Published in final edited form as:

Early Child Res Q. 2008 January 1; 23(1): 69–93. doi:10.1016/j.ecresq.2007.06.003.

Structural and Process Features in Three Types of Child Care for Children from High and Low Income Families

Chantelle J. Dowsett, Aletha C. Huston, and Amy E. Imes

University of Texas at Austin, Lisa Gennetian, The Brookings Institute

Abstract

We use observations from the NICHD Study of Early Child Care and Youth Development (SECCYD) to compare structural and process characteristics of child care centers, family child care homes (nonrelative care in a home setting) and care by relatives for 2, 3- and 4 1/2-year-old children. Type of care differences in structural and caregiver characteristics were consistent across ages: centers had higher child-to-adult ratios and bigger groups; centers had caregivers with better education, more training in early childhood, and less traditional beliefs about child rearing. Children in centers experienced more cognitive stimulation, less frequent language interactions with adults, less frequent negative interactions with adults, and less television viewing than did those in other types of care. In centers and family child care homes compared to relative settings, children engaged in more positive and negative interactions with peers and spent more time in transition and unoccupied. Curvilinear associations were found between structural features of care and family income, particularly for caregiver education and training. In contrast, process measures of caregiving rose monotonically with family income. Children from high-income families experienced more sensitive care, more cognitive stimulation, and fewer negative interactions with adults than did those from low-income families. We interpret the findings by linking the structural features and caregiver training to the cognitive and social processes observed in different types of care. Future research designed to understand the influences of child care on children's behavior might benefit from using this more nuanced description of child care experiences.

Child care quality is a well-documented predictor of children's intellectual and social development, but recent evidence indicates that type of care may be important independently of "global" ratings of quality. A recurrent finding in the literature is that children who participate in center-based arrangements—including Head Start—during their infant and preschool years perform better on cognitive and language development and show better pre-academic skills than children who spend an equivalent amount of time in child care homes or relative care of comparable quality (Garces, Thomas, & Currie, 2002; NICHD Early Child Care Research Network [ECCRN], 2000a; 2002; NICHD ECCRN & Duncan, 2003).

The relations of type of care to children's social behavior are more uncertain. Two longitudinal studies of large, national samples have shown that children with more center care experience were rated by caregivers and elementary school teachers as having more behavior problems and less self control than those who had not experienced center care (Magnuson, Ruhm, & Waldfogel, 2007; NICHD 2002; 2003a). Most longitudinal investigations of children from

Contact author Chantelle Dowsett, Human Development & Family Sciences, University of Texas at Austin, 1 University Station/A2700, Austin, TX 78712; 512-471-3141; E-mail: dowsettj@mail.utexas.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

low-income families show no relation between center care experience and maternal ratings of problem behavior or social competence, controlling for quality of care and family selection factors (Coley, Chase-Lansdale, & Li-Grinning, 2001; Fuller, Kagan, Loeb, & Chang, 2004).

By contrast, intervention programs for young children from low-income families, tested with random assignment experimental designs, indicate that high quality, center-based preschool programs can contribute to social skills as well as to cognitive development (Barnett, 1995). Reports from the National Head Start Impact Study show that three-year-olds assigned to Head Start were rated lower on behavior problems by their mothers than were children in the control group; there were no differences for four-year-olds (U.S. Department of Health and Human Services, 2005). In families participating in experimental demonstrations of welfare and employment policies, policy-induced increases in use of center-based care were associated with better school achievement and lower levels of externalizing behavior in early elementary school (Crosby, Dowsett, Huston, & Gennetian, 2005; Gennetian, Crosby, Dowsett, Huston, & Principe, 2005).

These disparate results have fueled the controversy and social policy discussion that revolves around children's participation in center-based care. One problem in interpreting these findings is the absence of nuanced information about how center-based settings differ from other types of care—what kinds of everyday experiences do children have in each type of setting? In this paper, we take a comprehensive look at structural and process features of different types of child care environments for children ages 2, 3, and 4 ½ years. We first examine “regulable” or structural and caregiver characteristics. Next, at the level of observed process, we go beyond global ratings of positive caregiving to consider specific activities and practices that may facilitate academic and cognitive skills as well as experiences that may promote socioemotional well-being and social interaction. We ask how care in centers, family child care homes, and relative care differs at both the structural and process levels and whether these differences are consistent or inconsistent for children of different ages. We also examine experiences of children from different family income levels and for children in Head Start centers compared to those in other child care centers used by low-income families.

Features of Different Types of Care

Approximately 1/3 of preschool children with employed mothers regularly attend center-based care in the U.S. (Sonenstein, Gates, Schmidt, & Boshun, 2002). Parents use center care more often for children in the 3-5-year-old age range than for infants and toddlers. According to National Household Education Surveys Program (NHES) data from 2001, 56 percent of 3-5 year olds were in center-based care compared to 21 percent of 1-2 year olds and 8 percent of infants under 1 year (Mulligan, Brimhall, & West, 2005).

Child care settings are typically described at two levels: structure (e.g., child-to-adult ratios, group size, licensure, caregiver education and training) and observable processes (e.g., sensitive and responsive caregiving, positive and negative peer interaction, cognitive and language stimulation, and health and safety practices; NICHD ECCRN, 2002). Most states regulate at least some structural and caregiver components of center and family child care home settings, based on the assumption that such features as ratios and caregiver training affect the daily experiences of children in the setting.

Centers, family child care homes, and relative care vary in both structural and process features, although only the structural differences are well documented. In centers, compared to both types of home-based settings, children have multiple caregivers; child-to-adult ratios and group sizes are larger; children are often grouped with same-aged peers; activities are more structured, educationally-oriented, and adult-directed; and caregivers have more education and training. Centers typically offer more space, toys, and materials to children than do other settings, and

there is usually a more structured educational curriculum and a physical environment designed for children (Eheart & Leavitt, 1989; Fuller et al., 2004; Kisker, Hofferth, Phillips, & Farquhar, 1991; Kontos, Hsu, & Dunn, 1994; NICHD ECCRN, 2004; Pence & Goelman, 1987). The predictable daily routine, structured academic curriculum, exposure to a large group of peers, and other features of center care may provide a different experience for children than that received in family child care homes or relative settings, even when caregivers are equally nurturant and attentive.

Structure may affect process (e.g., NICHD ECCRN, 2002), but there is relatively little information about the social and learning experiences that characterize these different types of settings. Most observational studies of process are limited to child care centers. In the few studies that have collected observational data across types, the categories and instruments used are often different for centers and family child care home settings—an indication that the structural differences are great enough to require different categories to assess process. For example, the most common observational instrument, the Early Childhood Environment Rating Scale (ECERS-R; Harms, Clifford, & Cryer, 1998), is used in centers; its companion instrument for home settings, the Family Day Care Rating Scale (FDCRS; Harms & Clifford, 1989), has only partial overlap with the center version. The subscales from the Early Childhood Environment Rating Scale-Revised (ECERS-R) can be used to create one dimension of quality in centers (Perlman, Zellman, & Le, 2004), and there is a strong relation between observed quality and structural quality (Burchinal, Cryer, Clifford, & Howes, 2002; Phillips, Mekos, Scarr, McCartney, & Abbott-Shim, 2000).

One exception is the observational system developed for the NICHD Study of Early Child Care, a study including the whole range of child care settings across ages. This measure, which focuses on an individual child rather than the average experience of children in the setting, reveals that the nature of child-caregiver interaction in different types of care setting varies according to the child's age. Earlier analyses show that, for children age 3 and younger, global ratings of positive caregiving were highest in relative care, intermediate in child care homes, and lowest in centers. Differences in child-adult ratios accounted for the quality differences in infant settings. At age 4½, global quality was higher in centers than in family child care homes and relative care (NICHD ECCRN, 1996; 2000b; 2004).

Although many components of global quality are positively correlated, a more nuanced understanding of children's experiences is likely to arise from examining multiple features of child care settings. In a recent investigation using ratings of 1,313 classrooms, factor analyses yielded two dimensions that explained 69% of the variance in the ECERS-R: activities/materials and language/interaction. The only structural variable that was moderately correlated with overall quality and the two identified subscales was caregiver education (Cassidy, Hestenes, Hegde, Hestenes, & Mims, 2005), suggesting that global quality and structural quality measures may not capture the full range of important processes. Sylva and colleagues (2006) supplemented the ECERS-R with a set of questions tapping processes that support children's emerging skills in literacy, math, science, and diversity (e.g., planning for individual needs as well as race and gender equality). These types of experiences, but not other measures of quality at age 3, predicted greater cognitive and language progress at age 5, yet only the original scales were associated with children's socioemotional progress. This study examined children in center-based settings without making a distinction among income levels (Sylva et al., 2006).

These findings suggest that investigations using global measures of quality may obscure different features of care, making it difficult to distinguish factors that are related to cognitive and language development from those associated with socioemotional development. In one earlier analysis of the NICHD SECCYD, several specific observational categories were

identified as theoretically interesting: language and cognitive stimulation, stimulating physical materials, television viewing, physical contact between caregiver and child, positive caregiver and child talking, and positive peer interaction. With types of care and age groups combined, all of these categories except positive peer interaction were correlated with one another, but the correlations were not exceptionally high; only one correlation exceeded .35, suggesting that examining specific processes may be fruitful (NICHD ECCRN, 2003b).

Income Differences in Features of Care

Higher income families use more center care and less care in family child care homes or care by relatives than do lower-income families (Bainbridge, Meyers, Tanaka, & Waldfogel, 2005; Capizzano & Adams, 2004; Early & Burchinal, 2001; Fuller, Kagan, Caspary, & Gauthier, 2002; NICHD ECCRN, 2004). Parents with low incomes are, however, more likely to use center-based care when subsidies and other policies promoting center care are made available to them (Crosby, Gennetian, & Huston, 2005; Fuller et al., 2002; Weinraub, Shlay, Harmon, & Tran, 2005). Because the availability of child care subsidies may increase parents' use of center-based care, it is especially important to understand how the experiences provided in such care differ from those that children from similar backgrounds have in other types of care.

On the whole, the average quality of centers serving different income levels does not differ greatly. In fact, there is some evidence that quality of centers serving very low-income and very high income children is better than quality in those serving working class and middle-income families (NICHD 1997b; Phillips Voran, Kisker, Howes, & Whitebrook, 1994). Centers serving low-income families score somewhat lower on process indicators of quality, including child-teacher interactions and educational content, compared to centers serving high-income families (Loeb, Fuller, Kagan, & Carrol, 2004; Phillips et al., 1994).

By contrast, the quality of family child care homes and relative care used by low-income families is generally lower than that of similar types of care used by higher income families and lower than that of centers serving low-income families (Coley et al., 2001; Fuller et al., 2004; NICHD 1997b; Votruba-Drzal, Coley, & Chase-Lansdale, 2004). Differences between centers and other types of care for low income children are more pronounced for cognitive stimulation than for caregiver warmth and social interaction, suggesting that centers may have more advantages for intellectual than for social development (Coley et al., 2001; Fuller et al., 2004).

In summary, existing research shows that different types of care have different structural features; there is some evidence that process features may differ as well. It also suggests that the differences in structure and process may vary by the income levels of children served, but few studies have compared children from different income levels or have differentiated processes beyond global quality measures. Although it is likely that both structural and process features of care vary by the ages of children served, most available investigations do not address age comparisons specifically.

The Present Study

The present study is designed to gain a better understanding of the structural and process features of child care centers, family child care homes, and relative settings using observations of child care settings experienced by children at three different ages—2, 3, and 4 ½ years. Because the settings experienced by children from low-income families may differ from those used by higher income families, we examine differences in child care characteristics associated with family income.

We used observations collected at three age levels in over 2,100 visits to centers, family child care homes (defined as care in a home by a nonrelative), and relative settings in the NICHD Study of Early Child Care and Youth Development to address the following research questions:

- a. How do centers, family child care homes, and relative care differ at both the structural and process levels? Are these differences consistent or inconsistent for children of different ages?
- b. Do family and child characteristics account for type of care differences in structure and process across settings?
- c. Do children from different family income levels experience different characteristics of child care at both the structural and the process levels? Are the features of different types of care similar or different for children from different family income levels?
- d. Do Head Start centers differ from other child care centers attended by children from low-income families?

