

## Child Care and Low-Income Children's Development: Direct and Moderated Effects

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A large literature has documented the influence of child care on young children's development, but few studies have examined low-income children in community care arrangements. Using data from Welfare, Children, and Families: A Three-City Study ( $N = 204$ ), this study examined the influence of child care quality and the extent of care on low-income children's (ages 2–4 years) cognitive and socioemotional development over time. Higher levels of child care quality were modestly associated with improvements in children's socioemotional development, and extensive hours in child care were linked to increases in children's quantitative skills and decreases in behavior problems. Analyses suggest that child care quality may be particularly salient for subgroups of children from low-income families.

As women entered the paid labor force at unprecedented rates at the end of the 20th century, the number of children in child care arrangements rose dramatically. More recently, the implementation of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996, which mandated employment for low-income women on welfare and imposed time limits on welfare receipt, has led to an influx of low-income women into the labor market. This has been accompanied by an increased demand for accessible, affordable, and flexible child care that facilitates low-income women's employment and

meets the needs of their children. At the beginning of the 21st century, a diverse array of child care settings, consisting of family day care homes, centers, relatives, and nonrelative care arrangements have become widespread contexts for children's early development. Today, three fourths of children under the age of 5 in the United States are in child care on a regular basis (U.S. Census Bureau, 2000). Understanding how child care environments influence children's developmental trajectories is a complex endeavor because children are influenced by multiple factors and contexts simultaneously as they traverse child care and home environments. Further challenges are introduced by the difficulty of differentiating child care effects from the influence of other child and family characteristics that are related to parents' selection of child care.

Bioecological and transactional models describe child development as the result of reciprocal interactions between children and the multiple environments in which they are embedded (Bronfenbrenner & Ceci, 1994; Sameroff, 1994). Proximal processes in both home environments and child care settings are central to children's development. The proximal processes in these settings are the product of children's biological endowments and the opportunities presented by children's environments and caregivers. Children's predispositions and characteristics may influence their attention, actions, and the responses they elicit from caregivers in their environments. In addition, children's interactions, experiences, and opportunities influence the way such predispositions express themselves. Combined, these interactions between children and their opportunity

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structures affect children's developmental trajectories (Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 1998).

#### *Child Care and Children's Development*

In terms of opportunity structures, several characteristics of child care influence children's development, including the type, stability, and extent (number of hours) of child care (Andersson, 1992; Baydar & Brooks-Gunn, 1991; Caughy, DiPietro, & Strobino, 1994; National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network, 2003). Especially important are high-quality arrangements that are characterized by a safe and healthy environment, caregivers who are responsive and warm, and materials and experiences that offer the stimulation and support necessary for mastering the central cognitive and social developmental challenges of early childhood.

An accumulating body of scientific research has established a modest link between child care quality and children's developmental trajectories across multiple domains. Specifically, better child care quality is associated with a wide range of socioemotional outcomes in children, including higher levels of compliance, sociability, attention regulation, and peer relations and lower rates of negative affect and behavior problems (NICHD Early Child Care Research Network 1998, 2000a, 2001; Peisner-Feinberg et al., 1999). High-quality child care has also been found to enhance children's language, reading, and math skills as well as their long-term academic achievement (NICHD Early Child Care Research Network, 2000b, 2003; Peisner-Feinberg et al., 1999; Peisner-Feinberg et al., 2001).

#### *Child Care and Low-Income Children's Development*

Most of the literature examining the effects of child care employs primarily middle- and upper-income samples. It is unclear whether child care will function similarly for low-income children. Low-income children, on average, experience less consistent caregiving, less supportive and cognitively stimulating home environments, and greater environmental stress than children in middle-class and wealthy families. These experiences appear to be particularly detrimental during early childhood for children's short- and long-term developmental trajectories (Duncan & Brooks-Gunn, 1997; McLoyd, 1998). In the face of these environmental demands, high-quality child care may provide low-income

children with opportunities that otherwise might not be available to them and hence may serve as an important protective factor for their development (Caughy et al., 1994). On the other hand, if low-income children face multiple risks at home, child care quality may have little buffering effect on their development.

Model early intervention programs, such as the Perry Preschool Project and Abecedarian Program, show that high-quality early child care experiences, combined with other services for children and families, are beneficial to low-income children's cognitive and socioemotional functioning (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Schweinhart, Barnes, & Weikart, 1997). These model interventions were typically administered by skilled professionals and provided diverse packages of services to children and families. The quality of care that low-income children experience in child care centers and more informal home arrangements, however, varies widely and often is deemed minimally responsive to the developmental needs of children and families (Coley, Li-Grining, & Chase-Lansdale 2003; Growing Up in Poverty Project, 2000). Hence, it is difficult to extend findings that are based on interventions to the child care to which most low-income children have access in their communities.

The results of studies using large or nationally representative data sets suggest that the type and quality of child care that children experience in community settings may be important for low-income children's development, but methodological and measurement limitations prevent us from drawing firm conclusions from this research, as well. For example, using data from the National Longitudinal Survey of Youth (NLSY), Caughy et al. (1994) found that center-based child care during the first 3 years of life was associated with higher math skills for children from households with incomes below the poverty line. Because child care quality was not directly examined by the NLSY, the authors used type of care as a proxy for high-quality care. Among studies that have examined child care quality in community care arrangements for a sufficiently large number of low-income children, most have found that child care quality was equally predictive of the cognitive and socioemotional development of poor and nonpoor children (Burchinal, Peisner-Feinberg, Bryant, & Clifford, 2000; Growing Up in Poverty Project, 2000). However, Burchinal et al. (2000) only included children who were in center-based care arrangements, thereby excluding a host of less formal child care settings such as day care

homes and relative care often used by low-income families. It is unclear whether the influence of child care quality on low-income children's development might be different for children in less formal child care settings versus in centers. Hence, more research is needed on the range of child care settings available to low-income families.

#### *Does Child Care Quality Matter More for Certain Children?*

In addition to family income, other characteristics of children and families may influence children's experiences in child care and hence the effects of child care on children's development. Bioecological and transactional models of child development suggest that the effects of child care quality may vary as a function of characteristics of the developing children, their family, or their experience in child care. Indeed, an increasing number of studies have supported this conceptual claim. For example, the NICHD Early Child Care Research Network (2002) found that the effects of child care quality were significantly higher for children with low cognitive scores. Furthermore, the academic and cognitive achievement of boys may be more sensitive to early experiences in child care than those of girls (Brooks-Gunn, Han, & Waldfogel, 2002; Desai, Chase-Lansdale, & Michael, 1989; Howes & Olenick, 1986).

