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Infant and Toddler Child-Care Quality and Stability in Relation to Proximal and Distal Academic and Social Outcomes

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Abstract

This study considered the quality and stability of infant and toddler nonparental child care from 6 to 36 months in relation to language, social, and academic skills measured proximally at 36 months and distally at kindergarten. *Quality* was measured separately as caregiver-child verbal interactions and caregiver sensitivity, and *stability* was measured as having fewer sequential child-care caregivers. This longitudinal examination involved a subsample ($N = 1,055$) from the Family Life Project, a representative sample of families living in rural counties in the United States. Structural equation modeling revealed that children who experienced more positive caregiver-child verbal interactions had higher 36-month language skills, which indirectly led to higher kindergarten academic and social skills. Children who experienced more caregiver stability had higher kindergarten social skills.

Children's early supportive relationships with adults during the first 3 years of life are instrumental to the development of their language and social skills, which, in turn, are strongly related to later achievement and success into adolescence (Landry & Smith, 2011; Suggate, Schaughency, McAnally, & Reese, 2018; Vandell, Belsky, Burchinal, Steinberg, & Vandergrift, 2010). Parent-child relationships are particularly strong predictors of children's language and social skills (NICHD Early Childcare Research Network, 2002). Nonetheless, a large percentage of children in the United States enter nonparental child care as infants and toddlers and spend a significant portion of time with caregiving adults in infant and toddler (IT) child-care settings. Young children may have limited access to promotive IT child-care environments because, despite high demand, IT child care tends to be of low to moderate quality (Schmit & Matthews, 2013). Even when high-quality IT child care is available, it is often prohibitively expensive, particularly for families who have low incomes. Publicly

funded child-care subsidies have been created to help low-income families access IT child care, but many child-care subsidy programs have long waiting lists (Schulman & Blank, 2004). Furthermore, families frequently change IT child-care settings for a variety of reasons, including subsidy availability (Chaudry, 2004). Taken together, these challenges prohibit families from accessing high-quality and stable IT child-care settings and caregivers (Sandstrom & Chaudry, 2012). The extent to which IT child care contributes to children's development of language, social, and academic skills is not well understood because it has been less studied than child care during the preschool period (Recchia & Fincham, 2019). This study will help fill this gap by examining child-care quality (caregiver-child verbal interactions and caregiver sensitivity) and caregiver stability measured from 6 to 36 months in relation to child outcomes measured proximally at 36 months and distally at the spring of kindergarten.

Caregiver-child verbal interactions, measured in this study by observations of positive verbal interactions between a caregiver and individual child, can motivate children to attend to verbal cues and make connections with language through their verbal exchanges with others, as supported by the social interactive framework (Bruner, 1975; Girolametto & Weitzman, 2002; Snow, 1999). In one study, children whose child-care caregiver provided more language stimulation from 15 to 36 months had higher expressive language skills at 36 months (NICHD Early Childcare Research Network, 2000). Another study found that more caregiver-child positive verbal interactions from 6 to 36 months was associated with expressive language at 36 months and served as a buffer for lower maternal language input when predicting to receptive language at 36 months and prekindergarten (pre-K; Vernon-Feagans, Bratsch-Hines, & Family Life Project Key Investigators, 2013).

Caregiver sensitivity, measured in this study by observer ratings of caregiver responsiveness to and acceptance of all children in the child-care setting, is important because young children have inherent affinities for social connections and learning through sensitive interactions, as supported by ecological frameworks (Bronfenbrenner & Morris, 2006; Burchinal, 2018; Mortensen & Barnett, 2015). Caregivers who engage in reciprocal, supportive, and adaptive caregiving behaviors help children gain important early language and social skills (Shin, 2015). Having more sensitive caregivers from 6 to 36 months was associated with fewer behavior problems at 36 months (NICHD Early Childcare Research Network, 1998), higher receptive vocabulary at 36 months (NICHD Early Childcare Research Network, 2000), and higher preacademic and language skills at 54 months (NICHD Early Childcare Research Network, 2002). After accounting for maternal sensitivity, having a child-care caregiver with high versus low sensitivity prior to age four was associated with higher social competence and math skills 1 year later (Vesely, Brown, & Mahatmya, 2013).

