment; however, with such a small sample ($N=113$), it is difficult to know whether there are no associations between first-year employment and these potential mediators, or whether we simply lack the power to detect them).

Maternal earnings

Full-time employment by the 12th month is associated with significantly higher earnings for the mother at each assessment point, although these links grow weaker over time, which makes sense as more mothers from the reference group go to work over time. For instance, mothers who worked FT by the 12th month are 21% more likely than those who did not work in the first year to be in the top third of maternal earnings at 15 months, as compared to 12% more likely at first grade (effect sizes are $.39$ and $.35$ respectively). Mothers who worked PT by 12 months are significantly less likely to have high earnings than those who did not work in the first year, and this earnings disadvantage persists over time (perhaps because they continue to work PT while some mothers who did not work in the first year may have moved into FT employment) (effect sizes range from $.10$ to $.18$). They are also significantly less likely to have high earnings than those who worked FT in the first year (effect sizes range from $.21$ to $.27$).

Home environment

The results for the home environment provide an interesting contrast to what was seen in the descriptive statistics (where there were no significant differences by maternal employment group). In these multivariate models, mothers who worked FT by 12 months have significantly higher depressive symptom scores at each assessment point than those who did not work in the first year (with effect sizes ranging from $.21$ to $.36$). Mothers who worked PT by the 12th month fare slightly better. Their depressive symptom scores are significantly elevated at four of the five assessment points relative to those who did not work in the first year, but the absolute value of the associations for them tends to be small (effect sizes range from $.07$ to $.09$). In addition, mothers who worked PT by the 12th month are rated as significantly more sensitive than those who did not work in the first year at three assessment points (24 months, age 4 ½, and first grade) (effects sizes range from $.23$ to $.29$). We re-estimated these models using a dichotomous cut-off score for depressive symptoms (using a cut-off of greater than or equal to 16, as defined in Chapter III) rather than a continuous score, and the results, shown in Appendix Table 4, were quite similar. At each of the 5 time points, FT employment by 12 months was associated with a significantly higher likelihood of the depressive symptom score being above the cut-off; the same was true for PT

employment by 12 months, although the PT coefficients did tend to be slightly smaller at both 15 months and 24 months.

Child Care

With regard to child care, there are several significant differences between children whose mothers worked FT in the first year and those whose mothers did not work in the first year. The former group have been in center-based care significantly more times by age 15 months than the latter group (although the effect size is small, .07). The former group are also significantly more likely to be in high-quality care *and* low-quality care by 15 months and 24 months (the other quality category being quality not observed), but after 24 months, significant quality differences between the two groups are few (more likely to be in high quality care at 36 months) (effect sizes are again small, ranging from .09 to .15).

Children whose mothers worked PT by 12 months are significantly more likely to be in high-quality care by 24 months, age 3, and age 4 ½, and also less likely to be in low-quality care at 4 ½, than children in the reference group whose mothers did not work in the first year (with effect sizes ranging from .06 to .12). Comparing children whose mothers worked PT by 12 months to children whose mothers worked FT by 12 months, the former group is significantly more likely to be in high-quality care at 15 months, and significantly less likely to be in low-quality care at 15 months, 24 months, age 3, and age 4 ½ (with effect sizes ranging from .06 to .09). These results suggest that children whose mothers worked PT in the first year go on to attend higher quality child care than those whose mothers did not work in the first year or whose mothers worked FT in the first year.

Timing of Employment within the First Year

The models presented thus far have shown the links between mothers working by the 12th month and later measures of income, home environment, and child care, distinguishing only between mothers who worked full-time and those who worked part-time. But mothers working by the 12th month vary not only by the number of hours worked per week but also by when they began work. In our sample of non-Hispanic white mothers, 54.7% were working at least some hours by 3 months after the birth. This rose to a total of 70.1% by 6 months, 75.4% by 9 months, and 78.2% by 12 months (defining these categories cumulatively and including all the women who had begun work by that point in time). It is possible that the links between working in the first year and income, home environment, or child care might vary by when the mother began work.

Accordingly, we re-estimated all our models for the mediators allowing the associations with first-year maternal employment to vary both by work hours and by timing. In results not shown, we estimated a series of 4 different regressions. First, we estimated the associations with working FT or PT by 3 months (as compared to beginning work sometime later or not at all); working FT or PT by 6 months; working FT or PT by 9 months; and finally, working FT or PT by 12 months. It is important to note that our ability to detect differential associations between the timing of employment and child outcomes may be limited in this sample, given that most of those working in the first year were working by 3 months. (If we calculate when mothers working in the first year had gone to work, 70% of

those working in the first year were working by 3 months, 90% by 6 months, 96% by 9 months, and 100% by 12 months). It is also important to note that, as discussed earlier, there are some differences between the women who worked by 3 or 6 months and those who began work later in the year. Thus, if we find differential effects of working by 9 or 12 months as compared to 3 or 6 months, this may reflect that these estimates draw on different groups of working mothers.

For the most part, the results from the timing models were consistent with those from the original models. We highlight here only those few instances where significant differences by timing of employment did appear. One difference that emerged related to timing was that when we estimated models using a cut-off for depressive symptoms (defined as greater than or equal to 16) rather than a continuous score (results not shown), the strongest pattern of associations between working FT in the first year and being above the cut-off for depressive symptoms at the 5 later time points was found when we compared those working by 9 or 12 months to those who did not work in the first year, suggesting that these associations are stronger for those beginning work after 6 months than for those beginning work earlier. A second difference related to timing had to do with results for the HOME scale. Here, we found a significant negative association between working FT by 3 months and the HOME scale as assessed at 15 months, 36 months, and age 4 ½ models, in comparison to the reference group of mothers who did not work in the first year. In contrast, coefficients on working FT by 6, 9, or 12 months, again in comparison to mothers who did not work in the first year, tended to be smaller in absolute value (i.e. less negative) and were not consistently statistically significant, suggesting that FT employment by 3 months may be more consequential for the HOME scale than employment begun thereafter. Taken together, these results for the non-Hispanic white sample suggest that working FT within the first year, as compared to not working in the first year, has relatively consistent links with mediators regardless of whether the work began by 3 months or later in the year (with the few exceptions noted above).

Another way to approach the timing question is to directly compare those who began work earlier versus later in the first year, in the spirit of the NICHD Early Child Research Network (1997b) in their analyses of child care timing. Accordingly, we also estimated supplemental models where we estimated the associations between 4 mutually exclusive categories of first-year maternal employment and the mediators. The 4 categories interact FT or PT employment and timing and are defined as follows: FT employment in the first year, begun by 6 months; PT employment in the first year, begun by 6 months; FT employment in the first year, begun between 7 and 12 months; and PT employment in the first year, begun between 7 and 12 months. Results of these alternative timing models (not shown) mainly confirm the pattern of results reported above.

How do the results for the small sample of African-American mothers compare? In the interests of space, we do not show those results nor do we discuss them at length, but we note that in contrast to the results for non-Hispanic white mothers, we do not find significant differences in the mediators between those who worked FT in the first year, those who worked PT, and those who did not work that year.

Conclusion

In summary, then, we find some evidence of links between first-year maternal employment and several of the potential mediators in the sample of non-Hispanic white women (but not in the smaller sample of African-American women). The strongest evidence concerns the links that are observed between FT maternal employment in the first year and two mediators: higher maternal earnings, which we would expect to be beneficial for child development, but also higher maternal depression scores, which might be detrimental. We also found evidence of some significant links between first-year maternal employment and other aspects of the home environment, as well as aspects of child care, but again with some positive associations as well as some negative ones, making it unclear whether the overall effect would be to benefit children or not. Accordingly, in the next chapter, we move on to estimates that use structural equation modeling (SEM) techniques to examine the associations between first-year maternal employment and later child outcomes and the role of the potential mediators in explaining those associations.

VII. STRUCTURAL EQUATION MODELLING ANALYSES OF THE LINKS BETWEEN FIRST-YEAR MATERNAL EMPLOYMENT AND CHILD DEVELOPMENT

This chapter presents results from structural equation modelling (SEM) analyses that estimate the associations between first-year maternal employment and child development, distinguishing direct effects of first-year employment from indirect effects that might work through the hypothesized mediators – maternal earnings, the home environment, and child care. Conducting SEM analyses is useful in that they provide information about whether the associations between first-year maternal employment and later child outcomes found in Chapters IV and V are direct or indirect and, if indirect, by what pathways they occur.

Another advantage of SEM models is that they produce estimates of total effects (these are the sum of the overall direct effects and overall indirect effects). As discussed in the prior chapter, first-year maternal employment may have some negative effects on mediating factors, in which case the total negative effect of first-year maternal employment could be larger (in absolute value) than the direct effect. At the same time, however, first-year maternal employment might have some positive effects on mediators, in which case such effects would offset any negative direct effects and could result in a smaller total effect (in absolute value). Thus, obtaining an estimate of the total effect is very useful.

Overview of SEM Models

We implemented SEM using AMOS software. As recommended by Hu and Bentler (1999; see also Garson, 2004), and consistent with other work in this area (e.g., NICHD ECCRN 2004a), we tested all our models using several indices, because standard chi-square tests are not appropriate in large samples such as ours. Specifically, we follow Hu and Bentler's (1999) recommendation to use the RMSEA (root mean square error of approximation), SRMR (standardized root mean square residual), and Bollen's GFI (goodness of fit index) to assess the goodness of fit of our models. According to Hu and Bentler (1999), values of less

than .06 on the RMSEA, less than or equal to .08 on the SRMR, and greater than or equal to .95 on the GFI indicate good fit. We report these test statistics for each of our models and in each case, these statistics satisfy the criteria for an acceptable model. We also report the relative chi-square (the chi-square fit index divided by the degrees of freedom), a more conservative measure which takes into account our relatively large sample size. Carmines and McIver (1981) state that the relative chi-square should be in the 2:1 or 3:1 range for an acceptable model. Kline (1998) says a value of 3 or less is acceptable. Again, all our models satisfy these criteria.

In each of our SEM models, we test for overall direct effects of full-time (FT) or part-time (PT) first-year maternal employment as well as overall indirect effects of FT or PT first-year maternal employment that might work through the mother's earnings to date, the mean rating of the home environment to date, the mean rating of the mother's sensitivity to date, the mother's mean report of depressive symptoms to date, mean child care quality to date, and the number of times the child had been in center care to date (we do not control for the number of times the child had been on other types of care, as these rarely had significant associations with outcomes and would have introduced too much complexity into the models). As discussed above, maternal employment might have adverse effects on the potential mediators, contributing to larger overall negative effects, or maternal employment might have positive effects on these factors, offsetting any otherwise negative direct effects.

For each outcome variable, we estimate an SEM model that includes all the controls that were included in our OLS models in Chapter IV and V plus the mediators of interest. In addition, all our models include controls for the other components of family income (i.e. fathers' earnings and any other family income). Again, the reference group is mothers who did not work in the first year.

Before turning to the results, it is important to add a word about language. Thus far, in describing our results, we have been careful to refer to associations rather than effects, because without experimental data we can not establish that what we are estimating are causal effects. However, in discussing the SEM results, it is convenient to use the word effect, since an important feature of SEM analyses is that they allow us to distinguish between direct, indirect, and total effects. In using the word effect here, we do not mean to imply that we have established causality with any certainty. This remains a challenge with SEM models, as it is with other types of multivariate models used with observational data.

SEM Results for Cognitive Outcomes

We begin with analyses of the links between FT or PT first-year maternal employment and the child's Bracken School Readiness score at age 3. Again, the reference group in the models is children whose mothers did not work in the first year, so the coefficients on FT or PT employment reflect the difference between those categories and the reference group. We also discuss, where relevant, instances where we see significant differences between the coefficients on FT vs. PT employment (although for the sake of simplicity, we do not show these latter significance levels in the Figures). The results, shown in Figure 1, indicate that once we take into account possible indirect effects working through mother's earnings, child care quality, number of times in center care, home environment, mother's sensitivity, and

maternal depressive symptoms, there are no significant overall direct effects of either PT or FT first-year maternal employment, as compared to no work in the first year, on the Bracken at age 3.

Looking now at the indirect effects in Figure 1, we can see that FT first-year maternal employment has no significant overall indirect effect on the Bracken at age 3, indicating that the sum of the indirect effects is not significantly different from zero. However, one of the paths – through number of times in center-based care – is significant (i.e., there is a significant effect of FT work on that mediator, and a significant effect of that mediator on the outcome). Working FT in the first year is associated with an increase in the number of times the child is in center-based care by 36 months, which in turn is associated with an increase in the Bracken at 36 months. Thus, greater use of center-based care by 36 months acts to offset what otherwise might be negative effects of FT employment in the first year.

Results for the other paths are in the expected directions but not consistently significant. In some cases, there is a significant effect of FT work on a mediator, but no significant effect of that mediator on the outcome, whereas both should be significant in order for us to consider the overall path to be significant. For example, FT work in the first year is strongly associated with higher maternal earnings by age 3, but those higher earnings are not significantly linked to the child's score on the Bracken at age 3, perhaps because mothers' earnings are only one component of family income (our models include a control for fathers' earnings, which are significantly associated with the child's score on the Bracken), and because we are controlling in the model for some of the ways that income might improve children's cognitive development. In supplemental models (results not shown) we allowed maternal earnings to work through the other mediators and found that in fact higher maternal earnings are associated with greater use of center-based care, better home environment, greater maternal sensitivity, and reduced maternal depression; however, allowing these additional paths did not change the overall pattern of results for these other mediators, and in models that entered maternal earnings without any of the other mediators, the association between maternal earnings and the Bracken score was still not significant. In other cases, there is a significant effect of a mediator on the outcome, but the effect of FT work on that mediator is not significant. This is the case with the HOME score and maternal sensitivity, which are strongly linked to the child's score on the Bracken, but which are not significantly affected by mothers working FT in the first year, as opposed to not working that year.

As noted earlier, one useful feature of SEM models is that they provide an estimate of the total effect, that is, the sum of the indirect and direct effects. In Figure 1, we can see that the total effect of FT first-year maternal employment on the Bracken is negative but not significantly different from zero.

With regard to PT first-year maternal employment, as compared to the reference category of not working in the first year, although it does have a significant positive indirect effect on the Bracken (coefficient is .028), none of the individual paths is significant. In some instances PT work significantly affects a mediator but that mediator does not significantly affect the outcome (this is the case for mother's earnings), while in other instances, a mediator significantly affects the outcome but PT work does not significantly affect that

mediator (child care quality, home environment, maternal sensitivity). The total effect of PT first-year employment on the Bracken in Figure 1 is not significantly different from zero. Nor are there any significant differences in the effects of FT vs. PT first-year employment on the Bracken.

Figures 2 – 4 present results from SEM models for three other cognitive outcome variables: the Preschool Language Scale at age 4 ½ (Figure 2); the WJR Language Skills Composite at first grade (Figure 3); and the WJR Applied Problems Standardized Score at first grade (Figure 4). (We also estimated SEM models for the 4 other cognitive outcomes considered earlier and the overall pattern of results from these models, not shown but available on request, is similar to those presented here. We present results for only selected outcomes in the interests of space.)

Looking first at the results for FT first-year employment, we can see a significant negative direct effect of FT first-year maternal employment, as compared to the reference category of no work in the first year, for all three outcomes (Figures 2–4). Turning to the indirect effects, there are no significant indirect effects of FT first-year maternal employment, again compared to no work in the first year, for any of the three cognitive outcomes at age 4 ½ and first grade. However, although the overall indirect effects of FT first-year maternal employment are not significant, there are some significant paths, working through increased use of center based care in the case of the Preschool Language Scale (Figure 2) and through greater maternal sensitivity in the case of all three outcomes (Figures 2–4). These are factors that act to offset the otherwise negative direct effects of FT maternal employment in the first year.

In contrast, PT first-year maternal employment has mostly non-significant direct effects on the three cognitive outcomes, compared to the reference category of no work in the first year (Figures 2–4). With regard to indirect effects, for each of the three outcomes we find a significant positive overall indirect effect of PT first-year maternal employment (.101 for Preschool Language Scale, .053 for WJR Language Skills, and .042 for WJR Applied Problems). The SEM models provide some evidence as to the mechanisms through which these positive indirect effects come about, suggesting that these work through improvements in the home environment and maternal sensitivity in the case of all three outcomes (Figures 2–4). The increases in maternal sensitivity associated with PT first-year employment are particularly noteworthy and are about twice as large as the increases in sensitivity found for FT first-year employment (both being compared to the reference category of no work in the first year).

Thus, the most important factors underlying the positive indirect links between PT first-year maternal employment and improved cognitive scores are higher quality home environments and substantially greater levels of maternal sensitivity, while for FT first-year maternal employment, the positive indirect effects, where present, work through increased use of center-based care and, to a lesser extent, somewhat greater levels of maternal sensitivity. This latter finding, that FT first-year maternal employment is associated with *greater* maternal sensitivity later in childhood, as compared to mothers who did not work in the first year, is somewhat surprising and suggests that there may be some long-run gains in a

mother's parenting associated with her employment in the first year, perhaps because of some improvements in mental health or satisfaction that we were not able to measure with our other controls. (This result may also reflect differences in characteristics between mothers that we are not able to control for.) The association between maternal sensitivity and FT first-year maternal employment is only about half as large as the association between maternal sensitivity and PT first-year maternal employment, suggesting that whatever it is that links employment with sensitivity is stronger when that employment is PT rather than FT. Consistent with the results shown in Figure 1, although we find that FT work in the first year is associated with higher maternal earnings, we do not find significant links between those earnings and children's scores on the cognitive outcome measures displayed in Figures 2–4. Thus, we do not find that higher maternal earnings are playing a significant offsetting role. Again, this is likely due to the fact that maternal earnings are only one component of family income and also that maternal earnings may in part work through other mediators. Supplemental models for the outcomes in Figures 2–4 indicate that higher maternal earnings are associated with more use of center care and higher quality of care.

