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Child Care in Poor Communities: Early Learning Effects of Type, Quality, and Stability

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Young children in poor communities are spending more hours in nonparental care because of policy reforms and expansion of early childhood programs. Studies show positive effects of high-quality center-based care on children's cognitive growth. Yet, little is known about the effects of center care typically available in poor communities or the effects of home-based care. Using a sample of children who were between 12 and 42 months when their mothers entered welfare-to-work programs, this paper finds positive cognitive effects for children in center care. Children also display stronger cognitive growth when caregivers are more sensitive and responsive, and stronger social development when providers have education beyond high school. Children in family child care homes show more behavioral problems but no cognitive differences.

In recent years, policy shifts that encourage mothers to leave home and enter paid jobs have influenced the number of parents selecting nonparental child care and the types of settings children enter. In addition, growth in federal child care vouchers for a wider range of low-income and working-class families has spurred demand for both center and home-based care, including licensed child care homes and subsidized individual caregivers (Blau, 2001; Collins, Layzer, Kreader, Werner, & Glantz, 2000). High-quality early childhood programs, typically situated within centers or preschools, have demonstrated significant effects on early language and cognitive development for children from low-income families (for review, see Barnett, 1995; Burchinal, 1999; Currie, 2001). Yet, effects for similar children in "naturally" varying centers across poor communities are more mixed, likely because of wide variation in program quality (Phillips, Voran, Kisker, Howes, & Whitebook, 1994). Center care for infants that manifests low quality may even depress early cognitive growth, relative to parental care (Vandell & Corasaniti, 1990; National Institute of Child Health and Human Development [NICHD][31] Early Child Care Research Network, 1997). The limited observational evidence available reveals highly variable quality of care in poor communities (Coley, Li-Grining, & Chase-Lansdale, in press; Phillips et al., 1994). We know little about the quality of care selected under the new policy regime by mothers moving from welfare to work. We also know little about the effects of these settings on their young children's development.

This paper reports on the observed quality of center and home-based child care settings selected by single mothers soon after they entered welfare reform programs in 1998. We estimate how young children's exposure to center versus home-based care, care quality, and care stability affect early cognitive and social development, net baseline levels of cognitive and social proficiencies, the mother's own cognitive ability and education level, and several other background factors. We also report a selection analysis to determine whether self-selection of care may be biasing our estimates.

Developmental Effects of Child Care Type and Quality

Carefully crafted preschool programs have shown significant effects repeatedly on young children's cognitive growth and, occasionally, on their social development. Such effects from small demonstration programs were first found with the Perry Preschool Project (Schweinhart, Barnes, Weikart, Barnett, & Epstein, 1993) and elaborated in similarly controlled interventions, such as the Abecedarian full-day preschool program (Campbell & Ramey, 1994), the Infant Health and Development Project (McCarton, Brooks-Gunn, Wallace, & Bauer, 1997), and the Chicago Child-Parent Centers (Reynolds & Temple, 1998). Random-assignment designs have been used more recently, revealing discrete developmental effects within a portion of Early Head Start sites

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(Love et al., 2002) and for welfare-reform experiments when they attend to parents' child care needs and increase the selection of center-based programs. The New Hope experiment in Milwaukee, Wisconsin is one example (Huston et al., 2001; Zaslow et al., 2002).

Generalizing effects from these demonstration programs to broadly available child care programs is difficult. Studies assessing the impact of centers—within both middle-class and low-income neighborhoods—tends to show less consistent effects on young children's cognitive growth. These estimates also tend to diminish when more extensive selection controls are included in estimation models (Burchinal, 1999; Fuller, Holloway, & Liang, 1996). Some investigators have found no significant effects from children's participation in center programs when they have drawn samples that presumably capture wider variability in center quality than was observed in the earlier demonstration projects (Clarke-Stewart, Gruber, & Fitzgerald, 1994; Kontos, 1991). The magnitude with which center care affects cognitive growth has been an issue with Head Start, given that positive effects have been modest and at times short lived, as children enter elementary schools of uneven quality (Lee & Loeb, 1995; NICHD Early Child Care Research Network, 1999).

In contrast to studies assessing child care type, studies looking at the influence of center quality on children's outcomes tend to find effects. The Cost, Quality, and Outcomes Study, tracking children who attended centers in widely varying communities in four states, found that quality indicators predict cognitive and social developmental gains into kindergarten and, for some outcomes, into second grade (Peisner-Feinberg et al., 2001). Effect sizes, though modest in most cases, are stronger for children from low-income families, even though the average quality of centers the children attended was moderate to low (Peisner-Feinberg & Burchinal, 1997). In one welfare reform experiment, when mothers facing stiff work requirements were able to find high-quality center care, their young children displayed higher levels of school readiness compared with those in the control group whose mothers faced little employment pressure (Zaslow, McGroder, Moore, & Le Menestrel, 1999; Zaslow, Oldham, Moore, & Magenheim, 1998). The NICHD (1997) study of early child care also found positive cognitive-developmental effects and mixed social-developmental effects from quality levels and time spent in center-based programs, even for toddlers. Yet, this study tracked only a small number of children from poor families.

Maternal Employment, Child Care Selection, and Local Supply Conditions

Marked shifts in family policy over the past decade have influenced demand for child care and the mix of organizations and individuals that provide care in poor communities. The process of child care selection, the availability of home-based providers, and the quality of care may all be changing as welfare reforms become institutionalized, spurring greater demand for child care and sizable infusions of new funding (Fuller, Kagan, Caspary, & Gauthier, 2002). One federal study reported that more than 1 million additional families now receive public child care support each year, compared with before the 1996 reforms (Collins et al., 2000). Initial observational studies of centers selected by welfare and working-poor families reveal widely varying levels of quality (Coley et al., in press; Fuller, Kagan, & Loeb, 2002). As the mix of providers evolves in poor communities and additional families express demand for nonparental care, it becomes more difficult to generalize from the early evaluations of the preschool demonstration programs. Findings of positive effects from high-quality centers alone cannot answer the question: On average, do children in poor communities benefit developmentally when placed in centers as their mothers are encouraged to move from home into paid jobs?

We know even less about the quality or impact of home-based care—licensed family child care homes (FCCHs) and kith or kin providers. One rare observational study found mixed but generally low quality in home-based settings (Kontos, 1991). The NICHD study found that the quality of center versus home-based care may depend on the child's age (Clarke-Stewart, 1999). In-home care provided by grandparents and fathers was determined to be of higher quality, compared with center-based programs, for toddlers at 15 and 24 months of age. But for preschoolers, center-based programs surpassed home-based settings on a variety of indicators. But, again, the NICHD sample included only a modest share of low-income families.

To estimate accurately the impact of child care on children's development, we must consider the process by which mothers select child care settings for their children. Under strong and immediate pressure to work outside the home, low-income mothers may be constrained in their choices, depending on the stock of care options available locally. In this case, the mother's own attributes may have little effect on child care choice. If children are allocated into center slots by caseworkers, traditional conceptions

of demand factors operating solely at the individual level are not sufficient. In addition, state regulatory policies may affect the distribution of center quality. Two studies have shown that the quality of centers situated in low-income neighborhoods, at least along structural measures (e.g., child–staff ratios), can be moderate to high compared with unregulated or nonsubsidized centers (Phillips et al., 1994). Alternatively, children exposed to risk factors at home may display a higher likelihood of being placed in home-based settings or in poorer quality centers (Belsky, Spritz, & Crnic, 1996; Tresch Owen & Cox, 1988), leading to selection bias when estimating discrete effects of nonparental child care. We focus considerable analytic attention on detecting potential bias arising from selection.

Empirical Questions

Earlier studies and evolving family policies prompt four empirical questions. First, what is the quality of child care available to women in the welfare system? Second, how does the type and quality of child care attended influence children's cognitive development? Early evidence suggests that high-quality center programs more effectively contribute to children's cognitive and language development than home-based providers; but these data are sparse, stem from controlled demonstrations, and were collected before implementation of the 1996 welfare reforms. Third, how does the type and quality of child care influence young children's social development? Earlier evidence on social-developmental effects of child care settings is mixed. We know little about possible effects in poor communities. Finally, do differences in developmental effects hold up to extensive controls for family differences in children's baseline proficiencies, mothers' own cognitive skills, home practices, and other family attributes? The magnitude of observed center effects has been moderate in naturalistic settings and typically diminishes when more thorough selection controls are included in estimation models.

Method

Our analysis stems from a 5-year study that is following low-income mothers and young children who in 1998 entered state welfare-to-work programs under the new federal Temporary Assistance for Needy Families (TANF) program. Our overall goal is to understand how home and child care environments change for children as their mothers face new pressures and incentives to work outside the home.

Procedure and Participants

The present paper reports on data collected from maternal interviews, child assessments, and observations of center care and home-based care settings for 451 families residing in San Francisco or San Jose, California, or Tampa, Florida. We selected research sites based on demographic diversity, variation in local policy conditions, variation in the stock of center programs among the census tracts in which low-income families resided, and cooperation of county welfare officials. We conducted maternal interviews and child assessments primarily in 1998 (baseline, Wave 1), when the mean child was 2½ years of age, and in 2000 (Wave 2), when the mean child was approximately 4 years old.