Family characteristics, such as the level of cognitive stimulation provided in children's homes, have also been found to moderate the influence of child care quality on children's development. Caughy et al. (1994) discovered that children from less stimulating home environments had higher reading scores at age 5 or 6 when they had entered child care before their first birthday, whereas their counterparts from more stimulating home learning environments scored lower when they began child care during infancy. Similarly, maternal education, which is associated with greater provision of cognitive stimulation and human capital for children, has also been shown to moderate the influence of child care quality (Peisner-Feinberg et al., 2001). Together, such findings indicate that child care quality may be more influential for children who experience greater individual and contextual risks.

Finally, the combination of different characteristics of children's care arrangements may affect children's development, although little research has addressed these types of interactions directly. An example of two child care characteristics is child care quality and the number of hours children spend in child care arrangements. Several studies have found

significant effects of the number of hours children spend in child care and children's development (NICHD Early Child Care Research Network, 1999, 2001, 2003). If child care quality is linked to children's development, it may have what the NICHD Early Child Care Research Network (2003) referred to as a dose-response relation, whereby child care quality has a stronger impact on children who spend more hours in care.

#### *Research Questions*

The current investigation was motivated by three central research aims. First, it provides an overview of the type, extent, and quality of the child care arrangements on which low-income urban families rely. Second, this study considered whether the extent, type, and developmental quality of low-income children's care arrangements relate to cognitive and socioemotional development over time. Finally, this study examined whether associations between child care quality and children's developmental trajectories vary according to characteristics of the child (e.g., child gender), the family (e.g., quality of children's home learning environments), or the child care setting (e.g., hours per week children spend in child care).

#### *Analytic Approach*

A major analytic challenge involves disentangling whether high-quality child care truly enhances children's development or whether it is simply that the most capable parents have children who are more developmentally advanced and choose higher quality child care. Certain characteristics of children and families, such as race or ethnicity, income, parental education and employment, social support, and children's age and gender, influence parents' decisions regarding child care (Fuller, Holloway, & Liang, 1996; Singer, Fuller, Keiley, & Wolf, 1998). Most studies have controlled for a variety of family differences that might influence both family decision making and children's development to isolate unbiased estimates of child care's influence. Because it is impossible to measure all important family characteristics, an additional strategy is to limit the influence of unmeasured variables statistically.

In the current analyses, associations between child care characteristics and children's cognitive and socioemotional development were modeled using the longitudinal lagged regression model presented in Equation 1.

$$\begin{aligned} \text{Child Outcomes}_{2i} = & B_0 + B_1 \text{Child Outcomes}_{1i} \\ & + B_2 \text{Child Care}_{1i} + B_3 \text{Maternal}_{1i} \\ & + B_4 \text{Child}_{1i} + B_5 \text{Household}_{1i} + \varepsilon_i. \end{aligned} \quad (1)$$

In this model, children's socioemotional and cognitive development at Time 2 were expressed as a function of child care characteristics, including the type of care arrangement, number of hours spent in care, and quality of the care. To reduce the threat of selection bias posed by measured characteristics of children and families, a series of child, maternal, and household factors were included in the models as covariates. A Time 1 measure of the same child outcome that was being modeled as the dependent variable at Time 2 was included as an additional covariate in the model to reduce omitted variable bias. The regression coefficients are thus interpreted as the effects of each independent variable on changes in rates of child functioning over time (Kessler & Greenberg, 1981). Including the Time 1 child outcome as a covariate allowed us to control for unmeasured, time-invariant differences in children that were present at the first interview (Cain, 1975; Chase-Lansdale et al., 2003). Unmeasured, time-varying characteristics of children that may be related to child care selection at Time 1 and children's development over time may continue to bias estimates of the relation between child care characteristics and children's development. The results of these analyses should be interpreted in light of this limitation of the analytic approach.

After examining the main effects of child care on children's development, this study explored whether the effects of child care quality varied as a function of the extent of care children experience, child gender, or quality of children's home learning environments. This was done by independently entering a series of interaction terms into the regression presented in Equation 1, including interactions between child care quality and each of the three potential moderators: extent of care, child gender, and home environment. All variables in the regression equation were centered before conducting the interaction analyses both to ease interpretation and to reduce problems of multicollinearity (Aiken & West, 1991).

All analyses were weighted with probability weights that are inversely proportional to the likelihood of being selected into and participating in the sample. Probability weights allow us to generalize to our population of inference, which includes all children living in low-income neighborhoods in

Boston, Chicago, or San Antonio in households with incomes less than 200% of the poverty line who are regularly in child care for 10 hr per week or more.

## Method

### *Participants*

Data for this study were drawn from the first two waves of the Welfare, Children, and Families: A Three-City Study, a longitudinal, multimethod study of the well-being of low-income children and families in the wake of welfare reform. Two components of the Three-City Study, the main survey and the embedded developmental study (EDS), provided data. The main survey was conducted with a household-based, stratified random sample of about 2,400 low-income children and their primary caregivers in low-income neighborhoods in Boston, Chicago, and San Antonio. In 1999, these families were randomly selected from more than 40,000 screened households, with a screening rate of 90%. In households that had incomes below 200% of the poverty line and a child between the ages of 0 and 4 years or 10 and 14 years, interviewers randomly selected one focal child and interviewed the child and his or her primary female caregiver. In most cases (90%) the caregiver was the mother; thus, *mothers* will be used to refer to caregivers in these analyses. The interview completion rate was 83%, resulting in an overall response rate of 74%. In 2000 and 2001, on average 16 months after the first wave, the same families were recontacted and interviewed again in Wave 2 of the survey. Approximately 88% of the families interviewed in Wave 1 were followed in Wave 2. During each wave of the main survey, mothers participated in an in-home interview lasting approximately 2 hr, during which they answered questions about themselves and their families, households, and children. In addition, children who were 2 years old and older were given individualized tests to assess their cognitive achievement. Essentially identical questions and measures were given during the two waves of data collection.

The second component of the Three-City Study used in these analyses is the EDS, which took a more intensive look into the lives of 2- to 4-year-old children and their families from the main survey sample. The goal of the EDS was to use multiple methodologies to capture rich details about the child's primary caregivers and early environments. This study focused on two components of the EDS: a mother component and a child care component.

Eighty-five percent of the eligible families from the main survey (those with a focal child aged 2–4 years) participated in the mother component, consisting of a supplemental interview with mothers and including extensive questions concerning the focal child's primary care arrangements. Nonresponse analyses revealed no significant differences between children and families who participated in the mother portion of the EDS and those who were eligible but did not participate.

The child care component of the EDS was composed of observations of child care settings and interviews with child care providers. Eligibility for the child care component was determined by a series of questions from the main survey relating to the focal child's engagement in nonmaternal care arrangements. Mothers who reported that their 2- to 4-year-old child was in child care for 10 hr or more per week were invited to participate in the child care component of the EDS. After obtaining permission from the mother and the child care provider, children were observed in their primary child care setting for at least 2 hr, and the child care providers were interviewed. The response rate for the child care component of the EDS was 70% in Wave 1. Nonresponse analyses revealed no significant differences between children and families who participated in the child care component of the EDS and those who were eligible but did not participate.