The analyses presented here go beyond the previous analyses of the NICHD SECCYD in several respects. We analyze multiple features of both structure and process in three types of care when children were 2, 3, and 4 ½ years old; two earlier analyses included a different set of multiple process features averaged across ages and not separated by type of care (ECCRN 2003a; 2003b). Our process measures include children's behavior as well as caregivers' actions because we are interested in describing children's daily experiences in their child care settings. We compare the experiences of children from lower-income families with those from higher-income families. Similar comparisons at 6 and 15 months indicated some important family income differences in overall quality and in the relative quality of different types of care (NICHD ECCRN, 1997b), but these comparisons have not been presented for the later age periods. There are likely to be large differences associated with developmental levels across the first years of life. Moreover, at age 4 ½, some children were in Head Start, allowing us to compare the features of Head Start with those of the other center-based settings used by low-income families.

Because the primary goal of this study is to describe different child care settings, we present one set of analyses comparing settings with no adjustments for possible differences among the families and children who use them other than geographic site and family income level. Nevertheless, it is likely that family and children's characteristics affect selection of both type and quality of care and, because we include children's behavior in the process measures, the characteristics of individual children could influence the patterns of adult and peer interactions. Therefore, we also present analyses with controls for the child's language ability, temperament, gender, ethnic group, and family characteristics to determine the extent to which observed differences among the three types of care are a function of these child and family characteristics.

Method

Participants

Families were recruited through hospital visits to mothers shortly after the birth of a child in 1991 living in 10 locations in nine U.S. states. Details of the sample selection are available in numerous publications from the study (see NICHD ECCRN, 1996; 2000b). The sample was limited to mothers over 18 who spoke English; babies who were healthy, not multiple births and not released for adoption, families who were not planning to move, lived within an hour of the research site in a neighborhood considered safe for teams of researchers to visit. A conditionally random sample assured adequate representation (at least 10%) of mothers without partners, mothers without a high school diploma, and mothers from ethnic minority groups. A total of 1,364 families completed a 1-month home visit and became study participants. The

resulting sample was diverse, including 24% ethnic minority children, 11% mothers who had not completed high school, and 14% single-parent mothers. Comparisons with the census data for the hospital catchment areas demonstrated that the sample demographics did not differ from those for the populations from which they were drawn. Over time, however, families lost to attrition were significantly more likely to be low-income, African American, single parent families, with lower levels of maternal education relative to those who remained in the study (NICHD ECCRN, 2004).

Child care regulations, which govern some of the structural and caregiver characteristics studied, vary across states. For example, across 50 states, mandated child-staff ratios in centers ranged from 7:1 to 17:1 for 3-year-olds in the 1990s when these data were collected. The range of regulations for child-staff ratios, maximum group sizes, caregiver formal training, and caregiver education at 9 and 30 months in the nine sampled states did not differ significantly from those in the other 41 states (NICHD ECCRN, 1999).

Information about child care settings was gathered when study participants were 2, 3, and 4 ½ years of age for all children who remained in the study and were in at least 8-12 hours a week of regular nonmaternal care. For a variety of reasons – caregiver or parent refusal or inability to schedule child-care visits within the 2-month assessment windows – it was not possible to observe all eligible settings. Consequently, observations were completed in 82% of eligible child care arrangements at age 2, 83% at age 3, and 86% at age 4 ½. A higher proportion of the unobserved group were from the southern sites, were in family child care homes, or were with grandparents and fathers (particularly at later ages), and the families of children in care settings that were not observed had significantly lower income-to-needs and lower maternal education than those in the observed groups.¹ The structural and process features of child care settings included in this report are based upon the experiences of 651 children at age 2, 844 children at age 3, and 1,075 children at age 4 ½, with a total of 381 children who had valid data across all three time points. Child and family characteristics of those who were observed in their child care settings can be found in Table 1.

Measures

Type of Care—The type of care observed for each child at each age was classified as *center-based care* in a preschool, child care center, or Head Start program; *family child care home* in another person's home by a non-relative; or *relative care* by father, mother's partner, grandparent, or other relative in child's home or the relative's home. We excluded care provided by a non-relative in the child's home because of small numbers and because the families using such care differed markedly from those using other types of care (e.g., their incomes were much higher; NICHD ECCRN, 1997a).

Family Income—Family income was calculated from mothers' reports at each data collection point and included earnings of the mother, earnings of her resident husband/partner, and all other sources of household income, including public assistance. An income-to-needs ratio was calculated by dividing the total family income by the poverty threshold for that family size (U.S. Department of Labor, 1994). A categorical variable was created at ages 2, 3, and 4.5 to classify families as poor (income-to-needs < 1.0), near-poor (income-to-needs 1.0-2.0), middle income (income-to-needs 2-4) or high-income (income-to-needs ≥ 4.0).²

¹Although some analyses of the NICHD SECCYD have used various forms of imputation to estimate missing data, we considered that approach to not be appropriate in this case, because we cannot determine what type of child care the families lost to attrition would have used if they remained in the study. In addition, because we are describing settings rather than children, it is not clear that one could obtain a valid estimation of missing data using the available information. Rather than exclude additional cases that had valid information on type of care and observed quality, but were missing income data, we substituted the mean income-to-needs ratio between six months and 4 ½ years of age. This allowed us to include an additional 12 cases at age 2, 7 cases at age 3, and 18 cases at age 4 ½. Five cases that did not have valid income data at other time points were excluded from the analyses.

Structural Features and Caregiver Characteristics

Group size—The observed group size was the total number of children present in the classroom/home setting averaged over observation cycles.

Child-adult ratio—The observed ratio of children to caregivers was the number of awake children in the classroom/home setting divided by the number of available adults averaged over observation cycles.

Caregiver general education—Questions regarding caregiver level of education were asked during the interview following the last child care visit at each age. Education of the primary caregiver was coded in six categories: (a) less than high school; (b) high school graduate; (c) some college/associate degree; (d) bachelors degree; (e) some graduate work; to (f) advanced degree.

Caregiver formal trainin—Questions regarding caregiver training were asked during the interview at each age. The caregiver's highest level of formal training in child development or early childhood education was coded into five categories: (a) none or missing; (b) high school; (c) certification, degree in related field, or vocational/ adult education; (d) some college; and (e) college or graduate degree.

Caregiver beliefs about raising young children—The caregiver's traditional attitudes and beliefs about raising young children were assessed with a self-administered questionnaire at each age (Schaefer & Edgerton, 1985). This 30-item questionnaire included such items as, “children should not question the authority of parents” and “children will be bad unless they are taught what is right” scaled on a 5-point Likert scale with higher values indicating more traditional (strict) beliefs and attitudes about child rearing and discipline, (age 2 $\alpha = .89$, age 3 $\alpha = .89$, age 4 $\frac{1}{2}$ $\alpha = .88$).

Process Measures of Children's Experiences

Observational Ratings of the Caregiving Environment (ORCE)—The ORCE was developed by the NICHD ECCRN to rate the types of child behaviors and interactions between children and caregivers that are believed to reflect child care quality. Unlike other measures of child care environments, it focuses on the experiences of a target child and was specifically designed to be used across a variety of child-care settings without modification (details of the method are given in NICHD ECCRN 1996; 2000b).³ Observations were conducted during morning hours in the primary care settings at all three age levels. Observation cycles of 44 minutes consisted of three 10-minute intervals of continuous recording, broken by 2-minute intervals for qualitative note-taking, followed by a 10-minute interval of observation focused on global qualities of the setting. At ages 2 and 3, observations were collected on two days (1-6 cycles, with an average of 4 cycles); at age 4½, they were collected on one day (1-2 cycles). In conjunction with these observations, questionnaires and interviews were conducted with the primary caregiver and, in centers, with the director.

At the end of each ORCE observation cycle, the observer completed a set of qualitative rating scales focused on the caregiver, child, and setting. These ratings were recorded for the caregiver who spent the most time interacting with the study child, either alone or in a group activity.

²For illustrative purposes, at the age 3 interview the average total income for families classified as “poor” was \$11,791.04 (SD=4,476.50), “near-poor” was \$25,348.84 (SD= 6,121.68), “middle-income” was \$43,833.33 (SD=10,219.50), and “high-income” was \$102,843.58 (SD=52642.30).

³In addition to the ORCE measure of positive caregiving that was used across all settings, the HOME and Profile measures were also analyzed in order to obtain more nuanced information about responsiveness, acceptance, and learning opportunities in home-based settings by relatives and non-relatives.

The qualitative ratings were scored on a four-point scale with values from 1 = “not at all characteristic” to 4 = “highly characteristic.”

Observed Global Quality is measured using the total qualitative composite score from the ORCE, the most frequently-used measure of child care quality for the SECCYD data. The total qualitative composite is the sum of five ORCE qualitative variables at age 2: sensitivity to non-distress, stimulation of development, positive regard, and two reflected (reverse-scored) variables, detachment and flatness of affect ($\alpha=.87$). At age 3, the composite is a sum of seven variables: caregiver fostering exploration, sensitivity to non-distress, stimulation of cognitive development, positive regard, and three reflected scales, caregiver intrusiveness, detachment, flatness of affect ($\alpha=.83$). At age 4 ½, the composite is the sum of caregiver sensitivity/responsivity and stimulation of cognitive development, and two reflected variables, intrusiveness/overcontrol and detachment/disengagement ($\alpha=.72$). Higher scores indicate higher quality.

In addition to the rating scales, the 44-minute ORCE cycles also included 30 minutes of time-sampling, during which the observer checked all categories of behavior that occurred during each minute, providing a measure of frequency. The behavior categories included child individual behaviors (e.g., activity with objects, unoccupied/transition, watching TV), child-peer interactions (e.g., negative interaction with other children, prosocial act) and child-caregiver interactions (e.g., caregiver reads aloud to child, caregiver responds to child's talk). Raw observations were collapsed into frequencies by first summing the number of observed behaviors across the 30 segments within an observation cycle (prorated if the child was not available during the entire cycle), then summing the scores across cycles, and scaling all variables to frequency per 60 segments. The reported scores represent the number of times a given behavior occurred in 60 segments.

For purposes of this paper, the observed behavioral frequencies of were grouped into categories based on our conceptual framework and guided by principal components analyses (with Varimax rotation). We present information in the tables and text on cognitive stimulation and language interactions, followed by interactions with caregivers and interactions with peers, followed by watching television and being in transition or unoccupied. Some of the scales have low alphas, primarily because of low frequencies, but we considered them useful because they represent conceptually important categories.

At age 2, five subscales were formed: (a) *cognitive stimulation* is the sum of teaches academic skill and reads to child ($\alpha=.44$); (b) *language interaction* is the sum of child talk, caregiver responds to child's talk, speaks positively to child, asks questions of child, other talk to child ($\alpha=.92$); (c) *interactions with caregiver and other child* includes mutual exchange with caregiver, activity with child or adult, child alone (reflected), and complies with adult ($\alpha=.69$); (d) *negative interaction with adult* is the sum of speaks negatively to child, negative/restrictive actions, child says no/refuses, child acts defiant to adult ($\alpha=.58$); and (e) *peer positive & negative interaction, teach social rule* is the sum of caregiver teaches social rule, negative interaction with other child, positive/neutral interaction with other child, prosocial act, negative non-aggressive act ($\alpha=.53$). In addition to the four composites, frequency counts for “transition/watching/unoccupied” behavior and “watching television” were included in the analyses.