We invited mothers into the study during their first visit to the local welfare office after TANF eligibility was determined by each county. All mothers were TANF eligible at baseline (Wave 1), were a single head of household, and had at least one resident child 12 to 42 months of age. Of the women meeting these sampling requirements, 89% agreed to join the study. We conducted maternal interviews at both Waves 1 and 2, covering several child care topics as well as questions about the development of their child. At Wave 1, we assessed children's baseline cognitive, language, and social-developmental proficiencies and conducted child care observations. At Wave 2, we conducted home visits, allowing a wider battery of child-assessment measures.

The 451 families who participated in Wave 2 comprise 77% of the original baseline (Wave 1) sample. A sample-attrition analysis reveals that families who left the Wave 1 sample did not differ significantly from the retained sample in terms of mother's age and school attainment, employment status, or children's Wave 1 cognitive and language development scores. Children who exited the sample were about 3 months older than those retained; this should not affect our estimation models because we control for age in the analyses. Because of a low response rate in Wave 2 of Vietnamese American families in San Jose, we omitted this subgroup from the present analysis.

Table 1 reports characteristics of the 451 California and Florida families who participated in both Wave 1 and Wave 2 data collection. The families are evenly distributed across the three research sites as follows: 31% San Jose ($n = 139$), 35% San Francisco ($n = 159$), and 34% Tampa ($n = 153$). Of the sample mothers, 41% are African American, 32% are Latina, and 24% are White. At some point in the year before the Wave

Table 1
Selected Mother and Child Characteristics

Variable	*N*	*M* (*SD*) or %	
Family background			
Child's age at maternal interview (in months)	451	28.32	(9.24)
Mother's education and cognitive proficiency			
Did not complete high school	451	44%	
Mother's PPVT score	356	19.7	(12.3)
Race or ethnicity			
Black	451	41%	
Hispanic	451	32%	
Asian	451	3%	
Site			
San Jose	451	31%	
San Francisco	451	35%	
Child outcome, Wave 1			
Word knowledge	418	0.00	(1.00)
Complex communication	402	0.00	(0.92)
Income and employment			
Worked for pay in prior year	451	83%	
Earned monthly income ($)	438	1,008	(737)
On welfare during last year	448	82%	
On welfare and working	451	22%	
Not on welfare and working	451	31%	
Not on welfare and not working	451	16%	
On welfare and not working	451	31%	
Parenting practices			
Library or museum	397	47%	
Number of books in the home	398	4.13	(1.04)
Read often	398	2.94	(1.07)
Child care use			
Wave 1: Child care at least 10 hr/week	451	68%	
Center care	451	29%	
Family child care home	451	9%	
Kith and kin	451	30%	
Wave 2: Child care at least 10 hr/week	451	83%	
Center care	451	40%	
Family child care home	451	10%	
Kith and kin	451	32%	
Both waves:			
Center care	451	21%	
Family child care home	451	4%	
Kith and kin	451	16%	
Moved to center in Wave 2	451	19%	
Other	451	31%	
No care	451	9%	

Note. PPVT = Peabody Picture Vocabulary Test.

2 interview, 83% of mothers were employed. Their average monthly income (from earnings plus cash benefits) was $1,008, despite their success in finding jobs.

During the baseline (Wave 1) interviews, 68% of the mothers used some type of nonparental child care at least 10 hr a week. As maternal employment rose, so did child care use. By Wave 2, 83% of mothers were using nonparental care. The share of women using center care increased markedly, rising from 29% to 40% between Waves 1 and 2. In part, this increase is due to children's aging over time: National surveys show that as children reach age 3 or 4, enrollment in center programs increases (Smith, 2000). Over the two waves of data collection, many mothers changed child care at least once: Twenty-one percent of children were in center care at both waves; 19% moved to a center between Waves 1 and 2; 4% were in an FCCH at both waves; 16% were with an individual nonparental provider; 31% were in a mixed arrangement; and 9% reported not using care at either Wave 1 or 2.

Measures

Maternal and home characteristics. The interviews with mothers, conducted at Waves 1 and 2, covered a variety of individual attributes and features of the home environment. For the present analyses, we drew on several of these variables as predictors of developmental outcomes. We controlled for these factors in our analyses to distinguish the effect of different types of child care from the selection of families into child care settings (Burchinal, 1999; Peisner-Feinberg et al., 2001). Demographic controls include mother's age, ethnicity, monthly income, and school attainment level. We asked a series of questions regarding the mother's work experiences over the prior 12 months and involvement in the welfare system. We sorted women into four groups based on whether they were currently working and whether they were still drawing cash aid under the TANF program, and we included controls for these groups in our analyses. In addition, we employed questions from the Home Observation for Measurement of the Environment (HOME) Inventory on parenting practices, including the mother's reported reading behaviors and engagement with the focus child in activities related to positive development (e.g., reading with the child; Bradley, 1993). Such practices might influence both child development and child care selection, and thus their omission could bias estimates of child care effects (Fuller et al., 1996).

In addition to controlling for the factors discussed earlier, we adjusted for mothers' cognitive proficiency and mental health. During our Wave 2 home visits, we administered the adult version of the

Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1997) in English or Spanish, assessing the mother's cognitive and language proficiency. To assess mental health, we used the Center for Epidemiologic Studies Depression Inventory (CES–D; McDowell & Newell, 1996), consisting of self-reported items such as "you felt lonely," "you were happy," and "you could not shake off blues, even with help from family and friends." Just more than two in five mothers in our sample displayed depressive symptoms at Waves 1 and 2, where *depressive symptoms* is defined as a score of 16 or greater.

Child care exposure, type, and stability. Children's exposure to differing types of child care is indicated by a series of dummy variables measuring whether a child: attended a center at both Waves 1 and 2, attended a licensed FCCH at both waves, had no nonparental care arrangement in both waves, moved to a center by Wave 2, or experienced another mix of child care types over the two waves. The base group includes children who were cared for by individual kith or kin members in Waves 1 and 2. We asked mothers how many child care providers they currently were using and for how many months the focal child had been attending the current provider setting. These two measures assess the stability of the primary child care arrangement, enabling us to differentiate the effects of quality from the effects of stability.

Observed child care quality. During Wave 1 data collection, we accessed child care settings to conduct half-day observations of quality features. We observed 158 centers (out of 196) and 136 home-based settings (out of 228), 69% of the settings attended by children in care for at least 10 hr per week. We measured quality using standard measures, such as the Early Childhood Environment Rating Scale (ECERS). The ECERS gauges a variety of structural and physical aspects of centers, such as the quality of facilities, availability of developmentally appropriate learning and play materials, the arrangement of child-centered activities, and the nature of child–caregiver interaction (Harms, Clifford, & Cryer, 1997). We used the counterpart instrument for family child care homes, the Family Day Care Rating Scale (FDCRS), in all home-based settings, including kith or kin providers. Early in our project we conducted a validation study to see how these instruments performed in center and home settings in low-income communities. We decided to use the ECERS, rather than the Infant/Toddler Environment Rating Scale (ITERS), for our Wave 1 child care observations, assuming that most children would be at the upper end of our age distribution. This proved to be true: two thirds of the 55 children enrolled in centers at Wave 1 were 24 months or older. Because our sample was already split between children in center care and those in home-based care, we did not want to introduce another quality measure for this small subgroup of young toddlers, for whom the ITERS may have been preferable.

We also administered the Arnett Scale of Caregiver Behavior (Arnett, 1989). This scale focuses on the character of social interaction between child and caregiver, including the caregiver's attentiveness and responsiveness, capacity to explain misbehavior and reason, and warmth and generalized affect. Items coded by the field researcher include, "(caregiver) speaks warmly to the children" and "pays positive attention to the children as individuals." It also measures the extent to which caregivers engage children in problem-solving activities rather than being directive.

Field staff were trained centrally on the observations measures, and all were required to reach a 90% level of interrater agreement on individual scales within the ECERS, FDCRS, and the Arnett measures. Finally, we obtained structural measures of quality (Phillips et al., 1994) through an interview with the child care provider. These measures include child–staff ratios, maximum group size, number of child groups at the setting, and the provider's education level and past participation in child development training and in-service workshops.

Table 2 reports mean scores on the quality measures for centers and home-based settings, partitioned by research site. Caregivers in centers have higher educational attainment than those in home-based settings, though as expected, the ratio of children to adults is higher in centers. In our sample, both child care types exhibited similar scores on the Arnett scale. Note that the ECERS and FDCRS are not directly comparable, especially given limited experience using the FDCRS in kith and kin settings. We, however, can compare the ECERS and FDCRS across sites. The California counties, especially San Jose, exhibit higher ECERS scores and appear to be of higher quality across all the measures. In an earlier paper, we separated licensed FCCHs from individual providers but detected few differences between these two groups. The multivariate analysis reported later distinguishes between FCCHs and kith or kin providers.

