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ABSTRACT

Child Care Subsidies and Child Development*

Child care subsidies are an important part of federal and state efforts to move welfare recipients into employment. One of the criticisms of the current subsidy system, however, is that it overemphasizes work and does little to encourage parents to purchase high-quality child care. Consequently, there are reasons to be concerned about the implications of child care subsidies for child development. In this paper, we provide a systematic assessment of the impact of subsidy receipt on a wide range of child outcomes. Drawing on rich data from the Early Childhood Longitudinal Study, we document a negative relationship between child care subsidies and child development. In particular, our results suggest that subsidy receipt in the year before kindergarten lowers reading and math test scores and increases a variety of behavior problems at kindergarten entry. Some of these negative effects persist to the end of kindergarten. A tentative explanation for the poorer outcomes is that subsidized children are more likely to receive intense exposure to low-quality child care.

JEL Classification: I18, I2, J13

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I. Introduction

Child care subsidies are an important policy instrument to facilitate the transition of welfare recipients into employment by defraying the expenses associated with child care. Indeed, several studies show that the cost of child care is an important constraint to helping disadvantaged mothers find employment (Kimmel, 1998; Anderson & Levine, 2000; Han & Walfdogel, 2001; Blau & Robins, 1988; Blau & Tekin, 2007; Tekin, 2005; 2007). As a result, the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) reorganized the patchwork child care subsidy system. In particular, Congress consolidated several preexisting subsidy programs into a single block grant, the Child Care and Development Fund (CCDF). Federal and state expenditures for child care assistance were increased substantially, and individual states were given greater flexibility in program design and administration. In 2005, states spent approximately $9.4 billion on child care subsidies and served 1.7 million children in an average month (Child Care Bureau, 2005a).

A sizable body of research examines the impact of child care subsidy receipt on mothers' employment and child care decisions (e.g., Meyers, Heintze, & Wolf, 2002; Tekin, 2005; 2007; Blau & Tekin, 2007). Findings from these studies indicate that subsidies are effective in moving single mothers into paid employment and shifting children from informal child care settings into the formal market. However, researchers have neglected the question of whether child care subsidies have implications for child development. The relevance of this issue is clear, given that expenditures and the number of children served through the CCDF exceed other early childhood intervention programs.[1] Furthermore, research shows that developmental experiences during the first few years

[1] In 2005, Head Start served 906,993 children, with expenditures of $6.8 billion. Early Head Start serves approximately 62,000 children each year, with expenditures of $684 million in 2005 (Office of Head Start, 2006). Finally, state pre-kindergarten programs enrolled 801,902 in 2005, with expenditures of $2.8 billion (NIEER, 2005).

of a child's life have lasting effects on cognitive and behavioral well-being (Heckman & Materov, 2004; Lynch, 2004).

Since most child care subsidies are used to purchase center-based care—which has been found to promote child development in some studies—it is commonly assumed that subsidies should also have positive effects on well-being. However, it is unclear *a priori* whether subsidies are beneficial or detrimental to child outcomes. There are three primary channels through which child care assistance policies can influence child outcomes. First, mothers must be employed to be eligible for a subsidy, and recent evidence suggests that early maternal employment is negatively associated with child development (Bernal, 2008; Brooks-Gunn, Han, & Waldfogel, 2002; James-Burdummy, 2005; Liu, Mroz, & Van der Klaauw, 2003; Ruhm, 2004). Second, subsidies create strong incentives to purchase nonparental child care. The evidence here is mixed, with some studies finding positive effects of child care attendance (Loeb et al., 2004; NICHD, 2003a; 2003b) and others finding insignificant or negative effects (Baydar & Brooks-Gunn, 1991; Bernal & Keane, 2008; Blau, 1999; Desai, Chase-Lansdale, & Robert, 1989). There is more agreement, however, that high-quality center-based care has positive effects on cognitive development, particularly for low-income children (NICHD & Duncan, 2003; Hill, Waldfogel, & Brooks-Gunn, 2002; Peisner-Feinberg et al., 2001). Finally, child care subsidies free up income for parents to spend on private consumption and goods that enhance child quality. The extent to which additional income is spent on private consumption versus child quality depends on the relative size of the income elasticities

This relationship is further complicated by the presence of several design features embedded in the CCDF that have implications for child care quality. Arguably the most important design feature is the principle of "parental choice," in which parents are free to use subsidies to purchase virtually any legally-operating child care provider, including those operating outside states' regulatory regimes. Furthermore, conditioning eligibility for subsidies on employment and income creates challenges for maintaining stable child care arrangements. In particular, if changes in

employment and income status are related to lapses in subsidy receipt, such instability could undermine child well-being by severing productive child-teacher relationships and exposing children to comparatively low-quality care during unsubsidized periods. States' reimbursement rates—or the maximum amount a state agency pays a given provider—can also influence quality. If reimbursements are below the federally *recommended* level, families may not have access to high-quality care, thereby reducing incentives for providers to make important quality enhancements. In general, the aim of current subsidy policy is to support employment among low-income families, while placing few restrictions on the quality child care (Blau, 2001; Gormley, 2007).

This paper represents the first attempt to study the implications of child care subsidy receipt for child development in the United States. Our analyses draw on the Kindergarten cohort of the Early Childhood Longitudinal Study (ECLS-K) to examine a wide range of child outcomes, including cognitive, behavioral, and psychomotor well-being. Our results indicate that child care subsidy receipt in the year before kindergarten leads to negative child outcomes at kindergarten entry. For example, our best estimates suggest that children who receive subsidies score 0.29 and 0.25 standard deviations lower on tests of reading and math ability, respectively. These negative effects generally apply to several outcomes in the behavioral domain. Furthermore, the impact of subsidies persists until the end of kindergarten. While the data do not permit a detailed analysis of the mechanisms through which child care subsidies are detrimental to child development, we present descriptive evidence from the ECLS-K and discuss results from other studies that both point to poor child care quality as a possible explanation for the negative subsidy effects. Implications of our findings are important because they suggest that the current child care subsidy system—with its overemphasis on employment—may undermine the development of children whose parents depend on this form of assistance.

II. Overview of Child Care Subsidy Policy and Previous Research on Child Care

The CCDF and Implications for Child Care Quality

To be eligible for CCDF funds, families must be engaged in a state-defined acceptable work activity (e.g., employment, education, or job training), have incomes below 85 percent of the state median income (SMI), and have at least one child ages 0 to 12. States are given substantial flexibility in designing their subsidy systems, including the ability to transfer up to 30 percent of their TANF block grant to the CCDF, setting reimbursement and co-payment rates, and defining acceptable work activities. However, states must spend no less than four percent of their CCDF allocation on quality improvement activities, and a market rate survey must be conducted every two years to ensure that subsidy families have "equal access" to high-quality providers.[2]

As previously stated, there are several design features associated with the CCDF that have implications for the quality of child care purchased with subsidies. The most important feature is the principle of "parental choice," in which parents are free to use subsidies to pay for any legally-operating child care provider, including unregulated relatives and other in-home caregivers.[3] To receive federal funds, providers are only required to be licensed if there is a state mandate, or they must meet basic health and safety regulations in cases where the state grants legal exemptions from licensing. The increased flexibility through "parental choice" is beneficial for working parents, but allowing providers to accept subsidized children while operating outside states' regulatory regime means that some children are exposed to low-quality care that is difficult to monitor (Adams, Tout, & Zaslow, 2007). Mandating only minimum quality standards also reduces the incentive for providers to invest in costly quality improvements that support child development.

The CCDF's emphasis on supporting employment may also influence the stability and quality of care received by low-income children. As noted above, parental eligibility for subsidies is

[2] Results from the survey are used to set reimbursements at a level that allows subsidized families to purchase child care up to the 75th percentile of the local price distribution.

[3] Indeed, fully 25 percent of subsidized children participate in unregulated daycare settings (Child Care Bureau, 2005b).

conditioned on employment and income, which means that parents lose eligibility if they become separated from a job, have earnings that exceed the threshold, or fail to comply with states' recertification rules. These eligibility rules can be at odds with children's developmental needs. Recent evidence suggests that the median subsidy spell lasts only three to seven months (Meyers et al., 2002). If lapses in subsidy receipt prompt frequent changes in child care arrangements when parents lose eligibility, such instability could have negative effects on child outcomes (Loeb et al., 2004; Shonkoff & Phillips, 2000; Tran & Weinraub, 2006).

Linking subsidy eligibility to employment and income also creates challenges for providers to increase quality. Child care providers that rely heavily on subsidized children as a source of revenue may experience severe fiscal shortfalls when parents lose eligibility or use their subsidy to pay another provider. States' use of rationing, waiting lists, and other tools to navigate the CCDF funding structure can be a further source of financial instability for child care providers. Given the volatility associated with serving large numbers of subsidized children, providers have few incentives to make substantial quality improvements, especially those requiring a long-term commitment of sustained funding (e.g., higher wages, additional and high-skilled staff, and educational materials) (Adams & Rohacek, 2002).

Finally, states' CCDF regimes influence child care quality through reimbursement rates. Child care subsidies increase purchasing power by enabling low-income parents to afford a level of quality provided in the larger child care market.[4] The CCDF attempts to surmount the problem of low average quality by setting reimbursement rates at a level high enough to cover at least 75 percent of the prices charged in the local child care market. Setting reimbursement rates at the 75th percentile is a federal *recommendation*, however, leaving states with substantial flexibility to set lower benefit levels. As of 2007, only nine states established reimbursement rates at the 75th percentile of the local

[4] Recent studies suggest, however, that average quality in U.S. child care settings tends to be mediocre and highly variable (Helburn et al., 1995; NICHD, 2000a; Phillips & Adams, 2001; Vandell & Wolfe, 2000).

price distribution, compared to 22 states in 2001 (Schulman & Blank, 2007). Low reimbursement rates limit parental access to high-quality providers, thereby decreasing demand for such services and weakening incentives for providers to raise quality.[5]

Previous Research

The only other study to consider explicitly the role of child care subsidies in determining child outcomes is Baker, Gruber, and Milligan (2008). The authors analyze the impact of Quebec's "$5 per day child care" program on child care utilization, labor supply, and child and parent outcomes. Their results show that, although this highly-subsidized child care program dramatically increased parental labor supply, it also had large, negative effects on children and parents. In particular, children were worse off in a variety of behavioral and health dimensions, ranging from increased physical aggression and diminished social skills to increases in common illnesses. The authors also find that the program led to more hostile and less consistent parenting, worse parental health, and lower-quality parental relationships. Our study differs from Baker, Gruber, and Milligan (2008) in a number of ways. First, we use data on sample of U.S. children. Second, the U.S. subsidy system is different from the one examined in Baker, Gruber, and Milligan (2008). The subsidies offered in Quebec are available for working and non-working parents, while the U.S. system is targeted at working parents. In addition, the Quebec program is a universal entitlement, and child care subsidies in the U.S. are means-tested. Finally, Baker, Gruber, and Milligan (2008) investigate child and parent outcomes for a sample of two-parent families, while we focus on children living with single mothers.

Although the literature on the effect of child care subsidies on child development is limited, there is a large number of studies examining the impact of child care utilization on children's intellectual and social development (Baydar & Brooks-Gunn, 1991; Bernal & Keane, 2008; Blau,

[5] States have addressed these incentive problems through tiered reimbursement rates, which provide higher rates to providers meeting more stringent quality standards. One problem with this approach, however, is that states will only pay the higher rates after providers make the quality improvements, and therefore does not help low-quality providers make the initial financial investments.

1999; Desai, Chase-Lansdale, & Robert, 1989; Hill, Waldfogel, & Brooks-Gunn, 2002; Loeb et al., 2004; NICHD, 2003a; 2003b; 2000a; 2000b; NICHD & Duncan, 2003; Peisner-Feinberg et al., 2001).[6] This body of work is relevant to our research because mothers respond to child care subsidies by moving children away from parent and relative care and into formal arrangements. Whether this substitution influences child outcomes positively or negatively depends on the relative productivity of parental care. Formal child care many improve child well-being if these arrangements place children in safer and more stimulating environments. However, significant time in these arrangements could lead to lower-quality mother-child interactions and less responsiveness of children to maternal sensitivity.