At age 3, four subscales were formed: (a) *cognitive stimulation* is the sum of teaches academic skill and reads aloud to child ($\alpha=.42$); (b) *language stimulation* is the sum of child talk, caregiver responds to child's talk, and asks questions of child ($\alpha=.61$); (c) *peer play* is the sum of activity with children only, prosocial act, positive/neutral interaction, and mutual pretend play as a function of total peer interaction ($\alpha=.82$); and (d) *negative behavior and interaction*

is the sum of negative interaction with other child, negative, non-aggressive act/binary, and physical aggression/binary ($\alpha=.43$). In addition to the four composites, frequency counts for “transition/watching/unoccupied” behavior and “watching television” were analyzed.

At age 4 ½, five subscales were created: (a) *cognitive stimulation* is the sum of teaches academic skill, facilitates learning, and reads aloud to child ($\alpha=.37$); (b) *language stimulation* is the sum asks adult a question, adult answers question, caregiver asks a question, child other talk, caregiver offers choice, encourages or praises, caregiver gives a direction, and adult other talk ($\alpha=.72$); (c) *non-teacher, peer social interaction* (3-items, cooperative play, boisterous play & other positive/neutral interaction with peer, $\alpha=.38$); (d) *peer negative behavior* is the sum of peer negative behavior, child physical aggression, and peer negative, non-aggressive behavior, ($\alpha=.57$); and (e) negative interaction with teacher is the sum of negative management, child acts defiant to adult, and child says “no” ($\alpha=.52$). In addition to the five composites, “transition/watching/unoccupied” behavior and “watching television” were analyzed.

Home Observation for Measurement of the Environment (HOME)—The HOME Inventory (Caldwell & Bradley, 1984) was adapted to measure the quality and quantity of stimulation and support available to a child in home-based settings by both non-relatives and relatives. Information used to score the 45 items is obtained during the course of the visit by means of observation and semi-structured interview. Each item is scored as “1” if the behavior is observed during the visit or if the parent reports that the conditions or events are characteristic of the home environment. A score of “0” is recorded if the behavior is not observed or reported. The age-appropriate versions were used at each of the three assessment points (see NICHD ECCRN, 2000a; 2002).

After determining that there was little support for an eight-factor solution that corresponds to the a-priori structure, the NICHD network examined the internal structure of the HOME, revealing a three-factor solution at age 2 and five-factor solutions at ages 3 and 4 ½: (a) *responsiveness* (age 2 $\alpha=.65$; age 3 $\alpha=.76$; age 4 ½ $\alpha=.51$); (b) *acceptance* (age 2 $\alpha=.74$; age 3 $\alpha=.73$; age 4 ½ $\alpha=.52$); (c) *physical environment* (age 3 $\alpha=.72$; age 4 ½ $\alpha=.63$); (d) *learning materials* (age 2 $\alpha=.76$; age 3 $\alpha=.76$; age 4 ½ $\alpha=.57$); and (e) *academic stimulation* (age 3 $\alpha=.85$; age 4 ½ $\alpha=.48$). We used these empirically derived scales in our analyses, as well as the *HOME total score* (age 2 $\alpha=.82$; age 3 $\alpha=.87$; age 4 ½ $\alpha=.82$).

Assessment Profile for Family Day Care—The Profile (Abbott-Shim & Sibley, 1992) is an observational measure intended to provide a comprehensive assessment of quality. At the 24-month visit, observers completed 7 subscales: Safety and Health, The Learning Environment, Scheduling, Curriculum, Individualizing, Physical Environment, and Adult Needs. Each subscale contains a series of specific items that are coded dichotomously as present (yes) or not present (no). The total scale score has a range of 0 to 63 with higher scores indicating that the overall child care environment is more positive. The Profile was analyzed only at age 2; there was little variability in scores at age 3 and consequently, it was discontinued at age 4 ½.

We conducted principal components analysis (with Varimax rotation) using the raw items from the family version of the Profile, which yielded four composite variables: teacher guided learning, learning materials, physical environment, and safety precautions. *Teacher guided learning* is the sum of 10 items ($\alpha=.80$). Sample items include: provider spends quiet, one-to-one time with each child (such as holding, assists with puzzle, etc.); children are asked questions that require remembering specific facts; provider allows children to make choices (such as presents two toys and allows child to choose). *Learning materials available* is the sum of 7 items ($\alpha=.75$). Sample items include: toys are organized in a variety of containers and/or shelves, and at least 3 different types of small muscle/manipulative materials are reachable by

the children without adult assistance (such as puzzles, legos, etc.). *Cleanliness, prepared for emergency* is the sum of 9 items that represent the physical environment of the setting ($\alpha = .74$). Sample items include: provider washes hands with soap and water before handling food, after assisting with each child's toileting, and after assisting a sick child; diapering surface is cleaned with disinfectant after each use; provider has training in first aid and infant/child CPR (Cardio-Pulmonary Resuscitation) procedures; written emergency procedures for relocating children in 2 minutes or less are posted (excluded from any arrangement with only the target child and his/her siblings in care); and a chart, or form, is available and used by provider and parents for recording variation in a child's routine (such as sleeping, eating, toileting, etc.). *Safety precautions* is the sum of 8 items ($\alpha = .70$). Sample items include: dangerous items in all other areas of the house (such as poisons, sharp scissors, cleaners) are stored out of reach of children; electrical cords are secured to prevent tripping or pulling; and furniture and equipment is in good repair.

The Physical Environment Checklist (PEC)—This observational measure was developed by the NICHD ECCRN for use in center-based classroom settings when the children were 4 ½ years of age. *Organization* is a 12-item scale that measures the extent to which the classroom space is uncluttered, divided into well defined areas, provides enough materials to go around, and children are able to use many materials independently without adult guidance or supervision, and an overall rating of the environment on a continuum from chaotic to well-planned ($\alpha = .77$). *Stimulation* is a 10-item scale measures the extent to which the classroom has three or more items available in the areas of construction, art, language, math, etc., and an overall rating of the environment on a continuum from barren to rich ($\alpha = .75$). Scores on the two scales range from 1-10, with higher values reflecting higher organization or stimulation.

The Classroom Practices Inventory—This observational measure of the emotional climate and academic activity focus of the program was used in centers at age 4 ½. Twenty-three pairs of items, based on the National Association for the Education of Young Children guidelines for developmentally appropriate practices for 4- and 5-year old children, are rated on a 5-point scale after several hours of direct observation (where 1 = *not at all like this classroom* and 5 = *very much like this classroom*; Hyson, Hirsh-Pasek, & Rescorla, 1990).

We conducted principal components analysis (with Varimax rotation) using the items from the CPI and identified three main factors. The first factor, *child initiated learning* (8 items, $\alpha = .89$), includes: children are involved in concrete learning activities, with materials closely related to their daily life experiences; teachers ask questions which encourage children to give more than one right answer; teachers use activities such as block building, measuring ingredients for cooking, woodworking, and drawing to help children learn concepts in math, science, and social studies. The second factor, *teacher warm and supportive* (9 items, $\alpha = .89$), includes such items as: teachers show affection and respect for children by smiling, or speaking to them at their eye level; and teachers talk about feelings – they encourage children to put their emotions (positive and negative) and ideas about feelings into words; teachers use redirection, positive reinforcement, and encouragement as guidance or discipline techniques. The third factor, *structured academic curriculum* (5 items, $\alpha = .83$), includes: children use workbooks, ditto sheets, flashcards, and other paper-and-pencil materials; reading and writing instruction emphasizes direct teaching of letter recognition, reciting the alphabet, coloring within the lines, and being instructed in the correct formation of letters; and teachers expect children to respond correctly with one right answer – memorization and drill are emphasized. High scores on the first two scales and a low score on the last scale are considered developmentally-appropriate practices.

Observer Reliability and Validity

To ensure that observers at the ten sites were making comparable ratings, all observers were certified on all instruments before beginning data collection and were tested for observer drift every 3-4 months. Agreement with master-coded videotapes and with other observers in live observations was evaluated using intra-class correlations (i.e., Pearson correlations and the repeated measures ANOVA formulation; Winer, 1971, p. 287). Agreement from the total qualitative composite (observed global quality) from the ORCE at the three age periods was at or above .74. In addition, for the ORCE behavioral frequencies, at least one indicator of inter-rater agreement exceeded .80 at all ages; however, reliability was lower for two behaviors that rarely occurred, “speaks negatively to child” at age 2 and “negative management” at age 4 ½.⁴

Turning to the observational measures of family child care homes and relative care settings, reliability estimates were greater than .90 on the home version of the assessment Profile at age 2, and greater than .80 at all ages on the HOME. For the observational measures used in center-based settings at age 4 ½, the Physical Environment Checklist exceeded .88 for all items and the Classroom Practices Inventory scales exceeded .80.

Family and Child Controls

We identified child and family characteristics that might account for selection of different types of care and a set of child characteristics that could affect interactions with caregivers. Family level variables at one month of age include maternal education, partner present or absent, number of children in the family, and maternal beliefs about the costs and benefits of maternal employment (Greenberger, Goldberg, Crawford, & Granger, 1988). Child level variables include gender, racial/ethnic group, maternal report of child global temperament at 6 months (scores range from 1-5 with higher scores reflecting a more difficult temperament; Carey & McDevitt, 1978), two developmental scales administered at 15 months of age, the Bayley Mental Development Index (Bayley, 1969) and the McArthur Communicative Developmental Inventories (CDI; Fenson, Dale, Reznick, Thal, & Reilly, 1991). Descriptive information about family and child characteristics appears in Table 1.

Results

To answer the first research question, whether the structural and process characteristics of centers, family child care homes and relative settings differed, we conducted multivariate analyses of covariance (MANCOVA) of structure and process features comparing three settings and four income categories (based on family income-to-needs) for each age level. All MANCOVAs included income group, providing information about whether children from higher and lower income families experienced different structural or process features in different types of care. Main effects of income group indicated overall differences across types of care, and interactions of income group with type of care indicated that the income differences varied across the three types of care.

In all analyses, we included a series of dummy indicators for data collection site as covariates, because use of different types of care varies across different regions of the country (Capizzano, Adams, & Sonenstein, 2000; Fuller et al., 2002) and because there is substantial variability in child care regulations, percent of children attending centers, subsidy policies, and average income across states (Fuller et al., 2004). We calculated an indicator of effect size, partial eta squared (η^2), which describes the proportion of the variance in features of the child care setting

⁴Pearson correlation = .42, Winer coefficient=.55 for live observations of “speaks negatively to child” at age 2, and Pearson correlation = .58, Winer coefficient=.71 for live observations for “negative management” at age 4 ½.

that is attributable to type and to income. These permit comparisons of effect sizes across ages more readily than do the significance levels of the *F* ratios because the latter depend on sample size.

Do Centers Differ from Other Types of Care?

Structural Features and Caregiver Characteristics—Six structural features and caregiver characteristics were examined at each age level. The regression-adjusted means, *F* ratios, and effect sizes from the MANCOVAs comparing the three types of care and four income groups are shown in Table 2. There were significant differences among types on all six variables at all three age levels.

Not surprisingly, the three types of care differed on two structural characteristics—group size and child-to-adult ratio at all age levels. Centers had the highest group sizes and child-to-adult ratios, and care by relatives had the lowest group sizes and ratios. Family child care homes fell in between. Centers were most likely to be licensed or certified, and relative care was least likely to be licensed or certified. In the 1990s, when these data were collected, all states required centers to be licensed, but some states exempted church-based or other types of programs. Many states had some form of licensing or certification for homes that cared for more than a certain number of unrelated children, but many family child care homes and most relative care would not have fallen under these requirements. The effect sizes (partial eta squared) for type of care were largest at age 3 (from .49 to .57) and smallest at age 4 ½ (from .19 to .31).

Three characteristics of caregivers were analyzed: overall education, training in child development, and traditional attitudes about raising children. Centers had better educated and trained caregivers whose beliefs about raising children were less traditional than those of providers in other settings. Relative caregivers had lower levels of education and training and more traditional beliefs about raising children than did providers in other settings. Again, family child care homes fell between centers and relatives. Differences between centers and relative care were significant at all age levels; relatives and non-relative family child care home providers did not differ significantly at ages 2 and 4 ½ years. Comparison of effect sizes indicates that the caregiver differences are larger for older children (from .07 to .18) than for settings experienced by 2-year-old target children (from .03 to .07), largely because teachers in centers attended by older children had more education and training than did teachers in centers attended by younger children.