Children's cognitive and language proficiencies. During both waves of data collection, we assessed children with the two subscales of the MacArthur Communicative Development Inventory (CDI; Fen-

Table 2
Observed Child Care Quality for Centers and Home-Based Settings, by Site

Variable	San Francisco	San Jose	Tampa	*f*-value
Center ($n = 158$)				
Early Childhood Environment Rating Scale (ECERS)	4.6 (1.1)	5.8 (0.8)	3.2 (1.4)	52.01***
Arnett Social Interaction Scale	3.0 (0.8)	2.4 (0.4)	2.6 (0.7)	13.86***
Caregiver completed high school (%)	97 (18)	94 (25)	88 (32)	
Children in setting (group size)	15.6 (7.3)	14.5 (6.1)	11.8 (7.2)	4.18*
Ratio of children per adult caregiver	4.5 (2.1)	5.9 (3.6)	7.8 (5.1)	7.38***
Home-based setting ($n = 136$)				
Family Day Care Rating Scale (FDCRS)	2.7 (1.3)	2.8 (1.2)	3.0 (1.5)	0.49
Arnett Social Interaction Scale	2.9 (0.8)	3.0 (0.6)	2.6 (0.8)	3.05
Caregiver completed high school (%)	77 (43)	53 (50)	49 (51)	4.31*
Children in setting (group size)	4.3 (4.3)	3.5 (3.1)	4.1 (4.8)	0.69
Ratio of children per adult caregiver	2.0 (1.4)	2.2 (1.6)	2.7 (2.2)	1.60

Note. Values are means, with standard deviations in parentheses. Average item scores reported for ECERS and Arnett measures.
*$p < .05$. ***$p < .001$.

son et al., 1994). These measures rely on mother's report of her child's language and communicative proficiencies. We also converted the CDI word usage scales into a picture version, directly administered by field staff, to help validate mother reports. We used the two versions of the CDI at baseline (Wave 1), the infant-toddler version for children 12 to 23 months old, and the toddler-preschooler version for children 24 to 42 months old. The CDI is one of a few instruments for which reliability and validity studies have been completed for this age range (Fenson et al., 1994). Two CDI subscales for both age groups prove predictive of Wave 2 cognitive and language proficiency: word knowledge or usage and communicative complexity. From raw scores we derive standardized performance scores for each subscale in each age group. We then combine the standardized scores across the two age cohorts and use these as controls for children's baseline levels of cognitive and language proficiency. The correlation between word knowledge or usage and complex communication subscales were 0.39 for the younger cohort and 0.56 for the older cohort, both significant at $p < .05$ or stronger. All estimation models control on child age.

During the Wave 2 home visits we administered the Bracken Basic Concept Scale, a measure of children's basic language and cognitive proficiency in a variety of domains (Psychological Corporation, 1998). The Bracken instrument, administered in English or Spanish, consists of six subscales that yield a school readiness composite and five additional subscales pertaining to self-awareness and social awareness, understanding of direction and position, understanding of texture and physical materials, understanding of quantity, and understanding of time and sequences of events. We used the Bracken scaled scores adjusted for child age.

To assess further children's school readiness skills at Wave 2, interviewers administered the story and print concepts portion of the Family and Child Experiences Survey (FACES), developed for the current national evaluation of Head Start. (We used this with the permission of the Head Start Bureau, Department of Health and Human Services; special thanks to Gary Resnick at Westat Inc. and Louisa Turillo at the Bureau for their steady cooperation.) These items involve reading a simple storybook, *Where's My Teddy*, to the focus child, then assessing the child's familiarity with the structure and print conventions of children's books, comprehension of the story, and recognition of basic words. We also assessed school readiness skills through a series of questions within the maternal interview related to whether the child could write his or her name, how far the child was able to count, and proficiency in drawing letters and pictures rather than scribbling on paper. These items were drawn from National Household Education Survey (NHES; Zill, Collins, West, & Hausken, 1995). We derived an internally reliable composite measuring mother-assessed cognition from these individual items.

Children's social development. In both waves, mothers completed subscales of the Child Behavior Checklist (CBCL 2/3), which assesses behavioral and emotional problems of toddlers and preschoolers (derived from Achenbach, 1992). The CBCL includes items such as "(child) cries a lot" and "(child) destroys (his/her) own things." We combined individual items to create a social problems composite and two complete subscales for aggressive and destructive behaviors (Achenbach, Edelbrookm, & Howell, 1987). The CBCL has been used in large national surveys such as the National Longitudinal Study of Youth (NLSY; Baker, Keck,

Mott, & Quinlan, 1993). It has also been shown to be predictive of outcomes in later childhood (Achenbach et al., 1987; Shaw, Winslow, Owens, & Hood, 1998; Zaslow et al., 1999).

Table 3 details children's cognitive proficiencies and social-developmental levels. The 4-year-olds participating in our study score predictably lower on the Bracken scales compared with national norms. It is usually appropriate to discuss differences only when significance tests have been computed. Unfortunately, we did not have the standard errors on the national means; therefore, we could not conduct these tests. However, the standard deviations, together with the sample size in our sample, indicated that the differences between our sample and the national averages are likely to be significant. In the case of the Bracken test, for example, the standard errors of the sample means for the first six measures were 2.12, 0.74, 0.53, 0.47, 0.39, and 3.98. The standard errors are likely to be smaller for the national means (given larger sample sizes). Even if they were the same size, the differences between the national norms and our sample would be significant at conventional levels.

Our sample of 4-year-olds also showed lower proficiency on basic school readiness items, such as the ability to write one's first name or count out loud to 20, compared with children sampled for the

Table 3
Mean Scores for Children's Cognitive and Social-Developmental Outcomes

	Study sample			National norms	
Composite measure for selected item	*N*	*M*	(*SD*)	*M*	(*SD*)
Bracken Basic Concepts Scale (age adjusted; children's *M* age = 4 years)					
Total scaled score	314	90.4	(14.0)	100.0	(15.3)
Direction and position	318	8.9	(5.3)	10.3	(3.0)
Self- and social awareness	317	9.0	(2.9)	10.4	(3.0)
Texture and materials	316	8.5	(2.9)	10.4	(3.2)
Quantity	316	9.2	(2.9)	10.5	(2.9)
Time and sequence	314	9.0	(6.5)	10.3	(3.0)
School readiness composite	321	89.7	(16.8)	100.7	(15.8)
Composite national percentile score	314	31		50	
FACES school readiness item (4-year-olds' scores)					
Children's storybook items[a]					
Book mechanics	365	0.5	(0.9)		
Familiarity with storybook	366	1.3	(1.1)		
Comprehension of read story	362	1.1	(1.2)		
Total scores on four study items	362	2.4	(2.6)		
Mother-reported cognitive, school readiness item					
Child can count out loud to 20	363	33%		53%	
Child can write first name	362	29%		66%	
Can write or draw rather than scribble	364	58%		72%	
Identifies primary colors by name	365	90%		80%	
Child behavior problem (CBCL items, 4-year-olds)					
Social problems composite[b]	370	82.6	(14.6)		
Aggressiveness subscale	385	25.8	(6.2)		
Destructive subscale	394	8.7	(2.1)		
Selected item comparison (3-point scale)					
Destroys his or her own things	379	1.6	(0.8)	1.2	(0.4)
Is disobedient	382	1.7	(0.6)	1.8	(0.5)
Is stubborn, irritable	380	1.9	(0.7)	1.7	(0.6)
Child cannot sit still, restless	381	2.0	(0.8)	1.8	(0.7)
Has temper tantrums	381	1.8	(0.8)	1.6	(0.7)

Note. National comparative data are from Psychological Corporation (1998, Bracken manual), national Head Start evaluation (G. Resnick & L. Tarullo, personal communication, January 2002), and Achenbach (1992) and Center for Human Resource Research (2000). FACES = Family and Child Experiences Survey; CBCL = Child Behavior Checklist.
[a]Response categories differed slightly; therefore, comparative data were not available from national Head Start evaluation. This comparison is against children from low-income families enrolled in Head Start programs.
[b]National comparisons were not available for the composites derived from the selected CBCL items. This comparison is against a national representative sample of 4-year-olds participating in the National Longitudinal Study of Youth.

national Head Start evaluation. Compared with the CBCL scores of 4-year-olds in the NLSY, our participating mothers reported a higher incidence of behavioral problems for their 4-year-olds on certain items, but these differences were not as consistent as gaps in the cognitive and school readiness measures.

Data Analysis

Examining possible selection effects. Because mothers in our study were not randomly assigned to different types of child care or quality conditions, selection bias is a concern. Maternal or home attributes may influence both the selection of center care and children's rate of development. For example, if more highly educated mothers choose center-based care for their children, rather than home-based care, a mean difference in child outcomes could be due to parental differences, not to causal effects of child care settings. The same selection process may apply to the quality and stability of care arrangements selected by parents, independent of type. We know this is likely in national probability samples (Burchinal, 1999; Singer, Fuller, Keiley, & Wolf, 1998); but, we do not know the extent to which family demand factors or institutional allocation accounts for the type and quality of care that low-income children receive.