Overall, these studies produce inconclusive results on the impact of center-based care on cognitive outcomes. The diversity of findings is due, in part, to identification problems stemming from the treatment of child care choices as exogenous. A recent study by Bernal and Keane (2008), however, addresses some of these self-selection issues by using welfare and other social policy reforms as instruments for a measure of child care time. Using a sample of single mothers in the NLSY, the authors find that an additional year of child care attendance reduces cognitive ability test scores by 2.1 percent, or approximately 0.11 standard deviations. Previous studies on social and emotional development generally find that children attending center-based care display more behavior problems and less self-control than children in other settings (NICHD, 2003b). When studies are able to discern levels of child care quality, the results consistently suggest that children attending high-quality center-based care perform better on cognitive tests than children in family homes or relative care. Moreover, the cognitive benefits of high-quality care are greater among children from disadvantaged backgrounds, a finding echoed by several random assignment studies evaluating states' welfare-to-work programs (Crosby et al., 2005; Gennetian et al., 2005) as well

[6] See Smolensky and Gootman (2003) for a thorough review of this research.

recent work on state pre-kindergarten programs (Gormley & Gayer, 2005; Magnuson, Ruhm, & Waldfogel, 2007).

A final strand of empirical work that is relevant to the current study focuses on the impact of early maternal employment on child development (Baum, 2002; Bernal, 2008; Blau & Grossberg, 1992; Brooks-Gunn, Han, & Waldfogel, 2002; Desai, Chase-Lansdale and Michael, 1989; James-Burdummy, 2005; Liu, Mroz, & Van der Klaauw, 2003; Ruhm, 2004; Waldfogel, Han, & Brooks-Gunn, 2002). Similar identification problems plague many of the studies in this literature. However, a recent convergence of evidence finds that maternal work during the first three years of a child's life is associated with small, negative effects on children's cognitive ability. Some of these negative effects persist until children reach kindergarten, but a general conclusion in the literature is that they attenuate over time, and are even offset by small, positive effects of later maternal employment.

III. Data Sources

The data used in the analysis are drawn from the Early Childhood Longitudinal Study, Kindergarten cohort (ECLS-K), a nationally representative sample of 21,260 children attending kindergarten in the fall of 1998.[7] Children in the ECLS-K are followed through the eighth grade, with detailed parent, child, and teacher interviews conducted in the fall and spring of kindergarten (1998 and 1999) and the spring of first (2000), third (2002), fifth (2004), and eighth (2007) grade. About 20 kindergartners per school from over 1,200 public and private schools are included in the sample.[8]

Analyses in this study are based on the fall and spring of kindergarten waves of data

[7] The ECLS-K is sponsored by the U.S. Department of Education. For more information, see the ECLS-K website at http://nces.ed.gov/ecls/kindergarten.asp. An additional longitudinal study, the ECLS-Birth cohort, follows 14,000 children born in 2001 through kindergarten entry.

[8] The ECLS-K used a multistage probability sample design to select the sample of children attending kindergarten in 1998. The primary sampling units (PSUs) were geographic areas consisting of counties or groups of counties. The second-stage consisted of public and private schools within sampled PSUs. The final stage units were students within schools. The school frame was freshened in the spring of 1998 to include newly opened schools that were not included in the original sample. Once the sample children were identified, parent contact information was obtained from the school, which was used to locate parents and seek consent for the child assessments and parent interviews. Completion rates (or response rates that are conditioned on earlier stages of data collection) for the fall of kindergarten interviews were high: 89.9 percent of child assessments were completed, 85.3 percent of parent interviews were completed, and over 90 percent of the teacher interviews were completed.

collection, in which child cognitive and behavioral assessments were conducted and parents were asked questions about child care attendance in the year prior to kindergarten entry. We limit our sample to 2,795 children who lived with a single mother as of the fall of kindergarten interview.[9] We focus on single mothers because they constitute a majority of eligible subsidy recipients. According to Herbst (2008a), 64 percent of eligible recipients are single mothers. Exclusions from the sample are made if children were living in two-parent families (12,431) or missing data on one or more of the primary outcome variables (4,421), child care arrangements (1,189), and child care subsidy questions (27). We exclude an additional 335 children attending Head Start, since the decision to participate in this early intervention program in is not influenced by child care subsidies.[10] Rates of item non-response on the remaining child and family variables are low, usually well below one percent of the final sample, and we retained these cases by imputing zeros for the missing values and creating dummy variables to control for the possibility of non-random imputation.

Child Outcomes

We explore a large set of child outcomes, broadly organized around cognitive, behavioral, and psychomotor categories. In the cognitive domain, reading and math tests were administered to all children in the fall of kindergarten.[11] The reading test was designed to measure language and literacy skills, such as print familiarity, letter recognition, beginning and ending sounds, vocabulary,

[9] Single mothers were identified in the ECLS-K by using the variable P1HPARNT, which describes the child's living arrangements. We defined single mother families as those in which the child lived with the "biological mother only."

[10] Additional minor exclusions from the sample were made due to missing zip code identifiers, an inability to match children to the 2000 Census geocoded data, and mothers under age 19. A number of researchers drop children who were not first-time kindergarteners. However, we decided to retain these children and add a control for their presence in all models. In any case, they comprise a small number of the total analysis sample (147).

[11] The reading and math tests were designed specifically for use in the ECLS-K. However, many of the individual items are derived from existing instruments, all with high reliability scores. For example, instruments such as the Peabody Individual Achievement Test—Revised (PIAT-R), Peabody Picture Vocabulary Test—3 (PPVT-3), and the Woodcock-Johnson Psycho-Educational Battery—Revised (WJ-R) were drawn from to create the ECLS-K measures. Overall reading and math scores can be broken down into proficiency scores, which provide a means of analyzing specific skills or content areas. Reading scores are comprised of proficiencies in letter recognition, beginning sounds, ending sounds, sight words, and words in context. Math scores are comprised of proficiencies in numbers and shapes, relative size, sequencing, addition/subtraction, and multiplication/division. In addition to the reading and math tests, the ECLS-K cognitive battery also includes a general knowledge test designed to capture children's "conceptual understanding of scientific facts, and skills and abilities to form questions about the natural world, to try to answer them on the basis of the tools and the evidence collected, and to communicate answer and how the answers were obtained." The ECLS-K does not provide proficiency scores for the general knowledge test, and its reliability scores are consistently below the other cognitive tests. Therefore, we limit our analyses to the reading and math scores.

and reading comprehension. The math test evaluated identification of one- and two-digit numerals, recognition of geometric shapes, counting and reading numerals, pattern and sequence recognition, and solving simple word problems. Reading and math outcomes are transformations of the raw scores into T-scores, which are population-referenced measures of children's achievement. As a result, these scores are interpreted in relation to a given child's peer group. For ease of interpretation, T-scores are scaled to have (for the full sample) a mean of 50 and a standard deviation of 10. Effect sizes are therefore derived by dividing all parameter estimates by 10. Reliabilities for both cognitive tests are high (0.93 for reading and 0.92 for math).

In the behavioral domain, we explore teachers' subjective reports of children's internalizing behavior problems, externalizing behavior problems, approaches to learning, self-control, and interpersonal behavior.[12] The Internalizing Behavior Scale asks about the frequency with which children display anxiety, loneliness, low self-esteem, and sadness (four items). The Externalizing Behavior Scale inquires about the frequency of acting out behaviors, including arguing, fighting, anger, and impulsive behavior (five items). The Approaches to Learning Scale measures behavior reflecting the ease children display in the learning environment, including attentiveness, task persistence, and eagerness to learn (six items). The Self-Control Scale measures the extent to which children are capable of controlling behavior by respecting the property of others, limiting temper, and responding appropriately to peer-pressure (four items). Finally, the Interpersonal Skills Scale provides information on children's ability to form and maintain friendships, comfort or help others, and show sensitivity toward one's peers (five items). All of the behavioral outcomes are measured on a scale of one to four. Higher scores on the Internalizing and Externalizing Behavior Scales indicate more frequent behavior problems, while higher scores on the remaining scales indicate

[12] Teachers were also asked to respond to several questions about children's academic performance. This academic rating scale (ARS) provides information in areas of language and literacy, general knowledge, and mathematical thinking. However, we limit our outcome list to teachers' assessments of social skills. Furthermore, in the fall of kindergarten, parents were asked about children's social skills in many of the same domains as teachers. Reliabilities for these assessments are often substantially below that of the teacher assessments, and so we chose to concentrate on teachers' evaluations of children's social skills.

increasingly positive behavior. These measures are scaled to have a mean of zero and a standard deviation of 10. Reliabilities are once again high (0.80 for Internalizing Behavior, 0.90 for Externalizing Behavior, 0.89 for Approaches to Learning: 0.89, 0.79 for Self-Control, and 0.89 for Interpersonal Skills).

The final set of outcomes explored in the study focus on children's psychomotor skills, specifically fine and gross motor skills. Fine motor skills capture hand-eye coordination and include such tasks as building a gate, drawing a person, and copying simple figures. The test of gross motor skills evaluates children in the areas of balancing, hopping, skipping and walking backward. Fine motor skills are measured on a scale of zero to nine, and gross motor skills are measured on a scale of zero to eight, with higher scores indicating greater abilities. As with the behavioral outcomes, these measures are scaled to have a mean of zero and a standard deviation of 10. Reliability scores for these measures are 0.57 for fine motor skills and 0.51 for gross motor skills.

Measures of Child Care Subsidy Receipt and Child Care Arrangements

The key independent variable in our analysis is a dummy variable indicating whether a child received subsidized, non-parental child care in the year prior to kindergarten. Parents are asked a series of questions about child care use during the past 12 months, including the number of arrangements, the amount of time (i.e., months, days, and hours) that each arrangement was used, whether there was a cost associated with each arrangement, and if so, the amount paid for care. Regarding subsidy receipt, parents were asked the following: "Did any of the following people or organizations help to pay for this … provider to care for {CHILD} the year before {he/she} started kindergarten?" Four possible choices were then presented to parents, and we coded those answering "a social service agency or welfare office" as receiving a child care subsidy. Similar questions appear in several nationally representative surveys (e.g., National Survey of America's Families and the Survey of Income and Program Participation), and other researchers have constructed indicators of subsidy receipt based on them (Blau and Tekin, 2007; Herbst, 2008a; Tekin, 2007). The U.S.

Department of Health and Human Services (1999) finds that between 12 percent and 15 percent of eligible families received a CCDF subsidy in 1998. In our ECLS-K sample, 14.8 percent of children are coded as receiving subsidized care during the same period, further increasing our confidence in the measure.[13]

We also create mutually exclusive groupings of child care arrangements. Specifically, we code children as having attended relative care (which includes caregiving inside and outside the child's home), non-relative care (nanny, babysitter, or family-based), center-based care (daycare center), or school-based services (prekindergarten, preschool, and nursery school). Children who did not attend any of these services are coded as receiving exclusively parent care. A non-trivial number of children received child care from more than one provider, so we create a decision rule to ensure mutually exclusive and exhaustive categories.[14] Participation rates in the various child care arrangements are as follows: 14.6 percent of children received no non-parental care (parent care only); 22 percent received care from a relative; 7.2 percent received care from a non-relative; 16.3 percent participated in center-based care; and 39.9 percent participated in a school-based program.

Child and Family Characteristics, Contextual Factors, and the Policy Context

We exploit the richness of the ECLS-K to control for a detailed vector of child and family characteristics as of the fall of kindergarten. Key child characteristics include age, race, and birth weight. Parental time and skill inputs are captured by mother's age, lagged maternal employment, mother's and father's educational attainment, and parent's educational expectations for the child. Parental resources and other goods inputs are represented by WIC and food stamps participation,

[13] Rates of child care subsidy receipt calculated by researchers using the NSAF match closely our ECLS-K estimate. For example, Tekin (2007) calculates a participation rate of 11.6 percent for a sample of single mothers, and Herbst (2008a) estimates a take-up rate of 13.9 percent, also from a sample of single mothers.

[14] Our decision rule is constructed so that we drop only those children who receive exclusively Head Start. Therefore, our indicator of subsidy receipt omits those reporting subsidy receipt while participating only in Head Start. However, our comparisons are similar when we estimated our models labeling these mothers as subsidy recipients. A child participating in Head Start along with another service is coded as participating in the non-Head Start service. The remaining tie-breakers are settled as follows: relative and center: center; non-relative and center: center; relative and school: school; non-relative and school: school; non-relative, relative, and center: center; non-relative, relative, and school: school.

total household income, and the number of books and audio CDs/tapes available in the home.[15] Finally, all models control for a number of child and family background characteristics. These include indicators of early and current child health as well as developmental setbacks, specifically, whether the child was born prematurely, the child's current weight, whether the child repeated kindergarten, and the presence of disabilities.[16] This vector also contains family attributes that indirectly proxy time inputs and other resources, such as the age of the mother as of the first birth, the number of siblings in the household, and region of residence.