Process Measures of Children's Experiences—We grouped the subscales on the Observational Rating of Caregiving Environment (ORCE) into different components of process. The observed global quality rating composite consists primarily of scales measuring caregivers' socioemotional responsivity and sensitivity. The subscales for cognitive stimulation and language interactions represent features of process related to intellectual development (Sylva et al., 2006). Several subscales describe positive and negative social interactions with peers and adults that might be most pertinent to children's social behavior. Finally, two scales—being unoccupied or in transition and watching television—may represent low levels of both cognitive and social stimulation, but transitions may also indicate structured time periods in the day (NICHD ECCRN, 2003b). The results for the three age levels appear in Table 3.

Observed global quality: Centers differed from other types of care, but the patterns depended on age. At age 2, centers and homes were rated lowest on total quality, and relative care was rated highest. At age 3, centers were comparable other types of settings. At age 4 ½, centers were rated higher than family child care homes and relative settings.

Observed cognitive and language interactions: The patterns for cognitive stimulation and learning activities were different from those for general language interactions (e.g., conversations, asking and answering questions). At ages 2 and 3, center caregivers had less frequent general language interactions with children than did caregivers in other types of care.

By contrast, for 3- and 4 ½-year-olds, centers had higher levels of cognitive stimulation than did other types of care. At age 3, centers were significantly higher than other types of care; relatives and family child care homes did not differ from each other. At age 4 ½, care in centers was highest and relative care was lowest with family child care homes in between and not significantly different from either.

Observed interactions with adults and peers: On the whole, children in centers and home settings had fewer negative interactions with adults than did children in relative care at 2 and 4 ½ years (this measure was not available for 3 years). At age 2, they also had fewer overall interactions with adults.

Children in centers and family child care homes interacted with peers, both positively and negatively, more than did children in relative care. Centers generally did not differ from family child care homes, but at age 4 ½, children in family child care homes had higher frequencies of peer play than did children in centers.

Unoccupied/transition and television viewing: At all ages and income groups, children in centers spent more time in transition or unoccupied and less time watching television than did children in other types of care. Children in relative care spent the smallest amount of time unoccupied or in transition and the largest amount of time watching television. A comparison of the effect sizes indicate that the type of care differences were largest for unoccupied behavior at age 2, and largest for television viewing at age 4 ½.

The Child Care HOME and the Assessment Profile for Family Day Care measures were available only for family child care homes and relative care. The results of the analyses comparing these two types of care appear in Table 4. Results for all three age groups are shown for the HOME, but the Profile was available only at age 2. The total score on the HOME did not differ for family child care homes and relative care settings; however, the subscales are of more interest for our purposes. Within each measure, the subscales were subjectively grouped according to the scheme used for the ORCE.

Social/emotional sensitivity and supportiveness was represented by the responsivity and acceptance scales on the HOME. At both 2 and 3 years, caregivers in family child care homes were rated as more accepting than were relative caregivers, but at age 3, relatives were rated as more responsive. There were no differences at age 4 ½.

Cognitive and language stimulation was represented by the subscales for learning materials, academic/language stimulation, and quality of the physical environment on the HOME as well as the subscales for teacher-guided learning and learning materials on the Profile. Across the three age groups, there were no statistically significant differences between family child care homes and relatives.

At age 2, the Profile contained two scales dealing with health and safety practices, and family child care homes were rated higher than relatives on both. For example, family child care homes demonstrated more regular handwashing and cleaning, better preparation for emergency situations, a safer household environment with furniture and equipment that was in good repair and items harmful to children removed from all areas of the house.

Do Family and Child Characteristics Account for Differences Among Types of Care?

Because family and child characteristics might affect selection of the type of care and because children's own characteristics might affect the processes we observed, the second set of MANCOVA analyses comparing the three types of care included additional child and family covariates that were measured prior to age 2. These include child gender, ethnic group, temperament at 6 months, cognitive and language scores at 15 months, maternal education, partner present or absent, number of children in the family, and maternal beliefs about the costs and benefits of maternal employment (results not shown). Overall, adding these controls made little difference in the effect sizes, and all of the significant F ratios shown in Tables 2-4 comparing three types of care continued to be statistically significant. In addition, the learning materials scale on the HOME at age 3 became statistically significant after the additional covariates were included, $F(26, 251) = 4.21$, $\eta^2 = .02$, $p < .05$, suggesting a suppressor effect.⁵

Do Child Care Features Differ by Family Income?

Structural Features—The third major research question was whether children from families with different income levels experience different features of child care within the three types of care examined here. The relations of income levels to structural features appear in Table 2. The main effects of income group test overall differences across types of care, and the interactions of income $\times$ type indicate whether the income differences vary by type of care. Overall, structural features—group size, ratio, and licensure--of settings did not differ by family income. By contrast, caregiver training and education differed by family income across age groups, although the effect sizes for income group were much smaller than those for type of care. On the whole, for 2- and 3-year-olds the patterns of means were curvilinear. Children in the lowest income families (below the poverty threshold) and those in the highest income families had better educated and trained caregivers than those in families with intermediate income levels. At age 4 ½, however, children in the poorest families had the least well-educated and trained caregivers, and caregivers for those in high income families had the highest levels of education and training.

Process Features

Observed global quality: Comparisons of high- and low-income families on the ORCE appear in Table 3. Global quality increased linearly with income at age 2, but a curvilinear pattern was observed at age 3. The largest differences in total quality were between settings attended by children whose families were classified as “near poor” and those who were in the highest income category, and these mean differences were most pronounced in relative settings.

Observed cognitive and language interactions: At 2 and 3, language interactions were more frequent in settings attended by higher- than by lower-income children, and for 2-year-olds cognitive stimulation was also lower for lower-income children. In general, children whose family incomes were below the poverty threshold received substantially less language and cognitive stimulation than did those at the highest income levels. At age 4 ½, however, there were no significant differences associated with family income.

Observed interactions with adults and peers: At age 2, children from the lowest-income families had fewer overall interactions with adults, but also more frequent negative interactions with adults than did those from higher-income families. At age 3, the lowest-income children had more negative interactions with peers, even though their frequencies of peer interactions were similar to those of children in higher-income families. At age 4 ½, there were no income

⁵Analyses with full set of child and family covariates are available from first author on request.

differences in negative interactions with adults or peers, but the amount of peer play varied across income groups and across types of care. Children in child care homes whose families were in the highest income category had significantly higher levels of peer play in comparison to children in relative care, regardless of income level.

Unoccupied/transition and television viewing: Overall, the amount of time children spent unoccupied or in transition did not differ by family income; however, the pattern of means at age 3 suggests that a higher frequency of unoccupied time was observed for children in the “near-poor” income category, relative to other income groups. Television viewing did not differ by family income at ages 2 and 3, but at 4 ½. The amount of time spent watching television was lowest among children in centers, regardless of income level, followed by the highest-income children in child care homes.

Income-group comparisons on the HOME and Assessment Profile are shown in Table 4. At all three age levels, higher-income children had more accepting and responsive caregivers than did those from lower-income families. The settings attended by higher-income children had higher levels of learning materials at ages 2 and 3 than did settings attended by lower-income children and at age 2, they had more teacher-guided learning. At age 3, children whose families were below the poverty level had comparable levels of academic/language stimulation to those in other income groups; only children in the near-poor group received significantly less stimulation than did those in the highest income group. Finally, at age 3 the child care settings that were used by the highest income group had higher physical environment ratings than those at any other income level, but at age 4 ½ this association was curvilinear; settings used by families in the “near-poor” group had significantly lower physical environment ratings than settings attended by higher-income children.

Do Family and Child Characteristics Account for Income Differences?

Many of the income differences were accounted for by the family and child characteristics. After controlling for the full set of covariates, the main effect of income and the type $\times$ income interaction remained statistically significant for licensure at age 3. However, the F ratios for caregiver education, training and beliefs about raising children were no longer statistically significant at any age. Similarly, although the type $\times$ income interactions remained for the ORCE, the only main effects for income that remained significant were for peer play and television viewing at age 4 ½. Finally, none of the F ratios for the HOME and the profile remained statistically significant in the full-control models, with the exception of the HOME total score and caregiver responsiveness on the HOME at age 3.

Head Start and Other Child Care Centers

The last research question concerned the features of Head Start centers in comparison with other child care centers attended by low-income children. This comparison was possible only at age 4 ½. Of the observations conducted for children from low-income families (income-to-needs 2.0 or lower) at age 4 ½, 49 took place in Head Start programs and 114 occurred in other center-based programs. Although many center-based programs provide developmentally-based curricula, Head Start programs are specifically designed to promote school readiness. Therefore, we compared them at both the structural and process levels to the other programs used by the low-income families in our sample. In addition to the ORCE observations, two measures were collected in centers at age 4 ½—the Physical Environment Checklist (PEC) and the Classroom Practices Inventory (CPI). Unlike the ORCE, which is based exclusively on the experiences of the target child, the PEC and CPI describe the quality of experiences provided at the classroom level.

There were no significant differences on any of the structural features, caregiver characteristics, or ORCE observed process variables (results not shown). There were, however, differences on some indicators of cognitive and academic activities measured by the Physical Environment Checklist and the Classroom Practices Inventory as shown in Table 5. Head Start programs were rated higher than other centers on organization and stimulation in the physical environment. Head Start centers used more child-initiated learning, and other centers used more structured academic curricula; that is, Head Start centers used more developmentally-appropriate practices than did other centers.

The Head Start sample was somewhat more disadvantaged than the low-income children attending other types of center-based care. They were more likely to be non-white, have a mother who is not partnered and less educated, have more children in the home, have a difficult temperament at 6 months of age, and lower cognitive scores, but higher language ability at 15 months of age. With these child and family characteristics controlled, the differences in the two settings held with two exceptions. Structured academic curriculum was no longer significant, ($F=3.39$, $p<.10$), and the effect for warm and nurturing became statistically significant ($F=6.24$, $p<.05$), such that caregivers in Head Start settings were more warm and nurturing than caregivers in other types of centers.

Discussion

We began with four major research questions: (a) How do centers, family child care homes, and relative care differ at both the structural and process levels? Are these differences consistent or inconsistent for children of different ages? (b) Do family and child characteristics account for differences among types of care? (c) Do children from different family income levels experience different characteristics of child care at both the structural and the process levels? (d) Do Head Start centers differ from other child care centers attended by low-income children?

Type of Care Differences

Centers, family child care homes, and relative care differed dramatically in structure and caregiver training. It is not news that centers have higher ratios and group sizes than do family child care homes and relative care, but they also have better educated and trained caregivers who have less traditional beliefs about raising children. For example, caregivers are less likely to endorse the ideas that “children should not question the authority of parents” or “children will be bad unless they are taught what is right.” Family child care homes fell somewhere between centers and relative care on structural and caregiver characteristics. These differences were independent of family and child characteristics, including family income. They appear to be a function of the way the care settings are organized and staffed.

Disaggregating global indicators of process proved useful in gaining a nuanced understanding of children's experiences in the three types of settings and perhaps a better understanding of the ways in which different settings affect children's learning and behavior. It also helped to understand how structure and caregiver characteristics may affect process. Structural features—that is, the number of adults and children in the setting—are associated with the frequency of social interactions with adults and peers. Children in relative care get more experience interacting with adults, both positively and negatively. For very young children, these adult interactions include more sensitive and responsive care, as indexed by global quality, but for older children, the reverse is true—centers provide more sensitive and responsive care. In centers and child care homes, where there are more children per adult and more children overall, the rates of language interactions and conversations with adults are lower than in relative care, and peer interactions are more frequent. These patterns and amounts of social interaction in the three settings may provide different contexts for learning how to relate to adults and peers.