Caregiver stability, measured in this study as having fewer sequential child-care caregivers over the first 3 years of life, is more likely to expose children to repeated and predictable interactions, which helps children build trusting relationships with adults, as supported by attachment theory (Ainsworth, 1989; Horm et al., 2018). These stable relationships help children develop attachment security, which in turn has been related to children's development and learning (Burchinal, Magnuson, Powell, & Hong, 2015). Prior work has primarily examined caregiver stability in relation to attachment security and social

outcomes. In early studies, children from 12 to 24 months who experienced more caregiver changes had lower attachment security with caregivers (Howes & Hamilton, 1992) and poorer observed and teacher-reported social competence with peers at 48 months (Howes & Hamilton, 1993). Having a larger number of different sequential caregivers from 6 to 36 months was related to higher parent-reported externalizing problems at 36 months (Pilarz & Hill, 2014), lower teacher-reported social skills at pre-K (Bratsch-Hines, Mokrova, Vernon-Feagans, & Family Life Project Key Investigators, 2015), and lower teacher-reported social-emotional adjustment at 6 years (Love et al., 2003). Finally, in other studies, child-care stability from 4 to 36 months was not associated with mother- or teacher-reported social competence at 36 months, 58 months, or kindergarten (NICHD ECCRN, 1998, 2003).

Limited work has associated caregiver stability during the IT period with language and academic outcomes. One study found that more stability was related to higher cognitive skills at age four (Loeb, Fuller, Kagan, & Carrol, 2004), whereas others did not find associations with cognitive or language skills at 15 months (Tran & Weinraub, 2006) or receptive vocabulary at pre-K (Lee, 2016), suggesting a need for further study.

Three recent studies have examined both caregiver quality and stability for infants and toddlers in center-based care (Choi, Horm, Jeon, & Ryu, 2018; Horm et al., 2018; Ruprecht, Elicker, & Choi, 2016). Based on a nationally representative sample of Early Head Start programs, caregiver instability from 12 to 36 months was not related to receptive language skills at 36 months, but was related to higher levels of teacher-reported problem behaviors and lower social competence at 36 months. The latter effect was mitigated by being in a more emotionally and behaviorally supportive classroom (Choi et al., 2018). Conversely, for children in Educare programs, having the same Early Head Start teacher from birth to 36 months was associated with lower teacher-reported behavioral concerns and higher self-control and initiative at 36 months, but these associations were no longer significant after children transitioned to Head Start (Horm et al., 2018). Ruprecht et al. (2016) purposefully sampled child-care centers that either did or did not promote the practice of child-care continuity (e.g., toddlers staying with the same caregivers for longer than is considered typical). Children aged 12–24 months in continuity classrooms had higher levels of observed interactive involvement with caregivers and were rated as having fewer problem behaviors by their caregivers.

Although useful, these recent studies had limitations. For example, children were exclusively in formal center-based care (e.g., Early Head Start, Educare), which has tended to be of higher quality than other care types (Bassok, Fitzpatrick, Greenberg, & Loeb, 2016; Yazejian et al., 2017). Small sample sizes further reduced the representative nature of the findings. In addition, social outcomes were reported by the same child-care caregivers whose classrooms were observed for quality. This study extended previous work using longitudinal data from a large representative sample of children living in the rural United States who were reported to be in a range of formal and/or informal child-care settings from 6 to 36 months and whose outcomes were reported or assessed at 36 months and in kindergarten. Furthermore, this is the only known study to relate caregiver stability during the IT period to both proximal developmental outcomes prior to school entry and distal developmental outcomes after the transition to elementary school. Our research questions were as follows:

(a) Were caregiver-child verbal interactions, caregiver sensitivity, and caregiver stability associated with children's language and parent-reported social skills at 36 months and/or children's academic achievement and teacher-reported social skills in the spring of kindergarten? (b) Did 36-month language and social skills mediate the associations between verbal interactions, sensitivity, and stability and children's kindergarten outcomes? Building on prior research, we hypothesized that higher levels of verbal interactions, sensitivity, and stability would be associated with better child outcomes at 36 months, which in turn would mediate children's kindergarten outcomes.