As noted above, the SEM results allow us to calculate total effects. As was the case in Figure 1 for the Bracken, we do not find significant total effects of FT first-year maternal employment for any of the three outcomes in Figures 2–4. These results indicate that where there are significant negative direct effects of FT first-year employment, these are counterbalanced by generally positive indirect effects. This is an important finding, and one that would not be so easy to see had we used OLS models instead of SEM. With regard to the total effects of PT first-year employment for the three cognitive outcomes at ages 4 ½ and first grade, we find no significant total effects. These results confirm the results from our earlier OLS models, indicating that the net effect of PT first-year employment for cognitive outcomes at these ages is neutral. Finally, when we contrast the direct, indirect, and total effects of FT vs. PT employment in the first year for the outcomes shown in Figures 2–4, we do not find any significant differences between the effects of FT vs. PT employment in the first year.

SEM Results for Child Externalizing Problems

In Figures 5–10, we present results from SEM models for six measures of child externalizing behavior problems – mother and caregiver/teacher reports of externalizing behavior problems at age 3, 4 ½, and first grade. (We also estimated SEM models for early attachment security, and for social skills and peer competence at first grade; the results are not shown here in the interests of space but are available upon request.)

The overall pattern of results from these SEM models is consistent with what we found in the earlier OLS models (Chapter V). Overall, the effects of FT and PT first-year employment estimated in the SEM models rarely reach statistical significance. Thus, when we look at the total effects of FT or PT first-year employment, as compared to no work in the first year, on the six behavioral outcomes (Figures 5–10), we can see that in no case are these statistically significant. Nor are there any significant direct or indirect effects of FT or PT first-year employment on the six behavioral outcomes.

Nevertheless, the SEM results provide some information as to whether and how FT or PT first-year maternal employment may be linked to later child behavior outcomes and what factors are playing a mediating or offsetting role. The results for FT first-year maternal employment indicate that there are few significant paths from FT first-year maternal employment, through the mediators, to child externalizing behavior problems, and the few that are found are not always consistent. In Figure 6, FT employment in the first year is linked to reduced child care quality by age 3, which in turn is linked to more caregiver-reported externalizing behavior problems at age 3 (since higher quality is linked to lower levels of behavior problems). But, in Figure 10, FT employment in the first year is linked to higher child care quality by age 4 ½, which in turn is linked to a higher level of caregiver-reported behavior problems at first grade (since quality by age 4 ½ is associated with higher levels of behavior problems). However, the other striking result from Figure 10 is that FT employment by the 12th month is linked to greater maternal sensitivity by first grade, and hence lower levels of caregiver-reported externalizing problems at that assessment. This latter finding is consistent with the finding from Figure 9, that FT maternal employment by the 12th month is linked to a higher HOME score by age 4 ½, and in turn to lower levels of mother-reported externalizing behavior at first grade. These findings point to an offsetting role played by maternal sensitivity and the HOME score. However, the bottom line of the results for FT first-year maternal employment is still that the total effects (as well as the overall direct and indirect effects) are not significantly different from zero.

Turning to PT first-year maternal employment, the results shown in Figures 5 to 10 tell a very consistent story. In Figure 5, for instance, we see that PT employment in the first year is linked to significantly improved child care quality and a significantly improved HOME score by age 3, both of which are in turn linked to significantly fewer mother-reported externalizing behavior problems at age 3. Similarly, Figure 7 indicates that PT employment in the first year is linked to a significantly improved HOME score by age 4 ½, which in turn is linked to significantly fewer mother-reported externalizing problems at that age, while Figure 8 indicates that PT employment in the first year is linked to significantly improved HOME scores and increased maternal sensitivity by age 4 ½, which in turn are linked to significantly fewer caregiver-reported externalizing behavior problems at that age. The same protective effect of PT employment in the first year is seen at first grade, when it is linked to a significantly higher HOME score by age 4 ½, which in turn is linked to significantly fewer mother-reported and caregiver-reported externalizing behavior problems (Figures 9 and 10), as well as to significantly greater maternal sensitivity by age 4 ½, which in turn is linked to significantly fewer caregiver-reported externalizing behavior problems (Figure 10). These results point to several pathways through which PT employment in the first year leads to improved child outcomes, offsetting any potentially negative direct effects. Again, though, the total effects of PT first-year maternal employment, and the overall direct and indirect effects, do not reach statistical significance.

Although the bottom-line results for child externalizing problems for the most part lack statistical significance when comparing FT or PT employment to the reference category of no employment in the first year, they do line up with the earlier OLS results (in Chapter V) in pointing to different associations with FT versus PT maternal employment in the first year. For PT employment in the first year, the results point to a pattern of generally

protective effects when it comes to later maternal- or caregiver-reported externalizing behavior problems, as evidenced by the many significant paths noted above. For FT employment, in contrast, the results paint a more mixed picture.

When we directly compare the total, indirect, and direct effects of FT vs. PT employment in the first year, we find several that are significantly different. At 36 months, the total, indirect, and direct effects of FT work on caregiver-reported externalizing behavior problems are significantly larger than the corresponding effects of PT work (all three differences significant at $p < .01$). At 54 months, both the total and indirect effects of FT work on maternal-reported externalizing behavior problems are significantly larger than the corresponding effects of PT work (both significant at $p < .05$), while on the caregiver-reported measure, all three effects of FT work are significantly larger than the corresponding effects of PT work (total and indirect significant at $p < .01$; direct significant at $p < .05$). We also find that at first grade, the total, indirect, and direct effects of FT work are larger than the corresponding effects of PT work on the caregiver-reported measure (significant at $p < .05$, $.01$, $.05$ respectively).

It is striking that the mediators that look to be most important in linking first-year employment to later behavioral outcomes are the home environment and, to a lesser extent, child care quality. Center-based care, which in other research has been linked to higher levels of externalizing behavior problems, is not a significant path linking first-year maternal employment and later behavioral outcomes in any of our SEM models. Yet, our results may help shed some light on the reasons why studies of child care have tended to find adverse effects of long hours in child care in early childhood. To the extent that long hours in child care are associated with FT maternal work in the first year, while shorter hours in child care are associated with PT maternal work in the first year, our results from the contrast between FT and PT employment in the first year would suggest that the latter pattern of employment and care would be associated with better social and emotional outcomes than the former.

VIII. DISCUSSION AND CONCLUSIONS

This paper used rich longitudinal data from the NICHD-SECC to address three questions. First, are there associations between full-time (FT) or part-time (PT) maternal employment in the first year and later child outcomes? Two, if associations are found, do these differ by child gender or temperament, or by maternal occupation? Third, what role do mother's earnings, the home environment, and child care play in mediating or offsetting the associations, where present, and how do our estimates of the total effects of first-year maternal employment change when we take these potential mediators into account?

This chapter summarizes the results, discussing them in the context of theory and prior research and also identifying limitations and topics for future research. We conclude with some thoughts about implications for policy.

The Big Picture

Early full-time employment is the modal experience for contemporary American mothers. The overwhelming majority of mothers (80%) work in the first year of their child's life. Of

these, 75% work full-time, and almost all are working by the time the child is 6 months old, with many working by 3 months. The small group of mothers who go to work part-time after the birth typically work very few hours and are characterized by a more positive set of features than their counterparts; thus, the possibility of unobserved positive selection is a factor that must always be kept in mind in interpreting results for this group.

In OLS regressions for white non-Hispanic women, full-time work in the first year is associated with modestly lower cognitive scores (relative to not working) but this is not the case for part-time work. Neither full-time work nor part-time work is associated with more behavior problems (relative to not working) although full-time work does seem to be worse in this regard than part-time work.

In the instances where these modest differences are found, they mostly operate through effects seen in early childhood, suggesting that they represent initial effects on levels that are sustained over time rather than effects on trajectories of development over time. Taking into account the timing of employment within the first year does not change these results. Nor do these results differ substantially across specific sub-groups within the white non-Hispanic sample.

SEM models for the white non-Hispanic sample add important information, indicating that there are also positive offsetting effects of full-time employment in the first year. Once those effects are taken into account, the overall effect of first-year maternal employment on child development is neutral, although differences between full-time and part-time employment persist.

Analyses for the smaller sample of African-American children do not suggest any significant associations between first-year maternal employment and later child outcomes. This finding, while drawn from a small and non-representative sample, is consistent with findings on African-American families from other datasets such as the NLSY-CS and Fragile Families. Therefore, we think it reasonable to conclude that first-year maternal employment is not a driver of child development outcomes for African-American children.

So what have we learned from these analyses of the NICHD-SECC, and how do our results advance knowledge in this area? We began this study with a review of prior empirical research and with a thorough consideration of theory from the major relevant disciplines. We built on this body of knowledge in designing our analyses, but our analyses differ from prior research in two main ways.

First, we have been able to take advantage of extraordinarily rich data from the NICHD-SECC. This dataset was specifically designed to gather the detailed data that would be needed to conclusively investigate the effects of early maternal employment and early child care on child development. As such, the NICHD-SECC provided us with detailed measures of maternal employment and child care, a rich array of child development outcome measures, and extensive information on child and family characteristics as well as potential mediators and offsetting factors.

Second, our study differs from prior work on this topic by addressing the analysis of mediating and offsetting factors in a more comprehensive and transparent way. Prior work assessed mediation and offsetting factors by including controls for those variables in regression models and then evaluating the remaining effect of maternal employment. Such models, while useful in displaying the effects of the relevant factors, tell us the effect of maternal employment holding constant the other factors but do not tell us the full effects of maternal employment taking into account the factors that are associated with it. SEM models, in contrast, tell us the full effects of maternal employment as it actually exists.

So, to return to the big picture, we have analyzed a contemporary cohort of American families, where the majority of mothers work full-time in the first year, and we have been able to bring to bear extraordinarily rich data and advanced analytic methods, informed by theory from a host of relevant disciplines. The results show conclusively that the overall effect of first-year maternal employment for contemporary American children is neutral. This result stands in sharp contrast to conclusions from many prior studies (including several of our own studies) but makes sense given the two key differences noted above – the availability of much better data, and the use of an analytic model that focuses on total effects rather than the effect of maternal employment holding constant other associated changes.

Our findings not only provide a more nuanced set of empirical results. They also call into question existing theoretical approaches to this area. Much of the theoretical work to date has emphasized the primacy of early relationships between the mother and child, in particular suggesting a key role for constructs such as attachment. While early relationships certainly are important, it is also clear that to the extent first-year maternal employment affects child developmental outcomes, attachment is not a major mechanism. We found little or no evidence that first-year maternal employment affected child attachment.

Instead, the more important mediators and offsetting factors seem to be factors related to the quality of parenting and children's experiences of child care. Recognizing the importance of these factors in explaining the effects of parental employment is important to future research on this topic, as it generates some testable hypotheses as to the circumstances under which maternal employment might be particularly beneficial or detrimental. If, for example, maternal employment is accompanied by insensitive parenting and poor quality child care, we might expect its overall effects to be negative, as compared to a situation where maternal employment was linked with more sensitive parenting and good quality child care.

In the following sections, we provide a brief summary of our main results and then discuss limitations and directions for future research. We conclude with a discussion of policy implications.

Summary of Results on First-Year Maternal Employment and Child Cognitive Outcomes

Intensity and timing of employment—In response to the first question, we did find some associations between FT maternal employment in the first 12 months, as compared to no employment in the first year, and later cognitive outcomes for non-Hispanic white children (we discuss results for the small sample of African-American children in a later section). Using a comprehensive definition of FT first-year employment, including any

women who worked FT by the 12th month, and comparing them to women who did not work in the first year, we found in OLS models (Chapter IV) that FT maternal employment by the 12th month was associated with significantly lower scores on all eight cognitive outcomes examined, although these associations were modest, with effect sizes ranging from $-.10$ to $-.18$. The associations at age 4 ½ and first grade were roughly similar in size to those at age 3 and were only partially explained by the link between FT employment in the first year and lower scores on the Bracken School Readiness Scale at age 3. These results are consistent with what was found in earlier analyses of these data that examined outcomes up to age 3 (Brooks-Gunn et al., 2002) but extends them by analyzing outcomes at age 4 ½ and first grade. As discussed in Chapter I, theory and prior research did not clearly indicate whether it was more likely that associations found at age 3 would fade out over time, persist over time, or indeed become larger over time. Our results suggest that the associations between FT maternal employment by the first year and child cognitive outcomes persist over time or possibly become larger.

We also examined the links between PT employment by the 12th month and later child outcomes, again in comparison to the reference category of no work in the first year. In contrast to the results for FT employment by the 12th month, we found no significant associations between PT employment by the 12th month and later child cognitive outcomes in OLS models, when compared to families where the mother did not work in the first year (Chapter IV).

The third contrast we examined was between FT employment in the first year and PT employment that year. For several outcomes (4 of 8 in Table 6), the coefficients for FT employment by 12 months and PT employment by 12 months were significantly different, suggesting that children's cognitive scores on those outcomes are higher if their mothers worked PT rather than FT in the first year. This finding is consistent with prior research that has found significant differences in the associations for FT employment in the first year versus PT employment in the first year in models for cognitive outcomes (see e.g. Brooks-Gunn et al., 2002; Han et al., 2001; Ruhm, 2004; Waldfogel et al., 2002).

Our findings suggest that any theory as to why first-year maternal employment is linked to later cognitive outcomes must address why FT employment would have significant negative associations while PT employment does not. As discussed in Chapter 1, one possible explanation (emphasized by economists) is that this finding may reflect selection bias, if there are differences between women who work FT or PT in the first year that are not controlled for in the model. One set of such differences might have to do with omitted characteristics of the mother; another might have to do with omitted job characteristics. The patterns in the raw data (Tables 1–3) provide some support for the selection hypothesis, in that mothers who work PT in the first year do tend to have the most favorable characteristics and also are most likely to be in professional jobs. However, another explanation is that PT employment in the first year is less disruptive of a child's cognitive development than is FT employment in the first year, because it has less impact on maternal time with the child (although Huston & Aronson, 2005 did not find significant effects of maternal time on child outcomes). If this hypothesis is correct, controlling for possible mediators should reduce the differential between the associations for FT employment in the first year and PT

employment in the first year (we discuss those results below). Of course, these hypotheses are not mutually exclusive, and indeed, we think it likely that both might help explain the patterns seen in these data.

We also examined the extent to which timing within the first year matters. However, the timing results were not clear enough to allow us to say whether timing in the first year matters or, if it does matter, why that is the case.

The role of moderating factors—The second question we addressed was what role, if any, child characteristics or maternal job characteristics played in moderating the associations found between first-year maternal employment and later child cognitive outcomes for the non-Hispanic white sample. Drawing on theory and prior research, we focused on two types of child characteristics – child gender and child temperament – and one indicator of maternal job characteristics – whether the occupation was professional versus non-professional – and tested for whether the associations between FT or PT first-year maternal employment varied by those characteristics. Overall, we found little or no evidence of moderating effects.

The role of mediators—The third question that we examined had to do with the role of mother's earnings, the home environment, and child care in mediating any associations, where present, between first-year maternal employment and later child outcomes. As discussed in Chapter I, theory and prior research pointed to each of these factors as potentially mediating the links between first-year maternal employment and later child outcomes.

Testing for mediation, in the spirit of Baron and Kenney (1986), we first estimated the association between the first-year maternal employment and the potential mediators in simple OLS regression models (Table 6) and then estimated the association between first-year maternal employment and later child outcomes, taking the mediators into account, using SEM models (Table 7). Our analyses of the links between first-year maternal employment and the potential mediators uncovered a number of significant associations. On the positive side, offsetting any possible detrimental effects of maternal employment, we found evidence that FT maternal employment in the first-year was associated with higher subsequent maternal earnings. However, on the negative side, we also found evidence that FT maternal employment in the first year was associated with more maternal depressive symptoms.. There were also some significant links between first-year FT employment and use of higher-quality child care or center-based care, which again would play an offsetting role.

We next presented results from structural equation modeling (SEM) analyses of mediation. The results of the SEM models (Chapter VII) shed light on the pathways by which first-year maternal employment might affect later child cognitive outcomes. They also provide evidence as to whether the overall effects of first-year maternal employment are significantly positive, negative, or neutral, once we take potential mediating and offsetting factors into account.

The SEM results for the cognitive outcomes tell a clear and important story: FT employment in the first year does have significant and negative overall direct effects on later child cognitive outcomes, as compared to not working in the first year, as was seen in the OLS models (and in prior research) but those effects are counter-balanced by positive overall indirect effects, and thus the total effect of FT employment in the first year, on average, is neutral. Moreover, the SEM models point to the pathways through which the positive indirect effects come about. These involve mainly increased use of center-based child care and increased maternal sensitivity by age 4 ½.

The SEM results further indicate that PT employment in the first year also has a neutral overall effect on later cognitive outcomes, when compared to not working in the first year. However, in this case the pattern is of significantly positive overall indirect effects, mainly working through a better quality home environment and substantially greater maternal sensitivity, balanced by non-significant but negative overall direct effects. As a result, the total effects of PT employment in the first year, like those of FT employment, are neutral. And, when we directly compare the effects of FT vs. PT employment in the first year on the cognitive outcomes, we find that they are not significantly different.

One common element across both FT and PT first-year maternal employment is a finding of greater maternal sensitivity by age 4 ½, which in turn is linked to better cognitive outcomes. We can only speculate as to what is behind this link. It may be that mothers who work in the first year experience greater satisfaction or improvements in mental health, which we were not able to measure in our dataset (i.e., the measure of depressive symptoms only taps a few aspects of mental health and there are no measures of life satisfaction in the data set) and which are linked with greater sensitivity in later years. It may also be that employment in the first year, whether FT or PT, is associated with greater financial security and/or reduced material hardship later in childhood and that these changes translate into more maternal sensitivity. We do know from our results that the link between first-year maternal employment and greater sensitivity by age 4 ½ is about twice as large for PT employment as it is for FT employment, suggesting that whatever it is about first-year maternal employment that leads to greater sensitivity later, it is stronger for PT than FT employment. One possibility, as discussed earlier, is that these findings reflect the differential selection of particular mothers into PT employment. Another possibility is that these findings reflect the influence of job quality (in particular, flexibility), which may be higher for those working PT or FT in the first year (see Chapter III), as they are more likely to be in professional jobs than those who did not begin work by 12 months. The finding for the positive offsetting role played by center-based care, for children whose mothers work FT in the first year, is consistent with theory and prior research on the cognitive benefits of center-based care (see e.g. Loeb et al., 2005; Magnuson et al., 2004; Magnuson & Waldfogel, 2005; NICHD ECCRN & Duncan, 2003), although the effect sizes are small to modest.