We employed three strategies to address potential selection bias. First, we included several statistical controls for mother, child, and family attributes that may be associated with both children's developmental outcomes and care selection. These include the mother's school attainment (a dummy variable indicating that the mother did not complete high school); mother's cognitive and language proficiency (PPVT score); ethnicity; mental health; work status and earnings; the parenting practices identified in the HOME Inventory; child's age; and child's earlier cognitive, language, and social-developmental outcomes (at baseline, Wave 1). We also controlled for mother's location (San Jose and San Francisco, with Tampa as the base). Second, we explicitly modeled child care selection by examining whether an array of variables related to family background, mother's income, work and welfare experience, local availability of center enrollment slots, and child outcomes predict the type of care selected. We conducted a similar analysis for the level of child care quality selected by mothers. Finally, we examined the possibility of using local enrollment capacity of child care centers as an instrument for whether a child attended a center. Unfortunately, local availability proved to be a poor instrument: It did not predict child care use or type at the census tract level.

Estimating child care effects over time. We began by employing ordinary least squares to determine the effects of child care settings on children's cognitive and social outcomes, after taking into account the control variables described earlier. We considered three models, each one adding predictors to the basic model. In the first step, we include only the controls for the child's cognitive proficiency (or social-developmental) levels at baseline (Wave 1), maternal and family attributes, and site. The second step adds predictors for work or welfare group membership, income, and parenting practices. The third model adds interactions between site and center use to the basic model. These interactions capture any differential child-development effects stemming from differences in mean center quality levels among the sites. To investigate the self-selection issues, we model mother's selection into different types of child care using multinomial logit regressions.

Similar to other longitudinal field studies, we encounter missing data in our sample because of none responses to some questions. The complete sample attrition analysis appears in Fuller, Kagan, and Loeb (2002). Among families participating at Wave 2, we were unable to complete home visits, and thus complete child assessments, for 11% of the cases. When children were unable to perform at minimal levels on the Bracken, usually the youngest children in the sample, field staff did not attempt the child assessment battery. The Bracken is thus more likely to be missing for the youngest children. There is no difference between those with missing and nonmissing data on the Bracken in terms of social problems, Wave 1 cognitive measures, or mother's PPVT scores. Sample attrition resulted in a slight loss of younger children who performed at significantly lower levels on the MacArthur CDI at Wave 1. There were some missing data on the control variables, as well. To include as many observations as possible, we recoded missing values to the mean and included a dummy indicating missing data for the following control variables: children's baseline cognitive scores, mother's PPVT scores, mother's mental health, and children's social problems in Wave 1. This adjustment did not change the substance of our results.

Results

Positive Effects From Center Participation

We begin by reporting on the estimated effects of participation in different types of care on children's

cognitive proficiencies at Wave 2, controlling for background characteristics and proficiency levels at baseline (Wave 1). Table 4 details results for the Bracken scales, and Table 5 reports the corresponding models for the FACES storybook assessment and mother-reported cognitive skills related to school readiness. We observed a strong, significant, and positive effect of participation in center-based programs on almost all cognitive outcomes, relative to children who remained with individual kith or

Table 4
Effects of Child Care Type on Cognitive Outcomes: Bracken Subscales

Variable	Total Score ($N = 314$)	Direction ($N = 318$)	Self-esteem ($N = 316$)	Texture ($N = 316$)	Quantity ($N = 316$)	Time ($N = 314$)	School readiness composite ($N = 321$)
Child outcome, Wave 1							
Word knowledge	3.01**	0.28	0.57**	0.61**	0.56**	0.37	3.17**
	(0.93)	(0.41)	(0.20)	(0.20)	(0.21)	(0.50)	(1.11)
Complex communication	1.91*	0.53	0.33†	0.35†	0.25	−0.28	2.34*
	(0.91)	(0.39)	(0.20)	(0.19)	(0.20)	(0.49)	(1.08)
Family background							
Child age	0.03	−0.04	0.01	—	—	−0.03	0.21*
	(0.09)	(0.04)	(0.02)	(0.02)	(0.02)	(0.05)	(0.10)
African American	−4.72*	−0.84	−0.90*	−1.36***	−0.55	−2.47*	−4.84*
	(1.95)	(0.85)	(0.42)	(0.41)	(0.43)	(1.05)	(2.31)
Latina	−3.68†	−1.10	−0.70	−0.65	−0.73	−2.25*	−4.24†
	(2.04)	(0.89)	(0.45)	(0.44)	(0.45)	(1.10)	(2.46)
Asian American	−1.38	−1.46	0.42	−0.01	−0.34	−2.94	1.03
	(4.50)	(1.98)	(0.98)	(0.96)	(1.00)	(2.42)	(5.43)
Mother's PPVT score	3.07***	0.15	0.52**	0.67***	0.53**	−0.28	2.69**
	(0.83)	(0.36)	(0.18)	(0.18)	(0.18)	(0.45)	(0.99)
Did not complete high school	−0.69	0.18	0.15	—	0.09	−1.06	−3.48†
	(1.59)	(0.70)	(0.35)	(0.34)	(0.35)	(2.39)	(1.90)
Site							
San Jose	3.64†	0.45	0.93*	1.21**	0.55	−0.69	5.96*
	(2.02)	(0.88)	(0.44)	(0.43)	(0.45)	(1.09)	(2.41)
San Francisco	3.59*	0.55	0.50	0.66†	0.20	−0.13	7.22***
	(1.80)	(0.78)	(0.39)	(0.38)	(0.40)	(0.96)	(2.15)
Child care							
Center both waves	8.10***	1.52	2.01***	1.37**	1.59**	0.85	5.88*
	(2.41)	(1.05)	(0.52)	(0.51)	(0.53)	(1.29)	(2.88)
Family child care home both waves	7.61†	2.41	0.96	−0.45	1.37	2.36	6.73
	(4.17)	(1.83)	(0.91)	(0.89)	(0.93)	(2.24)	(5.02)
No care both waves	2.15	−0.44	0.56	0.87	1.34†	0.03	−3.65
	(3.15)	(1.36)	(0.69)	(0.67)	(0.70)	(1.69)	(3.72)
Moved to center in Wave 2	4.84*	1.21	0.90†	0.35	0.26	0.51	5.61*
	(2.36)	(1.03)	(0.51)	(0.50)	(0.52)	(1.27)	(2.81)
Other	4.21†	1.61	0.87†	0.59	1.21†	1.72	1.06
	(2.28)	(0.99)	(0.49)	(0.48)	(0.50)	(1.22)	(2.70)
Missing							
Mother's PPVT score	−1.5	−0.71	0.28	0.67	−1.01	−1.06	2.69
	(4.45)	(1.96)	(0.97)	(0.18)	(0.99)	(2.39)	(0.99)
Word knowledge	−3.67	−1.06	−0.79	0.04	−0.16	−1.06	−6.12†
	(2.92)	(1.28)	(0.64)	(0.62)	(0.65)	(1.57)	(3.53)
Complex communication	−4.91†	1.00	−0.91	−0.36	−1.18*	−0.89	−1.01
	(2.61)	(1.15)	(0.57)	(0.56)	(0.58)	(1.40)	(3.15)
Adj. R^2	0.24	—	0.18	0.22	0.14	—	0.23

Note. Coefficients are reported, with standard errors in parentheses. PPVT = Peabody Picture Vocabulary Test. Entries with a dash (—) are values ranging between −.01 and+.01.
†$p < .1$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 5
Effects of Child Care Type on Cognitive Outcomes: FACES Assessments and Baseline Child Cognitive Proficiencies

Variable	FACES total ($N = 451$)	Book mechanics ($N = 365$)	Story comprehension ($N = 362$)	Book familiarity ($N = 366$)	Mother-assessed cognition ($N = 398$)
Child outcome, Wave 1					
Word knowledge	0.23†	0.09	0.11	0.12†	0.20***
	(0.13)	(0.06)	(0.07)	(0.07)	(0.05)
Complex communication	− 0.41	—	0.07	0.06	0.16***
	(0.40)	(0.06)	(0.07)	(0.07)	(0.05)
Family background					
Child age	0.12***	0.03***	0.06***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
African American	− 0.53†	− 0.36**	− 0.25	− 0.18	− 0.26*
	(0.29)	(0.12)	(0.16)	(0.14)	(0.11)
Latina	− 0.36	− 0.39**	− 0.27†	—	− 0.22†
	(0.30)	(0.13)	(0.16)	(0.15)	(0.12)
Asian American	− 0.84	− 0.38	− 0.10	− 0.47	− 0.47*
	(0.61)	(0.28)	(0.34)	(0.32)	(0.23)
Mother's PPVT score	0.39**	0.07	0.12†	0.13*	0.03
	(0.13)	(0.05)	(0.07)	(0.06)	(0.05)
Did not complete high school	0.22	—	0.19	− 0.15	− 0.19*
	(0.23)	(0.10)	(0.12)	(0.11)	(0.09)
Site					
San Jose	0.56†	0.17	0.07	0.18	0.29**
	(0.30)	(0.12)	(0.16)	(0.15)	(0.11)
San Francisco	− 0.05	− 0.18	− 0.03	− 0.05	0.33***
	(0.26)	(0.11)	(0.14)	(0.13)	(0.10)
Child care					
Center both waves	0.87**	0.28†	0.47*	0.51**	0.29*
	(0.35)	(0.14)	(0.19)	(0.17)	(0.13)
Family child care home both waves	0.58	− 0.03	0.11	0.29	—
	(0.58)	(0.24)	(0.31)	(0.28)	(0.22)
No care both waves	0.46	0.14	0.22	0.45*	0.02
	(0.43)	(0.19)	(0.24)	(0.22)	(0.17)
Moved to center in Wave 2	1.01**	0.32*	0.48*	0.62***	0.34**
	(0.34)	(0.15)	(0.19)	(0.17)	(0.13)
Other	0.90**	0.24†	0.35*	0.42**	0.05
	(0.31)	(0.13)	(0.17)	(0.16)	(0.12)
Missing					
Word knowledge	− 0.41	0.05	− 0.24	0.07	0.06
	(0.40)	(0.18)	(0.23)	(0.21)	(0.15)
Complex communication	0.06	0.26	0.11	− 0.06	− 0.21
	(0.38)	(0.17)	(0.21)	(0.19)	(0.15)
Mother's PPVT score	− 1.73***	− 0.09	− 0.02	0.08	− 0.32*
	(0.25)	(0.16)	(0.20)	(0.18)	(0.13)
Adj. R^2	0.35	0.17	0.27	0.27	0.43