Method

Participants

Data for this study were drawn from the Family Life Project (FLP), a longitudinal study of families living in two high-poverty rural regions of North Carolina (NC) and Pennsylvania (PA). FLP used epidemiological sampling procedures, whereby all families in three NC counties and three PA counties who had a child born between September 15, 2003 and September 14, 2004 were recruited to participate in the study. The full representative FLP sample included 1,292 families and oversampled for African American families in NC and low-income families in both regions (for more information about the FLP, including early child-care experiences, see Vernon-Feagans, Cox, & Family Life Project Key Investigators, 2013). FLP children who were reported to be in nonmaternal child care during at least one of four time points at 6, 15, 24, and 36 months ($N = 1,055$) were included in this study. We only excluded children who had parent-only care across the four time points, who differed from the included subsample in that they were less likely to be male, $\chi^2(1) = 4.36, p = .04$; African American, $\chi^2(1) = 65.62, p < .001$; or from NC, $\chi^2(1) = 51.19, p < .001$. The subsample included in this study was comprised of 52.23% males and 47.77% African American children. Families had an income-to-needs ratio of 1.81, signifying that families on average were living below 200% of the federal poverty threshold.

Procedures

FLP data were collected through home and/or child-care visits at 2, 6, 15, 24, and 36 months and school visits in the spring of kindergarten. In homes, research assistants (RAs) conducted parent interviews and child assessments and administered questionnaires. In child-care settings, RAs conducted caregiver interviews, child assessments, observed classrooms, and administered questionnaires, and caregivers completed questionnaires about the classroom and individual target children. In kindergarten classrooms, RAs administered spring child assessments and teachers completed questionnaires about the classroom and individual target children.

Measures

Child-Care Quality—Child-care quality was measured as caregiver-child verbal interactions and caregiver sensitivity.

Caregiver-child verbal interactions. At the 6-, 15-, 24-, and 36-month child-care visits, RAs completed two 10-min observations using the Childcare Verbal Interaction (CVI)

observation, which is a time-sampling live-coding system (Vernon-Feagans & Manlove, 2005). Coders used continuous coding in 10-s blocks to identify behaviors occurring between a caregiver and target child (6- to 36-month interrater reliability = 0.77). The categories were coded one time per 10-s segment if they occurred, regardless if they were observed additional times in a segment. Positive verbal interactions, which included affirmative vocalizations such as cooing and talking, were either initiated by the caregiver with the target child or by the target child with the caregiver. A composite variable, *caregiver-child verbal interactions* ($\alpha = .90$), was derived at each time point by summing the proportion of child-caregiver and caregiver-child verbal interactions across the 10-s blocks and then was averaged across 6–36 months.

Caregiver sensitivity.: At the 6-, 15-, 24-, and 36-month child-care visits, RAs completed the Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley, 1984), which has been used in child-care settings (Bradley, Caldwell, & Corwyn, 2003). Each scale item was scored in a yes/no fashion, with an overall average considered as the proportion of items scored as present during the observation of the child-care setting. A composite variable, *caregiver sensitivity* ($\alpha = .65$), was derived at each time point by averaging two HOME subscales of responsivity (e.g., *caregiver's voice conveys positive feelings toward children*) and acceptance of the child (e.g., *caregiver shouts at children*, reverse-scored) and then was averaged across 6–36 months.

Caregiver Stability—At the 6-, 15-, 24-, and 36-month home visits, parents were asked to provide contact information for their child's primary child-care caregiver, who was contacted shortly after the parent interview. Unique numeric identifiers were assigned to each caregiver who participated in a child-care visit, with caregivers visited at multiple time points retaining the same unique identifiers across time. From 6 to 36 months, *caregiver stability* was calculated by adding the number of unique numeric identifiers, which represented the child's number of different sequential caregivers, and ranged from 1 to 4. This variable was reverse-scored to represent caregiver stability rather than instability.