Although the ECLS-K asks parents a number of questions about subjective neighborhood quality, we control for contextual determinants of child outcomes by appending zip code-level Census data to our main data file. These variables are derived from the 2000 Decennial Census' long form, and are obtained by researchers through a restricted use data agreement. We incorporate 12 variables at the zip code-level into our analyses, including median household income, population density, the fraction of households receiving public assistance, racial and ethnic composition, percent foreign born, female employment rates, and educational attainment.

A final set of variables included in our analysis attempts to capture the state-level social policy environment in which children are raised and which have implications for single mothers' employment decisions. Although the ECSL-K provides information on early and current child care experiences, data covering maternal employment is incomplete. Therefore, we use a number of welfare and other social policy reforms implemented throughout the 1990s to account for unobserved

[15] We also experimented with a more extensive variable list, including a composite measure of socioeconomic status, which was constructed by ECLS-K staff and comprises parental education, occupation, and family income. This was ultimately excluded from the analysis, given that we include most of its constituent parts in the analysis. Our results are not sensitive to this exclusion. Furthermore, we experimented with a number of parent-child activities, such as frequency of reading, storytelling, playing games and sports, and participating in nature activities. Another cluster of potential variables included the extent to which parents thought it was important to have certain skills (e.g., counting and knowing letters) at the time of kindergarten entry. Finally, we considered additional family context variables, such as whether the child moved at all since birth and whether the current home location was chosen because of the school system. These variables are inconsistently associated with the outcomes, and removing them did not alter the results.

[16] We define disability status using an ECLS-K composite variable. It includes individual questions on whether the child ever received any form of therapy before kindergarten, or had a learning, activity, mobility, speech, hearing, or vision problem diagnosed by a professional.

work preferences that may be correlated with child outcomes.[17] Furthermore, these policy reforms should capture heterogeneity in state resources and attitudes influencing child development. These variables include the maximum AFDC/TANF benefit for a family of three, the combined federal/state EITC maximum credit, a dummy variable for whether a state has a lifetime time limit on welfare receipt, the number of months for states' time limits, a dummy variable for whether a state has an immediate work requirement, child age exemption from work requirements, a dummy for whether a state has a full family welfare sanction for the first instance of non-compliance with work requirements, and a dummy variable for whether a state operates a formal cash diversion program, and state pre-kindergarten spending per child ages 0 to 4.

IV. Conceptual Framework and Econometric Model

Our goal is to examine the relationship between child care subsidy receipt and children's cognitive, behavioral, and psychomotor outcomes at the start of kindergarten. These outcomes are determined by a child development production function whose inputs include purchased goods (e.g., food, books, medical care, etc.), the quality of non-parental child care, and the market and non-market time of parents. Economists have estimated variations of this production function to examine the impact of pre-kindergarten (Magnusson et al. 2007), child care inputs (Blau 1999), child care use and income (Bernal & Keane, 2008), and parental employment (Ruhm, 2004) on various measures of child well-being.

Rather than entering into the production function as a direct input, child care subsidies are assumed to influence child outcomes indirectly by affecting the mix of inputs toward purchased goods, non-parental child care, and the time allocation of parents. This is a plausible assumption because child care subsidies are essentially an in-kind benefit that enters parents' optimization problem through the budget and time constraints. In this framework, a decrease in the price of child

[17] A large literature investigates the impact of welfare reform, the EITC, and policy reforms on single mothers' labor supply decisions, consistently finding strong associations (e.g., Fang and Keane, 2004; Grogger, 2003; Herbst, 2008b; Meyer and Rosenbaum, 2001).

care is predicted to raise the likelihood that a parent will work and use paid child care by increasing the effective wage rate and making formal care relatively cheaper (Blau & Currie, 2004; Blau & Robins, 1988; 1991; Kimmel, 1998; Tekin, 2007). A child care subsidy therefore encourages parents to enter the paid labor force because it lowers the price of care.

As previously stated, a child care subsidy can influence child outcomes through several mechanisms. First, the income available for private consumption and purchasing goods to enhance child quality increases when families receive a subsidy. This is due to the positive effect of subsidies on employment, and the fact that these benefits release money that can be directed toward purchases other than child care. It is straightforward to show that the effect of an in-kind service is equivalent to a pure income transfer, in that it causes a parallel and outward shift in the budget constraint. Parents will therefore respond by increasing both private consumption and purchases for child-quality-enhancing goods and services.[18] The extent to which increases in disposable income is spent on private consumption as opposed to child quality depends on the relative size of the income elasticities.

Second, child care subsidies reduce the amount of time children spend with their parents, while increasing the amount of time in nonparental child care. Although increased spending on quality enhancing goods is predicted to be beneficial for child development, the impact of reduced maternal time depends on the relative quality of maternal versus nonparental child care. Evidence on the effect of maternal employment and child care is inconclusive. However, a key determinant of this relative productivity is the way in which the CCDF influences access to high-quality providers. As the previous section makes clear, there are several design features associated with the CCDF that raise concerns about the level of child care quality received by subsidized children. Overall, it is

[18] This is true under the plausible assumption that both are normal goods. Note that the additional expenditures on child care will be less than the amount of the subsidy due to the income effect.

unclear *a priori* whether subsidies are beneficial or detrimental to child development, and so this is ultimately an empirical question.

By substituting subsidy receipt into the non-market time of parents and non-parental child care quality, we can represent child outcomes as a function of child care subsidy receipt. Thus, our goal is to obtain reduced form parameters of the relationship between child outcomes and subsidy receipt. We start with an econometric model as follows:

$$Y_i = X_i\beta + \alpha S_i + \varepsilon_i, \quad (1)$$

where Y_i is one of nine measures of child development taken for child i in the fall and spring of kindergarten; S_i is an indicator for child care subsidy receipt in the year before kindergarten; X_i is a vector of exogenous determinants of child outcomes; and ε_i is a disturbance term. Note that α is an estimate of the net effect of child care subsidies on child development. It represents the combined effect that takes place through parents' altered time and budget constraints, as well as supply-side limitations on the ability to purchase quality care, both of which are predicted to have implications for child development.

Estimating equation (1) with the Ordinary Least Squares (OLS) will yield a biased estimate of α if the unobserved determinants of child outcomes are correlated with child care subsidy receipt. For example, mothers who seek and obtain a subsidy (as well as those who work and use nonparental child care) may be systematically different from those who do not in ways that are not observed by researchers. If high-skilled mothers are more likely to work and have high-skilled children, then failing to control for maternal productivity would lead to an upward bias of α. Another selection mechanism deals with the possibility that mothers take children's cognitive ability, temperament, and economic circumstances into consideration when deciding whether to work and obtain a child care subsidy. If mothers differentially select work and child care choices based on unobserved child characteristics, the coefficient on subsidy receipt, α, will once again be biased.

We take a number of steps to guard against bias from unobserved heterogeneity. First, we

exploit the richness of the ECLS-K data to control for an extensive set of child and family characteristics. Second, we incorporate detailed zip code-level and state social policy controls into the model. The purpose of these variables is to account for environmental and policy determinants of preferences for employment and child care that may influence child outcomes. Finally, we estimate models using Two-Stage Least Squares (2-SLS). To implement this approach, we rely on exclusion restrictions to identify the subsidy coefficient, α, in equation (1). Specifically, we need at least one instrument that is correlated with child care subsidy receipt, but uncorrelated with child outcomes. We use variables that determine how subsidies are rationed by state and local administrators under the assumption that child outcomes are orthogonal to the rationing mechanism, conditional on subsidy receipt status. Furthermore, we assume that rationing is conducted at the county level and therefore use county dummies as identifying instruments (Blau & Tekin, 2007).

A number of recent studies provide evidence that local subsidy administrators have substantial autonomy to *interpret* federal and state policy, as well as the authority to *shape* policy decisions with little oversight (Layzer & Collins, 2000; Blank et al., 2001; Mitchell et al., 1997). Appendix Table 1 shows that child care subsidy programs in all but seven states (Arizona, Connecticut, Hawaii, New Hampshire, Rhode Island, South Carolina, and South Dakota) are administered by county welfare or social service agencies.[19] In at least three states (Colorado, New York, and Texas), subsidy policy *and* administration are largely determined by county agencies, while another two states (Florida and Virginia) allow such agencies to establish local eligibility criteria. Perhaps the most common policy decision devolved to local agencies is establishing reimbursement rates, with counties in 38 states having the authority to do so. Appendix Table 1 also presents examples of administrative tools used by states to ration subsidies: creating wait lists/frozen intake (17 states) and providing an entitlement for TANF families (16 states). Such policies are critical to determining the mix of low-income families that access child care assistance. Thus, we

[19] In some states, the subsidy program is operated by regional agencies, which typically include groups of counties.

believe that the combination of local administration and rationing makes the county identifiers plausible candidates for explaining variation in child care subsidy receipt.

This identification strategy will be invalid if the county dummies cannot be appropriately excluded from equation (1). For example, state and local government policies may influence child outcomes through mechanisms that are outside the child care subsidy system. If states and localities with generous subsidy benefits are also more likely to offer pre-kindergarten programs and other child-related benefits, then our identification strategy will be invalid if these programs are not accounted for in the estimation. In order to guard against this possibility, we include in some models 21 zip code-level and state policy variables that proxy the ability and determination of state and local governments to influence child outcomes.[20]

Although the ECLS-K provides researchers with a rich set of information on children's early cognitive and behavioral development, it is important to mention some drawbacks associated with these data. First, with the exception of a single measure of early parental employment, the ECLS-K does not collect detailed information on parents' work histories. A related concern is that we are unable to account for earnings and other income sources over the first few years of a child's life. Second, information on children's early child care experiences is missing as well. In fact, the only historical child care data available in the ECLS-K focus on the age at which children began participating in nonparental care. A final drawback is that direct measures of child care quality are missing for children's arrangements in the year before kindergarten entry. One might therefore be concerned that our estimated subsidy effects are confounded with early maternal work, income, and child care quality. We attempt to assess the implications of these missing data by undertaking a number of systematic specification checks. However, there are reasons to be suspicious of incorporating such controls into the current analysis. It is well-known that maternal employment,

[20] Blau and Tekin (2007) provide evidence that county identifiers might be plausible instruments for identifying the effect of subsidy receipt on maternal employment. They predict subsidy receipt probabilities for women who are not mothers in their sample. Since these women are ineligible for subsidies, subsidy receipt estimated from a model using country dummies as identifiers should not have significant effects on the employment for these mothers. Their test provides no evidence against the identifying assumptions.

income, and child care quality are each endogenous to child outcomes, and dealing with them in addition to the endogeneity of subsidy receipt would add undue complexity to the empirical analysis. As others have noted, finding plausible instruments for maternal employment and child care, in particular, is a difficult task (Blau & Tekin, 2007; Bernal & Keane, 2008). Furthermore, measures of maternal work and child care time are highly correlated for single mothers, making it difficult to distill their independent effects (Bernal & Keane, 2008). Finally, excluding these factors allows us to concentrate on the overall impact of child care subsidies, which we argue is the parameter of interest from a policy perspective.

V. Empirical Results

Table 1 presents means for the outcome variables across subsidized and unsubsidized children in the ECLS-K. The figures reported in the table are weighed using the appropriate sample weight. Note that the reading and math scores of children in our sample are slightly below the mean for the full ECLS-K sample, with average scores of about 48. This is not surprising, given that the sample consists of children living in single-parent families. The table also shows that subsidized children perform worse than their counterparts in every domain, and most of these differences persist to the spring of kindergarten. In fact, tests of the null hypothesis of no difference between subsidy recipients and non-recipients are rejected for six of nine outcomes in the fall of kindergarten and six of seven outcomes in the spring of kindergarten. One should interpret these results with caution, as they do not adjust for any differences between subsidy recipients and non-recipients. Some of these poorer outcomes could reflect the possibility that subsidized children come from socially and economically disadvantaged backgrounds, an issue we explore next.

Table 2 displays summary statistics for the full set of variables used in the analysis. These results are presented for the entire sample and separately for subsidy recipients and non-recipients. As expected, subsidized children are much more likely to be placed in center care than non-recipients. More than 41 percent of subsidy recipients participate in center-based arrangements,

while only 12 percent of non-recipients are in such care. Subsidy recipients are also more heavily represented in other modes of non-relative care (nine percent versus seven percent). Non-recipients are mostly cared for by relatives and parents: fully 41 percent of non-recipient children receive care in either of these settings.