Analyses in the current study were based on 204 families who participated in the Wave 1 child care and mother components of the EDS as well as Wave 1 and Wave 2 interviews from the main survey. Attrition analyses were conducted comparing children who participated in the Wave 1 child care and mother portions of the EDS interview and who were followed in the Wave 2 main survey with those who were not successfully followed. These two groups of children, their families, and characteristics of their child care arrangements were found to be similar on nearly all dimensions. The only difference between the two groups was that children who were successfully followed in Wave 2 were more likely to have mothers who were employed part-time rather than full-time or not employed at Wave 1, as compared with their counterparts who were not followed in Wave 2 (19% vs. 3%,  $p < .05$ ).

Measures used in these analyses were drawn from survey as well as from observational and direct assessment methodologies, thus decreasing concerns over shared method variance or reporter bias. Demographic characteristics of children and their mothers and households are presented in Table 1 along with descriptive information about their child

Table 1  
*Child Care and Demographic Characteristics of the Sample (N = 204)*

	%	SD
Child care characteristics		
ECERS–R/FDCRS <sup>a</sup>	4.22	1.54
Arnett <sup>a</sup>	3.24	0.41
Hours in child care	33.91	14.77
Regulated home	0.09	0.28
Unregulated home	0.47	0.50
For-profit center	0.09	0.29
Nonprofit center	0.20	0.40
Head Start	0.15	0.36
City		
Boston	0.33	0.47
Chicago	0.32	0.47
San Antonio	0.35	0.48
Child characteristics		
Child age <sup>a</sup>	3.04	0.74
White	0.09	0.29
Black	0.61	0.49
Hispanic	0.30	0.46
Male	0.56	0.50
Maternal characteristics		
Mother age <sup>a</sup>	28.83	8.76
Greater than high school	0.47	0.50
GED or high school	0.25	0.43
Full-time employment	0.50	0.50
Part-time employment	0.19	0.39
Household characteristics		
Single	0.81	0.40
Minors in household <sup>a</sup>	2.71	1.28
Income-to-needs ratio <sup>a</sup>	0.85	0.59
Cognitive stimulation <sup>a</sup>	100.49	14.12

Note. Values in table are weighted percentages and standard deviations, unless otherwise noted. ECERS–R/FDCRS = Early Childhood Environment Rating Scale–Revised and Family Day Care Rating Scale.

<sup>a</sup>Weighted means and standard deviations.

care arrangements. The child care data for this sample of children were not entirely independent because some children in the sample were cared for in the same arrangement. The 204 children in the sample were cared for in 186 independent child care arrangements. Huber–White statistical techniques (STATA) were used to adjust for autocorrelation in the data.

### Measures

*Child care characteristics.* The global developmental quality of each child's care arrangement was measured with widely used and well-validated instruments. Center-based care arrangements were

rated using the Early Childhood Environment Rating Scale–Revised (ECERS–R; Harms, Clifford, & Cryer, 1998). Each item on the ECERS–R is given a score of 1 to 7 through the dichotomous rating of several subitems. Item scores are grounded by the odd numbers, with 1 = inadequate, 3 = minimal, 5 = good, and 7 = excellent care. The first 37 items of the ECERS–R cover the domains of space and furnishings ( $\alpha_{T1} = .74$ ), personal care routines ( $\alpha_{T1} = .83$ ), language and reasoning ( $\alpha_{T1} = .78$ ), activities ( $\alpha_{T1} = .80$ ), interactions ( $\alpha_{T1} = .90$ ), and program structure ( $\alpha_{T1} = .50$ ). Fifteen percent of the observations were independently double coded and obtained an average intraclass correlation (ICC) at the subscale level of .77. The quality of day care homes and informal home care arrangements was measured using the Family Day Care Rating Scale (FDCRS; Harms & Clifford, 1989). This instrument is organized in a manner similar to the ECERS–R. The first 29 items cover the spheres of space and furnishings for care and learning ( $\alpha_{T1} = .84$ ), basic care ( $\alpha_{T1} = .87$ ), language and reasoning ( $\alpha_{T1} = .82$ ), learning activities ( $\alpha_{T1} = .87$ ), and social development ( $\alpha_{T1} = .87$ ). The average ICC at the subscale level for the FDCRS was .96.

The Arnett Scale of Provider Sensitivity (Arnett, 1989) was used to measure the emotional and behavioral relationships between the care providers and children in both center- and home-based care arrangements. The Arnett Scale of Provider Sensitivity supplemented items related to the teacher–child relationships on the ECERS–R and FDCRS, which focus more on supervision and discipline. It consists of 26 items rated on a 4-point scale, which were combined into one measure ( $\alpha_{T1} = .94$ ), with higher scores indicating care providers who are warm, engaged, and use consistent and appropriate discipline strategies, and lower scores reflecting providers who are harsh, detached, and use inconsistent or inappropriately strong forms of discipline. Scores on the Arnett composite had an average ICC of .78.

To create a global child care quality composite that reflects important dimensions of child care independent of the type of care children experience, ratings on the subscales of the ECERS–R and FDCRS were combined with the composite score on the Arnett by standardizing the subscales of the ECERS–R and FDCRS measures and the composite score from the Arnett and calculating a sum across them. The ECERS–R and FDCRS have largely similar subscales, except that the Activities subscale of the FDCRS includes items similar to those in both the Activities and Program Structure subscales of the

ECERS–R. Hence, the latter two subscales were collapsed in the ECERS–R, creating five parallel subscales for both center and home child care arrangements. It is important to note that the ECERS–R and FDCRS were developed as separate instruments, acknowledging that center- and home-based child care arrangements may have distinct patterns of functioning and access to resources. This poses challenges to the validity of our global quality composite. However, many aspects of child care quality are likely to cut across different settings, reflecting considerable overlap of items and subscales between the ECERS–R and FDCRS. Other studies have recognized this similarity, as well, through comparisons of ECERS–R and FDCRS scores (Growing Up in Poverty Project, 2000). Finally, the extent of child care children experienced was measured using maternal report of the number of hours per week children were in child care, and children’s care type was coded as center- versus home-based care.

*Cognitive achievement.* Cognitive achievement was measured in Waves 1 and 2 of the main survey using direct assessment by field interviewers. The Woodcock–Johnson Psycho-Educational Battery Revised (WJ–R) Letter-Word Identification and Applied Problems subtests were administered to each focal child to assess their reading and quantitative skills, respectively (Woodcock & Johnson, 1989, 1990). The Spanish version of the WJ–R was administered if either the child or parent reported that Spanish was the child’s primary language ( $n = 13$ ; Bateria Woodcock–Munoz: Pruebas de Aprovechamiento–Revisada; Woodcock & Munoz-Sandoval, 1996). Standard scores were created using the methods and norms suggested by the authors of the instrument.