Note. Coefficients are reported, with standard errors in parentheses. FACES = Family and Child Experiences Survey; PPVT = Peabody Picture Vocabulary Test. Entries with a dash (—) are values ranging between − .01 and + .01.
$^{\dagger}p < .1$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

kin providers (the base). Only the Bracken subscales related to direction and time were not significantly predicted by center use.

We computed effect sizes in standard deviation units to gauge the magnitude of the effects. These estimates suggest that experience in a center at both waves increases Bracken total and school readiness composite scores by 0.6 and 0.4 *SD*, respectively. In comparison to individual kith and kin providers, center participation in both waves also increased

children's scores on the FACES storybook scales. The results are reported in Table 5. The effect sizes for knowledge of book mechanics, comprehension, and book familiarity subscales were 0.3, 0.4, and 0.5 *SD*, respectively. Mother-assessed cognition scores were 0.*3 SD* higher for children in center care at both Waves 1 and 2 than for children in kith and kin arrangements.

The large effects from center participation were evident not only for those attending centers during both data waves but also for the subset of children that moved to a center program between Waves 1 and 2. On the FACES subscale, children who moved to a center scored 0.4 to 0.*5 SD* higher compared with those cared for by kith or kin at both waves. A positive relationship between cognitive development and moving to a center was evident on the Bracken measures as well, yet the magnitude was smaller compared with children participating in centers at both waves. In general, the effects of center participation were strongest for school readiness measures, such as the Bracken school readiness composite and the FACES storybook items.

The center effects remained positive and significant (except for the Bracken direction and time subscales) after controlling for mother's education, children's baseline cognitive outcomes, site effects, age of the children, and mother's cognitive proficiency (PPVT score). Mother's PPVT displayed a positive and significant impact on almost all of the child's cognitive proficiencies. However, the magnitude of this impact was on average only about 0.15 *SD*, approximately half as strong as the impact of center enrollment. After adjusting for mother's cognitive ability, mothers having a high school diploma did not significantly affect children's cognitive development. Children with African American or Latina mothers tended to score lower on the cognitive outcomes. Children in San Jose and San Francisco showed higher cognitive growth than those in Florida, especially on school readiness measures. This local difference may have been due to the higher center quality observed in the two California sites. As expected, the Wave 1 measures of children's cognitive proficiency were strongly predictive of Wave 2 outcomes.

Effects of child care type on social development were less consistent. We report in Table 6 similar regressions predicting social-developmental outcomes (CBCL scales). The point estimates indicate that children participating in FCCHs exhibited more behavioral problems than those in other types of care settings, but the only statistically significant effect was that children attending FCCHs had more aggressive behaviors than children cared for by kith or kin in both waves. This relationship was large, 0.42 *SD*.

Consistent with other studies, we found that the mother's emotional depression was associated with a higher incidence of children's social problems (Graham, 1989; Zaslow et al., 1998). Given the high proportion of mothers exhibiting depressive symptoms in our sample, the link between depression and social development provides evidence that mothers' poor mental health may significantly hinder the social development of many low-income children. Mother's mental health, however, did not significantly influence children's cognitive outcomes (results not shown). African American children, those with early social problems as measured in Wave 1, and those with mothers who did not complete high school also were more likely to display social problems.

Including Proximal Determinants of Development

The next set of models included additional determinants of children's development related to mother's income, work and welfare status, and parenting practices, controlling for the effects of all previous predictors. We separated these additional factors from the earlier set because of the possibility that they were jointly determined with the choice of child care settings. All variables included in the models in Tables 4, 5, and 6 were included in these analyses as well. In Table 7 we see that the number of books in the home has a positive and significant effect on the FACES and mother-assessed school readiness measures. Children whose mothers read with them and take them to the library or museum more frequently also displayed fewer social problems (effect sizes of 0.14 and 0.19 *SD*, respectively). Children exhibited fewer social problems when their mothers were receiving welfare income and not working for wages at Wave 2 (marginally significant at $p < .10$). Mother's monthly income (from earnings and welfare) showed little effect on children's outcomes when all other variables were taken into account, though earnings was marginally negatively related to mother's assessment of the child. It is important that the center effect remained strong even after the addition of these variables. The center effect for the scores on the Bracken, FACES, and mother-assessed cognition and readiness were 0.6, 0.6, and 0.2 *SD*, respectively.

Site, Quality, and Stability Effects

The results in Table 2 suggest that the quality of center care may be higher in California counties,

Table 6
Estimates of the Effect of Child Care Type on Social Development (CBCL)

Variable	Social problems ($N = 370$)	Aggressive behavior ($N = 385$)	Destructive behavior ($N = 394$)	Other problems ($N = 388$)
Child outcome, Wave 1				
Word knowledge	− 1.11	− 0.17	− 0.07	− 0.33
	(0.81)	(0.35)	(0.12)	(0.28)
Complex communication	− 0.63	− 0.19	− 0.24†	− 0.09
	(0.81)	(0.36)	(0.13)	(0.29)
Early social problems	0.66***	0.26***	0.09***	0.19***
	(0.07)	(0.03)	(0.01)	(0.02)
Family background				
Child age	− 0.05	− 0.08†	—	—
	(0.12)	(0.05)	(0.02)	(0.04)
African American	4.88**	1.47†	0.39	1.19†
	(1.74)	(0.76)	(0.27)	(0.61)
Latina	1.08	− 0.20	− 0.02	0.26
	(1.88)	(0.82)	(0.29)	(0.67)
Asian American	2.34	—	− 0.24	1.57
	(3.84)	(1.65)	(0.59)	(1.38)
Mother's PPVT score	− 0.62	− 0.05	− 0.13	− 0.21
	(0.77)	(0.34)	(0.12)	(0.27)
Did not complete high school	2.72*	1.36*	− 0.02	0.52
	(1.39)	(0.61)	(0.22)	(0.49)
Mother's mental health	0.35***	0.13***	0.02***	0.12***
	(0.06)	(0.03)	(0.01)	(0.02)
Site				
San Jose	− 0.54	− 1.02	0.04	− 0.09
	(1.81)	(0.80)	(0.28)	(0.64)
San Francisco	− 3.24*	− 1.41*	− 0.60*	− 0.83
	(1.64)	(0.72)	(0.25)	(0.57)
Child care				
Center both waves	1.55	0.14	− 0.18	0.17
	(2.16)	(0.94)	(0.34)	(0.76)
Family child care home both waves	4.84	2.59†	0.72	0.15
	(3.50)	(1.56)	(0.55)	(1.26)
No care both waves	1.24	− 0.20	0.14	0.52
	(2.65)	(1.17)	(0.41)	(0.94)
Moved to center in Wave 2	− 1.00	− 0.46	− 0.19	− 0.413
	(2.13)	(0.93)	(0.33)	(0.75)
Other	− 2.29	− 0.96	− 0.18	− 0.47
	(1.93)	(0.84)	(0.30)	(0.68)
Missing				
Word knowledge	—	− 0.93	0.19	0.76
	(2.55)	(1.13)	(0.39)	(0.89)
Complex communication	3.78	0.86	0.52	0.40
	(2.49)	(1.08)	(0.37)	(0.86)
Mother's PPVT score	− 2.70	− 0.88	− 0.32	− 1.09
	(2.09)	(0.93)	(0.33)	(0.74)
Mother's mental health	8.85*	3.09	0.76	3.14*
	(4.21)	(1.88)	(0.67)	(1.51)
Early social problems	42.0***	15.4***	5.83***	11.7***
	(4.55)	(2.02)	(0.72)	(1.62)
Adj. R^2	0.35	0.27	0.23	0.24

Note. Coefficients are reported, with standard errors in parentheses. PPVT = Peabody Picture Vocabulary Test. Entries with a dash (—) are values ranging between − .01 and + .01.
$^{\dagger}p < .1$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 7
Regression Estimates of the Effect of Parenting Practices and Income on Child Outcomes