Interestingly, the table draws a mixed picture about the social and economic environments from which subsidy recipients and non-recipients are drawn. Subsidy recipients appear to be more disadvantaged on the basis of whether the mother was a teenager at first birth and whether she received food stamps. Furthermore, recipient families have fewer resources that may positively influence child development, as measured by the number of children's books, tapes, and CDs available in the home. On the other hand, subsidized children are no more likely to be born prematurely and are less likely to have low birth weights. Subsidized families have lower incomes, on average, which is not surprising given states' eligibility threshold. However, a closer look at family income reveals a non-linear relationship between income and subsidy receipt. In particular, families in the middle of the income distribution are more likely to receive a subsidy than those from other categories, indicating that subsidized families are not drawn disproportionately from the most disadvantaged backgrounds. A similarly complex relationship emerges when one compares educational attainment. Mothers of subsidized children are less likely to be high school drop-outs (13 percent versus 18 percent) and more likely to have some college education (40 percent versus 34 percent). On the other hand, mothers of unsubsidized children are more likely to have a bachelor's degree or more (11 percent versus 5 percent).

A final piece of descriptive evidence points to a reasonable amount of observational equivalence between subsidy recipients and non-recipients. The ECLS-K produces an index of socioeconomic status (SES), which combines mother's and father's education, mother's and father's occupational status, and total family income. According to this measure, subsidized and unsubsidized families are equally represented in every SES quintile but the top one. Even here,

however, the difference is not quantitatively large (five percent versus 11 percent).

In sum, although it appears that subsidized children are drawn from disadvantaged social and economic backgrounds, they are not disproportionately represented in the lowest SES quintiles. This is not surprising, given that the process of navigating the subsidy system probably requires substantial motivation and skill. Moreover, that the observable characteristics of subsidized families indicate that they are not negatively selected is interesting in light of the raw outcome differences between subsidized and unsubsidized children. Such a pattern is an initial piece of evidence that mechanisms outside the family context could be responsible for the poorer outcomes of subsidized children.

Results from OLS regressions of the fall of kindergarten child outcomes on child care subsidy receipt are presented in Table 3. Column (1) shows the subsidy coefficient for separate regressions that control for the child and family characteristics presented in Table 2.[21] Column (2) adds the state-level policy variables that are assumed to influence child outcomes, while column (3) incorporates the zip code-level variables that further account for local policy and attitudinal differences affecting child development.

As shown in Table 3, many of the differences in child outcomes between subsidy recipients and non-recipients disappear once the observable characteristics of children and families are added to the model. Specifically, differences in reading test scores, approaches to learning, self-control, interpersonal skills, and gross motor skills between subsidized and unsubsidized children are rendered statistically insignificant in column (1). Subsidy receipt, however, continues to be associated with increases in externalizing behavior problems, with the coefficient indicating that subsidies increase the frequency of such behavior by 0.1 standard deviations. With the exception of self-control, adding the state policy and zip code-level controls does not alter the results. As shown in column (2) and (3), the coefficient on subsidy receipt becomes statistically significant in the self-

[21] The only variables omitted from Table 2 are the indicators of child care participation.

control model, once again implying that subsidized children display more behavior problems. The magnitude of the subsidy coefficient in the externalizing behavior model is unchanged, and continues to be statistically significant at conventional levels.

Results from the fall 2-SLS models are presented in Appendix Table 2 (first-stage subsidy receipt equation) and Table 4 (second-stage child outcome equations). Looking first at the model predicting subsidy receipt, our results are consistent with previous studies (Blau & Tekin, 2007; Herbst, 2008a; Meyers, Heintze, & Wolf, 2002). Black children and those with multiple siblings are more likely to receive a subsidy. Mother's education is positively correlated with the likelihood of subsidy receipt, which is consistent with the story that considerable knowledge and skill may be necessary to navigate the application process and deal with local government agencies. Early maternal employment is a positive predictor of subsidy receipt, reflecting the fact that CCDF child care subsidies are tied to participation in work-related activities. Finally, families receiving WIC and food stamps are more likely to obtain subsidies. That the likelihood of subsidy receipt is greater among employed mothers *and* those with some attachment to other means-tested programs has been documented elsewhere (Herbst, 2008a). To evaluate the strength of the identifying instruments, we calculate the partial R^2 and conduct an F-test for the joint significance of the county dummies. The R^2 increases by 0.09 when the county dummies are added to the model, and the F-test yields a highly significant 24.33, more than twice the guideline suggested by Bound, Jaeger, and Baker (1995) to avoid weak instruments. Such findings suggest that our instruments are capable of leveraging sufficient identifying variation to estimate fairly precise subsidy effects.

Turning to the second-stage results, we find that nearly all of the subsidy coefficients imply poorer cognitive, behavioral, and psychomotor outcomes. Once again, adding the state policy and zip code-level controls does not appreciably change the results, so we focus our interpretations on the full model [column (3)]. Children receiving subsidized care have reading test scores that are 2.9 points lower than unsubsidized children. This translates to an effect size of 0.29 standard deviations.

Similarly, subsidy recipients score 2.5 points lower than non-recipients on the standardized math test, translating to an effect size of 0.25 standard deviations. In the behavioral domain, subsidy receipt is consistently associated with increased behavior problems. In fact, the coefficient on subsidies for approaches to learning and self-control imply sizeable negative effects. Our estimates suggest that subsidized children experience reductions in these positive behaviors of about one-third of a standard deviation. Interestingly, subsidy receipt is no longer statistically significant for externalizing behavior in the 2-SLS models, while the coefficient is large (and negative) but imprecisely estimated for interpersonal skills and gross motor skills.

It is useful to put these effect sizes into context. Bernal and Keane's (2008) analysis of preschool-aged children (of single mothers) in the NLSY finds that an additional year of nonparental child care use is associated with a reduction of 0.11 standard deviations in children's cognitive test scores. Conversely, low-skilled mothers whose children participate in formal care for an additional year experience increases of 0.25 standard deviations in cognitive test scores. Baker, Gruber, and Milligan's (2008) study of Quebec's child care program finds that subsidized children show a decline in social development of 0.17 standard deviations. Recent work on state pre-kindergarten programs also provides useful benchmarks. Gormley and Gayer's (2005) evaluation of Tulsa, Oklahoma's program finds effect sizes of 0.39 (cognitive ability), 0.38 (language ability), and 0.24 (motor skills) standard deviations. Finally, Magnuson, Ruhm, and Waldfogel (2007) estimate effect sizes of 0.24 (reading test), 0.20 (math test), -0.18 (self-control), and 0.24 (externalizing behavior) standard deviations for pre-kindergarten attendance among ECLS-K children. Thus, it appears that the absolute value of our subsidy estimates is similar to those from other early childhood intervention programs.

Specification Checks

The results discussed so far indicate a negative relationship between child care subsidy receipt in the year before kindergarten and child outcomes measured during the fall of kindergarten.

We now present results from several specification checks that examine the robustness of our initial findings (Table 5 and Table 6).

To assess whether these effects persist beyond the fall of kindergarten, we re-estimate our models using child outcomes measured during the spring of kindergarten interview. Results from these models are presented in column (1) and (3) of Table 5. Column (1) displays the subsidy coefficients from the OLS models, and column (3) displays the subsidy coefficients from the 2-SLS models. Note that we estimate these models using the specification that includes the zip code-level and state policy variables. As illustrated in column (1), the OLS coefficients are largely consistent with those in Table 3. There is a negative and statistically significant effect of subsidy receipt on self-control. The remaining coefficients are not estimated with much precision. While the OLS results do not point to a consistent pattern, the 2-SLS estimates presented in column (3) clearly suggest a negative effect of subsidy receipt that persists to the end of kindergarten. The coefficients on reading test scores, math test scores, and self-control are negative and significant, indicating that subsidy receipt reduces cognitive ability and increases behavior problems. The coefficients on approaches to learning and interpersonal skills are negative, again suggesting that subsidies are associated with worse behavioral outcomes, although neither coefficient is estimated precisely. Only the estimates for internalizing and externalizing behavior point to a positive effect of subsidy receipt, but neither is statistically significant.

As another attempt to guard against bias from unobserved heterogeneity, we take advantage of the fact that child outcomes in the ECLS-K are measured during multiple interviews. This allows us to estimate models with lagged dependent variables, which further account for unobservables that are correlated with child care subsidy receipt and child outcomes (Blau & Tekin, 2007).[22] To

[22] Conceptually, these models can be derived from a specification which posits that current child development (Y_{it}) is determined by subsidy receipt in all the previous periods, beginning with the most recent one. That is,

$$Y_{it} = \mu + \alpha S_{it-1} + \lambda\alpha S_{it-2} + \lambda^2\alpha S_{it-3} + \lambda^3\alpha S_{it-4} +,\ldots,+ \varepsilon_{it}. \quad (2A)$$

implement this approach, we estimate OLS and 2-SLS regressions of spring of kindergarten child outcomes on subsidy receipt, the full set of exogenous controls, and the appropriate lagged dependent variable (fall of kindergarten child outcome). Subsidy coefficients from these models are displayed column (2) and (4) of Table 5. Most of the OLS estimates, in column (2), point to a negative effect of subsidy receipt, although only the coefficient in the self-control model is statistically significant. The 2-SLS estimates, in column (4), also point to consistent negative effects. In particular, we find that subsidy recipients score 1.6 points lower than non-recipients on the reading test and 2.9 points lower on the math test, translating to effect sizes of 0.16 and 0.29, respectively. While most of the subsidy coefficients continue to point to negative effects in the behavioral domain, none of the estimates are measured precisely enough to be statistically significant.

Table 6 presents additional results that check the sensitivity of our findings to different specifications. The first row in this table shows the baseline subsidy results, which come from column (3) in Table 4. The second row restricts the analysis to states with clear evidence of county administration of child care subsidy programs. Specifically, we use the information in Appendix Table 1 to exclude states that do not meet two of the following three criteria: county-level variation in administration, eligibility determination, or reimbursement rates.[23] Our results do not change after restricting the sample in this manner. In fact, the coefficients on subsidy receipt become more significant despite a 20 percent reduction in the sample size. Note that the subsidy coefficient for

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Note that if $\lambda<1$, then the influence of subsidy receipt on child development becomes smaller as one goes back further into the past. Multiplying (2) by λ and lagging by one period results in:

$$\lambda Y_{it-1} = \lambda\mu + \lambda\alpha S_{it-2} + \lambda^2\alpha S_{it-3} + \lambda^3\alpha S_{it-4} + \lambda^4\alpha S_{it-5} + ,\ldots,+ \lambda\varepsilon_{it-1}. \quad (2B)$$

Subtracting (2B) from (2A) and re-arranging the terms yields

$$Y_{it} = \pi + \lambda Y_{it-1} + \alpha S_{it-1} + \omega_{it}, \quad (3)$$

where $\pi = \mu(1 - \lambda)$ and $\omega_{it}=(\varepsilon_{it} - \lambda\, \varepsilon_{it-1})$. We augment (3) by adding the controls in (1) to estimate the following equation:

$$Y_{it} = \pi + \lambda\, Y_{it-1} + \alpha S_{it-1} + X_i\beta + \omega_{it}. \quad (4)$$

[23] Applying these criteria eliminates 16 states from the analysis: Arizona, Connecticut, Hawaii, Iowa, Louisiana, Mississippi, New Hampshire, New Jersey, North Dakota, Rhode Island, South Carolina, South Dakota, Utah, Vermont, West Virginia, and Wyoming. We also experimented with models that applied only the first of these criteria (county-level administration). The results are very similar to those discussed in the text.

interpersonal skills is now statistically significant at the 10 percent level, while the coefficient for gross motor skills is marginally significant (p=0.109). The increase in statistical significance is expected since the instrument presumably becomes less noisy once we eliminate from our sample states with questionable variation in local control over subsidy policy and administration. We argue that the pattern exhibited in the second row of Table 6 provides more evidence in support of our identification strategy.

The next three rows in Table 6 attempt to deal with some of the drawbacks associated with missing data on child care quality and parental employment. To account for differences in child care quality across subsidy recipients and non-recipients, we add nine controls for states' child care regulations, including child-staff ratios and maximum group sizes.[24] Given that these regulations vary across children in different states, the subsidy effects are still not adjusted for differential quality within child care institutions or classrooms for a given state. Nevertheless, the results indicate that the impact of subsidy receipt is robust to cross-state differences in regulation-based child care quality. Results in rows 3 and 4 assess the influence of missing parental work histories in the ECLS-K. In particular, we use as a proxy for early maternal work dummy variables indicating whether children began nonparental care arrangements during the first three years of life. We also add an indicator for mothers' contemporaneous employment status, along with the control for lagged employment. As shown in rows 3 and 4, adding these variables does not appreciably change our results.