Children in centers and child care homes get more experience interacting with peers than do children in relative care, but it is notable that interactions with peers are more common in child care homes by age 4 1/2. Developing social skills with peers is an important developmental task, but these interactions may also provide opportunities to learn aggressive behavior unless the setting and curriculum are designed to promote positive forms of interaction and conflict resolution. Unfortunately, the observations do not offer information about how caregivers in different settings teach social skills—information that would be very helpful in understanding what children learn about social interactions with peers and adults in different types of care.

The three types of care differ in the prevalence of deliberate or planned experiences to promote learning, which may result in part from the education and training of the caregivers. Centers are settings designed to care for children; in comparison to other types of care, they have better-trained and educated caregivers, and they provide more cognitive stimulation, more activities designed for learning, more organized time periods, and less time watching television. Disaggregating these features from the global indicators of quality, which focus primarily on socioemotional features of care, may help to understand why center care contributes to children's intellectual and cognitive skills (Garces, et al., 2002; NICHD ECCRN, 2000a; 2002; NICHD ECCRN and Duncan, 2003). This hypothesis is consistent with the recent finding that observations tapping processes that support children's skills in literacy, math, science, and diversity predicted cognitive performance, but the global quality score from the ECERS-R did not (Sylva et al., 2006).

In short, this analysis suggests that it is worthwhile to analyze structure and process at a more fine-grained level than global quality. If we want to understand how child care contributes to children's development across domains – for example, intellectual skills, social skills with adults, and social skills with children – it may be useful to examine specific process categories that are likely to make different contributions to different developmental domains.

Family and Child Characteristics

Family and child characteristics did not account for the differences among the three types of care. The differences remained when children's temperaments and language and cognitive abilities as well as parents' education and other attributes were controlled. In general, the effect sizes were reduced slightly, but the structural and process differences we observed do not appear to be a result of systematic differences among the characteristics of the children placed in different types of care or of differences among families who select different types of care.

Differences by Family Income

Children from low-income families are more likely to experience care by relatives and care in family child care homes and are less likely to be in center care than children from high-income families (Bainbridge et al., 2005; Capizzano & Adams, 2004; Early & Burchinal, 2001; Fuller et al., 2002; NICHD ECCRN, 2004). Earlier evidence suggests that the quality of care received by low-income children, particularly in relative care and family child care homes, is lower than the care higher-income children receive. In at least two studies, however, center care for the very lowest income children was of better quality than that received by children from families with near-poor or modest incomes (NICHD ECCRN 1997b; Phillips et al., 1994).

In our analyses, the structural features of care experienced by children from different income levels did not differ very much, but higher-income children tended to have better educated and trained caregivers. For the youngest children, those from families below the poverty level had better educated and trained caregivers than did children from families with intermediate incomes. The process indicators did not follow this pattern; for 2- and 3-year-olds, children in the lowest income groups received care that was lowest on global quality, language

interactions, cognitive stimulation, and highest on negative adult interactions. The discrepancy between structural and process indicators in care received by poor children is consistent with observations in the Child Care Staffing Study (Phillips et al., 1994). The effect sizes for family income were typically smaller than those for type of care—that is, variations across the three types of care were greater than were those across the four income groups. Family income differences were less pronounced at age 4 ½, suggesting that lower income families may have better access to quality care for older children.

There is some evidence from prior studies that the quality of centers may differ less by family income than the quality of relative care and care in family child homes. Our analyses provide some support for this hypothesis at age 3 for global quality, but not for older children. By age 4 ½, there were few differences by type of care in the experiences of children from different income groups. Among several reasons is the fact that many programs for children from low-income families in this age group have strong early education components, among which Head Start is the most widely recognized and used.

In most respects, the Head Start programs that we observed were similar to other center-based settings used by low-income children, but Head Start centers did have more organized and stimulating environments and more opportunities for child-initiated learning, while spending less time on structured academic curricula. An emphasis on child-initiated learning is more consistent with recommendations by the NAEYC and many early childhood educators for developmentally-appropriate practices. Head Start teachers are urged to promote problem-solving and higher-order thinking skills through hands-on learning experiences rather than using drill and practice, flash cards, or ditto sheets to teach isolated skills (Bredekamp & Copple, 1997).

Many of the family income differences were accounted for by controls for child and family characteristics. Obviously, income is one indicator of a cluster of socioeconomic, family, and child characteristics, but the fact that these correlates account for the differences statistically does not mean the differences are not real. The observed experiences of the children actually differed. The best interpretation of this pattern may be that children from families with a set of correlated characteristics that include low income, low parent education, single mothers, minority ethnic group, and low child language and cognitive performance at 15 months are selected into care with different process features and that they have different experiences in child care than do their counterparts.

Caveats

The data used in this report come from a large number of settings attended by children in ten different geographic areas in the United States. The sample includes numerous locations, child care settings, age groups, and sociodemographic groups. Nevertheless, neither the sample of children nor the child care settings visited were randomly selected, so we cannot conclude that they represent national patterns across different types of care. Although the proportions of families at different income levels do not correspond exactly to national averages, they represent a wide range of family income and other demographic variations, offering useful information about variations in settings experienced by children from families in poverty compared to those from affluent families. The percent of caregivers who refused to be observed was higher for family child care homes than for centers, perhaps introducing some bias, but it is unclear whether such bias would increase or reduce the observed differences among types of care.

Because we were trying to describe the daily experiences of children in different types of care, our indices of process include children's behavior. Moreover, unlike many observations of child settings, these observations were focused on the experiences of an individual target child

rather than on the whole setting. It is possible, and in fact likely, that the observations were affected by the characteristics of the children; e.g., a child with better language skills may engage in more conversation with a caregiver. In fact, children with different characteristics do have different experiences in the same setting. Nevertheless most of the differences associated with types of care did not depend on the family and child characteristics that we measured. Although the types of care differences were robust to controls for these measured characteristics, it is possible that other unmeasured characteristics affected selection of children or families into different types of care.

The comparisons across age are affected by the changes in the proportions of children in the three types of care. This is especially true at age 4 ½, when the majority of children were in center care. Because center-based programs are more “normative” at age 4 ½, those children in family child care homes and relative care may be a more selected group or the caregivers may be more selected in some ways. This is unavoidable, given the naturalistic design in which parents place children in care. It represents the general trends in the population, and, therefore, is a reasonable representation of the features of these care types at each age for the children receiving them.

Finally, we have presented age contrasts based on the age of our target child. In centers, that child is likely to be in care with others of a similar age, but that is not generally true in family child care homes or relative care. Similarly, the income comparisons are based on the income of the target child's family; they do not represent the average family incomes for all children in a setting.

Implications for Policy and Future Research

One motivation for this research was the finding that availability of child care subsidies increases the likelihood that low-income parents will use center care (Crosby, Dowsett, et al., 2005; Fuller et al., 2002; Weinraub et al., 2005). Some commentators have asked whether this is “good” for children. It appears that centers offer more opportunities for cognitive and intellectual development than do the home-based settings with relatives or non-relatives that are typically used by low-income parents, but they also provide somewhat less sensitive care for 2-year-olds in our study. Both centers and family child care homes offer more opportunities than does relative care for peer interaction, positive and negative, which could facilitate the development of social skills, but could also provoke aggression. These nuanced observations of different types of care make it clear that one type of care is not necessarily “better” than others for all purposes, and they point to areas needing improvement in different types of care.

Family child care homes fell between centers and relative care on child-to-adult ratios and group size, licensure, caregiver education, training, and beliefs about raising children. Notably, at age 2, they had better physical environments and safety precautions than did relative care. On the other hand, rates of peer interaction were highest in family child care homes, and they provided fewer opportunities for cognitive stimulation and learning than did centers. Given the large number of children receiving care in these settings, policies for providing training and technical assistance to home child care providers might be useful.

Many parents believe that home-based care by relatives or others is preferable for very young children, and that center-based care is appropriate for older preschool children. Our analyses offer some support for this belief, in that global quality was highest in relative care and lowest in center care for the youngest children. These findings imply that there is particular need for improving education and training for people providing toddler care; center caregivers for 2-year-olds were less well-educated and less well-trained than were those in centers serving 4 ½-year-olds, perhaps partly accounting for their lower overall quality.

Disaggregating “quality” leads to some suggestions for specific areas in which caregivers could be better trained. What types of behaviors are evident among caregivers who provide cognitively stimulating care? Using the NICHD SECCYD measures as a guide, cognitive stimulation does not simply refer to the type of materials that the caregiver provides, but rather focuses on the caregiver's deliberate attempts to encourage the child's development, achievement, and learning. This can include activities that involve numbers, letters, shapes, or colors, but the key emphasis is on the quality of the interaction between the caregiver and child. Efforts to improve the level of cognitive stimulation in child care settings could emphasize a caregiver's skill in responding to and expanding on the child's verbalizations or vocalizations, asking questions that require problem solving, focusing the child's attention on the unique attributes and perceptual qualities of objects (i.e., their colors, how they move, what they can be used for), and suggesting more sophisticated play activities.

Caregivers could also improve their understanding of the types of interactions that are associated with socioemotional development. Training efforts to promote sensitive caregiving could guide caregivers to take an active interest in the child's activities by commenting when a child achieves success or does something new and interesting, providing enhancements when a child is exploring, or responding with redirection when the child begins to lose interest. Children also benefit from responsiveness, which refers to the caregiver's ability to respond to a child's distress in a prompt, appropriate, and effective manner, and may include calm reassurance, explanation, or negotiation to meet the child's needs.

One often-neglected dimension of positive caregiving is the ability to help children manage peer interactions effectively. The ORCE behavioral scale measures the number of times the caregiver teaches a “social rule,” either in response to prosocial interaction or in conflict situations. For example, the content of the social rule may be about hitting, grabbing toys, turn taking, saying “please” and “thank you,” giving compliments, expressing feelings of anger or distress verbally rather than physically, negotiating, or working together to solve problems. In future research measuring quality, more detailed information about the ways in which caregivers promote positive interactions with peers is needed; this feature of quality may be particularly useful when examining caregiving quality in relation to children's social behavior.

The results from the present study identify areas for improvement for different types of care settings at different ages. Because simply increasing the overall level of caregiver education does not appear to be sufficient (Early et al., 2007), the next step in child care research is to examine how training programs can target specific types of caregiver behaviors in order to improve caregiving quality. A number of multi-site, random-assignment evaluations of intensive caregiver training programs are currently underway. For example, the Quality Interventions for Early Care and Education (QUINCE) study (<http://www.fpg.unc.edu/~quince/index.cfm>), the Foundations of Learning Project (http://www.mdrc.org/project_11_78.html), and the Study of the Program for Infant/Toddler Care (<http://ies.ed.gov/ncee/edlabs/projects/project.asp?id=90>) aim to promote caregiver's knowledge, skills, and practices that are expected to enhance children's cognitive, language, and social interactions. Evaluation studies of this kind will help to identify features of positive caregiving that can be improved through training efforts, as well as to identify effective methods for bringing about these changes.

In conclusion, we advocate a more nuanced approach to examining quality in child care research. We urge child care researchers to examine specific processes that capture caregivers' socioemotional responsivity and sensitivity, cognitive stimulation and language interactions, as well as children's positive and negative social interactions with peers and adults. In future investigations, measuring these nuanced features of caregiving may help to uncover the

mechanisms through which early care experiences in different types of settings exert influence on children's social and cognitive development.

Acknowledgments

We gratefully acknowledge comments on earlier drafts from Margaret Burchinal and Janet Currie. This research has received support from the grant 90YE0074, Child Care Bureau, Administration on Children, Youth and Families, U.S. Department of Health and Human Services (DHHS) as well as the grant 5 T32 HD041019, Training Program in Population Studies, awarded to the Population Research Center at the University of Texas at Austin by the National Institute of Child Health and Human Development (NICHD). The contents are solely the responsibility of the authors and do not represent the official views of the funding agency, nor does the publication in any constitute an endorsement by the funding agency.