Our results for child care quality, in the SEM models, are more mixed. As in the OLS models, we find some links between first year FT employment and child care quality, and we also find some links between child care quality and later child cognitive outcomes, but these are not consistently found. This may be a reflection of the difficulty of estimating the effect of child care type and quality simultaneously or may be a reflection of the particular

measure of quality used in the NICHD-SECC, since this focuses on many dimensions of quality rather than just those thought to be related to cognitive achievement and, as discussed earlier, provides, on average, higher quality ratings to settings with fewer children and lower ratings to settings such as child care centers that have larger numbers of children (see discussion in Smolensky & Gootman, 2003). It is also possible that our results are limited by our using a median split for quality (although we also carried out some estimates using tertile splits, with similar results). It is also possible that, if we were able to examine quality, number of children within a setting, type of setting, and number of changes in settings simultaneously (i.e., if the data set were much larger), some other associations would emerge.

As noted above, we also find a positive offsetting role for the home environment for children whose mothers work PT in the first year. Families where the mother worked PT in the first year, as compared to not working that year, score higher on the HOME scale when the child is age 4 ½ (although not at age 3), and this is associated with higher cognitive scores at age 4 ½ and first grade. The link between the HOME score and cognitive achievement is consistent with theory and extensive prior research (see e.g. Bradley, 1995; Bradley et al., 1989; 2001a, 2001b; Fuligni et al, 2004; Klebanov et al., 1998; Leventhal, Martin, & Brooks-Gunn, 2004; Linver et al., 2004). However, as noted earlier, we can not be certain whether these differences in HOME scores for the families where mothers work PT in the first year reflect effects of that employment, other aspects of the mothers or jobs that occurred as a consequence of that employment and that we are not measuring, or pre-existing differences.

Summary of Results for First-Year Maternal Employment and Child Social and Emotional Outcomes

Intensity and timing of employment—We estimated a similar set of OLS models for the social and emotional outcomes as we had for the cognitive outcomes. In these models (Chapter V), we found fewer significant associations; again these were found only for the non-Hispanic white sample (we discuss the results for the African-American sample in a later section below). However, although we found no significant associations between FT employment by the 12th month, as compared to not working in the first year, and later social and emotional outcomes, we did find some significant associations when we took the timing of that employment into account. For example, when we controlled for whether the mother began working by 3 months, we found that FT maternal employment begun by 3 months was associated with significantly more externalizing behavior problems as reported by caregivers at age 4 ½ and by teachers at first grade (although not with externalizing problems as reported by the children's own mothers at those time points). This pattern of results suggests that some adverse associations, as compared to not working in the first year, may be present when mothers begin work earlier in the first year but not when they begin work later. This finding contrasts with the timing patterns found for cognitive outcomes, but in a sense, parallels those reported for length of time in child care and externalizing behavior (see, e.g., Belsky et al., 2007; NICHD ECCRN, 2003).

Comparing mothers who worked FT in the first year with those who worked PT that year, we found that children whose mothers worked PT in the first year had lower externalizing behaviors than those who worked FT that year (at age 3, age 4 ½, and first grade). This finding, again limited to the non-Hispanic white sample, is consistent with what we would have expected based on theory and prior research and was robust to models taking timing into account in various ways.

The role of moderators—We also considered whether the associations between maternal employment in the first year and later outcomes, where found, varied by child gender or temperament, or maternal occupation. As was the case with the cognitive outcomes, we found little to no evidence of significant interactions with any of these factors.

The role of mediators—Compared to the reference category of families where the mother did not work in the first year, the SEM results (Chapter VII) point to some significant beneficial indirect effects of PT maternal employment in the first year, versus generally neutral indirect effects of FT maternal employment that year. When we contrast the effects of FT vs. PT employment in the first year, we find that in several instances, PT employment is associated with significantly lower levels of child externalizing behavior problems at 36 months, 54 months, and first grade.

Our models also identify the pathways through which those protective effects of PT first-year employment come about – primarily through increases in the quality of the home environment and in the mother's sensitivity. That higher quality of the home environment and mother's sensitivity would be associated with lower levels of externalizing behavior problems is consistent with what we would expect from theory and prior research. But the finding that PT employment in the first year is associated with improvements in both these mediators is more novel and requires further work to be explained. In particular, we can not be sure whether these benefits reflect causal effects of PT employment in the first year, unmeasured changes that occur in conjunction with that employment, or pre-existing differences between mothers who work PT in the first year and other mothers.

Another striking finding is that these SEM models do not point to center-based care as an important mediator linking first-year FT or PT maternal employment and later externalizing behavior problems for the child. These results confirm the point we made at the outset, that the effects of first-year maternal employment may be quite distinct from the effects of center-based child care (since not all children whose mothers work enter center-based care, while some children attend center-based care even if their mothers are not working). These results are also of interest given that prior studies (including some carried out with this same dataset) have often linked time in child care with higher levels of subsequent behavior problems. Our results will be reassuring to parents whose children have been in early child care, but also should be verified in further research.

Racial/Ethnic Differences

Similar associations between first-year maternal employment and child outcomes were not found for the small sample of African-American children. This may reflect that our sample of African-American families (N=113) was too small to detect significant associations.

However, prior studies, with larger samples of African-American children (typically using the NLSY), have also not found significant associations between first-year maternal employment and cognitive outcomes across the first seven years of life for African-American children (see e.g. Waldfogel et al., 2002). Likewise, no associations were found using the Fragile Families and Child Wellbeing Study data set and looking at child PPVT scores and behavior problem scores at age 3 in a large birth cohort drawn from 20 cities where unmarried couples were over-sampled (N for the African-Americans was 885; Berger et al, 2008).

If the differential findings for African-American as compared to non-Hispanic white children are not simply a reflection of sample size in the NICHD-SECC, what then explains them? We need to keep in mind here that our small sample of African-American families differed in many ways on average from the larger and generally more advantaged sample of white families, so that some of the differences between the two samples may reflect factors other than race/ethnicity. Nevertheless, it is useful to consider what might explain these differential findings.

One hypothesis is that patterns of selection into employment differ by race/ethnicity. As discussed in Chapter I, prior research has found that the non-working reference group for non-Hispanic white women is more advantaged, relative to those who are employed, than is the non-working reference group for African-American women (Neal, 2004). We found evidence of this differential selection in our data, as shown in Table 1. However, our models do control for many child and family characteristics, and the pattern of differential findings remains.

Another hypothesis is that the implications of maternal employment in the first year of life may be different in African-American families than they are in non-Hispanic white families (Berger et al., 2008). If African-American families on average have lower incomes than non-Hispanic white families (this is the case in the NICHD-SECC data set), then the benefits associated with the increase in maternal earnings associated with FT maternal employment in the first year may be more consequential for those families. It is also possible that cultural beliefs, differences in parenting styles, intergenerational disadvantage, educational opportunities, and segregated neighborhoods and schools all contribute (Brooks-Gunn & Markman, 2005; Greenfield et al, 2006; Hart & Risley, 1995; Klebanov et al., 1994, 1998; Phillips et al, 1998; Raikes et al., 2004). It is not clear whether or how these variations might play into racial/ethnic variation in early maternal employment links to child outcomes.

Or, the implications in terms of child care experiences may differ between the groups (see also Johnson et al., 2003). For example, to the extent that African-American children are more likely to have multiple caregivers from birth, the mother working FT would not alter care arrangements as much as in non-Hispanic white families, which may be more likely to rely on exclusive maternal care until the mother goes back to work, at which time the child would be moved into some form of non-parental care for the first time. In the Fragile Families analyses (where the samples of African-American and white mothers were more comparable and the sample of the former larger), African-American children were more

likely to be in relative care and less likely to be in non-relative care at 12 months, than were non-Hispanic white children (Berger et al., 2008).

Some of these differences in experiences may be captured by our controls for maternal earnings, the home environment, and child care quality and type, in which case we might expect that controlling for those, in our mediator analyses, would reduce the differences in the results for non-Hispanic white and African-American families. At the same time, to the extent that the distributions for the mediators differ for the two groups, the analyses may not be comparable. We found that adding the mediators did not change the contrast in results between non-Hispanic white families and African-American families. It may be that our set of mediators is simply not rich enough to capture the factors that differ across these two groups of families. Or, as discussed earlier, we may be hampered by small sample size, or by remaining selection bias.

The Role of Fathers and Other Family Members

A second important limitation of this study is that we were not able to say much about fathers, since there is so little variation in first-year employment among them. We did (in results not shown) try adding controls for fathers' work hours as well as earnings to our models, but this did not alter the coefficients for maternal employment, nor did the controls for fathers' employment or earnings have any consistent associations with the child outcomes (although as noted earlier, we did find that fathers' earnings were positively associated with children's scores on the Bracken at age 3). Nevertheless, fathers clearly play an important and understudied role in child development. Fathers, as well as other family members (such as grandparents, elder siblings, and so on) may be involved in a variety of ways, including contributing income, participating in the day to day care of the child, or providing child care while the mother works. We are also mindful that our sample children were born in the early 1990s and that family roles are changing rapidly. Thus, mothers' and fathers' employment and caring patterns and behaviors may be different now than they were then.

Bringing in fathers and other family members would help make clear that in most instances, when we are examining maternal employment, we are also examining *parental* employment (since in most families where a mother is working, she is one of two working parents, or a single working parent). It would also allow analysts to examine whether the meaning of particular types of maternal employment – in particular, PT work – differs depending on which other family members are present in the home and how much they are working and earning.

Directions for Future Research

As discussed above, one important limitation of this study is that we were able to conduct only limited analyses for African-American families and that we were not able to carry out any analyses for Hispanic families, or other groups, due to small sample sizes. We can not assume that the findings reported here for non-Hispanic white families would generalize to African-American, Hispanic, or other families; indeed, our limited results for African-

American families suggest that they do not. Further research with larger samples of African-American, Hispanic, and other families is an important priority for future research.

A second important limitation, also discussed above, has to do with the role of fathers and other family members. Exploring the role of fathers should be a priority for future research. It would also be helpful to include information on other family members. Bringing in fathers as well as other family members would help elucidate the role that they play in early child development and also how the effect of parental employment might vary depending on the presence or involvement of other family members.

With regard to other directions for future research, a key cross-cutting issue has to do with causality. Although the NICHD-SECC data are extraordinarily detailed and extremely well-suited for these analyses, as noted earlier it is simply not possible to definitively establish causality using observational data such as these. The issue of selection bias – that women who follow different employment paths may differ to begin with, in ways we are not controlling for --is an ever-present concern. We control for a rich array of pre-birth characteristics, but we can not be sure that we have captured all the pre-existing differences that matter to child outcomes and that differentiate mothers who work FT, PT, or not at all in the first year after a birth. Controlling for pre-existing differences between families where mothers do and do not work in the first year remains a challenge, and it is always possible that associations estimated reflect differential selection into employment, rather than outcomes of employment (Hill et al., 2005). Future research could benefit from more extensive data on maternal attributes and behaviors prior to the birth. Relatedly, we must also be concerned about omitted variable bias. We have controlled for several factors that we think are likely to mediate any links between first-year maternal employment and later outcomes. But, there are likely to be other potentially important child and family characteristics that should be examined in future work, most importantly, as discussed above, the role of other members of the family, in particular fathers, but also other adults and even older siblings. It is likely that families adjust when mothers work full-time in the first year, and those adjustments may well affect children's cognitive or social and emotional outcomes. Conducting analyses that include data on these other family members is a high priority for future research.

In addition, there is a need for more fine-grained analyses of employment-related factors. As discussed earlier, psychologists and sociologists have emphasized how experiences on the job can spill over to the home, affecting parenting in both positive and negative ways. We explored some differences between those in professional and non-professional occupations, but there is much more to be done to analyze whether and how the effects of parental work might vary depending on the nature, type, and quality of the job. In particular, characteristics such as flexibility, job satisfaction, working hours, and work schedules are likely to be especially consequential.

Our findings also point to the need for more research on the role that mother's earnings play. Our results suggest that influence of maternal earnings depends on the amount of other family income and also may work through other factors such as the type and quality of child care the family can purchase. Future work should explore this in more detail and in

particular examine whether earnings matter more to families who are lower-income or who rely on single earners. As psychologists and economists have emphasized, factors such as material hardship and financial strain may influence parenting quality, but we did not have fine-grained measures for such factors. On a related note, little is known about how mothers decide about employment in the first year and the extent to which mothers have a choice as to when to work and for how many hours. We suspect that mothers in the U.S. have less choice than mothers in other Western countries which offer more governmental support to working mothers, in particular, longer periods of maternity leave, stronger rights to request part-time and flexible work schedules, and more subsidized child care to families during the preschool years.

There is also a need for further research on the role of child-level factors. Our analyses examined the potential moderating role of gender and temperament, but as we have emphasized, additional analyses, using larger samples, should be undertaken. In particular, the role of temperament would be worth further pursuing in a dataset with more detailed data, since the measure of temperament in the NICHD-SECC may be too global to capture the specific aspects of child temperament that might matter for children's adjustment to child care (Crockenberg, 2003). For example, dimensions such as behavioral reactivity, behavioral inhibition, and general difficultness might operate differently with respect to maternal employment (Rothbart & Bates, 2006). At the same time, infant temperament probably influences maternal sensitivity (Hane & Fox, 2006; Seifer, Schiller, Sameroff, Resnick, & Riordan, 1996). It might be desirable to have a measure of infant temperament reported by someone other than the mother, as her report may not be completely objective.

There is also a need for continued research on child care. Most children whose parents work spend at least some time in non-parental child care, and we have much more to learn about the many factors in child care settings that are consequential for child development and that might be changed to improve child outcomes (Maccoby & Lewis, 2003). In particular, future work should consider the hours that children are in child care and whether they have been in multiple arrangements. Future work should also explore the role of child care policies in influencing the cost, quality, and type of child care available to families, and their take-up of that care.

We also have more to learn about the changes that may arise in the home environment when parents work FT or PT in the first year. In this regard, further analyses of time use data – and analyses that include fathers' as well as mothers' time use -- would be particularly interesting.

Finally, future research should analyze other child outcomes, such as child health. Relatively few studies to date have examined the links between first-year maternal employment and child health outcomes (see e.g. Berger et al., 2005; Gordon, Kaestner, & Korenman, 2007), and we were not able to examine them here.

Conclusion

So what is the take-home message of our results and what are their implications for policy? It is certainly reassuring that our most complete models – using SEM analysis – find no

overall effects of FT or PT first-year maternal employment, as compared to the mother not working in the first year, on later child cognitive, social, or emotional outcomes. Although there may be some downsides of parental employment in terms of child development, employment also confers some clear benefits. Indeed, our results suggest that when we take factors such as maternal earnings, the home environment, and child care into account, the net effect of first-year employment on outcomes is neutral. This is particularly likely to be the case when that employment is part-time, rather than full-time.

Can we therefore conclude that American families have achieved a happy equilibrium, where women choose the mix of employment and time at home that best suits their child and family's needs and with no adverse effects on child outcomes? Although this is a tempting conclusion, we would caution against such an interpretation. It must be recalled that our main results pertain to non-Hispanic white women, and that the sample of women analyzed here is in many respects quite privileged. Many of those who worked in the first year of their child's life were likely to have been able to take advantage of a paid maternity leave and return to their pre-birth job. Our sample contains relatively few low-income or single mothers who are likely to have much less choice about when they start work, let alone the right to take a paid maternity leave and return to a pre-birth job. It is also important to note that our results reflect average effect across families in our sample. As discussed, it may be that there are some families or contexts where maternal employment has positive effects, while in others it has negative effects.

So what are the implications for policy? Here we consider three main types of policies that have been proposed to support families with working parents and young children: extending paid parental leave; giving parents the right to request part-time or flexible work schedules; and providing more support for good-quality child care.

With regard to paid parental leave, the United States is exceptional among advanced industrialized countries in not mandating a period of paid maternity leave (Waldfogel, 2006a, 2006b). Under the federal Family and Medical Leave Act (FMLA), about half of new mothers are eligible for a period of job-protected leave, but the law makes no provision for paid leave, and the period of leave – 12 weeks -- is very short. The vast majority of the mothers in our sample went to work very early in the first year – typically by 3 months – consistent with estimates from larger and more contemporary samples (Han, Ruhm, Waldfogel, & Washbrook, 2008). We can not tell with certainty how many new mothers would stay home longer if a longer period of leave, or paid leave, were offered, although evidence from other countries strongly suggests that when leave benefits are extended, women do take advantage of them (see, for example, Gregg, Gutierrez-Domenech, & Waldfogel, 2007). More limited evidence from the U.S., examining changes when the FMLA came into effect, as well as differences associated with state leave laws, also suggests that women take more leave when provisions are more generous (see, for example, Han & Waldfogel, 2003; Han, Ruhm, & Waldfogel, 2009).

Would outcomes for children be better if mothers could take more leave and return to work later? Although we found few overall differences by timing of employment in the first year, we did find that families where mothers worked FT by 3 months had worse HOME scores

subsequently and that children in those families had more caregiver- and teacher-reported externalizing problems at age 4 ½ and first grade. These findings provide some suggestive evidence that children's outcomes might be better if their mothers had the opportunity to stay home for more than the typically short period of leave provided under most U.S. maternity leave policies. Moreover, we know from comparative studies that when countries have longer periods of paid leave, health outcomes for children are better (Ruhm, 2000; Tanaka, 2005), while prior research on U.S. mothers indicates that when mothers are home longer in the first year, their children are more likely to be breast-fed, fully immunized, and up to date on their well-baby visits (Berger et al., 2005).