Interpretation of Empirical Results

By accounting for the endogeneity of child care subsidy receipt, we mitigate the influence of unobserved child and family characteristics that are correlated with measures of child well-being. An

[24] The full set of regulation controls is the following: center child-staff ratios for four-year-olds; family child-staff ratios for four-year-olds; center maximum group size for four-year-olds; family maximum group size for four-year-olds; a dummy variables that equals unity if center directors are required to have at least a BA degree; a dummy variables that equals unity if center/family child care staff are required to enroll in child development coursework; a dummy variables that equals unity if center/family staff are required to undergo a criminal background check; a dummy variables that equals unity if center/family indoor space is regulated by states; and a dummy variables that equals unity if states can impose a fine on center/family providers for failing to comply with regulations.

important question is why subsidies continue to influence child outcomes even after removing systematic differences between subsidized and unsubsidized children. In this section, we elaborate further on the mechanisms through which subsidies might have detrimental effects on children. The thrust of our discussion focuses on the stability and intensity of child care use during the period ECLS-K children received subsidized care (i.e., the year prior to kindergarten entry). We then turn our attention to summarizing previous research on overall child care quality in the U.S., as well as studies comparing quality across subsidized and unsubsidized children.

As previously stated, conditioning eligibility for child care subsidies on employment and income can be at odds with child development if lapses in eligibility lead to unstable child care arrangements.[25] Indeed, studies show that children participating in multiple arrangements have difficulties adjusting to new environments and developing trusting relationships with teachers and peers (Bacharach & Baumeister, 2003; Crockenberg & Litman, 1991; Youngblade, 2003). Such concerns are heightened given that the median subsidy spell lasts only three to seven months (Meyers et al., 2002). Furthermore, by increasing purchasing power, child care subsidies create incentives to buy more child care in the formal market. If the quality of care purchased with subsidies is poor, then subsidies might lead to a situation in which subsidized children are exposed to risky environments for longer periods.

Using the ECLS-K, we examine whether subsidized and unsubsidized children differ according to the intensity and stability of nonparental arrangements. Results from this exercise are presented in Table 7. The top panel of Table 7 provides an overview of child care use in the years prior to subsidy receipt. Specifically, it shows the fraction of recipients and non-recipients beginning their first nonparental arrangement at a given age. It appears that the patterns of early child care use

[25] Recent work by Adams, Snyder, and Sandfort (2002) highlight many challenges faced by parents in retaining access to child care subsidies. For example, states' recertification process, which occurs at regular intervals (usually every six or 12 months), is a way for agencies to check employment and income eligibility status. However, a failure to recertify can leave families ineligible for subsidies. Furthermore, states require parents to notify agencies if there is a change in employment status, including a job loss or a change in hours worked. Some states offer a brief window of continued access to subsidies if parents lose their job (to facilitate a job search), but others move quickly to eliminate eligibility.

are similar for both groups of children. For example, about equal proportions of subsidized and unsubsidized children first participated in nonparental care before age one (46 percent versus 43 percent). A significantly greater fraction of recipients started care at age one, but the percentages are identical at each starting-age thereafter.

The story changes dramatically, however, for child care use in the year of subsidy receipt (bottom panel of Table 7). In particular, subsidized children participate in nonparental care more intensively than non-recipients. Recipients are more likely to use a nonparental arrangement at least five times per week (82 percent versus 75 percent), and are more likely to be in care at least 40 hours per week (42 percent versus 35 percent). In addition, we find evidence that subsidized children receive less stable child care: a significantly greater share of subsidy recipients participates in multiple arrangements (57 percent versus 41 percent). Taken together, these data suggest that differential patterns of child care use emerge after children receive a subsidy. Subsidy recipients participate in nonparental care child environments more intensively, but at the same time, these arrangements tend to be more unstable. Of course, greater intensity of child care use cannot by itself explain the poorer outcomes among subsidized children; the impact of exposure depends crucially on the quality of care. However, the ECLS-K data do not permit detailed comparisons of child care quality, so we turn to the literature to provide insights.

Recent empirical work finds that average child care quality in the U.S. is rated "minimal" or "good" according to structural (e.g., child-to-staff ratio, group size, and conformity with health and safety standards) and process (e.g., caregiver interactions and cognitive/language stimulation) measures of child care environments (Helburn et al., 1995; Mocan, 1997; NICHD, 2000a). Studies by the NICHD Early Child Care Research Network (2000a) estimate that 42 percent of preschool child care settings are "poor" or "fair" quality, and that positive caregiving is "highly characteristic" for only 12 percent of children. A review of child care settings by the National Research Council appears to corroborate this, finding that 10 percent to 20 percent of early care and education

environments are “inadequate” and pose serious risks to child development (National Research Council & Institute of Medicine, 2000).

Although overall child care quality has been rated “good” at best, it is important for the purposes of this paper to discuss differences in purchased quality across low- and high-income families and subsidized and unsubsidized families. Studies comparing child care use across income groups find inconsistent differences in the quality of center-based care, with some research pointing to higher quality among low-income children (NICHD, 1997; Phillips et al., 1994) and others finding lower quality (Loeb et al., 2004; Marshall et al., 2001). Research by Dowsett et al. (2008) finds that structural measures of child care quality are about equal for low- and high-income children, but that poor children experience lower quality care across several process-oriented measures, including negative adult interactions and cognitive stimulation. The quality of family-based and relative care, however, is more consistently of lower quality among low-income children (Coley et al., 2001; Dowsett et al., 2008; Votruba-Drzal et al., 2004).

A sizeable body of research compares purchased child care quality across subsidized and unsubsidized (low-income) children. Generally speaking, results from these studies imply that subsidized children receive lower-quality care (Adams et al., 2001; Jones-Branch et al., 2004; Mocan, 2007; Raikes, Raikes, & Wilcox, 2005; Queralt, Witte, & Greisinger, 2000; Thornburg et al., 2002; Whitebook et al., 2004; Witt, Queralt, & Witte, 2000). For example, recent work by Mocan (2007) finds that subsidy density within child care centers (or the fraction receiving subsidized care) is negatively associated with a number of quality indicators, such as the sensitivity of child-teacher interactions, the frequency and nature of parent-teacher interactions, availability of materials that facilitate imaginative and active play, and the level of daily supervision. These findings are corroborated by state-specific analyses. An examination of daycare centers in Nebraska, for example, finds that subsidy density is negatively correlated with overall quality, as well as teacher salary and measures of cognitive stimulation (Jones-Branch et al., 2004). Many of these quality

differences are pronounced for children attending family-based care. A general finding in the literature is that subsidized providers are rated worse on both structural and process measures, especially caregiver education and sensitivity, staff turnover, and social interactions. Other researchers find that subsidized providers are also more likely to be out of compliance with state licensing standards (Queralt, Witte, & Greisinger, 2000; Thornburg et al., 2002).

In sum, this discussion suggests that child care subsidies shift children into a formal market providing "minimal" or "good" quality services, with (unsubsidized) low-income and subsidized children experiencing even poorer-quality environments. These quality concerns cut across the range of formal child care options—including center-based care—but appear to be particularly applicable to family-based settings. Results from this body of work, in combination with the descriptive evidence presented in Table 6, paint a tentative picture about the mechanisms through which the negative subsidy effects are operating. Specifically, it is conceivable that subsidized children receive intense exposure to low-quality care through center- and family-based arrangements. Furthermore, given that subsidized children are more likely to participate in multiple arrangements, these quality deficits might grow larger as the number of child care settings increases. Our story for the role of child care quality is plausible in light our earlier finding that subsidized families are equally represented across most socioeconomic strata.

VI. Conclusions

In recent years, child care subsidies have become an important policy instrument to help low-income parents move from welfare into the paid labor force. Given that the current subsidy system strictly ties benefits to participation in work-related activities, parents are able to use subsidies to purchase child care services from any legally-operating provider. However, there are few incentives or requirements within the CCDF that encourage parents and providers to make quality-enhancing investments. As a consequence, there are reasons to be concerned about the implications of child care subsidies for the well-being of children.

In this paper, we provide the first systematic assessment of the impact of the U.S. child care subsidy system on child development. Using a sample of ECLS-K children living with single mothers, we find consistent evidence that subsidies are associated with negative child development outcomes. In particular, our results suggest that subsidy receipt in the year before kindergarten lowers reading and math test scores, decreases the eagerness to learn, and leads to more behavior problems in the fall of kindergarten. The negative subsidy effects for reading and math test scores persist to the spring of kindergarten, but many of the behavioral effects attenuate. Although far from definitive, we provide evidence that the intense exposure to low-quality child care could be responsible for the negative subsidy effects. This story seems plausible in light of the fact that subsidized families are no worse off economically than their unsubsidized counterparts.

Our investigation points to the necessity of aligning the employment goals established by recent social policy reforms with the goal of ensuring child health and well-being. One way to accomplish this is by decoupling the strong relationship between subsidy receipt and employment, or by giving parents and child care providers strong to incentives to make quality investments. Based on the results of this study, policy changes directed at increasing the continuity of subsidized care would be beneficial, as would establishing reimbursements at a level high enough to allow parents to choose among high-quality providers in the community. Furthermore, the recent experience with pre-kindergarten in the U.S. may provide additional guidance on how to integrate child development goals into the subsidy system.

There are several possible directions for future research in this area. First, it is critical that researchers understand the mechanisms through which child care subsidies influence child well-being. Although we put forth a plausible story about the role of child care quality, additional work needs to verify whether this is the case. Future work should also attempt to understand the role of maternal employment, given that previous studies tend to find a negative relationship between early maternal work and child development. Second, it is important to determine whether certain child

care arrangements are responsible for the negative subsidy effects. It is clear that subsidy recipients are more likely to participate in center- and family- based child care, making these arrangements a reasonable place to begin an investigation. Finally, it is important to explore heterogeneity in the impact of child care subsidies. Given that previous research on child care finds a differential response depending on child and family characteristics, one may assume that such heterogeneity exists with respect to subsidies.

References

Adams, D., Roach, M., Riley, D., & Edie, D. (2001). Are program characteristics linked to child care quality? Wisconsin Child Care Research Partnership Issue Brief 3. Madison, WI: University of Wisconsin-Extension.

Adams, G., & Rohacek, M. (2002). More than a work support? Issues around integrating child development goals into the child care subsidy system. *Early Childhood Research Quarterly, 17,* 418-440.

Adams, G., Tout, K., & Zaslow, M. (2007). Early care and education for children in low-income families: Patterns of use, quality, and potential policy implications. Working Paper No. 4. Prepared for the Roundtable on Children in Low-income Families. Washington, DC: The Urban Institute.

Adams, G., Snyder, K., & Sandfort, J. (2002). Getting and retaining child care assistance: How policy and practice influence parents' experiences. Assessing the New Federalism Occasional Paper 55. Washington, DC: The Urban Institute.

Anderson, P. & Levine, P. (2000). Child care and mothers' employment decisions. In Finding Jobs: Work and Welfare Reform, Rebecca M. Blank and David Card, eds., New York: Russell Sage Foundation.

Bacharach, V., & Baumeister, A. (2003). Child care and severe externalizing behavior in kindergarten children. *Journal of Applied Developmental Psychology, 23,* 527-537.

Baker, M., Gruber, J., and Milligan, K. (2008). Universal child care, maternal labor supply, and family well-being. *Journal of Political Economy, 116,* 709-745.

Baum, C. (2002). A dynamic analysis of the effect of childcare costs on the work decisions of low-income mothers with infants. *Demography, 39,* 139-164.

Baydar, N., & Brooks-Gunn, J. (1991). Effects of maternal employment and child care arrangements in infancy on preschoolers' cognitive and behavioral outcomes: Evidence from the children of the NLSY. *Developmental Psychology, 27,* 918-931.

Bernal, R. (2008). The effect of maternal employment and child care on children's cognitive development. *International Economic Review, 49,* 1173-1209.

Bernal, R. & Keane, M. (2008). Child care choices and children's cognitive achievement: The case of single mothers, Universidad de los Andes Working Paper WP-July 31.

Blank, H., Behr, A., & Schulman, K. (2001). State Developments in Child Care, Early Education, and School Age Care, 2000. Washington DC: Children's Defense Fund.

Blau, F. & Grossberg, A. (1992). Maternal labor supply and children's cognitive development. *Review of Economics and Statistics, 74,* 474-481.

Blau, D. and Hagy, A. (1998). The demand for quality in child care. *Journal of Political Economy, 106,* 104-146.

Blau, D. & Tekin, E. (2007). The determinants and consequences of child care subsidies for single mothers in the USA. *Journal of Population Economics, 20,* 719−741.

Bound, J., Jaeger, D., & Baker, R. (1995). Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak. *Journal of the American Statistical Association, 90,* 443-450.