*Socioemotional functioning.* Children’s socioemotional functioning was measured at Waves 1 and 2 using mothers’ report on the age-appropriate version of the Child Behavior Checklist (CBCL; Achenbach, 1991, 1992;  $\alpha_{T1} = .95$  and  $\alpha_{T2} = .95$  both versions). The CBCL measures both internalizing behavior problems, which include depression, anxiety, and somatization, and externalizing behavior problems, which include aggressive and destructive behavior. Standard scores ( $t$  scores) for internalizing, externalizing, and total behavior problems were used as continuous measures of child behavior problems. Categorical variables indicating whether children scored at or above the 82nd percentile, which indicated behavior problems falling into the clinical or borderline range, were also considered.

Mothers also reported on their children’s positive behaviors using a six-item scale ( $\alpha_{T1} = .77$  and

$\alpha_{T2} = .75$ ) drawn from the New Chance Demonstration (Quint, Bos, & Polit, 1997). The items include questions about how often the child is in a good mood, whether the child is helpful and cooperative with others, and whether the child shows concern for other people's feelings.

*Child characteristics.* Basic demographic characteristics of children that have been linked to children's development and to parents' decisions about child care were included in the regression analyses. Child age was represented in months and gender was represented as a dummy variable. A series of dummy variables indicating whether the child is of non-Hispanic Black, non-Hispanic White, or Hispanic origin represented child race. All of the child characteristics were obtained via mother report at Wave 1.

*Maternal characteristics.* Several maternal characteristics, obtained from mothers' reports at Wave 1, were included in the regression equations as covariates. Mother's education was represented with a series of dummy variables indicating whether a child's mother had obtained less than a high school education, a high school or general equivalency degree, or greater than a high school education. Dummy variables representing whether mothers worked full-time (30 hr per week or more), part-time (between 10 and 29 hr per week), or were not employed (less than 10 hr per week) were included in the regression equations, as well. Finally, maternal age was represented continuously.

*Household characteristics.* Household characteristics were also obtained from mothers' reports at Wave 1. Family structure was represented by a dummy variable that indicates whether children were living in a household with married parents. A continuous measure of the number of minors in the household reflected mother's caregiving burden. Household income was represented by an income-to-needs ratio, calculated by dividing total household income by the poverty line, which was determined by the number of people living in the household. Finally, the level of cognitive stimulation in children's home environment at Wave 1 was assessed by a combination of mother report and interviewer observation, using items from the age-appropriate versions of the Cognitive Stimulation subscale of the Home Observation for Measurement of the Environment—Short Form (HOME—SF). This is a revised version of the original HOME designed by Caldwell and Bradley (1979), which was developed for the NLSY (Center for Human Resource Research, 1993). The Cognitive Stimulation subscale includes a subset of items from the original HOME

inventory and has been shown to have good psychometric properties and to capture the same domains as the longer version of the instrument (Baker & Mott, 1989; Center for Human Resource Research, 1993). Each item on the HOME—SF is scored dichotomously, where a score of 1 indicates the presence of a developmentally supportive aspect in the child's home environment and a score of 0 indicates its absence. Scores on the individual items were then summed, age standardized, and transformed into standard scores that have  $M = 100$  and  $SD = 15$ .

## Results

### *Low-Income Children's Experiences in Child Care*

Before presenting the results of the multivariate analyses, basic descriptive information about children, their families, and child care arrangements are considered. Table 1 presents child care and demographic characteristics of our sample. Descriptive information on child outcomes is found in Table 2. Correlations among these variables are available by request from the first author.

Roughly equal numbers of children were in child care centers, which include nonprofit and for-profit centers as well as Head Start programs, and home arrangements. Nonprofit centers and Head Start programs were the most frequently used among center care arrangements, with 20% and 15% of all children attending them, respectively. Only about 9% of children were cared for in for-profit child care centers. Relatively few children, less than 10%, were cared for in regulated home care settings. The average number of hours children spent in child care per week was just under 34 hr, with 34% of children in part-time care (less than 30 hr per week), 43% in full-time care (between 31 and 45 hr per week), and 33% in child care for 45 hr per week or more.

Examining the scores that children's care arrangements received on the ECERS—R/FDCRS and Arnett paints an overall picture of how well the child care settings were meeting the developmental needs of children. The ECERS—R/FDCRS scores are commonly broken into three categories that indicate the extent to which the child care arrangements are serving children's developmental needs: Inadequate care corresponds to scores that are less than 3, minimal care corresponds to scores that are 3 or greater but less than 5, and good care corresponds to scores that are 5 or higher. The average ECERS—R/

Table 2  
Descriptive Statistics on Child Outcomes (N = 204)

	Wave 1		Wave 2	
	M	SD	M	SD
Achievement				
Woodcock–Johnson Applied Problems (standard score)	92.34	16.80	92.91	18.49
Woodcock–Johnson Letter-Word Identification (standard score)	98.26	13.83	94.79	11.13
Prosocial behavior Child behavior problems <i>t</i> scores	4.10	0.65	4.16	0.59
Total	51.75	9.47	50.33	11.50
Internalizing	51.60	9.53	47.90	10.18
Externalizing	51.93	9.52	51.65	11.10
Clinical and borderline				
Total <sup>a</sup>	0.23	0.42	0.22	0.42
Internalizing <sup>a</sup>	0.17	0.38	0.12	0.33
Externalizing <sup>a</sup>	0.25	0.44	0.23	0.42

Note. Values in table are weighted means and standard deviations, unless otherwise noted.

<sup>a</sup>Weighted percentages and standard deviations.

FDCRS score for the sample, which was 4.22, suggests that on average children in the sample were in child care arrangements that were minimally adequate in meeting their basic developmental needs. Nevertheless, there was great heterogeneity in the quality of child care children experienced. In fact, roughly 24% of children were cared for in arrangements that provided inadequate environments for children's development, 36% of the care arrangements received scores indicating they are minimally adequate, and about 40% of children received care in arrangements that did a good job of meeting children's developmental needs. In general, the centers scored higher on these measures of developmental quality than did regulated homes, which in turn were higher than unregulated homes. The mean of 3.24 on the Arnett Scale of Provider Sensitivity suggests that on average children in the sample had care providers that were sensitive to children's emotional and behavioral needs.

#### *Child Care Characteristics and Low-Income Children's Development*

Ordinary least squares regressions that control for Wave 1 measures of children's development were performed to examine associations between child care characteristics and children's cognitive and socioemotional functioning over time. Panel 1 of Table 3 through Table 5 present results of the main effects regression models.