Variable	Total Bracken score ($N = 314$)	School readiness composite ($N = 321$)	FACES summary ($N = 451$)	Mother-assessed cognition ($N = 398$)	Social problems ($N = 370$)
Child care					
Center both waves	8.74***	6.17*	0.94**	0.30*	2.02
	(2.45)	(2.94)	(0.34)	(0.13)	(2.13)
Family child care home both waves	7.05†	5.72	0.43	−0.06	4.82
	(4.21)	(5.1)	(0.57)	(0.22)	(3.47)
No care both waves	2.88	−1.87	0.80†	0.08	0.56
	(3.30)	(3.95)	(0.43)	(0.17)	(2.75)
Moved to center in Wave 2	4.78*	5.64*	0.99**	0.33**	−1.09
	(2.40)	(2.87)	(0.33)	(0.13)	(2.11)
Other	4.62*	1.24	0.92**	0.06	−2.73
	(2.32)	(2.75)	(0.30)	(0.12)	(1.90)
Work or welfare group					
On aid, working	2.21	0.21	0.30	—	−1.17
	(2.84)	(3.42)	(0.38)	(0.14)	(2.32)
On aid, not working	−1.97	−5.15	−0.56	−0.27	−4.83†
	(3.27)	(3.95)	(0.44)	(0.17)	(2.81)
Off aid, not working	0.33	−0.45	0.04	−0.22†	2.10
	(2.42)	(2.88)	(0.32)	(0.13)	(2.10)
Income					
Monthly earnings	—	—	—	—	−5.21
	—	—	—	—	(3.60)
Welfare income	—	—	—	—	—
	—	—	—	—	—
Parenting practices					
Library	0.27	−0.33	0.36	0.20*	−2.96*
	(1.51)	(1.81)	(0.22)	(0.08)	(1.33)
Number of books	0.92	0.57	0.38***	0.09*	−0.21
	(0.81)	(0.97)	(0.11)	(0.04)	(0.67)
Read with child	−0.31	0.44	−0.11	0.03	−1.69*
	(0.77)	(0.92)	(0.11)	(0.04)	(0.67)
Adj. R^2	0.25	0.22	0.39	0.46	0.38

Note. Regression includes all control variables in previous models. Coefficients are reported, with standard errors in parentheses. FACES = Family and Child Experiences Survey. Entries with a dash (—) are values ranging between −.01 and +.01.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

especially in San Jose. Because of this, we might have expected the effect of centers on children's outcomes to be greater in these counties. Table 8 shows that the center effect for the Bracken school readiness composite, mother-assessed cognition, and social development was stronger for children in San Jose after taking into account all previous predictors. To get beneath these site differences, we next directly examined the effect of several measures of quality on child outcomes after additionally taking into account indicators of provider stability.

In Table 9 we report estimated effects of child care stability and quality, net the effects of all previously entered predictors. The comparison group for child care settings remained kith and kin caregivers during both waves of data collection. To simplify this display, we report on our four major composites: total Bracken score, Bracken school readiness composite, FACES storybook assessment, and the social problems index (CBCL). We see that children who had attended their current setting for more months, before the Wave 2 interview, displayed higher cognitive proficiencies at Wave 2. In other words, stability of care had a strong and consistent positive impact on child outcomes. The Arnett caregiver interaction scale, administered in center and home settings, significantly predicted scores on the FACES composite and on the CBCL composite. Children in settings with higher Arnett scores displayed greater reading readiness and fewer social problems. The

Table 8
Effects of Child Care on Children's Outcomes With Interactions Between Site and Center

Variable	Total Bracken score ($N = 314$)	School readiness composite ($N = 321$)	FACES summary ($N = 451$)	Mother-assessed cognition ($N = 398$)	Social problems ($N = 370$)
Site					
San Jose	2.86	4.56†	0.47	0.12	1.22
	(2.27)	(2.68)	(0.33)	(0.12)	(1.98)
San Francisco	4.01†	7.81**	0.04	0.27*	−2.12
	(2.14)	(2.54)	(0.30)	(0.11)	(1.90)
Child care					
Center both waves	7.69**	5.01	0.85*	0.04	4.53†
	(3.02)	(3.60)	(0.44)	(0.17)	(2.70)
Family child care home both waves	8.03†	7.43	0.63	0.03	4.68
	(4.18)	(5.02)	(0.58)	(0.22)	(3.49)
No care both waves	1.95	−4.01	0.45	—	1.42
	(3.15)	(3.71)	(0.42)	(0.16)	(2.64)
Moved to center in Wave 2	4.68*	5.35	0.99**	0.31	−0.80
	(2.36)	(2.80)	(0.34)	(0.13)	(2.12)
Other	4.00†	0.71	0.88**	—	−1.96
	(2.29)	(2.70)	(0.31)	(0.12)	(1.93)
Site*center interaction					
San Jose*Center	5.45	9.76†	0.82	1.01***	−9.27*
	(4.85)	(5.81)	(0.69)	(0.26)	(4.27)
San Francisco*Center	−1.63	−2.47	−0.43	0.17	−3.52
	(3.78)	(4.52)	(0.57)	(0.21)	(3.63)
Adj. R^2	0.24	0.24	0.35	0.45	0.36

Note. Regression includes all control variables from previous models. Coefficients are reported, with standard errors in parentheses. FACES = Family and Child Experiences Survey. Entries with a dash (—) are values ranging between −.01 and +.01.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

provider's education level was consistently and strongly related to the Bracken composites. Children in settings with more educated providers scored higher on both the total Bracken index and the school readiness composite.

Note that exposure to a center continued to display a positive effect on the Bracken total score and the FACES composite, and exposure to an FCCH continued to display increased social problems, even after taking into account these stability and quality factors. Unfortunately, we did not have direct observational data on classroom activities or the intended curriculum of the centers in which children participated. That data may have enabled us to explain the positive center effect. Overall, the positive effects for cognitive and language development were consistent with earlier work with low-income populations.

Selection Findings

Results from multinomial logit models that predicted type of care selected appear in Table 10. The first model included as predictors mother's ethnicity, site, mother's educational attainment, and mother's cognitive proficiency (PPVT), along with maternal income and employment status. The second model included additional predictors of the availability of center enrollment slots (within each mother's census tract) and child proficiencies at baseline (Wave 1). Results from the first model showed that mothers who lived in San Francisco or San Jose were less likely to choose center care than those in Tampa, possibly because of higher center availability in Tampa. We also see some difference by background characteristics. African American mothers were more likely to choose centers and FCCHs over kith and kin providers, and Asian American mothers were more likely to choose FCCHs over individual providers. Center care was also preferred for older children. Employed mothers were more likely to choose FCCHs than kith or kin.

In the second model we see that the observed availability of center enrollment slots in the mother's census tract did not predict type of care selected. This rules out using the capacity measure as an

Table 9
Effects of Child Care Quality on Children's Outcomes

	Bracken total			Bracken school readiness			FACES total			Social problems		
Variable	(*N* = 123)	(*N* = 123)	(*N* = 123)	(*N* = 125)	(*N* = 125)	(*N* = 125)	(*N* = 171)	(*N* = 171)	(*N* = 171)	(*N* = 144)	(*N* = 144)	(*N* = 144)
Months in setting	0.17*	0.17*	0.18†	0.26*	0.27*	0.26*	0.04**	0.03*	0.04**	0.01	0.01	0.02
	(0.08)	(0.08)	(0.09)	(0.11)	(0.12)	(0.13)	(0.01)	(0.01)	(0.01)	(0.10)	(0.10)	(0.11)
Number of settings		0.10	0.078		0.21	0.18		—	—		0.07	—
		(0.10)	(0.10)		(0.13)	(0.14)		(0.02)	(0.02)		(0.12)	(0.12)
Child care quality												
Average Arnett score	0.10	0.12	1.05	1.13	1.09	1.66	0.66**	0.54*	0.52*	−3.05†	−3.35†	−3.65*
	(1.45)	(1.50)	(1.57)	(1.99)	(2.06)	(2.18)	(0.25)	(0.25)	(0.25)	(1.78)	(1.82)	(1.87)
Ratio		0.48	0.42		0.31	0.13		0.13*	0.12†		0.47	0.54
		(0.39)	(0.39)		(0.54)	(0.55)		(0.07)	(0.07)		(0.49)	(0.49)
No. in setting		−0.24	−0.43†		0.01	0.04		−0.06†	−0.09*		−0.16	−0.19
		(0.22)	(0.23)		(0.30)	(0.33)		(0.04)	(0.04)		(0.27)	(0.29)
Provider education												
<High school	−9.55**			−12.44**			−0.51			−3.46		
	(3.18)			(4.32)			(0.47)			(3.49)		
High school		8.29*	7.18*		11.22*	10.62*		0.32	0.27		7.35†	6.89†
		(3.64)	(3.65)		(4.99)	(5.09)		(0.54)	(0.54)		(4.02)	(4.02)
Some college		12.09**	9.82**		11.49*	11.75*		0.32	0.11		0.35	1.62
		(3.80)	(3.90)		(5.22)	(5.44)		(0.55)	(0.56)		(4.16)	(4.30)
College+		9.40*	6.74†		10.13†	9.14†		1.43*	1.29*		2.56	2.99
		(3.90)	(4.01)		(5.30)	(5.54)		(0.61)	(0.63)		(4.55)	(4.66)
Other		10.21	6.15		13.07	9.60		2.01*	2.08*		3.98	5.80
		(6.84)	(6.94)		(9.46)	(9.74)		(0.90)	(0.92)		(6.93)	(7.11)
Child care												
Center both Waves			8.43*			2.09			1.23*			2.66
			(3.85)			(5.45)			(0.60)			(4.52)
Family child care			0.18			−3.78			0.54			10.22*
home both waves			(4.60)			(6.47)			(0.69)			(5.15)
Moved to center			1.86			1.38			0.65			2.42
in Wave 2			(3.93)			(5.56)			(0.62)			(4.76)
Other			3.80			−6.36			1.37*			−1.91
			(4.27)			(6.00)			(0.63)			(4.79)
Adj. R^2	0.23	0.23	0.26	0.25	0.23	0.23	0.38	0.40	0.41	0.09	0.10	0.11