Brooks-Gunn, J., Han, W., & Waldfogel, J. (2002). Maternal employment and child cognitive outcomes in the first three years of life: The NICHD study of early child care. *Child Development, 73,* 1052-1072.

Buchinal, M., Roberts, J., Riggins, R., Zeisel, S., Neebe, E., & Bryant, D. (2000). Relating quality of center-based child care to early cognitive and language development longitudinally. *Child Development, 71,* 339-357.

Child Care Bureau. (2005a). 2005 CCDF State Expenditure Data. Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Child Care Bureau. Accessed from http://www.acf.hhs.gov/programs/ccb/data/index.htm on March 1, 2008.

Child Care Bureau. (2005b). FFY 2005 CCDF Data Tables. Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Child Care Bureau. Accessed from http://www.acf.hhs.gov/programs/ccb/data/index.htm on March 1, 2008.

Coley, R., Chase-Lansdale, L., & Li-Grining, C. (2001). Child care in the era of welfare reform: quality, choices, and preferences. Policy Brief 01-4. Welfare, Children, and Families, A Three-City Study. Baltimore, MD: Johns Hopkins University.

Crosby, D., Gennetian, L., & Huston, A. (2005). Child care assistance policies can affect the use of center-based care for children in low-income families. *Applied Developmental Science 9,* 86-106.

Desai, S., Chase-Lansdale, P., & Michael, R. (1989). Mother or market? Effects of maternal employment on four-year-olds' intellectual abilities. *Demography, 26,* 545-561.

Dowsett, C., Huston, A., Imes, A., & Gennetian, L. (2008). Structural and process features in three types of child care for children from high and low income families. *Early Childhood Research Quarterly, 23,* 69-93.

Fang, H. & Keane, M. (2004). Assessing the impact of welfare reform on single mothers. *Brookings Papers on Economic Activity, 35,* 1-116.

Gennetian, L., Crosby, D., Dowsett, C., Huston, A., & Principe. (2005). Center-based care and social development of low-income children of working mothers. Paper presented at the biennial meeting of the Society for Research in Child Development. Atlanta, GA: SRCD Meetings, April 2005.

Gormley, W. (2007). Early childhood care and education: Lessons and puzzles. *Journal of Policy Analysis and Management, 26,* 633-671.

Gormley, W. & Gayer, T. (2005). Promoting school readiness in Oklahoma: An evaluation of Tulsa's pre-k program. *Journal of Human Resources, 40,* 533-558.

Grogger, J. (2003). The effects of time limits, the EITC, and other policy changes on welfare use, work, and income among female-headed families. *Review of Economics and Statistics, 85,* 394-408.

Hagy, A. (1998). The demand for child care quality: An hedonic price theory approach. *Journal of Human* Resources, *33,* 683-710.

Han, W. & Waldfogel, J. (2001). Child care costs and women's employment: A comparison of single and married mothers with pre-school age children. *Social Science Quarterly, 82,* 552-568.

Heckman, J., & Materov, D. (2004). The Productivity Argument for Investing in Young Children. High/Scope Educational Research Foundation. *The High/Scope Perry Preschool Study Through Age 40,* November.

Helburn, S., W., Culkin, W., Morris, J., Mocan, N., Howes, C., Phillipsen, L., Bryant, D., Clifford, R., Cryer, D., Peisner-Feinberg, E., Burchinal, M., Kagan, S., & Rustici, J. (1995). Cost, quality and child outcomes in child care centers study. Denver, CO: University of Colorado.

Herbst, C. (2008a). Who are the eligible non-recipients of child care subsidies? *Children and Youth Services Review, 30,* 1037-1054.

Herbst, C. (2008b). Do social policy reforms have different impacts on employment and welfare use as economic conditions change? *Journal of Policy Analysis and Management, 27,* 867-894.

Hill, J., Waldfogel, J., & Brooks-Gunn, J. (2002). Differential effects of high quality child care. *Journal of Policy Analysis and Management, 21,* 601–627.

James-Burdummy, S. (2005). The effect of maternal labor force participation on child development. *Journal of Labor Economics, 23,* 177-211.

Jones-Branch, J., Torquati, J., Raikes, H., & Edwards, C. (2004). Child care subsidy and quality. *Early Education and Development, 15,* 329-341.

Kimmel, J. (1998). Child care costs as a barrier to employment for single and married mothers. *Review of Economics and Statistics, 80,* 287-299.

Layzer, J. & Collins, A. (2000). National Study of Child Care for Low-Income Families, State and Community Sub-study, Interim Report, Executive Summary, Abt Associates, November.

Liu, H., Mroz, T., & van der Klaauw, W. (2003). Maternal employment, migration, and child development. Working Paper. Department of Economics, University of North Carolina, Chapel Hill.

Loeb, S., Fuller, B., Kagan, S. & Carrol, B. (2004). Child care in poor communities: Early learning effects of type, quality and stability. *Child Development, 75*, 47–65.

Lynch, R. (2004). *Exceptional Returns: Economic, Fiscal, and Social Benefits of Investment in Early Childhood Development.* Washington, D.C.: Economic Policy Institute.

Magnuson, K., Ruhm, C., & Waldfogel, J. (2007). Does prekindergarten improve school preparation and performance? *Economics of Education Review, 26,* 33-51.

Marshall, N., Creps, C., Burstein, N., Glantz, F., Robeson, W., & Barnett, S. (2001). The cost and quality of full day, year-round early care and education in Massachusetts: Preschool classrooms. Cambridge, MA: Wellesley Centers for Women and Abt Associates, Inc.

Meyer, B. & Rosenbaum, D. (2001). Welfare, the earned income tax credit, and the labor supply of single mothers. *Quarterly Journal of Economics, 116,* 1063-1114.

Meyers, M., Heintze, T., & Wolf, D. (2002). Child care subsidies and the employment of welfare recipients. *Demography, 39,* 165-180.

Meyers, M., Peck, L., Davis, E., Collins, A., Kreader, J.L., Georges, A., Weber, R., Schexnayder, D., Schroeder, D., & Olson, J. (2002). The dynamics of child care subsidy use: A collaborative study of five states. New York: National Center on Children in Poverty, Columbia University.

Mitchell, A., Stoney, L., & Dichter, H. (1997). Financing child care in the United States: An illustrative catalog of current ctrategies, 1997. Kansas City: MO: Edition E.M. Kaufman Foundation.

Mocan, N. (1997). Cost functions, efficiency, and quality in day care centers. *Journal of Human Resources, 32,* 861-891.

Mocan, N. (2007). Can consumers detect lemons? An empirical analysis of information asymmetry in the market for child care. *Journal of Population Economics, 20,* 743-780.

National Institute of Child Health and Human Development (NICHD). Early Child Care Research Network. (1997). Poverty and patterns of child care. In *Consequences of Growing Up Poor*. Greg J. Duncan and Jeanne Brooks-Gunn (Eds.). New York: Russell Sage Foundation.

National Institute of Child Health and Human Development (NICHD). (2000a). Characteristics and quality of child care for toddlers and preschoolers. *Applied Developmental Science, 4,* 116-141.

National Institute of Child Health and Human Development (NICHD). (2000b). The relation of child care to cognitive and language development. *Child Development, 71,* 960-980.

National Institute of Child Health and Human Development (NICHD). (2003a). Does quality of childcare affect child outcomes at age 4 ½? *Developmental Psychology, 39*, 451-469.

National Institute of Child Health and Human Development (NICHD). (2003b). Does amount of time spent in childcare predict socioemotional adjustment during the transition to kindergarten? *Child Development, 74*, 976-1005.

National Institute of Child Health and Human Development (NICHD) and Duncan, G. (2003). Modeling the impacts of child care quality on children's preschool cognitive development. *Child Development, 74*, 1454-1475.

National Institute for Early Education Research (NIEER). (2005). The State of Preschool: 2005 State Preschool Yearbook. New Brunswick, NJ: Rutgers University.

National Research Council and Institute of Medicine. (2000). From neurons to neighborhoods: the science of early child development. Committee on Integrating the Science of Early Childhood Development. Jack P. Shonkoff and Deborah A. Phillips (Eds.). Washington, DC. National Academies Press.

Office of Head Start. (2005). Head Start Program Fact Sheet. Available at: http://www.acf.hhs.gov/programs/ohs/about/fy2006.html. Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start.

Peisner-Feinberg, E., Burchinal, M., Clifford, R., Culkin, M., Howes, C., Kagan, S., & Yazejian, N. (2001). The relation of preschool child-care quality to children's cognitive and social development trajectories through second grade. *Child Development, 72,* 1534-1553.

Phillips, D., & Adams, G. (2001). Child care and our youngest children. *The Future of Children: Caring for Infants and Toddlers, 11*, 35-51.

Phillips, D., Voran, M., Kisker, E., Howes, C., & Whitebook, M. (1994). Child care for children in poverty: Opportunity or inequity? *Child Development, 65,* 472-492.

Queralt, M. & Witte, A. (1998). Influences on neighborhood supply of child care in Massachusetts. *Social Service Review, 72,* 17-47.

Queralt, M., Witte, A., & Greisinger, H. (2000). Championing our children': changes in quality, price and availability of child care in the welfare reform Era. Working Paper 2000-07. Wellesley, MA: Department of Economics, Wellesley College.

Raikes, H., Raikes, A., & Wilcox, B. (2005). Regulation, subsidy receipt and provider characteristics: What predicts quality in child care homes? *Early Childhood Research Quarterly , 20*, 164-184.

Ruhm, C. (2004). Parental employment and child cognitive development. *Journal of Human Resources, 39*, 155-192.

Schulman, K. & Blank, H. (2007). State child care assistance policies 2007: Some steps forward, more progress needed. Issue Brief. Washington, DC: National Women's Law Center.

Shonkoff, J. & Phillips, D. (2000). *From neurons to neighborhoods: The science of early childhood development*. Committee on Integrating the Science of Early Childhood Development. Washington, DC: National Academy Press.

Smolensky, E. & Gootman, J. (Eds). (2003). Working families and growing kids: Caring for children and adolescents. Washington, DC: National Academies Press.

Tekin, E. (2005). Child care subsidy receipt, employment, and child care choices of single mothers. *Economics Letters, 89*, 1-6.

Tekin, E. (2007). Single mothers working at night: Standard work, child care subsidies, and implications for welfare reform. *Economic Inquiry, 45,* 233−250.

Thornburg, K., Scott, J., & Mayfield, W. (2002). Early childhood program in Missouri: Workforce, quality, and policy-related findings. Report to the Midwest Child Care Research Consortium. Columbia, MO: Center for Family and Policy Research.

Tran, H. & Weinraub, M. (2006). Child care effects in context: Quality, stability, and multiplicity in nonmaternal child care arrangements during the first 15 months of life. *Developmental Psychology, 42,* 566-582.

U.S. Department of Health and Human Services, Administration for Children and Families (1999). Access to child care for low-income working families. Retrieved September 2003, from: www.acf.dhhs.gov/programs/ccb/research/ccreport/ccreport.

Vandell, D., & Wolfe, B. (2000). *Child care quality: Does it matter and does it need to be improved?* University of Wisconsin-Madison. Institute for Research on Poverty.

Votruba-Drzal, E., Coley, R., & Chase-Lansdale, L. (2004). Child care and low-income children's development: Direct and moderated effects. *Child Development, 75,* 296-312.

Whitebook, M., Phillips, D., Bellm, D., Crowell, N., Almaraz, M., & Jo, J. (2004). Two years in early care and education: A community portrait of quality and workforce stability, Alameda County, California. Berkeley, CA: Center for the Study of Child Care Employment, Institute of Industrial Relations, University of California, Berkeley.

Witt, R., Queralt, M., & Witte, A. (2000). Changes in the availability, quality, and price of child care in Massachusetts between 1997 and 1999. Working Paper 2000-12. Wellesley, MA: Department of Economics, Wellesley College.

Youngblade, L. (2003). Peer and teacher ratings of third- and fourth-grade children's social behavior as a function of early maternal employment. *Journal of Child Psychology and Psychiatry, 44*, 477-488.