References

- Abbott-Shim, M.; Sibley, A. Assessment profile for early childhood programs: Research version. Atlanta, GA: Quality Assist, Inc.; 1992.
- Bainbridge J, Meyers M, Tanaka S, Waldfogel J. Who gets an early education? Family income and the enrollment of 3- to 5-year-olds from 1968 to 2000. *Social Science Quarterly* 2005;86:724–745.
- Barnett WS. Long-term effects of early childhood programs on cognitive and school outcomes. *The Future of Children* 1995;5:25–50.
- Bayley, N. Bayley Scales of Infant Development: Manual. New York: The Psychological Corporation; 1969.
- Bredekamp, S.; Copple, C. Developmentally appropriate practice in early childhood programs. Washington D.C.: National Association for the Education of Young Children; 1997.
- Burchinal MR, Cryer D, Clifford RM, Howes C. Caregiver training and classroom quality in child care centers. *Applied Developmental Science* 2002;6:2–11.
- Caldwell, BM.; Bradley, PH. Home Observation for Measurement of the Environment. Little Rock, AR: University of Arkansas at Little Rock; 1984.
- Capizzano, J.; Adams, G. Snapshots of America's Families III. Vol. 16. Washington, DC: The Urban Institute; 2004. Children in low-income families are less likely to be in center-based child care. Retrieved March 20, 2007, from http://www.urban.org/UploadedPDF/310923_snapshots3_no16.pdf
- Capizzano, J.; Adams, G.; Sonenstein, F. Child care arrangements for children under five: Variation across states. Washington, DC: Urban Institute; 2000. Retrieved March 20, 2007 from http://www.urban.org/UploadedPDF/anf_b7.pdf
- Carey WB, McDevitt SC. Revision of the infant temperament questionnaire. *Pediatrics* 1978;61:735–739. [PubMed: 662513]
- Cassidy DJ, Hestenes LL, Hegde A, Hestenes S, Mims S. Measurement of quality in preschool child care classrooms: An exploratory and confirmatory factor analysis of the early childhood environment rating scale-revised. *Early Childhood Research Quarterly* 2005;20:345–360.
- Coley, RL.; Chase-Lansdale, PL.; Li-Grining, C. Child care in the era of welfare reform: Quality, choices, and preferences. Johns Hopkins University; Baltimore, MD: 2001. Policy Brief 01-04 Retrieved March 20, 2007, from http://web.jhu.edu/threecitystudy/images/publications/19168_Welfare_Nov.pdf
- Crosby, D.; Dowsett, C.; Huston, A.; Gennetian, L. Type of preschool child care and the later externalizing behavior of children in low-income, single mother families; Paper presented at the annual meeting of the Association for Public Policy Analysis and Management; Washington D. C.. 2005 Nov.
- Crosby D, Gennetian L, Huston A. Child care assistance policies can affect the use of center-based care for children in low-income families. *Applied Developmental Science* 2005;9:86–106.
- Early D, Burchinal M. Early childhood care: Relations with family characteristics and preferred care characteristics. *Early Childhood Research Quarterly* 2001;16:475–497.
- Early DM, Maxwell KL, Burchinal M, Alva S, Bender RH, Bryant D, et al. Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. *Child Development* 2007;78:558–580. [PubMed: 17381790]

- Eheart BK, Leavitt RL. Family day care: Discrepancies between intended and observed caregiving practices. *Early Childhood Research Quarterly* 1989;4:145–162.
- Fenson, L.; Dale, PS.; Reznick, JS.; Thal, D.; Reilly, JS. Technical manual for MacArthur Communicative Development. San Diego, CA: San Diego State University; 1991.
- Fuller B, Kagan SL, Caspary G, Gauthier C. Welfare reform and child care options for low-income families. *Future of Children* 2002;12:97–119.
- Fuller B, Kagan S, Loeb S, Chang Y. Child care quality: Centers and home settings that serve poor families. *Early Childhood Research Quarterly* 2004;19:505–527.
- Garces E, Thomas D, Currie J. Longer-term effects of head start. *American Economic Review* 2002;92:999–1012.
- Gennetian, L.; Crosby, DA.; Dowsett, CJ.; Huston, AC.; Principe. Center-based care and the cognitive and social development of low-income children of working mothers; Paper presented at the biennial meeting of the Society for Research in Child Development; Atlanta, GA. 2005 Apr.
- Greenberger E, Goldberg WA, Crawford TJ, Granger J. Beliefs about the consequences of maternal employment for children. *Psychology of Women Quarterly* 1988;12:35–59.
- Harms, T.; Clifford, RM.; Cryer, D. Early Childhood Environment Rating Scale-Revised. New York, NY: Teachers College Press; 1998.
- Harms, T.; Clifford, RM. Family Day Care Rating Scale. New York: Teachers College Press; 1989.
- Hyson MC, Hirsh-Pasek K, Rescorla L. The Classroom Practices Inventory: An observation instrument based on NAEYC's guidelines for developmentally appropriate practices for 4- and 5-year-old children. *Early Childhood Research Quarterly* 1990;5:475–494.
- Kisker, E.; Hofferth, S.; Phillips, D.; Farquhar, E. A profile of child care settings: Early education and care in 1990. Washington, DC: U.S. Government Printing Office; 1991.
- Kontos S, Hsu H, Dunn L. Children's cognitive and social competence in child-care centers and family day-care homes. *Journal of Applied Developmental Psychology* 1994;15:387–411.
- Loeb S, Fuller B, Kagan SL, Carrol B. Child care in poor communities: Early learning effects of type, quality, and stability. *Child Development* 2004;75:47–65. [PubMed: 15015674]
- Magnuson K, Ruhm C, Waldfogel J. Does prekindergarten improve school preparation and performance? *Economics of Education Review* 2007;26:33–51.
- Mulligan, GM.; Brimhall, D.; West, J. U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S Government Printing Office; 2005. Child care and early education arrangements of infants, toddlers, and preschoolers: 2001 (NCES 2006-039).
- NICHD Early Child Care Research Network. Characteristics of infant child care: Factors contributing to positive caregiving. *Early Childhood Research Quarterly* 1996;11:269–306.
- NICHD Early Child Care Research Network. Familial factors associated with the characteristics of nonmaternal care for infants. *Journal of Marriage and the Family* 1997a;59:389–408.
- NICHD Early Child Care Research Network. Poverty and patterns of child care. In: Duncan, GJ.; Brooks-Gunn, J., editors. *Consequences of growing up poor*. New York: Russell-Sage; 1997b. p. 100-131.
- NICHD Early Child Care Research Network. Child outcomes when child care center classes meet recommended standards for quality. *American Journal of Public Health* 1999;89:1072–1077. [PubMed: 10394318]
- NICHD Early Child Care Research Network. The relation of child care to cognitive and language development. *Child Development* 2000a;71:960–980.
- NICHD Early Child Care Research Network. Characteristics and quality of child care for toddlers and preschoolers. *Applied Developmental Science* 2000b;4:116–135.
- NICHD Early Child Care Research Network. Structure>process>outcome: Direct and indirect effects of caregiving quality on young children's development. *Psychological Science* 2002;13:199–206. [PubMed: 12009038]
- NICHD Early Child Care Research Network. Does amount of time spent in child care predict socioemotional adjustment during the transition to kindergarten? *Child Development* 2003a;74:976–1005.
- NICHD Early Child Care Research Network. Does quality of child care affect child outcomes at age 4 ½? *Developmental Psychology* 2003b;39:451–469.

- NICHD Early Child Care Research Network. Type of child care and children's development at 54 months. *Early Childhood Research Quarterly* 2004;19:203–230.
- Duncan GJ. NICHD Early Child Care Research Network. Modeling the impacts of child care quality on children's preschool cognitive development. *Child Development* 2003;74:1454–1475. [PubMed: 14552408]
- Pence AR, Goelman H. Who cares for the child in day care? An examination of caregivers from three types of care. *Early Childhood Research Quarterly* 1987;2:312–334.
- Perlman M, Zellman G, Le V. Examining the psychometric properties of the Early Childhood Environment Rating Scale-Revised (ECERS-R). *Early Childhood Research Quarterly* 2004;19:398–412.
- Phillips D, Mekos D, Scarr S, McCartney K, Abbott-Shim M. Within and beyond the classroom door: Assessing quality in child care centers. *Early Childhood Research Quarterly* 2000;15:475–496.
- Phillips D, Voran M, Kisker E, Howes C, Whitebook M. Child care for children in poverty: Opportunity or inequity? *Child Development* 1994;65:472–492. [PubMed: 8013235]
- Schaefer, E.; Edgerton, M. Parental and child correlates of parental modernity. In: Sigel, IE., editor. *Parental belief systems: The psychological consequences for children*. Hillsdale, NJ: Erlbaum; 1985. p. 287-318.
- Sonenstein, F.; Gates, G.; Schmidt, S.; Boshun, N. Assessing the New Federalism Occasional. Washington, D.C.: The Urban Institute; 2002. Primary child care arrangements of employed parents: Findings from the 1999 National Survey of America's Families. Paper 59. Retrieved November 17, 2006, from http://www.urban.org/UploadedPDF/310487_OP59.pdf
- Sylva K, Siraj-Blatchford I, Taggart B, Sammons P, Melhuish E, Elliot K, et al. Capturing quality in early childhood through environmental rating scales. *Early Childhood Research Quarterly* 2006;21:76–92.
- U.S. Department of Health and Human Services. Head Start impact study: First year findings. Rockville, MD: Westat; 2005. Retrieved March 20, 2007, from http://www.acf.hhs.gov/programs/opre/hs/impact_study/reports/first_yr_finds/first_yr_finds.pdf
- U.S Department of Labor, Bureau of Labor Statistics. U.S Department of Labor, Women's Bureau, Handbook in women workers: Trends and issues. Washington D. C.: U. S. Government Printing Office; 1994. Current population survey, March 1991.
- Votruba-Drzal E, Coley RL, Chase-Lansdale L. Child care and low-income children's development: Direct and moderated effects. *Child Development* 2004;75:296–312. [PubMed: 15015691]
- Weinraub M, Shlay AB, Harmon M, Tran H. Subsidizing child care: How child care subsidies affect the child care used by low-income African American families. *Early Childhood Research Quarterly* 2005;20:373–392.
- Winer, BJ. Statistical principles in experimental design. Vol. 2nd. New York: McGraw-Hill; 1971.

Table 1
Child and Family Characteristics by Type of Care Setting at Ages 2, 3, and 4.5

	2 years			3 years			4.5 years		
	Relative (n=193)	Home (n=185)	Center (n=184)	Relative (n=175)	Home (n=148)	Center (n=294)	Relative (n=87)	Home (n=63)	Center (n=669)
Family Income-to-needs ratio (<i>n</i>)									
<1	19	4	14	22	8	32	13	6	73
1-2	38	25	16	50	30	40	26	11	90
2-4	79	75	68	63	52	98	30	33	258
4+	57	81	86	40	58	124	18	13	248
Family Income-to-needs ratio	1.88 ^a (.06)	2.26 ^b (.06)	2.25 ^b (.06)	1.70 ^a (.07)	2.06 ^b (.08)	2.09 ^b (.06)	1.60 ^a (.10)	1.93 ^{ab} (.12)	2.02 ^b (.04)
Child is female (%)	53%	47%	48%	53%	45%	50%	56%	52%	51%
Non-Hispanic White (%)	74% ^a	91% ^b	90% ^b	77% ^a	89% ^b	85% ^b	73% ^a	92% ^b	86% ^b
Husband/partner lives in home (%)	82%	88%	82%	86%	82%	80%	82%	84%	86%
Number of Children in Family	2.18 (.07)	1.95 (.07)	2.01 (.07)	2.20 ^a (.07)	1.78 ^b (.08)	1.87 ^b (.05)	2.34 ^a (.10)	1.94 ^b (.12)	2.22 ^{ab} (.04)
Maternal Education (years)	13.97 ^a (.16)	15.01 ^b (.17)	15.17 ^b (.17)	13.81 ^a (.18)	14.63 ^b (.20)	14.99 ^b (.14)	13.53 ^a (.26)	14.61 ^b (.31)	14.75 ^b (.09)
Temperament ^d	3.18 (.03)	3.12 (.03)	3.10 (.03)	3.19 (.03)	3.11 (.03)	3.12 (.02)	3.22 (.04)	3.13 (.05)	3.16 (.02)
Child Language ^b	36.65 (2.23)	40.53 (2.26)	41.55 (2.34)	35.95 (2.37)	40.38 (2.60)	38.34 (1.81)	42.12 (3.39)	40.69 (4.25)	38.68 (1.17)
Bayley Score ^c	107.71 (1.02)	109.69 (1.04)	109.51 (1.05)	108.23 (1.09)	108.90 (1.19)	108.91 (.84)	109.12 (1.52)	109.26 (1.84)	109.39 (.55)
Benefits of employment ^d	19.41 (.20)	19.81 (.21)	19.97 (.21)	19.63 (.22)	19.59 (.24)	19.54 (.17)	19.34 (.32)	19.77 (.39)	19.19 (.12)
Costs of employment ^e	17.92 ^a (.35)	16.83 ^{ab} (.36)	16.50 ^b (.36)	18.13 (.38)	16.86 (.42)	17.23 (.30)	18.69 (.55)	16.95 (.67)	18.14 (.20)

Note.