Note. All models include controls for Wave 1 child outcomes (word knowledge and complex communication), child age, race or ethnicity (White, African American, Latina, Asian American), mother's Peabody Picture Vocabulary Test (PPVT) score, mother's education, and site (San Jose, San Francisco, or Tampa). FACES = Family and Child Experiences Survey. Entries with a dash (—) are values ranging between −.01 and +.01.
†$p < .10$. *$p < .05$. **$p < .01$.

instrument for center use. Mothers with high PPVT scores were more likely to select some type of nonparental child care, perhaps because they were more likely to be employed. But within the set of nonparental care choices they were no more likely to select centers. The same pattern holds for mothers without a high school diploma: They were less likely to care for their own child. We estimated the same models for the quality of care selected. Mothers in San Jose were more likely to enroll their child in a higher quality setting, perhaps linked to the availability of higher quality programs in this site. No family-level factors were significantly related to the quality measures.

Discussion

This study examined the effects of child care participation, quality, and stability on children's cognitive and social outcomes. We found a consistent, positive, and strong relationship between rates of child development in the cognitive domain and participation in center-based programs. These developmental effects were strongest for measures of school readiness and for children who were in a center at both Waves 1 and 2. The center effect remained sizable even in models that included other possible determinants of development, such as age, ethnicity, mother's education, mother's work and

Table 10
Multinomial Logit Estimates of the Relationship Between Family Characteristics and Child Care Selection

Variable	Center	Family child care	No care	Moved to center	Other	Center	Family child care	No care	Moved to center	Other
Site										
San Jose	0.14***	1.52	0.76	0.38	0.28*	0.17**	2.50	0.22	0.45	0.33†
San Francisco	0.21**	—	0.66	0.42	0.48	0.20**	—	0.36	0.50	0.38
Family background										
African American	2.59†	6.26†	1.62	1.00	1.62	1.71	4.63	1.86	0.72	1.07
Latina	0.58	1.03	0.71	0.58	1.06	0.62	0.99	2.48	0.57	0.89
Asian American	3.45	6.79*	5.27	2.51	4.97	1.81	40.4†	14.30	2.27	2.84
Did not complete high school	0.54	0.76	0.53	0.62	1.25	0.39†	0.75	0.28†	0.62	0.86
Child's age	1.07***	1.05	0.99	1.05**	1.04†	1.07**	1.05	0.98	1.06*	1.04†
Mother's PPVT score	1.23	1.46	0.56†	0.95	0.85	1.13	1.38	0.44*	0.97	0.78
Income and work										
Working	0.70	5.6E7***	1.27	0.61	0.59	0.77	2.6E7***	0.59	0.61	0.37
Weekly earnings	1.00	1.00	0.99***	1.00	0.99	1.00	1.00	0.99**	1.00	0.99
Months on welfare	1.05	0.97	1.00	1.11*	1.02	1.07	0.98	1.08	1.13*	1.05
Capacity						1.00	1.00	0.99	1.00	1.00
Word knowledge						1.07	0.63	0.75	1.10	0.82
Complex communication						0.77	1.74	1.15	0.79	0.86

Note. Capacity measures availability of centers in Census tract. PPVT = Peabody Picture Vocabulary Test. Entries with a dash (—) are values ranging between −.01 and +.01.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

welfare status, and income. By directly assessing the mother's cognitive proficiency (PPVT) and other proximal determinants of child development, including parenting practices, we were able to minimize the likelihood of selection bias when modeling the discrete effect of center-based care.

In addition to exposure to center-based care, child care quality also affected children's cognitive and language development. This effect appeared to stem partially from the character of social interaction between the caregiver and the child (the Arnett measure) in both center and home-based arrangements. Positive effects from the provider's education level were also evident. Future work might attempt to identify how provider education operates through mediators—such as increased sensitivity to, or more careful communication with, children—to advance youngsters' cognitive growth.

We also found that the Arnett interaction measure was predictive of fewer social-behavior problems, and this applied to children in center and home-based arrangements. This is a promising finding, but more work is necessary to understand how these child–caregiver interactions would lead to less aggression and problematic behavior in the home, the setting in which mothers assess these behaviors. Also, children showed more social problems when in the care of providers with less than a high school education. Similarly, children attending FCCHs tended to exhibit higher levels of aggression than those staying with individual kith or kin members.

Our selection analysis lends support to a causal interpretation of the results, though we cannot be sure that we have accounted for all factors that affect both the choices of care and child outcomes. The selection results in Table 10, including the lack of effect from mother's education or cognitive ability, or from the child's cognitive proficiency, suggest that the most obvious sources of bias—more able mothers choosing centers or more able children being placed in centers—are not likely to be driving the results. In addition, the stronger effect of centers on school readiness, in comparison with other measures, lends further support to the causal claim (for relative effects sizes see Table 11).

Why might selection not be as important in our sample as it has been shown to be in middle-income samples (Belsky et al., 1996; Tresch Owen & Cox, 1988)? The weakness of maternal and family-level factors in explaining the type or quality of care selected may be linked to the rising strength of allocation processes within welfare and child care agencies. That is, as the share of families receiving subsidized child care rises (Collins et al., 2000), institutional practices may become more influential in determining which families are allocated slots in centers or child care vouchers. At the same time, states and counties vary widely in their funding for

Table 11
Effect Sizes: Child Care Type and Quality and Other Family Characteristics for Children's Cognitive and Social Outcomes

Variable	Center care	Family child care	No care	Moved to center	Other care	Mom's PPVT score	Mom's mental health	No. of books	Child care quality	Child age
Bracken test										
Total	0.57***	0.54†	0.15	0.34*	0.30†	0.22***		0.04	0.09	
School readiness composite	0.35*	0.40	−0.22	0.33*	0.06	0.16**			0.21*	
FACES Test										
Total	0.33**	0.22	0.18	0.39**	0.34**	0.15**		0.19*	0.20*	0.05***
Book mechanics	0.32†	−0.03	0.15	0.36*	0.28†	0.08			0.22*	0.03***
Story comprehension	0.39*	0.09	0.18	0.40*	0.29*	0.10†			0.19†	0.05***
Book familiarity	0.46**	0.26	0.40*	0.55***	0.47**	0.11*			0.23*	0.05***
Mother-assessed cognition	0.29*	−0.01	0.02	0.37**	0.05	0.03		0.13*	0.08	0.05***
Social problems										
Composite	0.11	0.33	0.08	−0.07	0.16		0.02***			—
Aggressive	0.02	0.42†	−0.03	−0.07	0.15		0.02***			0.01*
Destructive	0.08	0.34	0.06	−0.09	−0.08		0.01***			—
Other problems	0.03	0.03	0.11	−0.08	−0.10		0.03***			0.03

Note. PPVT = Peabody Picture Vocabulary Test; FACES = Family and Child Experiences Survey. Entries with a dash (—) are values ranging between −.01 and +.01.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

center-based programs and the distribution of quality across centers (Fuller, Kagan, Caspary, et al., 2002). In these ways, family-level demand factors in this subsidized portion of the sector may be eclipsed by institutional practices.

Although selection may not be biasing our results, our family sample is restricted to three counties; generalizing these results to the national population of families moving from welfare to work is difficult. The advantage of sampling families in contrasting communities is that we can illuminate how the availability and quality of child care options vary systematically across local areas. Our initial descriptive findings demonstrate that child care quality varies substantially across our three research sites, with Tampa having the lowest quality care. These organizational conditions may mediate the influence of new work pressures and rising levels of maternal employment on the early development of children (Fuller, Kagan, Caspary, et al., 2002). Single mothers in Tampa and San Jose, for example, may face similar pressures to move from welfare to work. Yet, when mothers in San Jose find a center slot, their children are much more likely to experience high-quality care than those in Tampa.