Table 1: Descriptive Results for the Child Development Outcomes, Fall and Spring of Kindergarten

Variable	Full Sample	Subsidy Recipient	Non-Recipient
Cognitive Outcomes			
Reading Test Score, Fall (N=2,795)	47.54	46.79	47.67*
	(9.42)	(9.03)	(9.48)
Reading Test Score, Spring (N=2,659)	47.92	46.93	48.10**
	(9.73)	(9.21)	(9.81)
Math Test Score, Fall (N=2,795)	47.82	47.14	47.94
	(9.27)	(8.77)	(9.35)
Math Test Score, Spring (N=2,658)	48.14	47.05	48.33**
	(9.52)	(8.45)	(9.69)
Behavioral Outcomes			
Internalizing Behavior, Fall (N=2,795)	0.117	0.092	0.122
	(10.0)	(10.463)	(9.920)
Internalizing Behavior, Spring (N= 2,545)	0.047	0.839	-0.090*
	(9.840)	(10.021)	(9.804)
Externalizing Behavior, Fall (N=2,795)	0.155	1.848	-0.139***
	(10.102)	(10.708)	(9.966)
Externalizing Behavior, Spring (N= 2,551)	0.261	1.853	-0.015***
	(10.156)	(10.400)	(10.090)
Approaches to Learning, Fall (N=2,793)	0.010	-0.864	0.162*
	(9.994)	(10.073)	(9.974)
Approaches to Learning, Spring (N=2,560)	-0.130	-0.889	0.000
	(10.056)	(9.875)	(10.083)
Self-Control, Fall (N=2,720)	0.005	-1.556	0.276***
	(10.069)	(10.096)	(10.042)
Self-Control, Spring (N=2,554)	-0.167	-2.009	0.151***
	(10.073)	(9.691)	(10.105)
Interpersonal Skills, Fall (N=2,699)	0.011	-1.340	0.251***
	(9.994)	(10.306)	(9.921)
Interpersonal Skills, Spring (N=2,539)	-0.212	-1.737	0.050***
	(10.056)	(9.773)	(10.083)
Physical and Psychomotor Outcomes			
Fine Motor Skills, Fall (N=2,786)	-0.115	-0.155	-0.108
	(9.949)	(10.029)	(9.937)
Gross Motor Skills, Fall (N=2,766)	-0.068	-0.850	0.068*
	(9.933)	(9.920)	(9.931)

Source: Authors' calculations from the ECLS-K Base Year Restricted Use Data File.
Notes: All means are weighted using the ECLS-K Parent Full Sample weight. Standard deviations are in parentheses. Analyses are conducted on children with non-missing data. The number of subsidy recipients is 410 for the cognitive and behavioral outcomes, approaches to learning, and fine motor skills; 398 for self-control; 402 for interpersonal skills; 406 for gross motor skills. *, **, *** indicate that the difference in means for subsidy recipients and non-recipients is statistically significant at the 0.10 percent, 0.05 percent, and 0.01 percent levels, respectively.

Table 2: Descriptive Statistics by Subsidy Receipt Status

Variable	Full Sample	Subsidy Recipient	Non-Recipient
Child Characteristics			
Subsidy Recipient (%)	0.148	1.000	0.000
	(0.355)	(0.000)	(0.000)
Parent Child Care (%)	0.146	0.000	0.172***
	(0.353)	(0.000)	(0.377)
Relative Child Care (%)	0.220	0.137	0.234***
	(0.414)	(0.344)	(0.423)
Non-Relative Child Care (%)	0.072	0.091	0.068
	(0.258)	(0.288)	(0.253)
Center-based Child Care (%)	0.163	0.413	0.120***
	(0.370)	(0.493)	(0.325)
School-based Child Care (%)	0.399	0.359	0.406*
	(0.490)	(0.480)	(0.491)
Child's Age (Months, Fall of K)	68.50	68.36	68.52
	(4.47)	(4.02)	(4.54)
Boy (%)	0.506	0.506	0.506
	(0.500)	(0.501)	(0.500)
White (%)	0.399	0.344	0.409**
	(0.490)	(0.476)	(0.492)
Black (%)	0.370	0.421	0.362**
	(0.483)	(0.494)	(0.481)
Hispanic (%)	0.159	0.142	0.162
	(0.366)	(0.350)	(0.369)
Asian (%)	0.016	0.008	0.017
	(0.125)	(0.091)	(0.130)
Other Race/Ethnicity (%)	0.055	0.084	0.050***
	(0.229)	(0.278)	(0.218)
Weight (Pounds, Fall of K)	47.12	47.93	46.97*
	(9.59)	(9.61)	(9.58)
Premature Birth (%)	0.181	0.181	0.181
	(0.385)	(0.386)	(0.385)
Low Birth Weight (%)	0.071	0.058	0.074
	(0.258)	(0.233)	(0.262)
Disabled (%)	0.160	0.191	0.154*
	(0.366)	(0.394)	(0.361)
First-time Kindergartner (%)	0.947	0.943	0.948
	(0.224)	(0.232)	(0.222)
Only Child (%)	0.298	0.243	0.307***
	(0.457)	(0.429)	(0.461)
One Sibling (%)	0.370	0.350	0.374
	(0.483)	(0.478)	(0.484)
Two or More Siblings (%)	0.332	0.407	0.319***
	(0.471)	(0.492)	(0.466)
Family Characteristics			
Mother's Age (Years, Fall of K)	30.22	28.98	30.44***
	(5.99)	(5.35)	(6.07)
Mother was Teen at First Birth (%)	0.444	0.548	0.426***
	(0.497)	(0.498)	(0.495)
Early Maternal Work (%)	0.849	0.905	0.840***
	(0.358)	(0.293)	(0.367)
Mother's Education: Less than HS (%)	0.175	0.128	0.183***
	(0.380)	(0.335)	(0.386)
Mother's Education: HS/GED (%)	0.377	0.422	0.369**
	(0.485)	(0.495)	(0.483)

Mother's Education: Some College (%)	0.348	0.397	0.339**
	(0.476)	(0.490)	(0.473)
Mother's Education: BA+ (%)	0.100	0.052	0.109***
	(0.300)	(0.223)	(0.312)
Father's Education: Less than HS (%)	0.191	0.202	0.189
	(0.393)	(0.402)	(0.392)
Father's Education: HS/GED (%)	0.529	0.612	0.515***
	(0.499)	(0.488)	(0.500)
Father's Education: Some College (%)	0.175	0.157	0.178
	(0.380)	(0.364)	(0.382)
Father's Education: BA+ (%)	0.105	0.029	0.118***
	(0.307)	(0.167)	(0.323)
WIC Participant (%)	0.732	0.921	0.699***
	(0.443)	(0.269)	(0.459)
Food Stamp Recipient (%)	0.450	0.669	0.412***
	(0.498)	(0.471)	(0.492)
Total Family Income ($)	26,365	20,506	27,383***
	(33,084)	(22,308)	(34,519)
Primary Home Language is English (%)	0.930	0.946	0.927
	(0.256)	(0.226)	(0.261)
Children's Books in Home (No.)	58.05	53.43	58.85*
	(52.30)	(47.03)	(53.13)
Children's Tapes/CDs in Home (No.)	12.97	11.45	13.24*
	(17.27)	(14.34)	(17.71)
Parent Expects HS or Less for Child (%)	0.131	0.124	0.132
	(0.337)	(0.330)	(0.339)
Parent Expects Some College for Child (%)	0.156	0.208	0.147***
	(0.363)	(0.407)	(0.354)
Parent Expects BA for Child (%)	0.420	0.423	0.419
	(0.494)	(0.495)	(0.494)
Parent Expects Post-BA for Child (%)	0.293	0.245	0.302**
	(0.455)	(0.430)	(0.459)
Southern Residence (%)	0.447	0.388	0.458***
	(0.497)	(0.488)	(0.498)
Zip Code Characteristics			
Population Density (Persons/km^2)	3,859	3,943	3,844
	(7,790)	(7,747)	(7,799)
Median Household Income ($)	38,719	37,037	39,012
	(13,964)	(11,169)	(14,376)
Households Receiving Welfare (%)	0.048	0.052	0.047
	(0.040)	(0.041)	(0.040)
Hispanic (%)	0.130	0.116	0.132
	(0.183)	(0.149)	(0.188)
Non-Hispanic White (%)	0.577	0.602	0.573
	(0.314)	(0.299)	(0.317)
Non-Hispanic Black (%)	0.222	0.211	0.223
	(0.272)	(0.252)	(0.275)
Non-Hispanic American Indian (%)	0.025	0.026	0.025
	(0.108)	(0.101)	(0.109)
Non-Hispanic Asian (%)	0.035	0.030	0.036
	(0.064)	(0.056)	(0.065)
Non-Hispanic Other Race (%)	0.008	0.008	0.008
	(0.006)	(0.005)	(0.006)
Foreign Born (%)	0.103	0.091	0.105
	(0.119)	(0.100)	(0.122)

Female Ages 16+ Employed (%)	0.925	0.925	0.925
	(0.048)	(0.044)	(0.049)
Ages 25+ with Less than HS (%)	0.237	0.229	0.238
	(0.118)	(0.101)	(0.121)
State-level Social Policy Environment			
TANF Benefit (3-person Family, $)	362	378	359
	(147)	(142)	(148)
Lifetime Welfare Time Limit (%)	0.749	0.724	0.754
	(0.433)	(0.448)	(0.431)
Length of Time Limit (Months)	43.18	41.32	43.50
	(25.50)	(26.33)	(25.34)
Immediate Work Requirement (%)	0.714	0.747	0.708
	(0.452)	(0.435)	(0.455)
Child Age for Exemption from Work	13.00	12.13	13.13
Requirement (Months)	(13.15)	(14.24)	(12.95)
Full Family Welfare Sanction (%)	0.231	0.251	0.227
	(0.421)	(0.434)	(0.419)
Formal Cash Diversion Program (%)	0.291	0.317	0.287
	(0.454)	(0.466)	(0.452)
Federal/State EITC Max Credit	2,320	2,334	2,317
(1 Child, $)	(132)	(150)	(129)
Expenditures on State Pre-K Programs	99.84	106.30	98.72
(Per Child Ages 0-4, $)	(112.62)	(121.28)	(111.03)

Source: Authors' calculations from the ECLS-K Base Year Restricted Use Data File.
Notes: All means are weighted using the ECLS-K Parent Full Sample weight. Standard deviations are in parentheses. Analyses are conducted on children with non-missing data. *, **, *** indicate that the difference in means for subsidy recipients and non-recipients is statistically significant at the 0.10 percent, 0.05 percent, and 0.01 percent levels, respectively.

Table 3: OLS Results for the Impact of Child Care Subsidies on Child Development, Fall of Kindergarten

Child Outcome	(1)	(2)	(3)
Reading Test Score	0.565	0.565	0.596
	(0.505)	(0.509)	(0.510)
Math Test Score	0.649	0.667	0.660
	(0.477)	(0.480)	(0.477)
Internalizing Problem Behavior	-0.494	-0.492	-0.489
	(0.596)	(0.600)	(0.601)
Externalizing Problem Behavior	1.193**	1.219**	1.154*
	(0.594)	(0.591)	(0.590)
Approaches to Learning	-0.139	-0.162	-0.025
	(0.557)	(0.557)	(0.556)
Self-control	-0.832	-0.996*	-1.006*
	(0.581)	(0.579)	(0.582)
Interpersonal Skills	-0.581	-0.619	-0.575
	(0.588)	(0.591)	(0.593)
Fine Motor Skills	0.976*	0.917*	0.981*
	(0.551)	(0.549)	(0.548)
Gross Motor Skills	-0.407	-0.390	-0.321
	(0.565)	(0.563)	(0.570)
State Policy Controls	No	Yes	Yes
Zip Code-Level Controls	No	No	Yes

Source: Authors' calculations from the ECLS-K Base Year Restricted Use Data File.

Notes: Each cell represents the coefficient on child care subsidy receipt derived from an OLS regression of each child outcome on the subsidy dummy, the full set of child and family controls presented in Table 2, and depending on the column, state policy controls and zip code-level controls. Robust standard errors are in parentheses. All models include dummy variables that equal unity for the child care and family controls with missing data. Analyses are weighted using the ECLS-K Base Year Full Sample Parent Weight. Full results are available from the authors upon request. *, **, **** indicate that the subsidy coefficient is statistically significant at 0.10, 0.05, and 0.01 levels, respectively.

Table 4: 2-SLS Results for the Impact of Child Care Subsidies on Child Development, Fall of Kindergarten

Child Outcome	(1)	(2)	(3)
Reading Test Score	-2.827*	-3.109*	-2.916*
	(1.511)	(1.591)	(1.629)
Math Test Score	-2.236	-2.309	-2.454*
	(1.382)	(1.425)	(1.446)
Internalizing Problem Behavior	0.910	1.051	0.992
	(1.727)	(1.749)	(1.819)
Externalizing Problem Behavior	0.462	0.639	0.442
	(1.744)	(1.791)	(1.887)
Approaches to Learning	-3.723**	-4.224**	-3.240*
	(1.580)	(1.650)	(1.726)
Self-control	-0.919	-2.368	-3.055*
	(1.742)	(1.808)	(1.880)
Interpersonal Skills	-1.627	-2.055	-2.327
	(1.679)	(1.752)	(1.816)
Fine Motor Skills	0.227	-0.371	0.002
	(1.613)	(1.669)	(1.723)
Gross Motor Skills	-1.978	-1.954	-1.710
	(1.666)	(1.722)	(1.813)
State Policy Controls	No	Yes	Yes
Zip code Level Controls	No	No	Yes

Source: Authors' calculations from the ECLS-K Base Year Restricted Use Data File.