Child Skills at 36 Months—Language and social skills at 36 months were included as outcomes and mediators in inferential models.

Expressive language.: Research assistants administered the Expressive Communication subscale ($\alpha = .91$) of the Preschool Language Scale, 4th ed. (PLS; Zimmerman, Steiner, & Pond, 2002). Items assessed rudimentary aspects of expressive language and more advanced items that required the child to demonstrate verbal understanding of language concepts. Standard scores were calculated.

Receptive vocabulary.: Research assistants administered the Receptive Vocabulary subscale ($\alpha = .89$) of the Wechsler Preschool and Primary Scale of Intelligence, 3rd ed. (WPPSI; Wechsler, 2002). Items assessed how children were able to identify picture stimuli. Standard scores were calculated.

Social skills.: The child's parent completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001). Each of 25 items were scored on a scale of 0–2 (*not true, somewhat*

true, or *certainly true*). Scores were calculated for the Prosocial ($\alpha = .73$) and Total Problems (reverse-scored and comprised of Conduct Problems, Emotional Symptoms, Hyperactive Behaviors, and Peer Problems; $\alpha = .68$) subscales.

Child Skills at Kindergarten—Academic and social skills at the spring of kindergarten were included as outcomes in inferential models.

Academic skills.: Woodcock Johnson (WJ; Woodcock, McGrew, & Mather, 2001) subtests were administered by RAs in the spring of kindergarten. Picture Vocabulary ($\alpha = .81$) measured expressive language and word knowledge. Letter-Word Identification ($\alpha = .94$) measured children's ability to distinguish letter sounds and words. Applied Problems ($\alpha = .93$) measured children's ability to solve mathematics problems. Standard scores were calculated.

Social skills.: Kindergarten teachers completed two questionnaires of children's behaviors. As reported earlier with the parent SDQ measure (Goodman, 2001), scores from the Prosocial ($\alpha = .70$) and Total Problems (reverse-scored; $\alpha = .84$) subscales were calculated. Additional items from the Social Competence Scale (SCS; Conduct Problems Prevention Research Group, 1995; Werthamer-Larsson, Kellam, & Wheeler, 1991) were used, with 14 SCS items scored on a scale of 1–6 (*almost never*, *rarely*, *sometimes*, *often*, *very often*, and *almost always*). Scores were calculated from Social Competence ($\alpha = .88$), Emotion Regulation ($\alpha = .87$), and Aggressive-Oppositional Behaviors (reverse-scored; $\alpha = .87$) subscales.

Covariates—Child, family, child care, and school variables were included as covariates to account for potential selection bias.

Child covariates.: Child *gender* (0 = girls; 1 = boys) and *race* (0 = non-African American, 1 = African American) were reported by the child's parent at 2 months. Child *mental development index* (MDI) was assessed at 6 months using the Bayley Scales of Infant Development (Bayley, 1993). MDI ($\alpha = .73$) is a standard series of developmental tasks that measures children's cognitive development. Standardized scores were calculated.

Family covariates.: *State* (0 = PA; 1 = NC) was included to account for site differences among FLP families. Family poverty status was measured as the *income-to-needs ratio* reported by the mother at 6, 15, 24, and 36 months and was averaged across 6–36 months ($\alpha = .93$). *Maternal sensitivity* was measured using the same HOME subscales (Caldwell & Bradley, 1984) as reported earlier for child care at 6, 15, 24, and 36 months and was averaged across 6–36 months ($\alpha = .74$). *Maternal education* was reported by the mother at 6, 15, 24, and 36 months and included as the number of years of highest education achieved by 36 months.