A second policy currently receiving a good deal of attention is the "right to request" part-time or flexible hours (Waldfogel, 2006b, 2010). Under this policy, a parent with young children has the right to request a change to part-time or flexible work hours; the employer must give the request reasonable consideration (but does not have to grant the request if it would create a hardship). Evidence from the United Kingdom suggests that there can be considerable demand for such work hours. When the U.K. implemented their policy, a million parents (one quarter of those eligible) came forward to make such requests, nearly all of which were granted by employers. The policy has been so successful that it has now been extended to all parents (not just those with young children) (Waldfogel, 2010). Would such a policy alter parental behavior in the U.S., and if so, could it lead to improved outcomes for children? While we can not answer the first question conclusively, we do know from survey data that a substantial share of parents say they would prefer to work part-time or flexible hours (Waldfogel, 2007). With regard to outcomes for children, our results point to some clear advantages for children whose mothers worked PT rather than FT in the first year of their life. While it may be that such differences reflect other factors that we were not able to control for, the weight of the evidence suggests that having a mother who works PT in the first year does lead to better outcomes, on average, than having a mother who works FT in the first year.

The third relevant policy domain is child care. Child care policies, at both the federal and state level, affect the cost, quality, and type of care on offer, as well as the likelihood that families use that care (see review in Meyers, Rosenbaum, Ruhm, & Waldfogel, 2004). Although we need to be cautious in drawing conclusions about child care given the likelihood that the child care arrangements that the women in this sample had access to were of higher quality, on average, than the arrangements low-income or single mothers have access to, and also given that they reflect arrangements from the early 1990s, it is of concern that in our sample, many children were in care that was not of good quality, a finding that is consistent with those of other analysts (see review in Smolensky & Gootman, 2003).

Also relevant to child care policy are our findings with regard to center-based care. Another area in which the U.S. lags behind other countries is in the provision of preschool or prekindergarten prior to school entry. While most peer nations provide universal preschool or prekindergarten in the year or two before school entry, in the U.S. public support for preschool or prekindergarten, while growing, remains more limited and uneven (Waldfogel, 2006a, 2006b). Where associations between center-based care and child outcomes are found in this study, these tend to be positive. In contrast to some prior research (including some

studies using the same dataset) we do not find that children who experienced center-based care in their preschool years go on to develop more externalizing behavior problems. And we find that attending center-based child care at age 3 is associated with better cognitive development (a finding that is consistent with prior research). These findings regarding center-based care will be reassuring to parents and should lend support to efforts by policymakers to expand provision of preschool and prekindergarten programs for children in the year or two before school entry.

Thus, while we must be cautious in drawing policy implications, our findings do provide some support for the conclusion that outcomes for children might be better if the U.S. moved to a longer period of paid parental leave, offered parents the right to request part-time or flexible hours, and provided more support for quality child care and for preschool and prekindergarten programs. We recognize that a fuller analysis of these issues would consider both the costs and the benefits of such policy extensions.

Finally, we note that we are asking research questions that involve the complex interplay between several aspects of a family's life, as parents juggle work and family demands in the hopes of providing the best for their children. While our results are innovative and noteworthy in many ways, we are mindful that, in spite of our best efforts, our results can barely do justice to the challenges and difficulties experienced by families. We therefore call for the use of multi-method approaches (e.g., using both quantitative and qualitative methods) to better understand the everyday experiences of American families and how these experiences shape child and family well-being. Only when we are able to add a human story to the numbers will we be able to do justice to the complexity of families' experiences and fully understand the role played by the family, employment, and policy contexts in which parental employment occurs.

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Figure 1.

Figure 2.

Figure 3.

Figure 4.

Figure 5.

Figure 6.

Figure 7.

Figure 8.

Figure 9.

Figure 10.

Table 1
Selected Mother and Child Characteristics by Mother's Employment Status in the First Year

A. Non-Hispanic White (N=900)	(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2) & (3)
Boy (%)	50.20	51.92	48.98			
Having older sibling (%)	45.56	60.58	68.37	***	***	
Family income the year before birth	58805.45 (38273.65)	60468.76 (40766.27)	51109.71 (42757.74)		*	*
Mother's PPVT-R score	101.72 (16.20)	105.16 (14.85)	101.36 (18.56)	**		*
Mother was married at the year of birth (%)	93.55	97.60	90.31	*		***
Mother's education at the year of birth	14.78 (2.41)	15.19 (2.28)	14.12 (2.46)	*	**	***
Mother's age at the year of birth	29.06 (5.15)	29.50 (5.01)	29.41 (5.63)			
Maternal depressive symptoms (CES-D) at 1st month	9.84 (8.11)	9.75 (8.05)	12.04 (9.47)		**	**
<i>Child outcome at 15 month</i>						
Child felt securely attached (%)	64.83	66.83	57.73			
<i>Child outcome at age 3</i>						
Bracken School Readiness percentile score	45.91 (25.98)	48.62 (24.45)	42.29 (26.52)			*
Maternal-reported externalizing behavior	13.39 (6.69)	12.21 (6.98)	13.37 (6.68)	*		
Caregiver-reported externalizing behavior	10.22 (8.08)	7.34 (6.02)	7.44 (6.29)	***	*	
Child felt securely attached (%)	62.83	68.42	59.30			*
<i>Child outcome at age 4 ½</i>						
Pre-school Language Scale (PLS)	103.00 (18.06)	106.73 (17.63)	102.57 (20.45)	*		*
WJR-Language Skills Composite	100.80 (10.58)	102.22 (10.42)	99.44 (9.99)			*
WJR-Applied Problems	105.36 (14.31)	107.81 (14.08)	106.03 (14.39)	*		
Maternal-reported externalizing behavior	51.98 (9.10)	50.51 (9.57)	50.95 (9.20)			
Caregiver-reported externalizing behavior	51.33 (9.50)	46.39 (8.30)	48.30 (9.33)	***	**	
<i>Child outcome at first-grade</i>						
WJR-Language Skills Composite	106.36 (9.85)	107.55 (9.82)	105.84 (10.57)			
WJR-Applied Problems	114.52 (16.56)	115.90 (15.60)	114.73 (15.86)			
SSRS Academic Competence score	98.91 (10.78)	101.24 (10.58)	99.88 (12.26)	*		
Current school performance	3.48 (0.80)	3.55 (0.75)	3.56 (0.90)			
Maternal-reported externalizing behavior	48.81 (9.80)	46.80 (9.35)	48.14 (9.15)	*		

A. Non-Hispanic White (N=900)		(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2 & (3)
Caregiver-reported externalizing behavior		50.93 (8.56)	47.47 (7.48)	49.14 (7.86)	***	*	*
SSRS Social Skills		103.85 (13.44)	107.40 (12.52)	104.69 (12.46)	**		*
SSRS Peer Competence Subscale		15.40 (3.44)	16.27 (3.30)	15.68 (3.36)	**		
N		496 (55.11%)	208 (23.11%)	196 (21.78%)			
B. African-American (N=113)		(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2 & (3)
Boy (%)		57.69	43.48	40.43		*	
Having older sibling (%)		58.65	60.87	59.57			
Family income the year before birth		40576.93 (36228.88)	30000.00 (34918.74)	25691.51 (34297.00)		*	
Mother's PPVT-R score		85.73 (17.12)	89.35 (15.69)	80.47 (19.30)			
Mother was married at the year of birth (%)		71.15	60.87	51.06		*	
Mother's education at the year of birth		13.68 (1.88)	12.91 (2.47)	12.70 (1.53)		**	
Mother's age at the year of birth		26.26 (5.09)	24.30 (5.54)	23.36 (5.43)		**	
Maternal depressive symptoms (CES-D) at 1 st month		13.19 (8.88)	11.45 (6.93)	14.57 (8.73)			
<i>Child outcome at 15 month</i>							
Child felt securely attached (%)		59.09	64.29	70.27			
<i>Child outcome at age 3</i>							
Bracken School Readiness percentile score		25.90 (23.07)	26.53 (25.21)	20.01 (20.90)			
Maternal-reported externalizing behavior		13.52 (7.85)	14.57 (7.12)	16.94 (10.34)			
Caregiver-reported externalizing behavior		10.83 (7.04)	17.12 (10.70)	15.40 (10.09)	*		
Child felt securely attached (%)		52.38	42.86	46.15			
<i>Child outcome at age 4 1/2</i>							
Pre-school Language Scale (PLS)		85.33 (18.79)	87.30 (21.75)	82.59 (17.21)			
WJR- Language Skills Composite		90.94 (10.20)	95.40 (11.92)	90.33 (12.19)			
WJR-Applied Problems		95.27 (15.84)	90.60 (19.66)	89.69 (18.27)			
Maternal-reported externalizing behavior		50.21 (9.52)	55.67 (6.29)	56.29 (10.39)		**	
Caregiver-reported externalizing behavior		52.63 (9.86)	53.50 (11.61)	51.07 (9.49)			
<i>Child outcome at first-grade</i>							
WJR- Language Skills Composite		99.80 (10.76)	97.46 (10.34)	95.25 (12.81)		*	

A. Non-Hispanic White (N=900)	(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2 & (3)
WJR-Applied Problems	102.68 (14.71)	99.89 (18.13)	98.03 (16.50)			
SSRS Academic Competence score	96.48 (11.94)	93.94 (12.67)	93.19 (12.47)			
Current school performance	3.25 (0.79)	3.13 (0.74)	2.92 (0.94)		*	
Maternal-reported externalizing behavior	48.04 (9.60)	52.73 (10.95)	54.54 (12.90)		**	
Caregiver-reported externalizing behavior	55.26 (9.20)	58.70 (6.45)	55.62 (8.39)			
SSRS Social Skills	101.17 (15.10)	98.54 (18.54)	95.25 (16.13)			
SSRS Peer Competence Subscale	14.63 (2.61)	15.18 (2.23)	13.78 (2.95)			
N	64 (56.64%)	14 (12.39%)	35 (30.97%)			

Note. Table shows percentages, or mean values with standard deviation in parentheses. FT work is defined as the mother had ever worked 30 or more hours per week by the 12th month and part-time as the mother had only worked less than 30 hours per week by the 12th month. WJR: Woodcock Johnson Achievement and Cognitive Batteries. WJR-Language Skills Composite was created by taking the mean of the standardized scores of WJR-Incomplete Words, WJR-Picture Vocabulary, and WJR-Letter-Word Identification. All scales of WJR are standardized scores. SSRS: Social Skills Rating Systems and standardized scores are used. Current school performance is a part of "Child Evaluation" scale.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Parental Job Characteristics by Mother's Employment Status in the First Year

Non-Hispanic White (N=900)	(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2 & 3)
Mother occupation before birth (%)				***	*	***
Professional	38.92	53.63	26.73			
Non-Professional	61.08	46.37	73.27			
Father occupation at 1 st month (%)				***		
Professional	38.36	52.24	45.88			
Non-Professional	61.64	47.76	54.12			
Mother's job completely or fairly flexible at 6 th month (%)	59.78	75.48	na	***		*
Father's job completely or fairly flexible at 6 th month (%)	46.44	42.27	54.27			
Mother average weekly work hours by 12 th month	27.73 (8.67)	8.63 (5.47)	0	***	na	na
Father average weekly work hours by 12 th month	40.22 (15.98)	45.43 (13.41)	39.78 (18.13)	***		***
Combined mother and father average weekly work hours by 12 th month	67.96 (18.98)	54.07 (14.70)	39.78 (18.13)	***	***	***
Mother taking paid maternity leave (%)	72.18	36.06	11.22	***	***	***
N	496 (55.11%)	208 (23.11%)	196 (21.78%)			

Note. Table shows percentages, or mean values with standard deviation in parentheses. FT work is defined as the mother had ever worked 30 or more hours per week by the 12th month and PT as the mother had only worked less than 30 hours per week by the 12th month. na: not applicable.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3
Maternal Separation Anxiety and Time Use by Mother's Employment Status in the First Year

Non-Hispanic White (N=900)	(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2) & (3)
Mother separation anxiety at 1 st month	67.70 (12.62)	67.10 (12.35)	71.70 (12.90)		***	***
Mother separation anxiety at 6 th month	63.08 (13.04)	64.40 (13.24)	70.12 (13.52)		***	***
Minutes mother spends per weekday on social interaction with child	95.57 (75.36)	124.76 (102.08)	164.80 (106.78)	***	***	***
Minutes mother spends per weekday on social interaction as a proportion of total minutes in child care activities	0.42 (0.22)	0.41 (0.21)	0.44 (0.21)			
Minutes mother spend per weekend day on social interaction with child	156.54 (106.03)	131.98 (100.13)	130.41 (91.66)	**	**	
Minutes mother spends per weekend day on social interaction as a proportion of total minutes in child care	0.44 (0.22)	0.40 (0.22)	0.40 (0.21)	*	*	
<i>A. Professionals (n=311)</i>						
Mother separation anxiety at 1 st month	64.25 (11.84)	64.88 (11.76)	67.56 (15.05)			
Mother separation anxiety at 6 th month	60.17 (11.61)	61.60 (12.88)	66.07 (14.82)		**	
Minutes mother spends per weekday on social interaction with child	93.42 (71.96)	121.39 (102.50)	173.00 (123.14)	**	***	*
Minutes mother spends per weekday on social interaction as a proportion of total minutes in child care activities	0.42 (0.24)	0.42 (0.22)	0.45 (0.21)			
Minutes mother spend per weekend day on social interaction with child	161.64 (94.00)	123.23 (99.54)	140.87 (98.43)	**		
Minutes mother spends per weekend day on social interaction as a proportion of total minutes in child care	0.46 (0.20)	0.38 (0.22)	0.45 (0.20)	**		
<i>B. Non-Professionals (n=452)</i>						
Mother separation anxiety at 1 st month	69.60 (12.63)	69.33 (12.40)	74.10 (10.54)		**	**
Mother separation anxiety at 6 th month	64.59 (13.56)	67.54 (13.72)	72.95 (11.50)		***	**
Minutes mother spends per weekday on social interaction with child	96.06 (76.94)	128.47 (102.26)	197.67 (102.12)	**	***	***
Minutes mother spends per weekday on social interaction as a proportion of total minutes in child care activities	0.41 (0.22)	0.42 (0.20)	0.49 (0.15)		**	**
Minutes mother spend per weekend day on social interaction with child	155.29 (114.39)	153.84 (102.36)	155.94 (98.07)			
Minutes mother spends per weekend day on social interaction as a proportion of total minutes in child care	0.44 (0.22)	0.46 (0.22)	0.43 (0.20)			
N	496 (55.11%)	208 (23.11%)	196 (21.78%)			

Note. Table shows mean values with standard deviation in parentheses. FT work is defined as the mother had ever worked 30 or more hours per week by the 12th month and part-time as the mother had only worked less than 30 hours per week by the 12th month.

*
 $p < .05$.
**
 $p < .01$.

 $p < .001$.

Regression Estimates of the Associations between First-Year Maternal Employment and Child Cognitive Outcomes

Table 4

	Age 3	Age 4 ½	First-grade					
	Bracken School Readiness	Pre-School Language Scale (PLS)	WJR-Language Skills Composite	WJR-Applied Problems	WJR-Language Skills Composite	WJR-Applied Problems	SSRS Academic Competence	Current School Performance
A. Non-Hispanic White								
FT by 12 th mo.	-5.41 (2.63) * [-0.10]	-5.52 (2.01) ** [-0.15]	-2.99 (1.17) ** [-0.14]	-4.58 (1.64) ** [-0.16]	-2.54 (1.17) * [-0.12]	-4.32 (1.99) * [-0.13]	-3.63 (1.36) ** [-0.16]	-0.28 (0.10) ** [-0.17]
PT by 12 th mo.	-1.61 (2.67) [-0.03]	-2.25 (2.05) [-0.05]	-1.36 (1.18) [-0.06]	-2.14 (1.66) [-0.06]	-1.28 (1.19) [-0.05]	-3.28 (2.03) [-0.08]	-1.48 (1.37) [-0.06]	-0.22 (0.10) * [-0.11]
Diff. b/w FT & PT	*	*	*	*	ns	ns	*	ns
R ²	0.26	0.27	0.22	0.18	0.19	0.10	0.12	0.13
N	900	798	806	804	777	776	761	750
B. African-American								
FT by 12 th mo.	-8.08 (6.17) [-0.18]	-1.77 (5.85) [-0.05]	-3.95 (3.16) [-0.18]	-0.56 (4.65) [-0.02]	1.14 (3.45) [0.05]	-2.88 (5.08) [-0.09]	0.22 (4.38) [0.01]	0.12 (0.31) [0.07]
PT by 12 th mo.	-5.25 (7.25) [-0.08]	0.80 (6.98) [0.01]	-1.48 (3.79) [-0.04]	-1.55 (5.50) [-0.03]	-2.11 (4.22) [-0.06]	-9.60 (6.21) [-0.20]	-5.08 (5.48) [-0.14]	-0.28 (0.38) [-0.11]
Diff. b/w FT & PT	ns	ns	ns	ns	ns	ns	ns	ns
R ²	0.10	0.09	0.21	0.18	0.24	0.08	0.12	0.15
N	113	100	101	99	98	98	87	85

Note: FT: mothers ever worked 30 or more hours per week by the assessment point; PT: mothers only worked less than 30 hours per week by assessment point. Bracken School Readiness is percentile scores. Pre-school Language Scale is standardized score. WJR: Woodcock Johnson Achievement and Cognitive Batteries. All subscales of WJR are standardized scores; WJR-Language Skills Composite was created by taking the mean of the standard scores of WJR-Incomplete Words, WJR-Picture Vocabulary, and WJR-Letter-Word Identification. SSRS: Social Skills Rating Systems, using standardized score. Current School Performance is a part of “Child Evaluation” scale with a total score consisting of the mean of 19 items. Except SSRS Academic Competence Score and Current School Performance are teacher reports, all other scales are lab observations. Models control for child’s gender, having older sibling, log family income the year before the birth, mother’s marital status at birth, mother’s education at birth, mother’s age at birth, mother’s depressive symptoms (CES-D) at 1-month, and subsequent maternal employment.