Total sample size of settings observed at age 2 = 562, at age 3 = 617, at age 4.5 = 819.

The values in this table include regression-adjusted means, with standard deviations in parentheses.

Different superscripts (a-b) denote statistical differences, $p < .05$ using the Tukey-Kramer method.

Values with the same superscripts are not statistically different from one another.

^aThe range for maternal report of child temperament is 2 to 4.12.

^bThe range for child language is 0 to 99.

^cThe range for the Bayley Score assessed at age 15 months is 63 to 150.

^dThe range for Mother's beliefs about the benefits of maternal employment is 11 to 30.

^eThe range for Mother's beliefs about the costs of maternal employment is 6 to 34.

Table 2
Structural Features and Caregiver Characteristics

Variable	Type of Care		Center	F	Effect Size	Income				F	Effect Size	Type × Income
	Relative	Home				<1	1-2	3-4	4+			
Group size	2.12 ^a (.35)	4.36 ^b (.46)	10.07 ^c (.37)	128.96 ^{***}	.45	5.96 (.68)	5.27 (.46)	5.30 (.26)	5.53 (.27)	0.36	.00	1.06
Ratio	1.79 ^a (.20)	3.33 ^b (.27)	5.71 ^c (.22)	89.24 ^{***}	.36	3.76 (.40)	3.69 (.27)	3.54 (.15)	3.46 (.16)	0.28	.00	0.7
Licensure	0.07 ^a (.04)	0.39 ^b (.06)	1.02 ^c (.05)	113.63 ^{***}	.42	0.47 (.09)	0.54 (.06)	0.47 (.03)	0.51 (.03)	0.43	.00	0.83
Education	2.29 ^a (.11)	2.57 ^{ab} (.14)	2.91 ^b (.12)	7.80 ^{***}	.05	2.57 ^{ab} (.22)	2.27 ^a (.15)	2.70 ^{ab} (.08)	2.81 ^b (.09)	3.39 [*]	.03	2.2
Training	0.80 ^a (.16)	1.11 ^a (.21)	1.93 ^b (.17)	12.41 ^{***}	.07	1.51 (.31)	0.95 (.21)	1.18 (.12)	1.49 (.12)	2.06	.02	0.44
Beliefs	83.89 ^a (2.06)	76.01 ^{ab} (2.71)	74.74 ^b (2.18)	5.38 ^{**}	.03	81.36 (4.05)	77.96 (2.74)	78.23 (1.57)	75.31 (1.61)	0.95	.01	0.57
Group size	2.09 ^a (.42)	4.86 ^b (.46)	12.83 ^c (.29)	255.91 ^{***}	.57	6.67 (.66)	6.38 (.42)	6.41 (.33)	6.91 (.35)	0.47	.00	0.22
Ratio	1.77 ^a (.24)	3.98 ^b (.26)	7.11 ^c (.16)	184.86 ^{***}	.49	4.19 (.37)	4.11 (.24)	4.31 (.19)	4.54 (.19)	0.69	.01	0.73
Licensure	0.10 ^a (.04)	0.51 ^b (.04)	0.97 ^c (.03)	197.45 ^{***}	.51	0.58 ^{ab} (.06)	0.51 ^{ab} (.04)	0.43 ^a (.03)	0.57 ^b (.03)	4.39 ^{**}	.03	2.41 [*]
Income-to-needs <1	0.20 (.10)	0.60 (.13)	0.95 (.06)									
Income-to-needs 1-2	0.07 (.06)	0.47 (.06)	1.00 (.06)									
Income-to-needs 2-4	0.00 (.06)	0.34 (.05)	0.96 (.04)									
Income-to-needs 4+	0.11 (.07)	0.64 (.05)	0.97 (.03)									

Early Child Res Q. Author manuscript; available in PMC 2009 July 15.

Variable	Type of Care		Effect Size	Income				Effect Size		Type × Income	
	Relative	Home	Center	F	<1	1-2	3-4	4+	F		F
Education	2.27 ^a (.11)	2.74 ^b (.12)	3.29 ^c (.08)	29.68 ^{***}	.13	2.95 (.17)	2.57 (.11)	2.63 (.09)	2.91 (.09)	2.96 [*]	1.81
Training	0.67 ^a (.15)	1.29 ^b (.16)	2.23 ^c (.10)	40.36 ^{***}	.17	1.77 ^a (.23)	1.03 ^b (.15)	1.29 ^{ab} (.12)	1.50 ^{ab} (.12)	3.34 [*]	0.92
Beliefs	83.39 ^a (1.93)	74.68 ^b (2.10)	70.37 ^b (1.33)	15.42 ^{***}	.07	74.80 ^{ab} (3.00)	80.73 ^a (1.92)	75.52 ^b (1.52)	73.52 ^{ab} (1.58)	2.86 [*]	0.61
Group size	2.66 ^a (.85)	5.36 ^a (.99)	14.94 ^b (.29)	126.40 ^{***}	.31	7.55 (1.26)	7.41 (.79)	7.64 (.64)	8.01 (.73)	0.11	0.32
Ratio	2.38 ^a (.56)	4.86 ^b (.65)	8.66 ^c (.19)	66.96 ^{***}	.19	5.22 (.83)	4.67 (.53)	5.73 (.43)	5.57 (.48)	0.91	0.26
Licensure	0.09 ^a (.06)	0.76 ^b (.07)	0.83 ^b (.02)	76.12 ^{***}	.21	0.67 (.08)	0.50 (.05)	0.50 (.04)	0.57 (.05)	1.32	1.25
Education	2.20 ^a (.15)	2.52 ^a (.18)	3.76 ^b (.05)	64.51 ^{***}	.18	2.28 ^a (.23)	2.90 ^{ab} (.14)	2.88 ^{ab} (.12)	3.24 ^b (.13)	4.67 ^{**}	1.96
Training	0.51 ^a (.20)	1.16 ^a (.23)	2.56 ^b (.07)	61.41 ^{***}	.18	0.90 ^a (.29)	1.48 ^{ab} (.18)	1.34 ^a (.15)	1.92 ^b (.17)	3.84 ^{**}	0.78
Beliefs	81.66 ^a (2.35)	72.90 ^b (2.74)	64.34 ^c (.81)	27.03 ^{***}	.09	78.70 (3.51)	73.28 (2.21)	70.34 (1.79)	69.54 (2.03)	2.08	1.8

Note.

The values in this table include regression-adjusted means, with standard deviations in parentheses.

Different superscripts (a-c) denote statistical differences, $p < .05$ using the Tukey-Kramer method. Values with the same superscripts are not statistically different from one another.

* $p < .05$;

** $p < .01$;

*** $p < .001$.

Table 3
Observational Ratings for the Caregiving Environment (ORCE)

Variable	Type of Care		Center	Effect Size		Income				F	Effect Size	Type × Income
	Relative	Home		F		<1	1-2	3-4	4+			
Overall global quality	14.21 ^a	13.02 ^b	12.92 ^b	8.45 ^{***}	.03	12.05 ^a	13.29 ^{ab}	13.59 ^b	14.60 ^c	10.73 ^{***}	.06	1.94
	(.22)	(.37)	(.26)			(.53)	(.32)	(.18)	(.18)			
Cognitive stimulation	2.24	3.07	3.07	1.40	.01	0.85 ^a	3.24 ^{ab}	3.17 ^{ab}	3.93 ^b	4.12 ^{**}	.01	1.3
	(.35)	(.60)	(.43)			(.87)	(.51)	(.29)	(.30)			
Language stimulation	114.55 ^a	84.76 ^b	63.90 ^c	41.24 ^{***}	.13	67.30 ^a	89.40 ^{ab}	90.92 ^a	103.32 ^b	6.64 ^{***}	.04	2.05
	(3.58)	(6.07)	(4.35)			(8.79)	(5.19)	(2.92)	(3.00)			
Positive int. w/caregivers	4.01 ^a	2.32 ^b	2.47 ^b	6.35 ^{**}	.02	3.69 ^{ab}	3.67 ^a	2.06 ^b	2.32 ^{ab}	4.08 ^{**}	.02	1.02
	(.32)	(.54)	(.38)			(.78)	(.46)	(.26)	(.27)			
Positive int. w/ caregivers & peers	88.80 ^a	73.03 ^b	80.55 ^b	8.63 ^{***}	.03	64.99 ^a	86.98 ^b	83.81 ^b	87.40 ^b	6.25 ^{***}	.03	0.96
	(2.04)	(3.46)	(2.48)			(5.01)	(2.96)	(1.66)	(1.71)			
Positive & negative peer int.	6.86 ^a	13.11 ^b	14.21 ^b	23.52 ^{***}	.08	11.04	11.70	11.39	11.44	0.04	.00	0.72
	(.73)	(1.23)	(.88)			(1.78)	(1.05)	(.59)	(.61)			
Positive/occupied/transitioning/unoccupied/transitioning television	10.50 ^a	14.35 ^b	20.19 ^c	55.23 ^{***}	.17	16.08	15.05	14.90	14.02	1.00	.01	0.73
	(.59)	(.99)	(.71)			(1.44)	(.85)	(.48)	(.49)			
Positive television	11.57 ^a	7.49 ^b	0.74 ^c	39.22 ^{***}	.13	7.12	6.27	6.82	6.20	0.20	.00	0.22
	(.78)	(1.31)	(.94)			(1.90)	(1.12)	(.63)	(.65)			
Positive scales				19.62 ^{***}						2.41 ^{***}		
				(14, 1072)						(21, 1537)		
Overall global quality	19.66	19.08	19.30	1.01	.00	18.86 ^{ab}	18.81 ^a	19.64 ^{ab}	20.09 ^b	4.34 ^{**}	.02	3.37
	(.26)	(.35)	(.22)			(.47)	(.30)	(.22)	(.24)			
Time-to-needs <1	19.06	18.67	18.86									
	(.68)	(1.11)	(.55)									
Time-to-needs 1-2	18.23	18.41	19.79									
	(.45)	(.57)	(.50)									
Time-to-needs 2-4	20.86	18.96	19.09									
	(.39)	(.43)	(.32)									