Panel 1 of Table 3 contains results for children's cognitive achievement. There were no significant associations between child care quality and the

development of children's quantitative and reading skills. The only significant association between child care characteristics and children's cognitive development was a modest one between the hours of child care per week and children's quantitative skills. Specifically, a standard deviation increase in the hours children spent in care each week was related to nearly one fifth of a standard deviation increase in children's quantitative skills over time.

In general, child care characteristics were more strongly linked to children's socioemotional functioning over time, presented in Tables 4 and 5. Child care quality was related to reductions in children's rates of internalizing behavior and serious externalizing behavior problems. Specifically, a standard deviation increase in the child care quality composite was linked to just less than one fifth of a standard deviation reduction in internalizing behavior problems and one fifth of a standard deviation reduction in the likelihood that children would exhibit externalizing behavior problems in the borderline or clinical range. Child care quality was also associated with increases in children's positive behaviors, such that a standard deviation increase in the child care quality was related to just more than one tenth of a standard deviation increase in positive behaviors. The number of hours per week children spent in child care arrangements related only to one measure of children's socioemotional functioning, with greater time in care linked to reductions in the likelihood that children's scores on the total behavior problem measure placed them in the borderline or clinical range. The magnitude of this effect was relatively small, with a standard deviation increase in the

Table 3  
 Regressions Examining the Influence of Child Care Characteristics on Children's Achievement Over Time

Main effects regression models	Woodcock–Johnson Applied Problems		Woodcock–Johnson Letter-Word Identification	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Child outcomes Wave 1	0.47***	0.10	0.31***	0.06
Child care characteristics				
Quality	1.98	1.95	−0.39	1.25
Hours	0.24*	0.11	−0.06	0.06
Center	1.64	3.60	−0.31	2.06
Child characteristics				
Child age	1.54	1.95	−1.20	1.05
White	−4.14	6.63	−3.39	3.10
Black	−4.13	3.58	−2.40	2.03
Male	−2.88	2.78	−3.14 <sup>†</sup>	1.66
Maternal characteristics				
Mother age	0.03	0.14	−0.12	0.08
Greater than high school	7.93*	3.79	3.64 <sup>†</sup>	2.09
GED or high school	5.95	4.28	2.26	2.17
Full-time employment	−2.20	3.46	4.52*	2.02
Part-time employment	6.42	3.95	1.27	1.98
Household characteristics				
Single	0.40	3.42	−0.78	2.25
Minors in household	0.56	1.60	−0.09	0.58
Income-to-needs ratio	0.04	2.25	1.76	1.42
Cognitive stimulation	0.09	0.10	0.11	0.07
<i>F</i>	2.80***		5.42***	
<i>R</i> <sup>2</sup>	0.30		0.35	
Hours × Quality interaction models				
Hours × Quality	−0.18	0.11	−0.03	0.08
<i>F</i>	2.74***		5.11***	
<i>R</i> <sup>2</sup>	0.31		0.35	
Home × Quality interaction models				
Home × Quality	0.08	0.09	0.15*	0.07
<i>F</i>	2.82***		5.64***	
<i>R</i> <sup>2</sup>	0.30		0.38	
Gender × Quality interaction models				
Gender × Quality	4.79	3.68	−0.69	2.05
<i>F</i>	2.91***		5.34***	
<i>R</i> <sup>2</sup>	0.31		0.35	

Note. Omitted groups include Hispanic female children cared for in home-based care arrangements whose mothers have less than high school, are not employed, and are married.

<sup>†</sup>*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

Table 4  
 Regressions Examining the Influence of Child Care Characteristics on Children's Socioemotional Development Over Time

Main effects regression models	Positive behaviors		CBCL internalizing <i>t</i> score		CBCL externalizing <i>t</i> score		CBCL total <i>t</i> score	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Child outcomes Wave 1	0.42***	0.08	0.63***	0.06	0.47***	0.09	0.56***	0.08
Child care characteristics								
Quality	0.11 <sup>†</sup>	0.07	-2.01*	1.01	-1.38	1.35	-1.76	1.24
Hours	-0.00	0.00	-0.05	0.04	-0.01	0.06	-0.06	0.06
Center	0.04	0.12	-1.13	1.58	0.60	2.26	0.71	2.16
Child characteristics								
Child age	-0.04	0.07	1.37	0.87	-0.30	1.14	0.58	1.09
White	0.04	0.20	7.40**	2.48	3.25	3.45	6.27*	3.20
Black	-0.17	0.11	4.58**	1.65	5.18*	2.55	6.04*	2.58
Male	-0.01	0.09	-0.65	1.27	-4.11*	1.83	-2.69	1.79
Maternal characteristics								
Mother age	0.00	0.01	-0.09	0.08	-0.05	0.11	-0.08	0.11
Greater than high school	-0.03	0.12	0.28	1.93	-0.21	2.33	-0.90	2.44
GED or high school	-0.06	0.15	-1.46	1.70	-2.16	2.47	-4.10	2.54
Full-time employment	0.12	0.10	-4.63**	1.72	-6.20**	2.36	-5.83**	2.35
Part-time employment	0.12	0.13	-8.26***	1.86	-3.33	2.50	-4.82*	2.42
Household characteristics								
Single	0.19	0.13	-0.67	1.77	1.45	2.34	2.15	2.27
Minors in household	-0.02	0.04	-0.11	0.60	0.12	0.87	-0.22	0.93
Income-to-needs ratio	0.09	0.09	-1.50	1.27	2.42	1.63	1.13	1.57
Cognitive stimulation	0.01	0.00	0.05	0.05	0.02	0.08	0.03	0.08
<i>F</i>	3.05***		12.35***		4.30***		6.66***	
<i>R</i> <sup>2</sup>	0.29		0.49		0.30		0.38	
Hours × Quality interaction models								
Hours × Quality	0.00	0.00	-0.09 <sup>†</sup>	0.05	-0.22**	0.06	-0.15*	0.06
<i>F</i>	2.99***		11.90***		5.28***		7.42***	
<i>R</i> <sup>2</sup>	0.29		0.50		0.34		0.40	
Home × Quality interaction models								
Home × Quality	0.00	0.00	-0.00	0.05	0.08	0.06	0.02	0.06
<i>F</i>	3.59***		12.09***		4.05***		6.20***	
<i>R</i> <sup>2</sup>	0.29		0.49		0.31		0.38	
Gender × Quality interaction models								
Gender × Quality	0.07	0.12	-2.43	1.66	-1.27	1.92	-0.10	1.94
<i>F</i>	2.90***		11.40***		4.15***		6.59***	
<i>R</i> <sup>2</sup>	0.29		0.49		0.30		0.38	

Note. Omitted groups include Hispanic female children cared for in home-based care arrangements whose mothers have less than high school, are not employed, and are married. CBCL = Child Behavior Checklist.  
<sup>†</sup>*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