Unstandardized beta coefficients are presented with standard errors in parentheses and standardized beta coefficients in brackets.

ns: not significant.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Regression Estimates of the Associations between First-Year Maternal Employment and Child Cognitive Outcomes, Controlling for Bracken School Readiness at 36 Months

Table 5

Age 4 ½		First-grade					
Pre-School Language Scale (PLS)		WJR-Language Skills Composite	WJR-Applied Problems	WJR-Language Skills Composite	WJR-Applied Problems	SSRS Academic Competence	Current School Performance
A. Non-Hispanic White							
FT by 12 th mo.	-3.87 (1.83) * [-0.10]	-1.76 (1.05) [-0.08]	-2.81 (1.48) [-0.10]	-1.60 (1.06) [-0.08]	-2.96 (1.86) [-0.09]	-2.78 (1.28) * [-0.12]	-0.23 (0.09) * [-0.14]
PT by 12 th mo.	-1.57 (1.86) [-0.04]	-0.75 (1.06) [-0.03]	-1.26 (1.49) [-0.04]	-0.79 (1.08) [-0.03]	-2.55 (1.90) [-0.07]	-1.06 (1.30) [-0.04]	-0.19 (0.10) * [-0.10]
Diff. b/w FT & PT	ns	ns	ns	ns	ns	ns	ns
R ²	0.40	0.37	0.34	0.34	0.22	0.21	0.22
N	798	806	804	777	776	761	750
B. African-American							
FT by 12 th mo.	1.55 (5.37) [0.04]	-2.28 (2.96) [-0.10]	2.10 (4.36) [0.07]	3.19 (3.25) [0.14]	0.57 (4.66) [0.02]	1.22 (4.28) [0.05]	0.31 (0.29) [0.19]
PT by 12 th mo.	2.36 (6.35) [0.04]	-0.68 (3.52) [-0.02]	-0.14 (5.11) [-0.00]	-0.65 (3.94) [-0.02]	-7.14 (5.64) [-0.14]	-3.98 (5.35) [-0.11]	-0.12 (0.35) [-0.05]
Diff. b/w FT & PT	ns	ns	ns	ns	ns	ns	ns
R ²	0.24	0.32	0.30	0.35	0.25	0.18	0.13
N	100	101	99	98	98	87	85

Note: FT: mothers ever worked 30 or more hours per week by that month; PT: mothers only worked less than 30 hours per week by that month. Bracken School Readiness is percentile score. Pre-school Language Scale is standardized score. WJR: Woodcock Johnson Achievement and Cognitive Batteries. All subscales of WJR are standardized scores; WJR-Language Skills Composite was created by taking the mean of the standard scores of WJR-Incomplete Words, WJR-Picture Vocabulary, and WJR-Letter-Word Identification. SSRS: Social Skills Rating Systems, using standardized score. Current School Performance is a part of “Child Evaluation” scale with a total score consisting of the mean of 19 items. Except SSRS Academic Competence Score and Current School Performance are teacher reports, all other scales are lab observations. Models control for child’s gender, having older sibling, log family income the year before the birth, mother’s PPVT-R score, mother’s marital status at birth, mother’s education at birth, mother’s age at birth, mother’s depressive symptoms (CES-D) at 1-month, and subsequent maternal employment.

Unstandardized beta coefficients are presented with standard errors in parentheses and standardized beta coefficients in brackets.

ns: not significant.

*
p < .05.

**
p < .01.

p < .001.

Table 6
Regression Estimates of the Association between First-Year Maternal Employment and Child Social and Emotional Outcomes

Attachment at 15 month		Attachment at age 3		CBCL at age 3			CBCL at age 4 ½			SSRS Standardized Score – Teacher report at First-grade		CBCL at First-grade	
Secure		Secure		Maternal-report Externalizing	Caregiver-Report Externalizing	Maternal-report Externalizing	Caregiver-Report Externalizing	Social Skills	Peer Competence Scale	Maternal-report Externalizing	Teacher-report Externalizing		
A. Non-Hispanic White													
FT by 12 th month	0.06 (0.05) [0.06]	–0.01 (0.05) [–0.01]	0.80 (0.75) [0.06]	2.34 (1.47) [0.14]	2.51 (1.38) [0.13]	2.00 (1.12) [0.11]	–2.00 (1.62) [–0.08]	–0.61 (0.42) [–0.09]	1.01 (1.17) [0.05]	1.31 (1.03) [0.08]			
PT by 12 th month	0.06 (0.05) [0.06]	0.03 (0.06) [0.03]	–0.28 (0.77) [–0.02]	–0.20 (1.50) [–0.01]	–1.61 (1.41) [–0.07]	0.71 (1.13) [0.03]	0.80 (1.64) [0.02]	0.11 (0.42) [0.01]	–0.84 (1.19) [–0.04]	–1.55 (1.04) [–0.08]			
Diff. b/w FT & PT	ns	ns	*	**	***	ns	*	*	*	***			
R ²	0.02	0.03	0.10	0.03	0.08	0.05	0.07	0.08	0.07	0.05			
N	885	903	925	488	611	832	781	781	806	786			
B. African-American													
FT by 12 th month	–0.13 (0.14) [–0.13]	–0.06 (0.15) [–0.06]	–3.36 (2.37) [–0.20]	–5.86 (5.54) [–0.33]	4.13 (4.11) [0.21]	–4.56 (2.90) [–0.24]	5.12 (5.03) [0.18]	1.47 (1.43) [0.18]	–4.74 (3.57) [–0.22]	–0.98 (2.79) [–0.06]			
PT by 12 th month	0.03 (0.17) [0.02]	–0.15 (0.17) [–0.10]	–2.38 (2.74) [–0.09]	–1.16 (5.44) [–0.05]	8.34 (4.98) [0.30]	2.49 (3.44) [0.08]	1.86 (6.13) [0.04]	1.60 (1.74) [0.13]	–0.59 (4.21) [–0.02]	2.20 (3.40) [0.08]			
Diff. b/w FT & PT	ns	ns	ns	ns	ns	*	ns	ns	ns	ns			
R ²	0.11	0.16	0.11	0.03	0.07	0.15	0.12	0.14	0.12	0.17			
N	117	116	120	49	65	105	93	93	98	93			

Note: FT: mothers ever worked 30 or more hours per week by the assessment point; PT: mothers only worked less than 30 hours per week by assessment point. Models control for child's gender, having older sibling, log family income the year before the birth, mother's PPVT-R score, mother's marital status at birth, mother's education at birth, mother's age at birth, mother's depressive symptoms (CES-D) at 1-month, and subsequent maternal employment. Unstandardized beta coefficients are presented with standard errors in parentheses and standardized beta coefficients in brackets. ns: not significant.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 7

Regression Estimates of the Association between First-Year Maternal Employment and Child Externalizing Behavior Problems Controlling for Earlier Measure of Externalizing Behavior Problems

CBCL	At Age 4 1/2		At First-grade	
	Maternal-report Externalizing	Caregiver-report Externalizing	Maternal-report Externalizing	Teacher-report Externalizing
<i>A. Non-Hispanic White</i>				
Method 1				
FT by 12 th month	1.15 (0.88) [0.06]	0.52 (2.49) [0.02]	0.88 (1.01) [0.04]	0.16 (1.78) [0.01]
PT by 12 th month	0.80 (0.89) [0.04]	-2.34 (2.58) [-0.08]	-0.15 (1.03) [-0.01]	-3.15 (1.81) [-0.15]
Diff. b/w FT & PT	ns	ns	ns	***
Same measure at 36 months	0.87 (0.04) ***	0.42 (0.08) ***	0.72 (0.04) ***	0.20 (0.05) ***
R ²	0.42	0.15	0.31	0.09
N	830	376	804	426
Method 2				
FT by 12 th month	1.23 (0.94) [0.06]	2.94 (1.63) [0.13]	0.90 (1.05) [0.05]	1.25 (1.02) [0.07]
PT by 12 th month	1.14 (0.95) [0.05]	-0.63 (1.66) [-0.02]	0.18 (1.07) [0.01]	-1.30 (1.03) [-0.07]
Diff. b/w FT & PT	ns	***	ns	***
Average score from the same measures reported by both mother and caregiver at 36 months	0.81 (0.04) ***	0.44 (0.08) ***	0.69 (0.05) ***	0.20 (0.05) ***
R ²	0.33	0.14	0.26	0.07
N	831	611	805	785
<i>B. African-American</i>				
Method 1				
FT by 12 th month	-3.08 (2.41) [-0.16]	7.41 (11.07) [0.31]	-2.88 (3.05) [-0.13]	11.20 (5.00) [0.60] *
PT by 12 th month	2.48 (2.84) [0.08]	12.32 (13.72) [0.38]	-0.84 (3.58) [-0.02]	9.64 (5.13) [0.40]
Diff. b/w FT & PT	*	ns	ns	ns
Same measure at 36 months	0.64 (0.10) ***	-0.13 (0.48)	0.68 (0.12) ***	0.28 (0.16)
R ²	0.42	0.28	0.36	0.35
N	105	33	98	43
Method 2				

CBCL	At Age 4 1/2			At First-grade		
	Maternal-report Externalizing	Caregiver-report Externalizing	Maternal-report Externalizing	Teacher-report Externalizing	Teacher-report Externalizing	
FT by 12 th month	-2.70 (2.52) [-0.14]	4.97 (5.28) [0.20]	-2.38 (3.15) [-0.11]		0.39 (2.75) [0.02]	
PT by 12 th month	1.98 (2.95) [0.07]	10.49 (6.68) [0.30]	-1.33 (3.67) [-0.04]		1.83 (3.29) [0.07]	
Diff. b/w FT & PT	ns	ns	ns		ns	
Average score from the same measures reported by both mother and caregiver at 36 months	0.64 (0.11) ***	0.26 (0.30)	0.69 (0.13) ***		0.28 (0.11) **	
R ²	0.37	0.08	0.33		0.22	
N	105	65	98		93	

Note: FT: mothers ever worked 30 or more hours per week by the assessment point; PT: mothers only worked less than 30 hours per week by assessment point. Models control for child's gender, having older sibling, log family income the year before the birth, mother's PPVT-R score, mother's marital status at birth, mother's education at birth, mother's age at birth, mother's depressive symptoms (CES-D) at 1-month, and subsequent maternal employment. Method 1 controls for prior level of problems using the same measure at 36 months. Method 2 uses the average score for the same measure reported by the mother and caregiver at 36 months. Unstandardized beta coefficients are presented with standard errors in parentheses and standardized beta coefficients in brackets. ns: not significant.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 8

Mother's Earned Income, Home Environment, and Child Care by Mother's Employment Status in the First Year

A. Non-Hispanic White (N=900)	(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2) & (3)
<i>Mother's earned income by age 3 (%)</i>						
At the bottom third	15.32	47.60	25.51	***	**	***
At the middle third	38.91	31.73	10.71		***	***
At the top third	42.14	10.58	2.55	***	***	***
<i>Mother's earned income by age 4 1/2 (%)</i>						
At the bottom third	15.12	46.15	34.69	***	***	*
At the middle third	34.88	36.54	12.76		***	***
At the top third	47.98	12.02	5.10	***	***	*
<i>Mother's earned income by first-grade (%)</i>						
At the bottom third	15.93	49.52	39.29	***	***	*
At the middle third	36.29	30.29	18.37		***	**
At the top third	46.77	16.35	7.65	***	***	**
<i>Home environment by age 3</i>						
Average mother's depressive symptoms	8.42 (6.38)	8.00 (6.08)	8.62 (6.71)			
Average HOME score	40.58 (4.24)	41.48 (4.07)	39.88 (5.32)	**		***
Average mother's sensitivity	12.25 (1.40)	12.66 (1.33)	12.13 (1.46)	***		***
<i>Home environment by age 4 1/2</i>						
Average mother's depressive symptoms	8.60 (6.14)	7.96 (5.74)	8.61 (6.47)			
Average HOME score	42.44 (4.04)	43.30 (3.96)	41.79 (5.33)	**		**
Average mother's sensitivity	13.39 (1.47)	13.85 (1.46)	13.14 (1.72)	***		***
<i>Home environment by first grade</i>						
Average mother's depressive symptoms	8.46 (6.01)	7.78 (5.66)	8.53 (6.43)			
Average mother's sensitivity	14.06 (1.60)	14.54 (1.60)	13.74 (1.86)	***	*	***
<i>Child care by age 3</i>						
Child care quality at/above average (%)	47.18	48.08	18.37		***	***
Child care quality below average (%)	43.15	25.96	18.37	***	***	***
Number of times in center care	1.92 (2.82)	1.45 (2.49)	1.26 (2.12)	*	**	
<i>Child care by age 4 1/2</i>						

A. Non-Hispanic White (N=900)	(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2 & (3))
Child care quality at/above average (%)	54.03	54.81	23.98	***	***	***
Child care quality below average (%)	41.53	33.65	52.04	*	*	***
Number of times in center care	3.60 (4.10)	3.12 (3.53)	3.03 (3.08)			
B. African-American (N=113)	(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2 & (3))
<i>Mother's earned income by age 3 (%)</i>						
At the bottom third	32.81	50.00	31.43			
At the middle third	42.19	28.57	14.29	**	**	
At the top third	100.00	0	0	**	**	
<i>Mother's earned income by age 4 1/2 (%)</i>						
At the bottom third	28.13	42.86	40.00			
At the middle third	43.75	28.57	20.00	*	*	
At the top third	21.88	7.14	0	**	**	
<i>Mother's earned income by first-grade (%)</i>						
At the bottom third	34.38	35.71	62.86	**	**	
At the middle third	40.63	35.71	17.14	**	**	
At the top third	25.00	7.14	0	***	***	
<i>Home environment by age 3</i>						
Average mother's depressive symptoms	10.86 (6.49)	10.07 (4.14)	14.14 (8.24)	*	*	
Average HOME score	34.79 (5.74)	33.71 (4.85)	32.47 (5.71)	*	*	
Average mother's sensitivity	10.48 (1.96)	10.28 (2.14)	9.66 (1.95)	*	*	
<i>Home environment by age 4 1/2</i>						
Average mother's depressive symptoms	11.48 (6.34)	9.90 (4.08)	14.79 (8.01)	*	*	*
Average HOME score	36.94 (5.06)	35.02 (4.65)	34.52 (5.38)	*	*	
Average mother's sensitivity	11.51 (2.14)	11.07 (2.43)	10.70 (2.14)			
<i>Home environment by first grade</i>						
Average mother's depressive symptoms	11.18 (6.21)	9.77 (3.63)	14.39 (7.88)	*	*	*
Average mother's sensitivity	11.90 (2.25)	11.26 (2.71)	11.05 (2.15)			
<i>Child care by age 3</i>						
Child care quality at/above average (%)	20.31	14.29	14.29			

A. Non-Hispanic White (N=900)	(1) FT work by 12th month	(2) PT work by 12th month	(3) No work by 12th month	Significant test btw (1) & (2)	Significant test btw (1) & (3)	Significant test btw (2) & (3)
Child care quality below average (%)	60.94	64.29	37.14		*	
Number of times in center care	1.84 (2.49)	1.43 (2.06)	0.86 (1.52)		*	
<i>Child care by age 4 1/2</i>						
Child care quality at/above average (%)	32.81	14.29	22.86			
Child care quality below average (%)	60.94	78.57	42.86			
Number of times in center care	3.62 (3.68)	3.64 (2.73)	2.26 (2.40)		*	

Note. Table shows percentages, or mean values with standard deviation in parentheses.