Variable	Type of Care			Effect Size		Income				Type × Income	
	Relative	Home	Center	F		<1	1-2	3-4	4+	F	
Time-to-needs 4+	20.49 (.50)	20.30 (.42)	19.47 (.28)								
ive stimulation	2.62 ^a (.37)	2.91 ^a (.50)	4.66 ^b (.31)	10.09 ***	.03	2.78 (.68)	3.48 (.43)	3.48 (.32)	3.85 (.34)	0.68	.00
age stimulation	95.29 ^a	76.47 ^b	63.22 ^c	54.56 ***	.16	72.88 ^{ab}	74.95 ^a	81.27 ^{ab}	84.20 ^b	3.30 [*]	.02
Time-to-needs <1	(2.34)	(3.18)	(1.96)			(4.29)	(2.68)	(2.00)	(2.18)		
Time-to-needs 1-2	83.29	68.99	66.37								
Time-to-needs 1-2	(6.17)	(10.11)	(5.00)								
Time-to-needs 1-2	86.99	74.89	62.98								
Time-to-needs 2-4	(4.05)	(5.18)	(4.59)								
Time-to-needs 2-4	103.79	79.19	60.83								
Time-to-needs 2-4	(3.58)	(3.94)	(2.93)								
Time-to-needs 4+	107.08	82.80	62.71								
Time-to-needs 4+	(4.53)	(3.80)	(2.57)								
lay	18.02 ^a	39.96 ^b	36.22 ^b	50.16 ***	.15	31.04	30.23	32.15	32.17	0.30	.00
ive peer interactions	(1.58)	(2.14)	(1.32)			(2.89)	(1.81)	(1.35)	(1.46)		
ing/unoccupied/transitions	2.07 ^a	4.24 ^b	3.65 ^b	23.21 ***	.07	4.12 ^a	3.49 ^{ab}	2.97 ^b	2.70 ^b	4.36 ***	.02
ing/unoccupied/transitions	(.21)	(.29)	(.18)			(.39)	(.25)	(.18)	(.20)		
ing television	8.81 ^a	11.41 ^b	14.72 ^c	37.62 ***	.11	12.41	12.63	10.82	10.73	2.84 [*]	.01
ing television	(.52)	(.71)	(.44)			(.96)	(.60)	(.45)	(.49)		
oscales	10.82 ^a	7.48 ^b	1.28 ^c	62.21 ***	.17	6.12	8.04	6.18	5.77	1.91	.01
oscales	(.67)	(.90)	(.56)			(1.22)	(.76)	(.57)	(.62)		
ed global quality				32.28 ***						2.43 ***	
ed global quality				(12, 1172)						(18, 1658)	
ive stimulation	11.01 ^a	11.09 ^a	12.03 ^b	9.97 ***	.02	11.25	10.90	11.76	11.60	2.41	.01
ive stimulation	(.25)	(.35)	(.10)			(.39)	(.28)	(.19)	(.27)		
ive stimulation	5.2582 ^a	7.0233 ^{ab}	9.3459 ^b	9.12 ***	.02	7.26	6.25	7.79	7.53	0.52	.00
ive stimulation	0.9304	1.3125	0.3733			(1.48)	(1.04)	(.71)	(1.02)		
ive stimulation	60.545	50.147	53.781	2.98	.01	59.25	51.32	57.07	51.65	1.39	.01

Variable	Type of Care		Effect Size		Income			Type × Income	
	Relative	Home	Center	F	<1	1-2	3-4	4+	F
Active interactions w/ adults	2.8719	4.0514	1.1524		(4.56)	(3.22)	(2.20)	(3.15)	
	1.4713 ^a	0.3219 ^b	0.8312 ^b	6.61 ^{**}	1.15	0.71	0.85	0.79	0.45
	0.1983	0.2797	0.0796		(.31)	(.22)	(.15)	(.22)	
	9.0808 ^a	17.934 ^b	13.318 ^c	11.09 ^{***}	12.18 ^{ab}	12.40 ^{ab}	12.35 ^a	16.85 ^b	3.39 [*]
Time-to-needs <1	1.1255	1.5878	0.4516		(1.79)	(1.26)	(.86)	(1.24)	
	6.88	18.07	11.59						
	(2.75)	(4.44)	(1.18)						
	10.62	14.24	12.34						
Time-to-needs 1-2	(1.99)	(3.02)	(1.05)						
	7.82	14.51	14.73						
	(1.81)	(1.76)	(.62)						
	11.00	24.92	14.61						
Time-to-needs 4+	(2.34)	(2.76)	(.64)						
	2.1837	3.5387	2.8088	2.33	3.10	3.17	2.53	2.58	0.72
	0.3726	0.5256	0.1495		(.59)	(.42)	(.29)	(.41)	
	8.1815 ^a	10.432 ^a	15.94 ^b	46.49 ^{***}	11.70	12.95	11.15	10.28	1.58
Watching television	0.8092	1.1416	0.3247		(1.28)	(.91)	(.62)	(.89)	
	12.476 ^a	7.301 ^b	0.7357 ^c	131.37 ^{***}	6.25 ^{abc}	8.59 ^{ab}	7.85 ^{ab}	4.67 ^c	5.29 ^{**}
	0.7029	0.9916	0.2821		(1.12)	(.79)	(.54)	(.77)	
	11.409	6.6482	0.6859						
Time-to-needs <1	(1.72)	(2.77)	(.74)						
	12.462	11.944	1.3522						
	(1.25)	(1.89)	(.66)						
	15.008	8.0908	0.4424						
Time-to-needs 2-4	(1.13)	(1.10)	(.39)						
	11.026	2.5208	0.4621						
	(1.46)	(1.73)	(.40)						
				28.53 ^{***}					1.8 [*]
Rescales				(14, 1574)					(21, 2260)

Note.

The values in this table include regression-adjusted means, with standard deviations in parentheses.

Different superscripts (a-c) denote statistical differences, $p < .05$ using the Tukey-Kramer method. Values with the same superscripts are not statistically different from one another.

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

Table 4
Home Observation for Measurement of the Environment (HOME) & Home Profile

Variable	Type of Care		Effect Size		Income				F	Effect Size	Type × Income
	Relative	Home	F		<1	1-2	2-4	4+			
HOME					Age 2						
Total Score	34.46 (.45)	35.25 (.75)	0.80	.00	31.64 ^a (1.49)	34.06 ^{ab} (.70)	35.94 ^{bc} (.43)	37.78 ^c (.49)	9.27***	.07	0.76
Responsivity/Involvement	6.50 (.13)	6.20 (.21)	1.44	.00	5.75 ^{ab} (.42)	5.91 ^a (.20)	6.58 ^b (.12)	7.16 ^c (.14)	10.05***	.08	0.43
Acceptance	4.41 (.12)	5.17 (.20)	10.67**	.03	4.66 (.39)	4.51 (.19)	4.92 (.11)	5.08 (.13)	2.10	.02	1.70
Learning materials	8.28 (.19)	8.01 (.31)	0.53	.00	6.38 ^a (.61)	8.26 ^b (.29)	8.66 ^{bc} (.18)	9.28 ^c (.20)	8.15***	.06	0.38
All subscales			5.68*** (3, 350)						4.88*** (9, 852)		
Home Profile											
Teacher-guided learning	5.88 (.21)	6.00 (.36)	0.08	.00	4.91 ^a (.70)	5.60 ^a (.33)	6.19 ^a (.21)	7.06 ^b (.23)	6.08***	.05	0.37
Learning materials	4.42 (.15)	4.32 (.25)	0.11	.04	3.19 ^a (.50)	4.36 ^{ab} (.24)	4.74 ^{bc} (.15)	5.18 ^c (.16)	6.21***	.00	0.28
Cleanliness, prep. for emergencies	1.31 (.13)	2.49 (.22)	21.33***	.06	1.72 (.43)	1.81 (.20)	2.02 (.12)	2.06 (.14)	0.48	.00	2.30
Safety precautions	5.18 (.17)	6.01 (.29)	5.83*	.02	4.49 ^a (.58)	5.43 ^a (.27)	5.93 ^{ab} (.17)	6.54 ^b (.19)	6.13***	.05	3.36*
Income-to-needs <1	4.19 (.48)	4.79 (1.04)									
Income-to-needs 1-2	4.37 (.34)	6.50 (.42)									
Income-to-needs 2-4	5.70 (.23)	6.17 (.24)									
Income-to-needs 4+	6.48	6.60									

Variable	Type of Care		Effect Size		Income			Effect Size		Type × Income	
	Relative	Home	F		<1	1-2	2-4	4+	F		F
All subscales	(.29)	(.24)	8.16 *** (4, 355)						2.91 *** (12, 940)		
HOME Total Score	38.88 (.66)	38.75 (.93)	0.01	.00	36.84 ^{ab} (1.74)	35.59 ^a (.92)	39.42 ^b (.74)	43.42 ^c (.86)	12.73 ***	.11	0.35
Caregiver responsiveness	8.03 (.16)	6.70 (.23)	21.98 ***	.07	6.69 ^{ab} (.42)	6.67 ^{ab} (.22)	7.76 ^{ac} (.18)	8.33 ^c (.21)	10.80 ***	.10	0.26
Acceptance	4.86 (.10)	5.50 (.14)	12.52 ***	.04	4.93 ^{abc} (.27)	4.83 ^a (.14)	5.40 ^{bd} (.11)	5.55 ^{cd} (.13)	5.45 **	.05	1.04
Academic/Language Stimulation	5.45 (.24)	6.13 (.34)	2.50	.01	5.75 ^{ab} (.64)	5.11 ^a (.34)	5.67 ^{ab} (.27)	6.64 ^b (.31)	3.63 *	.04	0.82
Learning materials	3.86 (.15)	3.54 (.21)	1.42	.00	3.62 ^{ab} (.40)	3.20 ^a (.21)	3.75 ^{ab} (.17)	4.24 ^b (.20)	4.11 **	.04	0.75
Physical Environment	5.39 (.13)	5.09 (.19)	1.72	.01	4.64 ^a (.35)	4.76 ^a (.19)	5.37 ^a (.15)	6.20 ^b (.17)	11.74 ***	.11	0.39
All subscales			11.64 *** (5, 292)						4.15 *** (15, 806)		
HOME Total Score	43.31 (.85)	43.76 (1.15)	0.09	.00	40.85 ^{ab} (1.89)	41.29 ^a (1.34)	45.36 ^{ab} (.90)	46.64 ^b (1.38)	4.09 **	.09	0.81
Acceptance	5.15 (.13)	5.48 (.18)	2.16	.02	4.55 ^a (.29)	5.49 ^b (.20)	5.64 ^b (.14)	5.59 ^b (.21)	4.06 **	.09	0.43
Academic/Language Stimulation	7.20 (.29)	7.98 (.38)	2.43	.02	7.29 (.63)	6.89 (.44)	7.78 (.31)	8.40 (.46)	1.95	.05	1.68
Learning materials	5.22 (.17)	5.48 (.23)	0.70	.01	4.91 (.38)	5.12 (.26)	5.69 (.18)	5.67 (.27)	1.96	.05	0.30
Physical Environment	5.40 (.18)	5.60 (.24)	0.43	.00	5.02 ^{abc} (.39)	4.97 ^a (.27)	5.88 ^{bd} (.19)	6.14 ^{cd} (.28)	4.33 **	.09	0.48

Variable	Type of Care		Effect Size		Income			Effect Size		Type × Income	
	Relative	Home	F		<1	1-2	2-4	4+	F		F
All subscales			0.88 (4, 121)						2.29** (12, 320)		

Note.

The values in this table include regression-adjusted means, with standard deviations in parentheses.

Different superscripts (a-d) denote statistical differences, $p < .05$ using the Tukey-Kramer method. Values with the same superscripts are not statistically different from one another.

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

Table 5
Features of Head Start vs. Other Center-Based Settings for Low-income Families at Age 4.5

	Head Start (n = 49)	Other Center (n = 114)	HS vs. Other Center <i>F</i>	Effect Size
Physical Environment Checklist				
Organization	11.50 (1.33)	10.16 (1.29)	20.16 ***	.12
Stimulation	4.91 (1.38)	3.42 (1.34)	23.1 ***	.13
Classroom Practices Inventory				
Child initiated learning	5.08 (.62)	4.53 (.60)	15.79 ***	.10
Structured academic curriculum	-0.05 (.65)	0.34 (.63)	7.42 **	.05
Teacher warm nurturing	5.12 (.72)	4.91 (.70)	1.64	.01

Note.

The values in this table include regression-adjusted means, with standard deviations in parentheses.

Analyses of Head Start vs. other center-based settings are calculated for a sub-sample of children with family income-to-needs ratio less than 2.0.

*
 $p < .05$

**
 $p < .01$

 $p < .001$.