Child care and kindergarten covariates.: Because children were not consistently reported to be in child care, the *number of observed time points in child care* was calculated as the number of CVI observations that were conducted from 6 to 36 months. Child-care *quantity* was reported by the child-care caregiver (or parents, if caregivers were not interviewed) as

the number of hours target children were in care each week at 6, 15, 24, and 36 months. Quantity, which included values of 0 for children who were not in child care, was averaged across 6–36 months ($\alpha = .62$). Child-care *type* (0 = informal; 1 = formal) was reported by child-care caregivers (or parents, if caregivers were not interviewed). Informal care primarily included relative care, but also included a small proportion of families using family child-care homes (4%–7% across time points). Formal care included nonhome, center-based environments. Type was calculated as the proportion of formal care across 6–36 months ($\alpha = .77$). *Kindergarten classroom quality* was measured using the Classroom Assessment Scoring System (Pianta, La Paro, & Hamre, 2008) and was the average of Instructional Support, Classroom Organization, and Classroom Emotional Support domains ($\alpha = .80$).

Analysis Plan—Structural equation modeling was conducted using Mplus (Version 7; Muthén & Muthén, 1998–2013) employing models that used weights and stratification variables to account for the complex sampling design. To account for missing data on the outcome variables (20%–25%), we used full information maximum likelihood estimation. To account for missing data on the independent variables (0%–28%), we brought covariates into the model as dependent variables in order to make distributional assumptions about covariates (Muthén & Muthén, 1998–2013). Prior to conducting inferential analyses, we examined fit indices of the measurement model.

Analyses considered two latent constructs as kindergarten outcomes: (a) academic skills, comprised of WJ Picture Vocabulary, Letter-Word Identification, and Applied Problems; and (b) teacher-reported social skills, comprised of SDQ and SCS subscales. Both latent outcomes were regressed on the primary predictors, including caregiver-child verbal interactions, caregiver sensitivity, and caregiver stability; the covariates; and the mediators. Two latent constructs served as 36-month outcomes/mediators: (a) language skills, comprised of PLS expressive language and WPPSI receptive vocabulary; and (b) parent-reported social skills, comprised of SDQ subscales. These 36-month outcomes/mediators were also regressed on caregiver-child verbal interactions, caregiver sensitivity, caregiver stability, and covariates. For all models, standardized regression coefficients were reported and model fit was assessed from the chi-square test, root mean square error of approximation (RMSEA), and comparative fit index (CFI). Tests of mediation were conducted by examining indirect effect estimates (MacKinnon, 2008).

Results

Descriptive information is presented in Table 1 and results are presented in Figure 1.

Model fit was found to be good, $\chi^2(159, N = 1,055) = 396.15, p < .001$; RMSEA = .04 (CI = .03–.04), CFI = .94. Overall, the model explained 39% of the variance in language and 33% of parent-reported social skills at 36 months, and 57% of academic skills and 25% of teacher-reported social skills in kindergarten. Caregiver-child verbal interactions were correlated with caregiver sensitivity, $r = .31, p < .001$, and with caregiver stability, $r = .23, p < .001$.

Caregiver-child verbal interactions had a direct association with language skills at 36 months ($\beta = .16, p < .001$), but not social skills at 36 months nor academic nor social skills at

kindergarten. Caregiver-child verbal interactions also had indirect associations with kindergarten academic skills (verbal interactions $\rightarrow$ language $\rightarrow$ academic skills, $\beta = .11$, $p = .002$) and social skills (verbal interactions $\rightarrow$ language $\rightarrow$ social skills, $\beta = .04$, $p = .01$) through its direct association with 36-month language skills. Caregiver sensitivity was not directly associated with 36-month language and social skills nor directly or indirectly associated with kindergarten academic and social skills. Caregiver stability had a direct association with social skills in kindergarten ($\beta = .18$, $p = .01$), but was not directly associated with 36-month language and social skills or kindergarten academic skills, and no indirect associations emerged.