FT work is defined as the mother had ever worked 30 or more hours per week by the 12th month and PT as the mother had only worked less than 30 hours per week by the 12th month. Percentages for earned income categories do not sum to 100% because there is also a category (not shown in the table) for missing earned income at each time point.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 9

Associations between FT and PT First-Year Maternal Employment and Mother's Income, Home Environment, and Child Care

A. Non-Hispanic White Children	Mother's Earned Income			Home Environment		Child Care Type		Child Care Quality	
	Maternal income at the bottom third	Maternal income at the middle third	Maternal income at the top third	HOME Scale	Maternal sensitivity	Maternal depressive symptoms	Frequency of using center care	CC quality at/above the average	CC quality below average
<i>A. At 15 months</i>									
FT by 12 th mo.	−0.20 (0.04)***	0.08 (0.04)	0.21 (0.04)***	−0.33 (0.40)	−0.09 (0.15)	1.82 (0.78)*	1.33 (0.48)**	0.18 (0.05)***	0.09 (0.05)*
PT by 12 th mo.	0.14 (0.04)***	0.04 (0.05)	−0.12 (0.04)**	−0.08 (0.42)	0.15 (0.16)	1.68 (0.81)*	0.93 (0.49)*	0.05 (0.05)	−0.00 (0.05)
Diff. b/w FT & PT	***	ns	***	ns	*	ns	ns	***	**
R ²	0.30	0.17	0.39	0.20	0.15	0.21	0.07	0.15	0.09
<i>B. By 24 months</i>									
FT by 12 th mo.	−0.23 (0.04)***	0.08 (0.05)	0.22 (0.04)***	na	0.16 (0.13)	2.09 (0.70)**	0.16 (0.15)	0.11 (0.05)*	0.11 (0.05)*
PT by 12 th mo.	0.16 (0.04)***	0.04 (0.05)	−0.11 (0.04)**	na	0.33 (0.13)**	1.31 (0.71)	−0.07 (0.15)	0.10 (0.05)*	−0.03 (0.05)
Diff. b/w FT & PT	***	ns	***	na	ns	ns	*	ns	***
R ²	0.22	0.13	0.39	na	0.23	0.27	0.04	0.15	0.10
<i>C. By age 3</i>									
FT by 12 th mo.	−0.19 (0.05)***	0.10 (0.05)*	0.20 (0.04)***	−0.69 (0.44)	−0.07 (0.14)	2.13 (0.63)***	0.19 (0.31)	0.16 (0.06)**	0.08 (0.05)
PT by 12 th mo.	0.17 (0.05)***	0.09 (0.05)	−0.10 (0.04)*	−0.00 (0.44)	0.23 (0.15)	1.79 (0.64)**	−0.28 (0.31)	0.20 (0.06)***	−0.05 (0.05)
Diff. b/w FT & PT	***	ns	***	*	**	ns	*	ns	***
R ²	0.19	0.12	0.38	0.34	0.27	0.32	0.05	0.13	0.12
<i>D. By age 4 ½</i>									
FT by 12 th mo.	−0.18 (0.05)***	0.12 (0.05)*	0.18 (0.04)***	−0.82 (0.42)*	0.07 (0.16)	1.91 (0.60)**	0.20 (0.44)	0.09 (0.06)	−0.02 (0.06)
PT by 12 th mo.	0.14 (0.05)**	0.17 (0.05)***	−0.14 (0.04)***	−0.16 (0.42)	0.39 (0.16)**	1.42 (0.61)*	−0.36 (0.45)	0.14 (0.05)**	−0.13 (0.06)*
Diff. b/w FT & PT	***	ns	***	*	**	ns	ns	ns	**
R ²	0.18	0.10	0.40	0.37	0.29	0.34	0.06	0.12	0.04
<i>E. By first-grade</i>									
FT by 12 th mo.	−0.15 (0.05)**	0.12 (0.05)*	0.12 (0.04)**	na	0.10 (0.17)	1.73 (0.59)**	na	na	na
PT by 12 th mo.	0.17 (0.05)***	0.09 (0.05)	−0.15 (0.04)***	na	0.43 (0.17)**	1.19 (0.59)*	na	na	na
Diff. b/w FT & PT	***	ns	***	na	**	ns	na	na	na

	Mother's Earned Income			Home Environment		Child Care Type		Child Care Quality	
	Maternal income at the bottom third	Maternal income at the middle third	Maternal income at the top third	HOME Scale	Maternal sensitivity	Maternal depressive symptoms	Frequency of using center care	CC quality at/above the average	CC quality below average
A. Non-Hispanic White Children									
R ²	0.22	0.07	0.35	na	0.29	0.36	na	na	na
N	900	900	900	na	900	900	na	na	na
B. African-American									
	Mother's Earned Income			Home Environment		Child Care Type		Child Care Quality	
	Maternal income at the bottom third	Maternal income at the middle third	Maternal income at the top third	HOME Scale	Maternal sensitivity	Maternal depressive symptoms	Frequency of using center care	CC quality at/above the average	CC quality below average
<i>A. At 15 months</i>									
FT by 12 th mo.	-0.04 (0.09)	0.03 (0.10)	0.06 (0.06)	-0.77 (1.33)	0.34 (0.55)	-3.44 (1.98)	0.57 (1.39)	0.03 (0.10)	0.04 (0.11)
PT by 12 th mo.	0.01 (0.11)	0.01 (0.13)	0.01 (0.08)	1.31 (1.60)	0.35 (0.66)	-1.11 (2.39)	1.59 (1.36)	-0.01 (0.12)	0.22 (0.14)
Diff. b/w FT & PT	ns	ns	ns	ns	ns	ns	ns	ns	ns
R ²	0.39	0.46	0.30	0.31	0.16	0.35	0.16	0.11	0.37
<i>B. By 24 months</i>									
FT by 12 th mo.	0.15 (0.12)	-0.09 (0.12)	0.05 (0.08)	na	0.44 (0.46)	-0.30 (1.74)	0.08 (0.31)	0.25 (0.11)*	-0.30 (0.13)*
PT by 12 th mo.	0.06 (0.14)	-0.04 (0.14)	-0.02 (0.09)	na	0.29 (0.54)	-0.47 (2.05)	0.40 (0.37)	0.04 (0.13)	0.08 (0.16)
Diff. b/w FT & PT	ns	ns	ns	na	ns	ns	ns	ns	**
R ²	0.34	0.26	0.34	na	0.23	0.46	0.18	0.15	0.26
<i>C. By age 3</i>									
FT by 12 th mo.	0.13 (0.13)	-0.16 (0.12)	0.06 (0.08)	-1.34 (1.41)	0.38 (0.54)	-1.37 (1.63)	0.11 (0.63)	0.14 (0.11)	-0.17 (0.14)
PT by 12 th mo.	0.06 (0.15)	-0.02 (0.14)	-0.04 (0.09)	-0.84 (1.67)	0.14 (0.64)	-1.58 (1.92)	0.20 (0.74)	0.04 (0.13)	0.00 (0.16)
Diff. b/w FT & PT	ns	ns	ns	ns	ns	ns	ns	ns	ns
R ²	0.28	0.36	0.36	0.40	0.29	0.47	0.21	0.14	0.25
<i>D. By age 4 1/2</i>									
FT by 12 th mo.	-0.02 (0.13)	-0.16 (0.14)	0.04 (0.09)	-1.19 (1.29)	0.37 (0.64)	-0.74 (1.69)	0.02 (1.01)	-0.01 (0.14)	0.21 (0.15)
PT by 12 th mo.	-0.10 (0.16)	-0.07 (0.16)	0.00 (0.11)	-1.46 (1.54)	-0.13 (0.76)	-1.57 (2.02)	0.66 (1.21)	-0.17 (0.17)	0.42 (0.18)*
Diff. b/w FT & PT	ns	ns	ns	ns	ns	ns	ns	ns	ns
R ²	0.32	0.29	0.39	0.46	0.28	0.47	0.18	0.16	0.22
<i>E. By first-grade</i>									

A. Non-Hispanic White Children	Mother's Earned Income			Home Environment		Child Care Type		Child Care Quality	
	Maternal income at the bottom third	Maternal income at the middle third	Maternal income at the top third	HOME Scale	Maternal sensitivity	Maternal depressive symptoms	Frequency of using center care	CC quality at/above the average	CC quality below average
FT by 12 th mo.	-0.04 (0.13)	0.01 (0.14)	0.04 (0.10)	na	0.35 (0.68)	-1.11 (1.71)	na	na	na
PT by 12 th mo.	-0.20 (0.16)	0.05 (0.17)	-0.01 (0.12)	na	-0.23 (0.80)	-1.83 (2.01)	na	na	na
Diff. b/w FT & PT	ns	ns	ns	na	ns	ns	na	na	na
R ²	0.38	0.18	0.34	na	0.25	0.43	na	na	na
N	113	113	113	na	113	113	na	na	na

Note: FT; mother ever worked 30 or more hours per week by 12th month; PT; mother only worked less than 30 hours per week by 12th month. Models control for child's gender, having older sibling, log family income the year before the birth, mother's PPVT-R score, mother's marital status at birth, mother's education at birth, mother's age at birth, mother's depressive symptoms (CES-D) at 1-month, and subsequent maternal employment.

Unstandardized beta coefficients are presented with standard errors in parentheses, all models were estimated by OLS. Na indicates that outcome measure is not available at that age.

*
p < .05.

**
p < .01.

p < .001.

Appendix Table 1

Correlation Matrix for Analyzed Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Externalizing behavior at age 3																	
1. Maternal report																	
2. Caregiver report	.23***																
Externalizing behavior at age 4 ½																	
3. Maternal report	.66***	.18***															
4. Caregiver report	.23***	.32***	.29***														
Socioemotional outcomes at first-grade																	
5. SSRS Social Skills	-.18***	-.12**	-.16***	-.34***													
6. SSRS Peer	-.17***	-.12**	-.15***	-.36***	.88***												
Competence																	
7. Maternal-reported externalizing behavior	.56***	.20***	.69***	.29***	-.24***	-.23***											
8. Teacher-reported externalizing behavior	.22***	.25***	.25***	.48***	-.57***	-.57***	.34***										
Time-invariant independent variables																	
9. Boy	.04	.09*	-.08**	.11**	.01	-.15***	-.03	.01									
10. Having older siblings	-.04	.00	-.03	-.03	.03	.08**	.01	-.07*	-.02								
11. Family income the year before birth	-.20***	-.13**	-.13***	-.18***	.25***	.18***	-.19***	-.19***	-.01	.02							
12. Mother's PPVT-R score	-.16***	-.16***	-.12***	-.17***	.22***	.16***	-.16***	-.19***	-.03	-.02	.45***						
13. Mother married at the year of birth	-.13***	-.07	-.08**	-.10**	.22***	.17***	-.10**	-.17***	.01	.12***	.55***	.26***					
14. Mother's education at the year of birth	-.21***	-.16***	-.14***	-.20***	.26***	.18***	-.19***	-.19***	-.04	-.05	.55***	.59***	.31***				
15. mother's age at the year of birth	-.18***	-.11**	-.14***	-.13***	.18***	.13***	-.19***	-.17***	-.03	.23***	.56***	.47***	.34***	.55***			
16. mother's depression at first month	.29***	.06	.22***	.08*	-.08**	-.06*	.20***	.12***	.04	-.01	-.25***	-.20***	-.16***	-.23***	-.21***		
17. FT by 12 month	.01	.11**	.02	.15***	-.06*	-.08**	.03	.11***	.01	-.15***	.14***	-.01	.06*	.08**	.03	-.05*	
18. PT by 12 month	-.08**	-.11**	-.06	-.12***	.12**	.11**	-.09**	-.14***	-.00	.06*	.07**	.14***	.10***	.13***	.07*	-.07*	-.54***
19. Employed at 15 months	-.05	.05	-.03	.05	.05	.03	-.02	.00	.02	-.08**	.23***	.12***	.14***	.19***	.15***	-.13***	.48***
20. Employed at 24 months	-.06*	.02	-.03	.08*	.08**	.06*	-.03	-.00	-.03	-.08**	.20***	.09**	.12***	.15***	.12***	-.09***	.41***

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
21. Employed at 36 months	-.04	.00	-.01	.05	.00	-.03	-.00	.06	-.00	-.06*	.14***	.05	.12***	.15***	.10***	-.08**	.38***
22. Ever employed between 42 and 54 months	-.03	-.01	-.03	.08*	.01	-.02	-.00	.04	.03	-.07*	.08***	.08**	.06*	.08**	.03	-.04	.32***
23. Ever employed between 42 and first-grade	.03	.03	.00	.00	.10**	.01	.01	.02	.03	.00	-.05	-.01	.04	-.01	-.02	-.01	.27***
Time-variant variables																	
24. Mother's income by age 3	-.10***	-.03	-.03	.04	.05	.02	-.08**	.00	-.05	-.08**	.45***	.27***	.14***	.40***	.33***	-.15***	.49***
25. Mother's income by age 4 ½	-.10***	-.03	-.04	.04	.05	.01	-.09**	.00	-.05	-.08**	.44***	.28***	.14***	.41***	.32***	-.15***	.47***
26. Mother's income by first-grade	-.10***	-.04	-.06	.04	.05	.02	-.09**	.00	-.04	-.07*	.43***	.28***	.13***	.41***	.32***	-.16***	.44***
27. Other family income by age 3	-.06*	-.09*	-.04	-.05	-.06*	-.07*	-.01	.00	-.03	.01	.20***	.07*	-.01	.08**	.10***	-.04	-.09***
28. Other family income by age 4 1/2	-.07*	-.07	-.04	-.06	-.02	-.04	-.02	-.01	-.04	-.01	.20***	.08**	.00	.10***	.11***	-.04	-.09***
29. Other family income by first-grade	-.07**	-.06	-.05	-.07*	-.00	-.03	-.03	-.05	-.04	-.00	.26***	.11***	.02	.14***	.14***	-.05*	-.08**
30. Father's earned income by age 3	-.17***	-.10*	-.10**	-.17***	.17***	.14***	-.14***	-.14**	-.03	.04	.67***	.35***	.17***	.42***	.40***	-.18***	-.13***
31. Father's earned income by age 4 ½	-.17***	-.09*	-.10**	-.16***	.18***	.15***	-.15***	-.14*	-.03	.03	.66***	.35***	.18***	.42***	.39***	-.18***	-.13***
32. Father's earned income by first-grade	-.18***	-.10*	-.11***	-.16***	.19***	.16***	-.16***	-.13*	-.02	.02	.64***	.35***	.19***	.42***	.38***	-.18***	-.12***
33. Child care quality above average by age 3	-.09**	-.14**	-.02	-.06	.07*	.05	-.01	-.02	-.07*	-.08**	.20***	.19***	.14***	.22***	.14***	-.09**	.11***
34. Child care quality below average by age 3	.08**	.13**	.05	.14***	-.09**	-.09**	.05	.09**	.05*	-.04	-.03	-.13***	-.02	-.07**	-.05*	.02	.24***
35. Child care quality above average by age 4 ½	-.06*	-.10*	-.05	-.12***	.08**	.06	-.01	-.05	-.03	-.08**	.21***	.16***	.17***	.21***	.13***	-.08**	.08**
36. Child care quality below average by age 4 ½	.04	.10*	.04	.12***	-.08*	-.07*	.01	.07*	.02	.02	-.06*	-.10***	-.07*	-.09***	-.07*	.01	.14***
37. Frequency of using father care by age 3	-.03	-.00	-.04	-.06	.06*	.08*	-.03	-.10**	.04	.05	.00	-.01	.12***	-.01	-.03	-.04	-.00
38. Frequency of using relative care by age 3	.02	.00	.02	-.02	-.04	-.04	-.00	.04	-.04	-.08**	-.09**	-.10***	-.12***	-.11***	-.10***	.02	.10***
39. Frequency of using non-relative care by age 3	-.07*	.07	-.00	.01	.08**	.06*	-.03	-.05	-.02	.08**	.26***	.17***	.09***	.24***	.20***	-.07*	.02
40. Frequency of using family day care by age 3	.02	.02	-.01	-.00	.01	-.03	.01	.02	-.02	-.11***	.10***	.12***	.04	.13***	.10***	-.04	.25***
41. Frequency of using center-based care by age 3	-.04	-.07	-.01	.13**	-.02	-.04	-.03	.06*	-.00	-.05*	.13***	.11***	.07**	.18***	.13***	-.04	.12***
42. Frequency of using father care by age 4 ½	-.03	.02	-.05	-.07	.07*	.08**	-.03	-.12***	.03	.05*	.00	-.02	.13***	-.02	-.02	-.03	-.02
43. Frequency of using relative care by age 4 ½	.02	.01	.01	-.00	-.04	-.04	-.01	.04	-.03	-.07**	-.10***	-.12***	-.13***	-.12***	-.11***	.02	.09***
44. Frequency of using non-relative care by age 4 ½	-.08**	.06	-.01	.01	.09**	.07*	-.04	-.06	-.01	.07**	.26***	.17***	.09***	.24***	.20***	-.07**	.03
45. Frequency of using family day care by age 4 ½	.02	.02	-.00	.03	-.00	-.03	.02	.05	-.01	-.11***	.09**	.10***	.04	.12***	.09***	-.04	.25***
46. Frequency of using center-based care by age 4 ½	-.03	-.08*	.02	.09**	-.03	-.04	-.02	.06*	-.01	-.05*	.17***	.14***	.08***	.21***	.16***	-.06*	.09**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
47. Attending full-day kindergarten	.08**	.02	.06*	.05	-.13***	-.14***	.05	.12***	-.01	-.03	-.04	-.10***	-.01	-.00	-.03	.04	.06*
48. Using father care after school in first-grade	-.10***	-.05	-.10***	-.09*	.12***	.10**	-.13***	-.13***	.01	-.02	.22***	.18***	.24***	.21***	.20***	-.09***	.13***
49. Using relative care after school in first-grade	.00	.02	-.01	-.05	.05	.04	-.01	-.04	-.06*	.00	.14***	.09**	.06*	.11***	.15***	-.06*	.05
50. Using self-care after school in first-grade	.00	-.05	-.01	.01	.03	.03	-.00	-.00	-.00	.03	.05	.05	.03	.06*	.04	-.01	-.05*
51. Using after-school programs in first-grade	-.04	-.05	-.01	.09*	-.02	-.04	-.02	.11**	-.02	-.09***	.14***	.15***	.04	.16***	.13***	-.08**	.21***
52. Using after-school activities in first-grade	-.13***	-.06	-.10***	-.18***	.21***	.17***	-.11***	-.14***	-.10***	-.02	.36***	.27***	.23***	.33***	.32***	-.14***	-.01
53. Average HOME score by age 3	-.26***	-.22***	-.18***	-.21***	.32***	.24***	-.23***	-.27***	-.09**	-.11***	.50***	.49***	.40***	.52***	.41***	-.25***	.03
54. Average HOME score by age 4 ½	-.28***	-.24***	-.21***	-.24***	.33***	.26***	-.26***	-.28***	-.10***	-.09***	.51***	.51***	.40***	.54***	.43***	-.26***	.04
55. Average mother's sensitivity by age 3	-.22***	-.21***	-.16***	-.22***	.25***	.21***	-.16***	-.24***	-.10***	.01	.40***	.46***	.32***	.42***	.36***	-.25***	-.00
56. Average mother's sensitivity by age 4 ½	-.23***	-.21***	-.17***	-.24***	.27***	.24***	-.18***	-.26***	-.10***	.01	.39***	.48***	.32***	.42***	.35***	-.22***	.01
57. Average mother's sensitivity by first-grade	-.22***	-.19***	-.18***	-.24***	.26***	.24***	-.19***	-.26***	-.08**	.01	.38***	.49***	.31***	.43***	.36***	-.21***	.01
58. Average maternal depression by age 3	.38***	.12***	.30***	.11**	-.15***	-.13***	.29***	.13***	-.02	-.00	-.30***	-.27***	-.22***	-.30***	-.25***	.53***	-.02
59. Average maternal depression by age 4 ½	.38***	.12***	.31***	.13***	-.17***	-.14***	.31***	.15***	-.00	-.00	-.31***	-.28***	-.23***	-.31***	-.25***	.55***	-.01
60. Average maternal depression by first-grade	.39***	.14***	.33***	.13***	-.17***	-.15***	.33***	.16***	-.00	-.00	-.31***	-.28***	-.23***	-.31***	-.26***	.55***	-.02
61. Bracken School Readiness at age 3									-.17***	-.18***	.38***	.40***	.20***	.44***	.31***	-.18***	.02
62. Pre-school Language Scale at age 4 ½									-.15***	-.08**	.45***	.49***	.26***	.45***	.37***	-.18***	-.02
63. WJR-Language Skills Composition at age 4 ½									-.02	-.13***	.40***	.46***	.21***	.44***	.30***	-.20***	-.00
64. WJR-Applied Problems at age 4 ½									-.12***	-.05	.40***	.44***	.23***	.39***	.29***	-.20***	-.00
65. WJR-Language Skills Composite at first-grade									.00	-.13***	.37***	.46***	.21***	.39***	.26***	-.15***	.02
66. WJR-Applied Problems at first-grade									.05	-.03	.31***	.36***	.21***	.35***	.26***	-.15***	.01
67. SSRS Academic Competence Score at first-grade									.09	-.08**	.30***	.29***	.20***	.31***	.21***	-.13***	-.02
68. Current School Performance at first-grade									-.05	-.11***	.31***	.34***	.19***	.36***	.19***	-.15***	-.00