Notes: Each cell represents the coefficient on child care subsidy receipt derived from a 2-SLS regression of each child outcome on the subsidy dummy, the full set of child and family controls presented in Table 2, and depending on the column, state policy controls and zip code-level controls. Robust standard errors are in parentheses. All models include dummy variables that equal unity for the child care and family controls with missing data. Analyses are weighted using the ECLS-K Base Year Full Sample Parent Weight. Full results are available from the authors upon request. *, **, **** indicate that the subsidy coefficient is statistically significant at 0.10, 0.05, and 0.01 levels, respectively.

Table 5: OLS and 2-SLS Results for the Impact of Child Care Subsidies on Child Development, Spring of Kindergarten

	OLS		2-SLS	
Child Outcome	**(1)**	**(2)**	**(3)**	**(4)**
Reading Test Score	0.248	-0.146	-3.222**	-1.612
	(0.530)	(0.382)	(1.643)	(1.179)
Math Test Score	0.034	-0.429	-4.212***	-2.871***
	(0.463)	(0.325)	(1.462)	(1.031)
Internalizing Problem Behavior	0.149	0.389	-2.362	-1.475
	(0.592)	(0.490)	(1.710)	(1.524)
Externalizing Problem Behavior	0.818	0.306	-0.553	0.071
	(0.599)	(0.440)	(1.760)	(1.279)
Approaches to Learning	0.117	-0.036	-0.856	-0.058
	(0.583)	(0.437)	(1.698)	(1.282)
Self-control	-1.275**	-0.747	-2.993*	-1.894
	(0.577)	(0.471)	(1.769)	(1.427)
Interpersonal Skills	-0.755	-0.575	-0.625	-0.924
	(0.581)	(0.486)	(1.753)	(1.437)
Lagged Dependent Variable	No	Yes	No	Yes
State Policy Controls	Yes	Yes	Yes	Yes
Zip code Level Controls	Yes	Yes	Yes	Yes

Source: Authors' calculations from the ECLS-K Base Year Restricted Use Data File.

Notes: Each cell represents the coefficient on child care subsidy receipt derived from a 2-SLS regression of each child outcome on the subsidy dummy and the full set of child and family controls presented in Table 2. All models include dummy variables that equal unity for the child care and family controls with missing data. Analyses are weighted using the ECLS-K Base Year Full Sample Parent Weight. Full results are available from the authors upon request. *, **, **** indicate that the subsidy coefficient is statistically significant at 0.10, 0.05, and 0.01 levels, respectively.

Table 6: Additional Results and Tests of Robustness

	RTC	MTC	IPB	EPB	ATL	SC	IS	FMS	GMS
Baseline specification	-2.916*	-2.454*	0.992	0.442	-3.240*	-3.055*	-2.327	0.002	-1.710
	(1.629)	(1.446)	(1.819)	(1.887)	(1.726)	(1.880)	(1.816)	(1.723)	(1.813)
States with clear county administration of subsidies	-4.994***	-4.160**	1.557	0.202	-5.850***	-3.915*	-3.776*	-1.229	-3.362
	(1.870)	(1.708)	(2.099)	(2.100)	(2.018)	(2.145)	(2.121)	(2.039)	(2.096)
Add controls for states' child care regulations	-3.422**	-2.900*	1.387	0.017	-3.862**	-3.632*	-3.127*	-0.464	-2.241
	(1.674)	(1.485)	(1.847)	(1.943)	(1.790)	(1.928)	(1.879)	(1.783)	(1.922)
Add controls for nonparental care between ages 0-2	-2.743*	-2.242	0.945	0.502	-3.246*	-3.156*	-2.544	0.081	-1.814
	(1.630)	(1.445)	(1.832)	(1.875)	(1.723)	(1.868)	(1.812)	(1.708)	(1.820)
Add control for current maternal employment	-2.716*	-2.303	0.852	0.317	-3.218*	-3.013	-2.330	-0.061	-1.543
	(1.628)	(1.437)	(1.800)	(1.878)	(1.725)	(1.881)	(1.806)	(1.723)	(1.798)

Source: Authors' calculations from the ECLS-K Base Year Restricted Use Data File.

Notes: Each cell represents the coefficient on child care subsidy receipt derived from a 2-SLS regression of each child outcome on the subsidy dummy and the full set of child and family controls presented in Table 2, including the state and zip code controls. All models include dummy variables that equal unity for the child care and family controls with missing data. These results are based on the fall of kindergarten child outcomes. RTC: reading test score; MTC: math test score; IPB: internalizing problem behavior; EPB: externalizing problem behavior; ATL: approaches to learning; SC: self-control; IS: interpersonal skills; FMS: fine motor skills; GMS: gross motor skills. The model for states with clear local subsidy administration *excludes* the following states: Arizona, Connecticut, Hawaii, Iowa, New Hampshire, Rhode Island, South Carolina, South Dakota, Louisiana, Mississippi, New Jersey, North Dakota, Utah, Vermont, West Virginia, and Wyoming. The model including states' child care regulations includes: center child-staff ratios for four-year-olds; family child-staff ratios for four-year-olds; center maximum group size for four-year-olds; family maximum group size for four-year-olds; a dummy variables that equals unity if center directors are required to have at least a BA degree; a dummy variables that equals unity if center/family child care staff are required to enroll in child development coursework; a dummy variables that equals unity if center/family staff are required to undergo a criminal background check; a dummy variables that equals unity if center/family indoor space is regulated by states; and a dummy variables that equals unity if states can impose a fine on center/family providers for failing to comply with regulations. Robust standard errors are in parentheses. Analyses are weighted using the ECLS-K Base Year Full Sample Parent Weight. Full results are available from the authors upon request. *, **, **** indicate that the subsidy coefficient is statistically significant at 0.10, 0.05, and 0.01 levels, respectively.

Table 7: Patterns of Non-Parental Child Care Use for Subsidy Recipients and Non-Recipients in the Years Prior to Kindergarten Entry

Characteristic	Full Sample	Recipients	Non-Recipients
Child Care Use in the Years Prior to Subsidy Receipt			
Began First Nonparental Arrangement < Age 1	0.435	0.459	0.431
Began First Nonparental Arrangement at Age 1	0.121	0.176	0.112***
Began First Nonparental Arrangement at Age 2	0.104	0.108	0.103
Began First Nonparental Arrangement at Age 3	0.143	0.149	0.141
Child Care Use in the Year of Subsidy Receipt			
Months in Child Care (%)			
1-2 Months	0.027	0.025	0.028
3-5 Months	0.059	0.096	0.051***
6-8 Months	0.126	0.140	0.124
9-12 Months	0.784	0.737	0.793**
5+ Days/Week in Child Care (%)	0.764	0.823	0.751***
Hours/Week in Child Care			
1-20 Hours	0.377	0.296	0.394***
21-39 Hours	0.262	0.285	0.257
40+ Hours	0.360	0.417	0.347***
Multiple Child Care Arrangements (%)	0.433	0.567	0.408***

Source: Authors' calculations from the ECLS-K Base Year Restricted Use Data File.
Notes: Analyses are weighted using the ECLS-K Base Year Full Sample Parent Weight. Analyses are limited to children in non-parental child care arrangements (relative, non-relative, center-based, school-based, and Head Start) in the years prior to kindergarten entry. The percentages for children in multiple child care arrangements include children in Head Start. Center-based arrangements include daycare services, while school-based arrangements include pre-k, preschool, and nursery school. Non-relative care includes both in-home and out-of-home arrangements. *, **, *** indicate that the percentages for subsidy recipients and non-recipients are statistically significantly different at the 0.10, 0.05, and 0.01 levels, respectively.

Appendix Table 1: Variation in Local Administration and Rationing of Child Care Subsidies

State	Local/County Administration	Local/County Eligibility Determination	County Reimbursement Rates	Wait List or Frozen Intake	Entitlement for TANF Families
Alabama	●		●	●	
Alaska	●		●	●	●
Arizona			●		●
Arkansas	●		●	●	●
California	●		●	●	
Colorado	●	●	●		
Connecticut			●	●	
Delaware	●		●		●
Dist. of Col.					
Florida	●	●	●	●	
Georgia	●		●	●	
Hawaii					●
Idaho	●		●		
Illinois	●		●		
Indiana	●		●		●
Iowa	●				
Kansas	●		●		
Kentucky	●		●		●
Louisiana	●				
Maine	●		●	●	●
Maryland	●		●		
Massachusetts	●		●	●	
Michigan	●		●		
Minnesota	●		●	●	
Mississippi	●			●	
Missouri	●		●		
Montana	●		●		
Nebraska	●		●		
Nevada	●		●		●
New Hampshire					
New Jersey	●				
New Mexico	●		●		●
New York	●	●	●	●	●
North Carolina	●		●	●	
North Dakota	●				
Ohio	●		●		●
Oklahoma	●		●		
Oregon	●		●		
Pennsylvania	●		●		
Rhode Island					●
South Carolina			●	●	
South Dakota			●		
Tennessee	●		●	●	●
Texas	●	●	●	●	●
Utah	●				
Vermont	●				
Virginia	●	●	●	●	●
Washington	●		●		
West Virginia	●				
Wisconsin	●		●		
Wyoming	●				

Notes: Data in this table come from the following: (1) Schulman, K., Blank, H., & Ewan, D. (2001). *A fragile foundation: State child care assistance policies.* Washington, DC: The Children's Defense Fund and (2) U.S. Department of Health and Human Services, Administration for Children and Families, Child Care Bureau. (2002). *Child care and development fund: Report of state plans FY2002-2003.* Most of these figures reflect state policies in 2000. The data on county reimbursement rates reflect county-level variation and regional (which typically includes groups of counties) variation. As of 2000, two states (Connecticut and South Carolina) had frozen intake for subsidies.

Appendix Table 2: Results from the First-Stage Child Care Subsidy Receipt Equation

Variable	Coefficient	Standard Error
Child's Age	-0.002	0.001
Boy	0.008	0.013
Black	0.039*	0.022
Hispanic	0.034	0.025
Asian	-0.026	0.059
Other Race/Ethnicity	0.094**	0.037
Weight	0.002***	0.001
Premature Birth	0.032	0.020
Low Birth Weight	-0.059**	0.030
Disabled	0.017	0.019
First-time Kindergartner	-0.017	0.033
One Sibling	0.013	0.017
Two or More Siblings	0.045**	0.019
Mother's Age	0.005	0.011
(Mother's Age)^2	-0.010	0.017
Mother was Teen at First Birth	0.008	0.018
Early Maternal Work	0.069***	0.020
Mother's Education: HS/GED	0.095***	0.021
Mother's Education: Some College	0.120***	0.023
Mother's Education: BA+	0.141***	0.034
Father's Education: HS/GED	0.024	0.020
Father's Education: Some College	0.001	0.025
Father's Education: BA+	-0.048	0.032
WIC Participant	0.088***	0.018
Food Stamp Recipient	0.121***	0.017
ln(total family income)	-0.003	0.004
Primary Home Language is English	-0.013	0.032
Children's Books in Home	0.000	0.000
(Children's Books in Home)^2	0.000	0.000
Children's Tapes/CDs in Home	0.000	0.001
(Children's Tapes/CDs in Home)^2	0.000	0.000
Parent Expects Some College for Child	0.043*	0.026
Parent Expects BA for Child	0.030	0.023
Parent Expects Post-BA for Child	0.021	0.024
Southern Residence	-0.100	0.330
Constant	2.202	1.842
Zip Code Controls	Yes	
State Policy Controls	Yes	
County Fixed Effects	Yes	
Number of Observations	2,795	
R^2	0.202	
Partial R^2	0.092	
F-statistic (p-value)	24.33 (< 0.01)	

Source: Authors' calculations from the ECLS-K Base Year Restricted Use Data File.
Notes: Analyses are weighted using the ECLS-K Base Year Full Sample Parent Weight. Also included in the model are dummy variables that equal unity for each variable with missing data. Not shown here are the coefficients on the zip code, state policy, and county fixed effects, which are the identifying instruments. *, **, **** indicate that the coefficient is statistically significant at 0.10, 0.05, and 0.01 levels, respectively.