Discussion

Infants and toddlers in the United States tend to experience nonparental child care that varies in terms of quality and stability, particularly in rural areas where economic and employment insecurity lead to fewer high-quality child-care options (Bratsch-Hines, Baker, & Vernon-Feagans, 2016). This study sought to add to the limited literature on IT child care using a sample of children living in high-poverty rural areas. We concentrated on two key aspects of IT child care, quality and stability, in association with children's proximal and distal academic and social outcomes. Of particular note, this was the first known study to consider the association between caregiver stability during the IT years and academic outcomes after the transition to elementary school. In filling these gaps, our study found that (a) caregiver-child verbal interactions was positively associated with children's 36-month language skills and this association fully mediated associations between caregiver-child verbal interactions and children's kindergarten academic and social skills; (b) caregiver sensitivity was not associated with 36-month or kindergarten outcomes; and (c) caregiver stability from 6 to 36 months was positively associated with kindergarten social skills, but was not associated with 36-month outcomes or kindergarten academic skills.

An important feature of child-care quality is children's access to a responsive caregiver with whom children are more likely to engage in back-and-forth interactions, learn how to elicit responses from adults, and learn language and vocabulary (Girolametto & Weitzman, 2002). Moreover, early language skills facilitate children's successful engagement in the academic and social context of school (Dickinson, McCabe, & Essex, 2006). We found that more verbal interactions between an individual child and child-care caregiver was positively associated with language skills at 36 months. Furthermore, 36-month language skills fully mediated the association between caregiver-child verbal interactions and children's kindergarten academic and social skills. Previous studies that have measured the frequency of children's language interactions with their child-care caregiver likewise found an association with children's language skills (NICHD Early Childcare Research Network, 2000; Vernon-Feagans, Bratsch-Hines, et al., 2013). This study extends previous work by documenting evidence of the association between IT caregiver-child interactions and child outcomes as late as kindergarten. Ensuring that infants and toddlers have access to caregivers who engage with them using positive verbal interactions may help children learn key language skills that promote subsequent academic and social development in elementary school.

Additionally, we found no evidence to indicate that caregiver sensitivity, when measured at the global classroom level, was related to child outcomes, even though other studies have documented the importance of caregiver sensitivity in child-care settings for children's academic and social competence (e.g., Vesely et al., 2013). Our measure of caregiver sensitivity was consistent with prior research on child-care quality, which has typically focused on general caregiving behaviors and/or structural and environmental characteristics of child care as experienced by groups of children. However, these global quality measures provide relatively weak predictive power to children's concurrent and later academic and social skills (Burchinal, 2018), in part because global indicators may not represent the quality experienced by individual children (Jeon et al., 2010). Although caregiver sensitivity, measured in this study as having more responsive and accepting caregivers, is undoubtedly important for children, additional research is needed to explore methods of capturing how individual children are exposed to these caregiving behaviors.

This study was potentially the first to examine caregiver stability in relation to both academic and social skills assessed at 36 months and in elementary school. Caregiver stability was related to children's social skills as reported by kindergarten teachers, such that children with more stability from 6 to 36 months were rated by their kindergarten teacher as having higher social skills, which is a similar finding to other studies (e.g., Love et al., 2003). Although we expected caregiver stability likewise to be associated with 36-month outcomes, our findings suggested a delayed effect of caregiver stability on social skills, which only began to emerge after school entry. This may have been due to differences between parent- and teacher-report of social skills. Nonetheless, there appeared to be something unique about the experience of having stable child-care caregivers that led to increased competence in the social sphere of kindergarten classrooms. For young children whose relationships with their caregivers were disrupted, there may have been greater potential for difficulty forming attachments to future caregivers and, in turn, forming strong relationships with peers and other adults (Ahnert, Pinquart, & Lamb, 2006). Conversely, other work has shown that caregiver stability from 36 to 48 months was not related to literacy or math outcomes prior to kindergarten entry (Ansari & Purtell, 2018). Given limited evidence, however, additional prospective research is needed in order to understand the long-term effects of child-care stability on a range of child outcomes.