	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
19. Employed at 15 months	.09***																
20. Employed at 24 months	.06*	.58***															
21. Employed at 36 months	.00	.49***	.56***														

	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
22. Ever employed between 42 and 54 months	.04	.40***	.46***	.58***													
23. Ever employed between 42 and first-grade	.03	.30***	.35***	.45***	.76***												
Time-variant variables																	
24. Mother's income by age 3	-.16***	.48***	.47***	.44***	.33***	.24***											
25. Mother's income by age 4 ½	-.16***	.45***	.44***	.41***	.36***	.26***	.98***										
26. Mother's income by first-grade	-.16***	.42***	.41***	.38***	.34***	.28***	.94***	.96***									
27. Other family income by age 3	.06*	-.00	-.06*	-.05*	-.07**	-.10**	.04	.05	.06								
28. Other family income by age 4 ½	.01	-.06*	-.09**	-.08**	-.12***	-.15***	.03	-.00	-.02	.35***							
29. Other family income by first-grade	-.00	-.01	-.03	-.03	-.10**	-.14***	.20	.20	.16	.25***	.15***						
30. Father's earnings by age 3	.10***	-.02	-.06	-.10***	-.18***	-.21***	.32***	.31	.29	.21***	.16***	.36***					
31. Father's earnings by age 4 ½	.11***	-.02	-.06	-.10***	-.19***	-.22***	.32***	.31	.29	.21***	.15***	.38***	.99***				
32. Father's earnings by first-grade	.11***	-.01	-.05	-.10***	-.20***	-.23***	.31	.31	.28	.20***	.14***	.35***	.97***	.98***			
33. Child care quality above average by age 3	.10***	.17***	.15***	.22***	.18***	.12***	.21	.21	.22	.05	.02	.03	.11	.11	.12***		
34. Child care quality below average by age 3	-.07**	.25***	.27***	.17***	.17***	.15***	.17***	.15	.12	-.02	-.02	-.07*	-.12***	-.13***	-.12***	-.50***	
35. Child care quality above average by age 4 ½	.04	.05*	.02	.00	.04	.09**	.10***	.11	.13	.06*	.02	.02	.09**	.09**	.11***	.47***	-.32***
36. Child care quality below average by age 4 ½	-.03	.11***	.15***	.16***	.11***	.06*	.07*	.05*	.04	-.03	-.01	-.03	-.01	-.01	-.02	-.24***	.57***
37. Frequency of using father care by age 3	.15***	.14***	.15***	.14***	.14***	.10***	-.01	-.02	-.03	.00	-.04	-.06	-.11***	-.11***	-.10***	.10***	.02
38. Frequency of using relative care by age 3	-.03	.09**	.12***	.10***	.11***	.09**	.01	.01	.00	-.07*	-.04	-.06	-.12***	-.12***	-.12***	.11***	.03
39. Frequency of using non-relative care by age 3	.06*	.11***	.07*	.07*	.06*	.02	.29	.29	.32	.12***	.11***	.14***	.31***	.32***	.32***	.21***	-.06*
40. Frequency of using family day care by age 3	-.06*	.24***	.21***	.21***	.15***	.12***	.19	.19	.18	-.05	-.03	.01	.03	.03	.04	.08**	.12***
41. Frequency of using center-based care by age 3	-.02	.11***	.15***	.11***	.06	.05	.16	.15	.15	.07*	.02	.04	.07**	.07**	.08**	.02	.24***
42. Frequency of using father care by age 4 ½	.15***	.11***	.11***	.10***	.13***	.09**	-.04	-.04	-.05	.00	-.04	-.07*	-.12***	-.12***	-.11***	.09***	.01
43. Frequency of using relative care by age 4 ½	-.04	.08**	.10***	.10***	.12***	.08**	.01	.01	.00	-.07*	-.04	-.06	-.13***	-.13***	-.13***	.10***	.04
44. Frequency of using non-relative care by age 4 ½	.05	.12***	.08**	.08**	.07*	.04	.31	.31	.33	.10***	.09***	.16***	.31***	.31***	.32***	.20***	-.06*
45. Frequency of using family day care by age 4 ½	-.07*	.24***	.22***	.21***	.17***	.13***	.18	.18	.17	-.05	-.04	.00	.00	.00	.01	.08**	.13***
46. Frequency of using center-based care by age 4 ½	.00	.07*	.12***	.09**	.02	.03	.15***	.14***	.14	.08**	.03	.06	.13***	.13***	.14***	.05	.20***
47. Attending full-day kindergarten	-.06*	-.00	.03	.01	.03	.07*	.02	.02	.04	.01	.01	-.02	-.02	-.01	.00	.08**	.07**
48. Using father care after school in first-grade	.02	.16***	.16***	.15***	.15***	.12***	.16	.17	.19	-.03	-.01	-.01	.02	.03	.04	.17***	.04

	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
49. Using relative care after school in first-grade	.05	.07*	.06*	.06*	.09**	.11***	.05	.06*	.08**	.02	.04	-.02	.08**	.09**	.11***	.12***	.06*
50. Using self-care after school in first-grade	.08**	-.01	-.04	-.03	.03	.01	-.02	-.03	-.01	.05	.07*	-.02	.01	.01	.01	.00	.00
51. Using after-school programs in first-grade	-.08**	.19***	.18***	.21***	.19***	.16***	.25	.26	.29	.02	-.00	.01	.05	.05	.04	.12***	.13***
52. Using after-school activities in first-grade	.14***	.09***	.07**	.03	.02	-.02	.12***	.11	.12***	.07***	.12***	.14***	.31***	.32***	.34***	.18***	-.04
53. Average HOME score by age 3	.13***	.18***	.19***	.13***	.10***	.02	.24***	.24	.25	.05	.05	.10**	.31***	.31***	.32***	.21***	-.12***
54. Average HOME score by age 4 ½	.13***	.18***	.19***	.15***	.11***	.04	.25	.25	.26	.05	.05	.10**	.32***	.32***	.34***	.23***	-.12***
55. Average mother's sensitivity by age 3	.15***	.12***	.10***	.05	.04	-.02	.18***	.18***	.18***	.03	.05	.08**	.30***	.30***	.31***	.19***	-.09**
56. Average mother's sensitivity by age 4 ½	.16***	.12***	.12***	.08**	.06*	.02	.17***	.18***	.19***	.02	.05	.08**	.27***	.28***	.29***	.20***	-.09**
57. Average mother's sensitivity by first-grade	.15***	.13***	.11***	.07*	.06*	.04	.17***	.18***	.19***	.02	.04	.08**	.25***	.26***	.28***	.20***	-.09**
58. Average maternal depression by age 3	-.07*	-.15***	-.11***	-.09**	-.04	-.00	-.19***	-.19***	-.20***	-.01	-.02	-.05	-.22***	-.22***	-.22***	-.08**	.02
59. Average maternal depression by age 4 ½	-.08**	-.14***	-.11***	-.09***	-.04	.01	-.19***	-.20***	-.21***	-.01	-.02	-.06	-.23***	-.23***	-.24***	-.08**	.03
60. Average maternal depression by first-grade	-.08**	-.14***	-.12***	-.09**	-.04	.00	-.19***	-.20***	-.21***	-.02	-.02	-.06	-.23***	-.23***	-.24***	-.08**	.03
61. Bracken School Readiness at age 3	.09**	.14***	.14***	.08**	.02	-.02	.23***	.23***	.23***	.11***	.05	.07*	.30***	.30***	.31***	.23***	-.17***
62. Pre-school Language Scale at age 4 ½	.12***	.14***	.14***	.08**	.04	-.03	.22***	.22***	.21***	.07*	.07*	.10**	.31***	.32***	.33***	.18***	-.12***
63. WJR-Language Skills Composition at age 4 ½	.11***	.17***	.16***	.07*	.07*	-.02	.23***	.23***	.21***	.07*	.05	.06	.27***	.27***	.28***	.19***	-.13***
64. WJR-Applied Problems at age 4 ½	.08**	.12***	.11***	.06*	.03	.01	.18***	.19***	.20***	.05	.05	.07*	.26***	.26***	.26***	.19***	-.14***
65. WJR-Language Skills Composite at first-grade	.08*	.14***	.12***	.06	.06	.00	.19***	.19***	.18***	.06*	.05	.10**	.26***	.26***	.27***	.15***	-.10***
66. WJR-Applied Problems at first-grade	.08*	.13***	.11***	.09**	.03	-.02	.19***	.19***	.18***	.03	.02	.11***	.25***	.25***	.26***	.14***	-.09**
67. SSRS Academic Competence Score at first-grade	.08*	.09**	.12***	.05	.02	-.01	.11***	.11***	.11***	.03	.04	.04	.21***	.21***	.22***	.10**	-.10**
68. Current School Performance at first-grade	.05	.08**	.11***	.05	.00	-.00	.14***	.14***	.14***	.03	.05	.05	.22***	.23***	.24***	.14***	-.11***

	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
36. Child care quality below average by age 4 ½	-.71***																
37. Frequency of using father care by age 3	.07**	.01															
38. Frequency of using relative care by age 3	.11***	-.00	-.10***														
39. Frequency of using non-relative care by age 3	.14***	-.05*	-.11***	-.11***													
40. Frequency of using family day care by age 3	.06*	.07**	-.17***	-.18***	-.10***												
41. Frequency of using center-based care by age 3	-.09**	.24***	-.20***	-.18***	-.11***	-.19***											

	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
42. Frequency of using father care by age 4 ½	.07**	.01	.95***	-.10***	-.11***	-.19***	-.21***										
43. Frequency of using relative care by age 4 ½	.10***	.00	-.09***	.96***	-.10***	-.17***	-.19***	-.10***									
44. Frequency of using non-relative care by age 4 ½	.15***	-.07*	-.11***	-.10***	.98***	-.10***	-.11***	-.12***	-.10***								
45. Frequency of using family day care by age 4 ½	.06*	.07*	-.17***	-.16***	-.10***	.97***	-.19***	-.18***	-.16***	-.10***							
46. Frequency of using center-based care by age 4 ½	-.03	.23***	-.20***	-.17***	-.08**	-.13***	.93***	-.24***	-.20***	-.10***	-.18***						
47. Attending full-day kindergarten	.08**	.08**	-.02	.07*	-.00	.04	.13***	-.00	.08**	-.01	.05	.19***					
48. Using father care after school in first-grade	.17***	-.01	.19***	.03	.01	.14***	.04	.23***	.04	.01	.13***	.06*	.14***				
49. Using relative care after school in first-grade	.16***	.03	.02	.11***	.14***	.13***	.01	.02	.15***	.15***	.14***	.07*	.10***	.23***			
50. Using self-care after school in first-grade	.06*	-.03	.08**	-.04	-.03	.02	.01	.08**	-.02	.03	.04	.00	.00	.08**	.11***		
51. Using after-school programs in first-grade	.02	.14***	-.09**	-.04	.03	.17***	.30***	-.10***	-.06*	.02	.16***	.37***	.22***	.14***	-.05	-.03	
52. Using after-school activities in first-grade	.20***	-.04	.03	-.04	.12***	.11***	.15***	.04	-.04	.13***	.09***	.21***	.10***	.29***	.29***	.09***	.15***
53. Average HOME score by age 3	.24***	-.16***	.06*	-.09**	.12***	.08**	.15***	.07*	-.11***	.12***	.06*	.17***	-.04	.25***	.06*	.06*	.13***
54. Average HOME score by age 4 ½	.26***	-.16***	.04	-.09**	.14***	.09**	.15***	.05	-.10***	.14***	.07*	.19***	.02	.30***	.12***	.07*	.16***
55. Average mother's sensitivity by age 3	.17***	-.08**	.04	-.12***	.14***	.08**	.10***	.04	-.11***	.14***	.05	.15***	-.03	.21***	.12***	.05*	.11***
56. Average mother's sensitivity by age 4 ½	.19***	-.07**	.05	-.11***	.11***	.09**	.11***	.05	-.10***	.12***	.07*	.17***	.02	.27***	.20***	.06*	.14***
57. Average mother's sensitivity by first-grade	.19***	-.08**	.05	-.12***	.11***	.10***	.12***	.05	-.11***	.12***	.08**	.18***	.05	.31***	.23***	.06*	.17***
58. Average maternal depression by age 3	-.07*	.02	-.03	.01	-.12***	-.04	-.03	-.03	.02	-.12***	-.02	-.04	.05	-.15***	-.01	-.02	-.04
59. Average maternal depression by age 4 ½	-.07*	.02	-.03	.02	-.12***	-.03	-.04	-.04	.03	-.12***	-.02	-.05	.06*	-.15***	-.01	-.01	-.04
60. Average maternal depression by first-grade	-.07*	.02	-.03	.02	-.12***	-.03	-.05	-.04	.03	-.12***	-.02	-.05	.07*	-.16***	-.02	-.00	-.04
61. Backen School Readiness at age 3	.17***	-.13***	-.02	-.04	.12***	.04	.14***	-.04	-.05	.12***	.02	.17***	-.08**	.12***	.07*	.03	.11***
62. Pre-school Language Scale at age 4 ½	.17***	-.11***	-.06	-.06*	.10***	.10**	.16***	-.06*	-.08**	.11***	.07*	.18***	-.15***	.17***	.11***	.07*	.12***
63. WJR-Language Skills Composition at age 4 ½	.15***	-.12***	.02	-.04	.13***	.06*	.09**	.01	-.07*	.13***	.03	.13***	-.07*	.14***	.05	.03	.11***
64. WJR-Applied Problems at age 4 ½	.14***	-.09**	.01	-.08**	.12***	.06*	.10**	.00	-.11***	.13***	.05	.12***	-.12***	.07*	.08*	.04	.12***
65. WJR-Language Skills Composite at first-grade	.14***	-.11***	-.01	-.02	.10***	.05	.11***	-.01	-.03	.10***	.02	.12***	-.06	.12***	.04	.03	.10***
66. WJR-Applied Problems at first-grade	.12***	-.08**	-.02	-.05	.10***	.05	.14***	-.04	-.08*	.11***	.04	.14***	-.04	.09**	.03	.02	.10***
67. SSRS Academic Competence Score at first-grade	.11***	-.09**	-.00	-.01	.08*	.03	.08**	.01	-.02	.08**	.01	.08*	-.02	.14***	-.00	.01	.04
68. Current School Performance at first-grade	.15***	-.12***	-.04	-.03	.09**	.07*	.09**	-.03	-.05	.10***	.05	.09**	-.03	.13***	.00	.00	.06*

	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
53. Average HOME score by age 3	.38***															
54. Average HOME score by age 4 ½	.43***	.96***														
55. Average mother's sensitivity by age 3	.34***	.54***	.56***													
56. Average mother's sensitivity by age 4 ½	.40***	.55***	.60***	.93***												
57. Average mother's sensitivity by first-grade	.42***	.54***	.61***	.89***	.97***											
58. Average maternal depression by age 3	-.15***	-.34***	-.35***	-.31***	-.29***	-.27***										
59. Average maternal depression by age 4 ½	-.16***	-.36***	-.38***	-.32***	-.30***	-.28***	.96***									
60. Average maternal depression by first-grade	-.17***	-.36***	-.37***	-.32***	-.30***	-.29***	.94***	.98***								
61. Bracken School Readiness at age 3	.34***	.49***	.50***	.39***	.40***	.39***	-.22***	-.23***	-.23***							
62. Pre-school Language Scale at age 4 ½	.37***	.54***	.58***	.48***	.49***	.51***	-.25***	-.28***	-.28***	.61***						
63. WJR-Language Skills Composition at age 4 ½	.31***	.55***	.56***	.40***	.42***	.43***	-.26***	-.26***	-.25***	.60***	.68***					
64. WJR-Applied Problems at age 4 ½	.30***	.46***	.48***	.44***	.45***	.45***	-.23***	-.25***	-.26***	.59***	.69***	.66***				
65. WJR-Language Skills Composite at first-grade	.28***	.46***	.49***	.39***	.41***	.43***	-.23***	-.23***	-.23***	.56***	.62***	.71***	.58***			
66. WJR-Applied Problems at first-grade	.29***	.39***	.32***	.36***	.38***	.39***	-.22***	-.22***	-.22***	.49***	.59***	.56***	.63***	.62***		
67. SSRS Academic Competence Score at first-grade	.23***	.39***	.41***	.30***	.31***	.30***	-.20***	-.20***	-.21***	.43***	.42***	.46***	.46***	.58***	.54***	
68. Current School Performance at first-grade	.24***	.41***	.44***	.32***	.34***	.33***	-.19***	-.20***	-.21***	.47***	.47***	.50***	.50***	.61***	.56***	.84***

*
p < .05.
**
p < .01.

p < .001.