Table 5  
 Regressions Examining the Influence of Child Care Characteristics on Children's Serious Behavior Problems Over Time

Main effects regression models	CBCL internalizing clinical/borderline		CBCL externalizing clinical/borderline		CBCL total clinical/borderline	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Child outcomes Wave 1	0.30**	0.11	0.33***	0.09	0.46***	0.09
Child care characteristics						
Quality	0.00	0.04	-0.10 <sup>†</sup>	0.06	-0.07	0.05
Hours	-0.00	0.00	-0.00	0.00	-0.00 <sup>†</sup>	0.00
Center	-0.03	0.07	0.13	0.08	0.08	0.07
Child characteristics						
Child age	0.01	0.04	-0.08 <sup>†</sup>	0.04	-0.01	0.04
White	0.03	0.08	-0.05	0.10	0.13	0.10
Black	-0.03	0.05	0.02	0.07	0.17**	0.06
Male	0.07	0.05	-0.09	0.06	-0.05	0.06
Maternal characteristics						
Mother age	-0.00	0.00	-0.00	0.00	-0.00	0.00
Greater than high school	-0.05	0.08	0.08	0.09	-0.07	0.09
GED or high school	-0.16*	0.08	-0.05	0.10	-0.12	0.09
Full-time employment	-0.10	0.07	-0.15 <sup>†</sup>	0.09	-0.07	0.08
Part-time employment	-0.18*	0.08	-0.03	0.11	-0.12	0.09
Household characteristics						
Single	0.06	0.07	-0.02	0.08	0.08	0.08
Minors in household	0.03	0.03	0.04	0.03	0.01	0.03
Income-to-needs ratio	-0.03	0.03	0.10	0.06	0.04	0.05
Cognitive stimulation	0.00	0.00	-0.00	0.00	0.00	0.00
<i>F</i>	1.42		3.01***		3.71***	
<i>R</i> <sup>2</sup>	0.20		0.23		0.32	
Hours × Quality interaction models						
Hours × Quality	-0.00	0.00	-0.01***	0.00	0.00	0.00
<i>F</i>	1.34		4.71***		3.42***	
<i>R</i> <sup>2</sup>	0.20		0.29		0.32	
Home × Quality interaction models						
Home × Quality	-0.00	0.00	0.00*	0.00	0.00	0.00
<i>F</i>	1.37		3.09***		3.46***	
<i>R</i> <sup>2</sup>	0.20		0.24		0.32	
Gender × Quality interaction models						
Gender × Quality	-0.15*	0.06	-0.16*	0.08	0.02	0.08
<i>F</i>	1.47		3.27***		3.53***	
<i>R</i> <sup>2</sup>	0.22		0.25		0.32	

Note. Omitted groups include Hispanic female children cared for in home-based care arrangements whose mothers have less than high school, are not employed, and are married. CBCL = Child Behavior Checklist.

<sup>†</sup>*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

number of hours in care per week associated with just more than one tenth of a standard deviation reduction in the likelihood that children would exhibit borderline or clinical total behavior problem scores.

It is interesting that the type of child care (center based vs. home based) was not significantly linked to either domain of children’s development in these models that control for child care quality. Furthermore, interactions between child care quality and type were conducted and found to be nonsignificant (data not shown; results are available from first author). These results suggest that the effects of child care quality do not vary by the type of care.

*Child, Family, and Child Care Characteristics as Moderators*

Having examined the main effects of child care characteristics on children’s development, the number of hours per week children were in care, the quality of children’s home learning environments, and child gender are now considered as moderators of associations between child care quality and children’s development. Results of these analyses can be found, respectively, in Panels 2, 3, and 4 of Table 3 through Table 5.

*Child care quality and hours of care.* The Hours × Quality interactions were not related to the development of children’s reading or quantitative skills over time. These interactions were significantly linked, however, to children’s rates of internalizing, externalizing, and total behavior problems as well as to the likelihood that children would fall into the borderline or clinical range on serious externalizing behavior problems. In short, these interactions indicate that the relation between child care quality and children’s behavioral functioning varies as a function of the amount of time children spend in child care.

Figure 1 illustrates this interaction for internalizing behavior problems. Results (not shown) were similar for total behavior problems. Figure 2 demonstrates the nature of this interaction for externalizing behavior problems.

Results (not shown) for serious externalizing behavior problems were nearly identical. The steep downward slope on the high-quality-care lines across both figures indicates that increases in the number of hours children spent in care are associated with reductions in the levels of children’s behavior problems for children in high-quality child care arrangements. Furthermore, in Figure 2 the upward sloping low-quality-care line indicates that

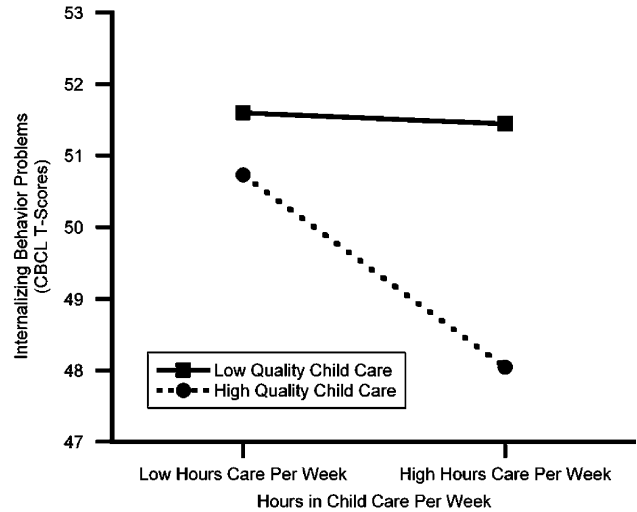


Figure 1. Interaction between hours in child care and child care quality predicting internalizing behavior problems. CBCL = Child Behavior Checklist.

increases in the number of hours children spent in low-quality care arrangements were related to elevated levels of externalizing behavior problems. These results suggest that extensive hours of care in high-quality arrangements may be protective for children’s socioemotional functioning, whereas long hours of care in low-quality settings may be particularly detrimental for children’s rates of externalizing behavior problems.