These findings should be considered in light of several limitations. First, despite our use of several covariates, the observational nature of the data could not fully account for family selection bias. Investigating the quality and stability of children's family experiences could strengthen future studies. Second, only four data collection time points captured children's child-care experiences and thus were likely not sufficient to capture "true" caregiver-child verbal interactions, caregiver sensitivity, or caregiver stability. Third, the time spent observing child-care settings at each time point was relatively short, which also may have limited the magnitude of the findings. Fourth, the experiences of day-to-day caregiver instability or multiple concurrent caregivers were not considered, which have implications for children's developmental outcomes (De Schipper, Tavecchio, Van IJendoorn, & Linting, 2003). Finally, we were unable to capture the potential bidirectional nature of our variables of interest. That is, children with higher language skills may have elicited more positive

verbal interactions with caregivers and children's behavior problems may have led to parents to change care arrangements.

Many families in the United States and across the world face significant barriers to accessing high-quality and stable child care, particularly in rural areas, where low population density can lead to an insufficient supply of child-care programs that meet state quality standards (Henly & Adams, 2018; Rao & Wong, 2018). The potential for high-quality child care to enhance the development of children's academic and social skills is significant, especially for children from low-income or otherwise socioeconomically disadvantaged backgrounds (Love et al., 2003; Yazejian et al., 2017), and particularly for infants and toddlers whose experiences with caregivers during their first 3 years of life are integral to subsequent optimal development (Mortensen & Barnett, 2015). Our study suggests that children in rural communities stand to benefit from exposure to high-quality child care that is individualized and stable over time. However, the magnitude of these child-care quality and stability findings were modest, suggesting that children's child-care experience may be a necessary, but insufficient, means to ameliorate the substantial socioeconomic achievement gaps that begin to emerge as early as infancy (Burchinal, 2018). In-depth studies during children's first 3 years are needed to understand the true magnitude of IT child-care quality and stability. Furthermore, policy initiatives that support families' access to preferred, affordable, stable, and high-quality child care are needed. Finally, IT child-care caregivers across diverse settings need key strategies to interact with children in positive ways, which can help build a workforce of caregivers to set the foundation for infants' and toddlers' optimal development.

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References

- Ahnert L, Pinquart M, & Lamb ME (2006). Security of children's relationships with nonparental care providers: A meta-analysis. *Child Development*, 77, 664–679. 10.1111/j.1467-8624.2006.00896.x [PubMed: 16686794]
- Ainsworth MS (1989). Attachments beyond infancy. *American Psychologist*, 44, 709–716. 10.1037/0003-066X.44.4.709
- Ansari A, & Purtell KM (2018). Continuity and changes in classroom age composition and achievement in Head Start. *Journal of Applied Developmental Psychology*, 58, 86–95. 10.1016/j.appdev.2018.07.002
- Bassok D, Fitzpatrick M, Greenberg E, & Loeb S (2016). Within- and between-sector quality differences in early childhood education and care. *Child Development*, 87, 1627–1645. 10.1111/cdev.12551 [PubMed: 27246392]
- Bayley N (1993). Bayley II scales of infant development. New York, NY: Psychological Corporation.
- Bradley RH, Caldwell BM, & Corwyn RF (2003). The child care HOME inventories: Assessing the quality of family child care homes. *Early Childhood Research Quarterly*, 18, 294–309. 10.1016/S0885-2006(03)00041-3
- Bratsch-Hines ME, Baker C, & Vernon-Feagans L (2016). Minority families in the rural United States: Family processes, child care, and early schooling In Crockett L & Carlo G (Eds.), *Rural ethnic minority youth and families in the United States: Theory, research, and applications* (pp. 143–164). Cham, Switzerland: Springer International.