Appendix Table 2
Regression Estimates of the Associations between First-Year Maternal Employment and Child Cognitive Outcomes, Using Two Alternative Methods to Take Timing into Account

A. Non-Hispanic White	Age 3		Age 4 ½		First-grade			
	Bracken School Readiness	Pre-School Language Scale (PLS)	WJR- Language Skills Composite	WJR-Applied Problems	WJR- Language Skills Composite	WJR-Applied Problems	SSRS Academic Competence	Current School Performance
Method 1								
FT by 3 rd mo.	-2.74 (1.89) [-0.05]	-1.35 (1.44) [-0.04]	-0.77 (0.83) [-0.04]	-2.46 (1.17)* [-0.08]	-0.07 (0.83) [-0.00]	-1.88 (1.41) [-0.06]	-0.94 (0.97) [-0.04]	-0.02 (0.07) [-0.01]
PT by 3 rd mo.	-1.27 (2.20) [-0.02]	0.62 (1.67) [0.01]	0.63 (0.97) [0.02]	1.40 (1.35) [0.04]	1.22 (0.95) [0.05]	-0.27 (1.62) [-0.01]	0.42 (1.10) [0.02]	-0.01 (0.08) [-0.01]
Diff. b/w FT & PT	Ns	Ns	ns	**	ns	ns	ns	ns
R ²	0.27	0.28	0.23	0.19	0.20	0.12	0.13	0.14
FT by 6 th mo.	-5.02 (2.20)* [-0.10]	-3.03 (1.68) [-0.08]	-1.77 (0.97) [-0.08]	-3.23 (1.37)* [-0.11]	-0.56 (0.97) [-0.03]	-3.08 (1.64) [-0.10]	-1.81 (1.13) [-0.08]	-0.15 (0.08) [-0.10]
PT by 6 th mo.	-2.38 (2.36) [-0.04]	-0.73 (1.81) [-0.02]	-0.37 (1.04) [-0.01]	0.16 (1.46) [0.00]	-0.08 (1.04) [-0.00]	-2.66 (1.76) [-0.07]	-0.39 (1.19) [-0.02]	-0.15 (0.09) [-0.08]
Diff. b/w FT & PT	Ns	Ns	ns	**	ns	ns	ns	ns
R ²	0.28	0.28	0.23	0.19	0.20	0.12	0.13	0.14
FT by 9 th mo.	-6.52 (2.41)** [-0.13]	-5.90 (1.85)*** [-0.16]	-2.71 (1.07)* [-0.13]	-3.80 (1.51)* [-0.13]	-1.72 (1.08) [-0.09]	-4.24 (1.83)* [-0.13]	-2.67 (1.27)* [-0.12]	-0.22 (0.09)* [-0.14]
PT by 9 th mo.	-3.20 (2.51) [-0.05]	-3.51 (1.93) [-0.08]	-1.33 (1.11) [-0.05]	-1.49 (1.56) [-0.04]	-0.95 (1.12) [-0.04]	-3.97 (1.97)* [-0.10]	-1.31 (1.29) [-0.05]	-0.20 (0.09) [-0.11]
Diff. b/w FT & PT	Ns	Ns	ns	*	ns	ns	ns	ns
R ²	0.28	0.28	0.23	0.19	0.20	0.12	0.13	0.15
FT by 12 th mo.	-5.26 (2.64)* [-0.10]	-5.40 (2.02)** [-0.14]	-2.85 (1.17)* [-0.14]	-4.50 (1.65)** [-0.16]	-2.48 (1.17)* [-0.12]	-4.36 (2.00)* [-0.13]	-3.61 (1.36)** [-0.16]	-0.29 (0.10)** [-0.18]
PT by 12 th mo.	-1.51 (2.67) [-0.02]	-2.17 (2.05) [-0.05]	-1.26 (1.18) [-0.05]	-2.08 (1.66) [-0.06]	-1.24 (1.20) [-0.05]	-3.32 (2.04) [-0.09]	-1.47 (1.38) [-0.05]	-0.22 (0.10)* [-0.12]
Diff. b/w FT & PT	*	*	Ns	*	ns	ns	*	ns
R ²	0.28	0.28	0.23	0.19	0.20	0.12	0.13	0.15
Method 2								
(1) FT by 12 th mo. & Worked by 6 th mo.	-5.28 (-2.66)* [-0.10]	-5.06 (2.04)** [-0.14]	-2.82 (1.18)* [-0.13]	-4.54 (1.66)** [-0.16]	-2.20 (1.18) [-0.11]	-4.30 (2.02)* [-0.13]	-3.39 (1.37)** [-0.15]	-0.27 (0.10)** [-0.17]
(2) FT by 12 th mo. & Worked b/w 7–12 th mo	-7.56 (4.83) [-0.05]	-9.48 (3.60)** [-0.09]	-3.05 (2.10) [-0.05]	-3.38 (2.94) [-0.04]	-5.94 (2.10)** [-0.10]	-5.28 (3.57) [-0.06]	-6.41 (2.46)** [-0.10]	-0.48 (0.18)** [-0.10]
(3) PT by 12 th mo. & Worked by 6 th mo.	-2.93 (2.80) [-0.04]	-2.39 (2.15) [-0.05]	-1.11 (1.24) [-0.04]	-1.56 (1.75) [-0.04]	-1.13 (1.24) [-0.04]	-3.84 (2.11) [-0.09]	-1.49 (1.43) [-0.05]	-0.25 (10.)* [-0.12]
(4) PT by 12 th mo. & Worked b/w 7–12 th mo	3.86 (4.09) [0.03]	-0.89 (3.16) [-0.01]	-1.79 (1.80) [-0.04]	-4.11 (2.53) [-0.06]	-1.32 (1.88) [-0.03]	-0.87 (3.22) [-0.01]	-1.10 (2.18) [-0.02]	-0.07 (0.16) [-0.02]
Diff. b/w (1) & (2)	ns	ns	ns	ns	*	ns	ns	ns
Diff. b/w (3) & (4)	ns	ns	ns	ns	ns	ns	ns	ns
Diff. b/w (1) & (3)	ns	ns	*	**	ns	ns	ns	ns

	Age 3		First-grade					
	Bracken School Readiness	Pre-School Language Scale (PLS)	WJR- Language Skills Composite	WJR-Applied Problems	WJR- Language Skills Composite	WJR-Applied Problems	SSRS Academic Competence	Current School Performance
A. Non-Hispanic White								
Diff. b/w (2) & (4)	*	*	ns	ns	*	ns	ns	*
R ²	0.27	0.27	0.22	0.18	0.19	0.10	0.12	0.13
N	900	798	806	804	777	776	761	750

Note: FT: mothers ever worked 30 or more hours per week by the assessment point; PT: mothers only worked less than 30 hours per week by assessment point. All models control for child's gender, having older sibling, log family income the year before the birth, family ever in poverty between birth and the assessment, mother's PPVT-R score, mother's marital status at birth, mother's education at birth, mother's age at birth, mother's depressive symptoms (CES-D) at 1-month, and subsequent maternal employment. Unstandardized beta coefficients are presented with standard errors in parentheses and standardized beta coefficients in brackets. ns: not significant.

Appendix Table 3

Regression Estimates of the Association between First-Year Maternal Employment and Child Social and Emotional Outcomes, Using Two Alternative Methods to Take Timing into Account

A. Non-Hispanic White	Attachment at 15 month		Attachment at 36 month		CBCL at age 3			CBCL at age 4 ½			SSRS Standardized Score – Teacher report at First-grade			CBCL at First-grade		
	Secure	Secure	Secure	Maternal-report Externalizing	Caregiver-Report Externalizing	Maternal-report Externalizing	Caregiver-Report Externalizing	Social Skills	Peer Competence Scale	Maternal-report Externalizing	Teacher-report Externalizing					
Method 1																
FT by 3 rd month	0.02 (0.04) [0.02]		−0.01 (0.04) [−0.01]	0.44 (0.54) [0.03]	1.08 (0.86) [0.07]	0.93 (0.80) [0.05]	2.33 (0.94) * [0.12]	−0.36 (1.20) [−0.01]	−0.21 (0.31) [−0.03]	0.93 (0.85) [0.05]	1.57 (0.75) * [0.09]					
PT by 3 rd month	−0.01 (0.05) [−0.01]		0.05 (0.05) [0.04]	−0.80 (0.63) [−0.04]	0.12 (1.01) [0.01]	−0.22 (0.93) [−0.01]	−0.83 (1.10) [−0.03]	1.17 (1.34) [0.03]	0.24 (0.35) [0.03]	−1.13 (0.96) [−0.05]	−1.93 (0.84) * [−0.09]					
Diff. b/w FT & PT	ns		ns	*	ns	ns	**	ns	ns	*	***					
R ²	0.03		0.03	0.10	0.01	0.05	0.07	0.06	0.08	0.07	0.05					
FT by 6 th month	0.06 (0.05) [0.06]		−0.02 (0.05) [−0.02]	0.65 (0.64) [0.05]	1.44 (1.11) [0.09]	1.03 (0.94) [0.06]	2.27 (1.13) * [0.12]	−2.37 (1.37) [−0.09]	−0.73 (0.35) * [−0.11]	0.94 (0.98) [0.05]	2.22 (0.87) * [0.13]					
PT by 6 th month	0.04 (0.05) [0.03]		0.07 (0.05) [0.06]	−0.20 (0.68) [−0.01]	−0.18 (1.19) [−0.01]	−0.16 (1.00) [−0.01]	−1.19 (1.21) [−0.05]	0.39 (1.42) [0.01]	−0.03 (0.37) [−0.00]	−1.15 (1.04) [−0.05]	−0.57 (0.90) [−0.03]					
Diff. b/w FT & PT	ns		*	ns	ns	ns	***	*	*	*	***					
R ²	0.03		0.04	0.10	0.02	0.05	0.08	0.07	0.08	0.07	0.05					
FT by 9 th month	0.07 (0.05) [0.08]		−0.01 (0.05) [−0.01]	0.81 (0.70) [0.06]	1.53 (1.28) [0.10]	2.02 (1.03) [0.11]	3.01 (1.27) * [0.16]	−1.86 (1.51) [−0.07]	−0.66 (0.39) [−0.10]	1.53 (1.08) [0.08]	1.46 (0.96) [0.09]					
PT by 9 th month	0.05 (0.05) [0.05]		0.04 (0.05) [0.04]	0.11 (0.72) [0.01]	−0.87 (1.35) [−0.05]	0.90 (1.06) [0.04]	−0.54 (1.33) [−0.02]	0.66 (1.54) [0.02]	0.12 (0.40) [0.02]	−0.30 (1.12) [−0.01]	−1.02 (0.98) [−0.05]					
Diff. b/w FT & PT	ns		ns	ns	**	ns	***	*	**	*	***					
R ²	0.03		0.03	0.10	0.02	0.05	0.08	0.07	0.08	0.07	0.05					
FT by 12 th month	0.06 (0.05) [0.06]		−0.01 (0.05) [−0.01]	0.77 (0.76) [0.05]	2.43 (1.47) [0.15]	1.98 (1.12) [0.11]	2.40 (1.39) [0.13]	−2.21 (1.64) [−0.08]	−0.68 (0.42) [−0.10]	0.99 (1.18) [0.05]	1.30 (1.04) [0.08]					
PT by 12 th month	0.06 (0.05) [0.06]		0.03 (0.06) [0.03]	−0.30 (0.77) [−0.02]	−0.13 (1.50) [−0.01]	0.69 (1.14) [0.03]	−1.70 (1.41) [−0.08]	0.67 (1.65) [0.02]	0.07 (0.43) [0.01]	−0.88 (1.20) [−0.04]	−1.55 (1.05) [−0.08]					
Diff. b/w FT & PT	ns		ns	*	**	ns	***	*	*	*	***					
R ²	0.03		0.03	0.10	0.03	0.05	0.08	0.07	0.08	0.07	0.05					
Method 2																
(1) FT by 12 th mo. & Worked by 6 th mo.	0.06 (0.06) [0.07]		−0.00 (0.06) [−0.00]	0.82 (0.76) [0.06]	2.36 (1.48) [0.15]	1.46 (0.79) [0.11]	2.64 (1.40) [0.14]	−2.30 (1.64) [−0.09]	−0.74 (0.42) [−0.11]	1.05 (1.18) [0.05]	1.55 (1.04) [0.09]					
(2) FT by 12 th mo. & Worked b/w 7–12 mo	−0.06 (0.10) [−0.02]		−0.01 (0.01) [−0.00]	−0.17 (1.40) [−0.00]	3.75 (2.46) [0.08]	1.57 (1.46) [0.04]	−0.53 (2.35) [−0.01]	−0.31 (2.99) [−0.00]	0.42 (0.77) [0.02]	−0.34 (2.11) [−0.01]	−1.74 (1.90) [−0.04]					
(3) PT by 12 th mo. & Worked by 6 th mo.	0.06 (0.06) [0.05]		0.04 (0.06) [0.04]	−0.46 (0.80) [−0.03]	−0.05 (1.53) [−0.00]	0.44 (0.83) [0.03]	−2.21 (1.47) [−0.09]	0.74 (1.70) [0.02]	0.13 (0.44) [0.02]	−1.26 (1.24) [−0.05]	−1.54 (1.08) [−0.07]					

A. Non-Hispanic White	Attachment at 15 month		Attachment at 36 month		CBCL at age 3			CBCL at age 4 ½			SSRS Standardized Score – Teacher report at First-grade			CBCL at First-grade		
	Secure		Secure		Maternal-report Externalizing	Caregiver-Report Externalizing	Maternal-report Externalizing	Caregiver-Report Externalizing	Social Skills	Peer Competence Scale	Maternal-report Externalizing	Teacher-report Externalizing		Maternal-report Externalizing	Teacher-report Externalizing	
(4) PT by 12 th mo. & Worked b/w 7–12 mo	0.09 (0.09) [0.04]		−0.02 (0.09) [−0.01]		0.41 (1.19) [0.01]	−0.59 (2.39) [−0.01]	1.63 (1.24) [0.05]	0.87 (2.14) [0.02]	0.13 (2.65) [0.00]	−0.33 (0.68) [−0.02]	1.04 (1.92) [0.02]	−1.31 (1.68) [−0.03]				
Diff. b/w (1) & (2)	ns		ns		ns	ns	ns	ns	ns	ns	ns	*				
Diff. b/w (3) & (4)	ns		ns		ns	ns	ns	ns	ns	ns	ns	ns				
Diff. b/w (1) & (3)	ns		ns		*	**	ns	***	**	**	***	***				
Diff. b/w (2) & (4)	ns		ns		ns	ns	ns	ns	ns	Ns	ns	ns				
R ²	0.03		0.03		0.10	0.03	0.05	0.09	0.07	0.08	0.07	0.05				
N	885		903		925	488	832	611	781	781	806	786				

Note: FT: mothers ever worked 30 or more hours per week by the assessment point; PT: mothers only worked less than 30 hours per week by assessment point. Models control for child’s gender, having older sibling, log family income the year before the birth, family ever in poverty between the birth and the assessment, mother’s PPVT-R score, mother’s marital status at birth, mother’s education at birth, mother’s age at birth, mother’s depressive symptoms (CES-D) at 1-month, and subsequent maternal employment. Method 1 estimates 4 separate models (comparing mothers who worked by 3 months to all others, mothers who worked by 6 months to all others, mothers who worked by 9 months to all others, and mothers who worked by 12 months to all others). Method 2 interacts FT or PT by 12th month with a control for whether the mother began work by 6 months or began work between 7 and 12 months. Unstandardized beta coefficients are presented with standard errors in parentheses and standardized beta coefficients in brackets. ns: not significant.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Appendix Table 4

Associations between First-Year Maternal Employment and Maternal Depressive Symptoms at Clinical Level (≥ 16), Non-Hispanic White Children

Maternal Depressive Symptoms ≥ 16	At 15 month	At 24 month	At 36 month	At 54 month	At First grade
FT by 3 rd mo.	0.55 (0.27)*	0.81 (0.28)**	0.04 (0.03)	0.04 (0.02)	0.02 (0.02)
PT by 3 rd mo.	0.35 (0.34)	0.33 (0.36)	0.05 (0.03)	0.04 (0.03)	0.02 (0.03)
Diff. b/w FT & PT	ns	ns	ns	ns	ns
Pseudo R ²	.153	.170	.172	.204	.199
FT by 6 th mo.	0.69 (0.31)*	1.00 (0.33)**	0.07 (0.30)*	0.04 (0.03)	0.02 (0.03)
PT by 6 th mo.	0.69 (0.34)*	0.61 (0.36)	0.08 (0.03)*	0.04 (0.03)	0.03 (0.03)
Diff. b/w FT & PT	ns	ns	ns	ns	ns
Pseudo R ²	.156	.172	.174	.204	.199
FT by 9 th mo.	0.88 (0.33)**	1.61 (0.36)***	0.12 (0.03)***	0.11 (0.03)***	0.07 (0.03)*
PT by 9 th mo.	0.77 (0.35)*	1.00 (0.39)**	0.11 (0.04)**	0.10 (0.03)**	0.07 (0.03)*
Diff. b/w FT & PT	ns	*	ns	ns	ns
Pseudo R ²	.158	.188	.180	.213	.203
FT by 12 th mo.	0.81 (0.35)*	1.43 (0.38)***	0.11 (0.04)**	0.11 (0.04)**	0.07 (0.03)*
PT by 12 th mo.	0.70 (0.36)*	0.91 (0.39)**	0.11 (0.04)**	0.10 (0.04)**	0.07 (0.04)*
Diff. b/w FT & PT	ns	ns	ns	ns	ns
Pseudo R ²	.156	.180	.177	.211	.202
N	900	900	900	900	900

Note. FT: mothers ever worked 30 or more hours per week by the assessment point; PT: mothers only worked less than 30 hours per week by assessment point. All models control for child's gender, having older sibling, log family income the year before the birth, family ever in poverty between birth and the assessment, mother's PPVT-R score, mother's marital status at birth, mother's education at birth, mother's age at birth, mother's depressive symptoms (CES-D) at 1-month, and subsequent maternal employment. Logit was used with numbers representing coefficients and standard errors in parentheses.