*Child care quality and home learning environments.* The interaction between children’s home learning environment and child care quality was

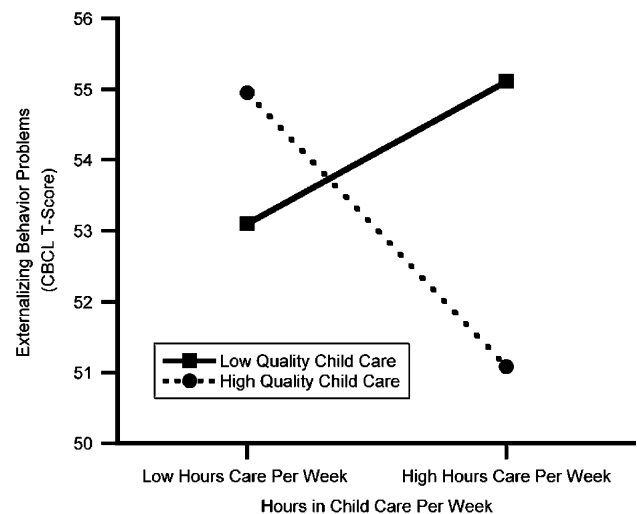


Figure 2. Interaction between hours in child care and child care quality predicting externalizing behavior problems. CBCL = Child Behavior Checklist.

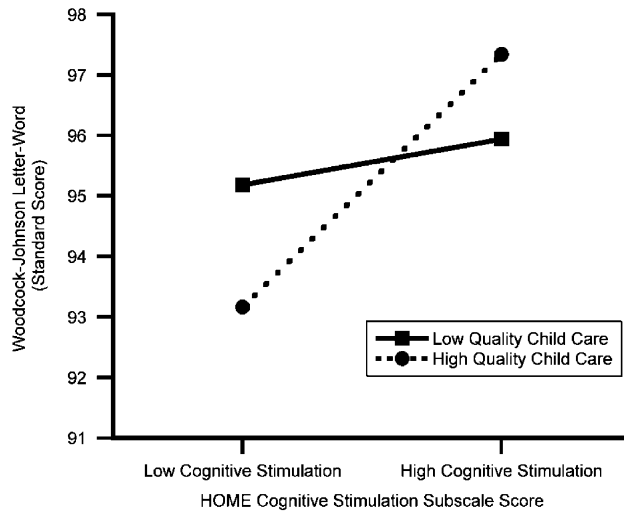


Figure 3. Interaction between child care quality and children's home learning environment predicting Woodcock-Johnson Letter-Word standard scores. HOME = Home Observation for Measurement of the Environment.

significantly related to the development of children's reading skills and serious externalizing behavior problems. In Figure 3 it can be seen that high-quality child care was particularly beneficial for the reading skill development of children from home environments that provided high levels of cognitive stimulation.

This interaction suggests that high-quality child care is not able to make up for low levels of cognitive stimulation in low-income children's home environments, but rather it is under circumstances of a supportive and stimulating environment in both the home and child care environment that children's cognitive skills appear the most elevated.

Figure 4 illustrates the significant interaction that existed between children's home learning environments and child care quality for serious externalizing behavior problems. High-quality child care appears protective against serious behavior problems for all children, regardless of their home learning environment, whereas the combination of low-quality child care and low levels of home cognitive stimulation lead to particularly elevated levels of serious externalizing problems. In contrast to the finding for children's reading skills development, this result suggests that high-quality child care environments may be able to attenuate the effects of less stimulating home learning environments that some low-income children experience.

*Child care quality and child gender.* Children's cognitive development and continuous measures of

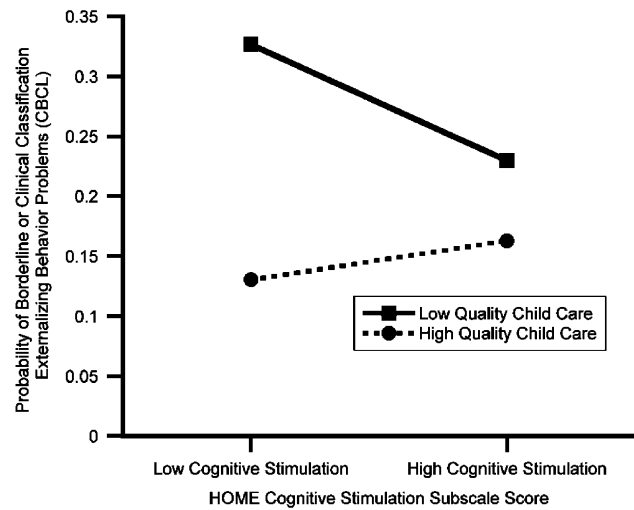


Figure 4. Interaction between child care quality and children's home learning environment predicting the likelihood that children will exhibit externalizing behavior problems in the clinical or borderline range. CBCL = Child Behavior Checklist; HOME = Home Observation for Measurement of the Environment.

behavior problems were not significantly linked to interactions between child care quality and child gender. However, this interaction term was significantly related to serious internalizing and externalizing behavior problems, illustrated in Figures 5 and 6, respectively.

These plots show that high-quality child care was especially salient for boys. Specifically, low-quality child care appeared particularly detrimental for boys' serious internalizing behavior problems, whereas high-quality child care was more protective for boys than girls when it came to serious externalizing behavior problems.

## Discussion

Using data from multiple sources on a representative sample of preschoolers in urban, low-income neighborhoods in Boston, Chicago, and San Antonio, this study extends existing child care research by illustrating the importance of high-quality care for low-income children in community-based care arrangements. Even after controlling for measured and unmeasured characteristics of children and families, this investigation showed that the developmental quality of child care was modestly linked to preschool-age children's developmental trajectories. Child care quality seems to be particularly important for children's socioemotional development, controlling for type of care. Specifically, the quality of children's care arrangements predicted slight de-

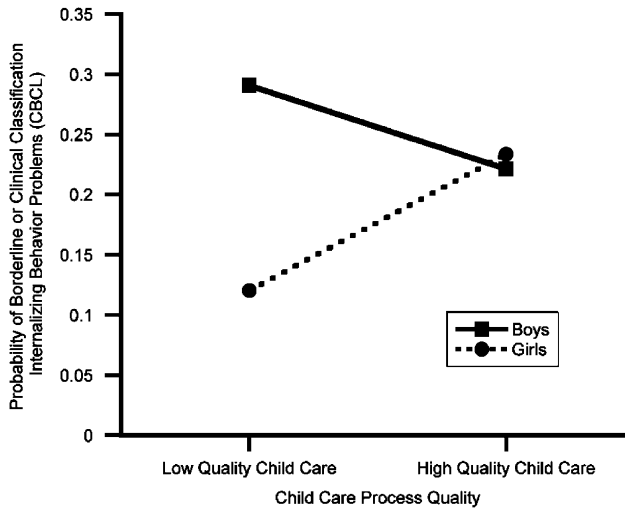


Figure 5. Interaction between child care quality and gender predicting the likelihood that children will exhibit internalizing behavior problems in the clinical or borderline range. CBCL = Child Behavior Checklist.

creases in children’s internalizing behavior problems and marginal reductions in rates of serious externalizing problems over time. Child care quality was also modestly related to maternal reports of children’s positive behaviors. The consistency, warm engagement, and support for prosocial peer interactions found in high-quality child care arrangements may provide an important context that enhances young children’s abilities to regulate their emotional