This study contributes to the literature on child care effects by focusing on low-income families moving from welfare to work. Earlier work on child care effects either focused on middle-class families or drew from diverse samples with only a small subset of low-income households. There are few longitudinal studies of young children from low-income families, outside of studies such as the Perry Preschool Program that focused on a particular, high-quality care setting rather than a range of care available in poor communities. Our findings complement previous work that has found positive effects of center care and quality on children's cognitive development (Burchinal, Campbell, Bryant, Wasik, & Ramey, 1997; NICHD Early Child Care Research Network, 2000). It also provides new evidence on the benefits of care stability and the possible negative impact of family child care homes on children's social development. The strong positive effects stemming from center care (relative to kith and kin arrangements), as well as from quality and stability, suggest that as government invests more resources in child care, greater attention should be paid to the quality of care and ensuring center-based options for more families.

References

Achenbach, T. M. (1992). *Manual for the Child Behavior Checklist/2-3 and 1992 Profile*. Burlington: University of Vermont Department of Psychiatry.

Achenbach, T. M., Edelbrookm, C., & Howell, C. (1987). Empirically based assessment of the behavioral and emotional problems of 2-3 year old children. *Journal of Abnormal and Child Psychology, 15*, 629–650.

Arnett, J. (1989). Caregivers in day-care centers: Does training matter? *Journal of Applied Developmental Psychology, 10*, 541–552.

Baker, P., Keck, C., Mott, F., & Quinlan, S. (1993). *NLSY child handbook revised edition: A guide to the 1986-1990 NLSY child data*. Columbus, OH: Center for Human Resource Research.

Barnett, W. S. (1995). Long-term effects of early childhood programs on cognitive and school outcomes. *Future of Children*, *5*(3), 25–50.

Belsky, J., Spritz, B., & Crnic, K. (1996). Infant attachment security and affective-cognitive information processing at age 3. *Psychological Science*, *7*, 111–114.

Blau, D. M. (2001). *The child care problem: An economic analysis*. New York: Russell Sage Foundation.

Bradley, R. (1993). Children's home environments, health, behavior, and intervention efforts: A review using the HOME Inventory as a marker measure. *Genetic, Social, and General Psychology Monographs*, *119*, 439–490.

Burchinal, M. R. (1999). Child care experiences and developmental outcomes. *Annals of the American Academy of Political and Social Science*, *563*, 73–97.

Burchinal, M., Campbell, F., Bryant, D., Wasik, B., & Ramey, C. (1997). Early intervention and mediating processes in cognitive performance of children of low-income African American families. *Child Development*, *68*, 935–954.

Campbell, F. A., & Ramey, C. T. (1994). Effects of early intervention on intellectual and academic achievement: A follow-up study of children from low-income families. *Child Development*, *65*, 684–698.

Center for Human Resource Research. (2000). *NLSY79: The 1998 Child and young adult data users guide*. Columbus: Ohio State University.

Clarke-Stewart, A. (1999). *Characteristics and quality of child care for toddlers and preschoolers*. Washington, DC: National Institute of Child Health and Human Development Early Child Care Research Network.

Clarke-Stewart, K. A., Gruber, C. P., & Fitzgerald, L. M. (1994). *Children at home and in day care*. Hillsdale, NJ: Erlbaum.

Coley, R. L., Li-Grining, C., & Chase-Lansdale, L. (in press). Low-income families' child care experiences. In H. E. Peters (Ed.), *From welfare to child care*. New York: Russell Sage.

Collins, A., Layzer, J., Kreader, J. L., Werner, A., & Glantz, F. (2000). *National study of child care for low-income families: State and community substudy interim report*. Cambridge, MA: Abt Associates.

Currie, J. (2001). Early childhood education programs. *Journal of Economic Perspectives*, *15*, 213–238.

Dunn, L., & Dunn, L. (1997). *Peabody Picture Vocabulary Test, Third Edition*. Circle Pines, MN: American Guidance Service.

Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., & Pethick, S. J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development*, *59*(5), 1–173.

Fuller, B., Holloway, S. D., & Liang, X. (1996). Family selection of child-care centers: The influence of household support, ethnicity, and parental practices. *Child Development*, *67*, 3320–3337.

Fuller, B., Kagan, S. L., Caspary, G., & Gauthier, C. (2002). Welfare reform and child care options for low-income families. *Future of Children*, *12*, 97–119.

Fuller, B., Kagan, S. L., & Loeb, S. (2002). New lives for poor families: Mothers and young children move through welfare reform. Technical Report.

Graham, P. (1989). Maternal depression and its impact on early child development. In *Early influences shaping the individual* (Vol. 160, pp. 183–191). New York: Plenum Press.

Harms, T., Clifford, R., & Cryer, D. (1997). *Published ECERS and FDCRS Scales*. New York: Teachers College Press.

Huston, A. C., Duncan, G. J., Granger, R., Bos, J., McLoyd, V., Mistry, R., et al. (2001). Work-based antipoverty programs for parents can enhance the school performance and social behavior of children. *Child Development*, *72*, 318–336.

Kontos, S. J. (1991). Child care quality, family background, and children's development. *Early Childhood Research Quarterly*, *6*, 249–262.

Lee, V. E., & Loeb, S. (1995). Where do Head Start attendees end up? One reason why preschool effects fade out. *Educational Evaluation & Policy Analysis*, *17*, 62–82.

Love, J. M., Kisker, E., Ross, C. M., Schochet, P. Z., Brooks-Gunn, J., Paulsell, K. B., et al. (2002). *Making a difference in the lives of infants and toddlers and their families: The impacts of Early Head Start*. Princeton, NJ: Mathematica Policy Research.

McCarton, C. M., Brooks-Gunn, J., Wallace, I. F., & Bauer, C. R. (1997). Results at age 8 years of early intervention for low-birth-weight premature infants: The infant health and development program. *Journal of the American Medical Association*, *277*(2), 126–132.

McDowell, I., & Newell, C. (1996). *Measuring health: A guide to rating scales and questionnaires*. New York: Oxford University Press.

National Institute of Child Health and Human Development Early Child Care Research Network. (1997). Poverty and patterns of child care. In G. J. Duncan (Ed.), *Consequences of growing up poor* (pp. 100–131). New York: Russell Sage Foundation.

National Institute of Child Health and Human Development Early Child Care Research Network. (1999, April). *Effects sizes from the NICHD study of early child care.* Paper presented at the Society for Research in Child Development, Albuquerque.

National Institute of Child Health and Human Development Early Child Care Research Network. (2000). The relation of child care to cognitive and language development. *Child Development*, *71*, 960–980.

Peisner-Feinberg, E. S., & Burchinal, M. R. (1997). Relations between preschool children's child-care experiences

and concurrent development: The Cost, Quality, and Outcomes Study. *Merrill-Palmer Quarterly, 43*, 451–477.

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

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

Psychological Corporation. (1998). *Bracken Basic Concept Scale, Revised*. San Antonio, TX: Harcourt Brace.

Reynolds, A. J., & Temple, J. A. (1998). Extended early childhood intervention and school achievement: Age thirteen findings from the Chicago Longitudinal Study. *Child Development, 69*, 231–246.

Schweinhart, L., Barnes, H., Weikart, D., Barnett, W. S., & Epstein, A. (1993). *Significant benefits: The High/Scope Perry Preschool study through age 27* (Vol. 10). Ypsilanti, MI: High/Scope Press.

Shaw, D., Winslow, E., Owens, E., & Hood, N. (1998). Young children's adjustment to chronic family adversity: A longitudinal study of low-income families. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*, 545–553.

Singer, J., Fuller, B., Keiley, M., & Wolf, A. (1998). Early child care selection: Variation by geographic location, maternal characteristics, and family structure. *Developmental Psychology, 34*, 1129–1144.

Smith, K. (2000). *Who's minding the children? Child care arrangement*. Washington, DC: United States Census Bureau (Household Economic Studies, P70-70).

Tresch Owen, M., & Cox, M. J. (1988). Maternal employment and the transition to parenthood. In A. W. Gottfried (Ed.), *Maternal employment and children's development: Longitudinal research* (pp. 85–119). New York: Plenum Press.

Vandell, D. L., & Corasaniti, M. A. (1990). Variations in early child care: Do they predict subsequent social, emotional, and cognitive differences? *Early Childhood Research Quarterly, 5*, 555–572.

Zaslow, M. J., McGroder, S. M., Moore, K. A., & Le Menestrel, S. (1999, April). Behavior problems and cognitive school readiness among children in families with a history of welfare receipt: Diverging patterns and their predictors. Paper presented at the Society for Research in Child Development, Albuquerque.

Zaslow, M. J., Moore, K. A., Brooks, J. L., Morris, P. A., Tout, K., Redd, Z. A., et al. (2002). Experimental studies of welfare reform and children. *Future of Children, 12*, 79–96.

Zaslow, M. J., Oldham, E., Moore, K. A., & Magenheim, E. (1998). Welfare families' use of early childhood care and education programs, and implications for their children's development. *Early Childhood Research Quarterly, 13*, 535–563.

Zill, N., Collins, M., West, J., & Hausken, E. (1995). *Approaching kindergarten: A look at preschools in the United States*. Washington, DC: National Center for Educational Statistics (No. 95-280).