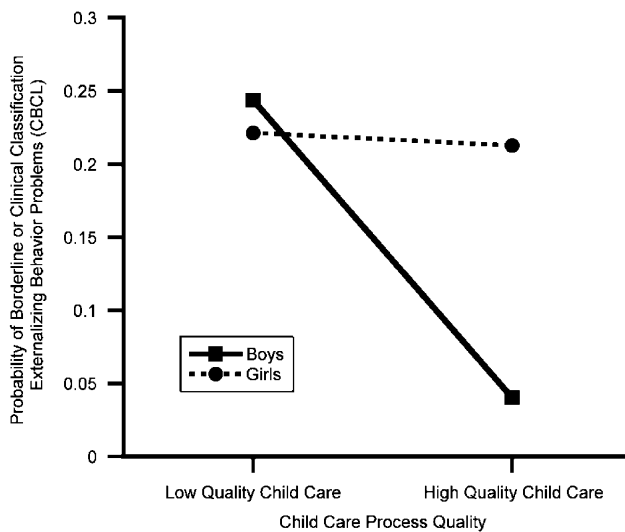


Figure 6. Interaction between child care quality and gender predicting the likelihood that children will exhibit externalizing behavior problems in the clinical or borderline range. CBCL = Child Behavior Checklist.

and behavioral functioning and in turn improves their psychological and behavioral well-being.

In contrast to other research, which has found that high-quality child care may increase children’s cognitive skills, no main effects of child care type or quality on children’s reading and math skills trajectories were found. It was only under conditions of highly stimulating home environments that high-quality child care predicted significant increases over time in children’s reading skills. It may be that, within the normative range of child care quality available to low-income children in their communities, even relatively high-quality care is not able to make up for other environmental challenges to children’s cognitive development. A second possibility is that quality child care may need to be experienced consistently over a longer period to have a significant effect. Unlike other studies that have longitudinal assessments of children’s experiences in child care (e.g., NICHD Early Child Care Research Network, 2003), the data used in these analyses provided only a snapshot of children’s child care experiences.

Another notable finding from this study was that extensive child care did not seem to be harmful to low-income children’s development, except when the care was of low quality. This is particularly meaningful because a substantial number of children, one third of the sample, experienced child care for more than 45 hr per week. For the sample as a whole, as the number of hours children spent in child care arrangements increased, their quantitative skills improved and their probability of scoring in the borderline or clinical range on total behavior problems declined. However, the quality and extent of child care interacted in important ways to influence children’s trajectories. Specifically, more extensive, high-quality child care fostered children’s socioemotional functioning, as exemplified by reductions in both internalizing and externalizing problem behaviors. There also appears to be a subgroup of children for whom high hours of child care could be problematic. Children who experienced extensive amounts of care in low-quality arrangements showed elevated levels of externalizing behavior problems over time, including elevations that placed children into a categorization indicating the potential need for clinical services.

Our results with respect to the quantity of care stand in contrast to those recently released by the NICHD Early Child Care Research Network (2003), which found positive associations between weekly hours of child care and children’s behavior problems in kindergarten and at 54 months of age. The

disparity in findings between Three-City Study and the NICHD Early Child Care Research Network's study may be due in part to the different samples. The Three-City Study was composed of primarily low-income families in low-income neighborhoods. The sample used in these analyses had a mean income-to-needs ratio of .85, or \$14,360 per year for a family of two adults and two children. The NICHD study, although diverse, was more affluent with a mean income-to-needs ratio of approximately 3.7, or \$62,512 per year for a family of two adults and two children (NICHD Early Child Care Research Network, 2003). Extensive research has indicated that poverty during early childhood presents significant risks to development (Duncan & Brooks-Gunn, 1997; National Research Council and Institute of Medicine, 2000). It may be that more hours in child care in our study represents a buffering influence, given that the general quality of care was decent to good. Only for very-low-quality care were extensive hours of care detrimental to children's functioning, a finding that is consonant with a multiple-risk perspective (Friedman & Chase-Lansdale, 2002).

Our results also suggest that child care quality is especially salient for boys' social development. Low-quality child care seems to be particularly detrimental for boys' serious internalizing behavior problems, whereas high-quality child care is more protective for boys than for girls when it comes to serious externalizing behavior problems. Two factors that might explain gender differences in the effects of quality on social development are differences in same-sex peer groups and gender disparities in the development of self-regulation. Even when preschool-aged boys and girls are in the same child care arrangements, their experiences may differ significantly because most of children's social interactions take place within the context of same-sex peer groups (Fabes, Shepard, Guthrie, & Martin, 1997; Maccoby, 1998). The nature of boys' and girls' play within the context of these same-sex peer groups in child care differs (Fabes, Hanish, & Martin, 2003). Boys tend to engage in more rough, active, and physical play that is characterized by higher levels of conflict and takes place with less adult supervision. Girls' play, on the other hand, is more likely to emphasize cooperation and verbal communication and is more often supervised and structured by adults, who tend to form closer relationships with girls than boys in child care settings (Ahnert, Pinquart, & Lamb, 2003, as cited in Ahnert & Lamb, 2003; Fabes et al., 2003; Maccoby, 1998). High-quality child care may be particularly important for aiding boys' social and behavioral

development because it provides greater structure, supervision, and safety, all which are critical for ensuring that the more aggressive and physical forms of play do not lead to the development of behavior problems.

A second reason that child care quality may be more important for boys' social development is because of gender differences in the development of self-regulation. Preschool-aged boys tend to lag behind girls in their development of inhibitory control, which is central in promoting children's socioemotional functioning (Kochanska, Murray, Jacques, Koenig, & Vandegest, 1996). Similarly, recent research suggests that boys may be more reactive to stress and are less adept than girls in regulating their physiological arousal (Crockenberg, 2003; Dettling, Gunnar, & Donazella, 1999; Dettling, Parker, Lane, Sebanc, & Gunnar, 2000; Tout, de Haan, Campbell, & Gunnar, 1998). Hence, boys may be more influenced by child care quality because high-quality care provides more responsive and effective forms of external control, helping boys regulate their emotions and behaviors and thus improving their social development. For girls, these external forms of control are relatively less important because they possess greater self-regulatory capabilities.

In sum, this study is part of a new generation of child care research that is taking a more nuanced approach to multiple dimensions of children's experiences at home and in child care. With a sizable sample, in-depth measurement of child outcomes across multiple domains, and rigorous statistical methodology, this study provides further evidence that child care quality is an important factor in the developmental trajectories of young children in poverty. Nevertheless, this study is not without its limitations, including only one wave of child care data, challenges to consistency of measurement of quality across settings, and a short-term longitudinal design. The results of the present study add to a growing body of empirical evidence suggesting the need for policy and programmatic efforts to increase low-income families' access to high-quality child care.

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