- Bratsch-Hines ME, Mokrova I, Vernon-Feagans L; Family Life Project Key Investigators. (2015). Child care instability from 6 to 36 months and the social adjustment of children at prekindergarten. *Early Childhood Research Quarterly*, 30, 106–116. 10.1016/j.ecresq.2014.09.002
- Bronfenbrenner U, & Morris PA (2006). The bioecological model of human development In Lerner RM (Ed.), *Theoretical models of human development. Handbook of child psychology* (Vol. 1, 6th ed., pp. 793–828). Hoboken, NJ: Wiley.
- Bruner JS (1975). From communication to language: A psychological perspective. *Cognition*, 3, 255–287. 10.1016/0010-0277(74)90012-2
- Burchinal MR (2018). Measuring early care and education quality. *Child Development Perspectives*, 12, 3–9. 10.1111/cdep.12260
- Burchinal M, Magnuson K, Powell D, & Hong SS (2015). Early childcare and education In Bornstein MH, Leventhal T, & Lerner RM (Eds.), *Handbook of child psychology and developmental science: Ecological settings and processes* (pp. 223–267). Hoboken, NJ: Wiley.
- Caldwell BM, & Bradley RH (1984). *Home observation for measurement of the environment*. Little Rock, AR: University of Arkansas at Little Rock.
- Chaudry AJ (2004). *Putting mothers first: How low-wage working mothers manage child care*. New York, NY: Russell Sage Foundation.
- Choi JY, Horm D, Jeon S, & Ryu D (2018). Do stability of care and teacher-child interaction quality predict child outcomes in Early Head Start? *Early Education and Development*, 30, 337–356. 10.1080/10409289.2018.1546096
- Conduct Problems Prevention Research Group (CPPRG). (1995). *Teacher social competence scale technical report*. Retrieved from <http://www.fasttrackproject.org>
- De Schipper JC, Tavecchio LWC, Van IJendoorn MH, & Linting M (2003). The relation of flexible child care to quality of center day care and children's socio-emotional functioning: A survey and observational study. *Infant Behavior and Development*, 26, 300–325. 10.1016/S0163-6383(03)00033-X
- Dickinson DK, McCabe A, & Essex MJ (2006). A window of opportunity we must open to all: The case for preschool with high-quality support for language and literacy In Dickinson DK & Neuman SB (Eds.), *Handbook of early literacy research* (Vol. 2, pp. 11–28). New York, NY: Guilford.
- Girolametto L, & Weitzman E (2002). Responsiveness of child care providers in interactions with toddlers and preschoolers. *Language, Speech, and Hearing Services in Schools*, 33, 268–281. 10.1044/0161-1461(2002/022)
- Goodman R (2001). Psychometric properties of the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40, 1337–1345. 10.1097/00004583-200111000-00015 [PubMed: 11699809]
- Henly JR, & Adams G (2018). *Increasing access to quality child care for four priority populations: Challenges and opportunities with the CCDBG reauthorization*. Washington, DC: Urban Institute Retrieved from <https://www.urban.org/research/publication/increasing-access-quality-child-care-four-priority-populations>
- Horm DM, File N, Bryant D, Burchinal M, Raikes H, Forestieri N, ... Cobo-Lewis A (2018). Associations between continuity of care in infant-toddler classrooms and child outcomes. *Early Childhood Research Quarterly*, 42, 105–118. 10.1016/j.ecresq.2017.08.002
- Howes C, & Hamilton CE (1992). Child relationships with child care teachers: Stability and concordance with parental attachments. *Child Development*, 63, 859–866. 10.1111/j.1467-8624.1992.tb01667.x [PubMed: 1505244]
- Howes C, & Hamilton CE (1993). The changing experience of child care: Changes in teachers and in teacher-child relationships and children's social competence with peers. *Early Childhood Research Quarterly*, 8, 15–32. 10.1016/S0885-2006(05)80096-1
- Jeon H-J, Langill CC, Peterson CA, Luze GJ, Carta JJ, & Atwater JB (2010). Children's individual experiences in early care and education: Relations with overall classroom quality and children's school readiness. *Early Education and Development*, 21, 912–939. 10.1080/10409280903292500

- Landry SH, & Smith KE (2011). Maternal sensitivity and responsiveness: A conceptual framework with empirical evidence In Davis DW & Logsdon MC (Eds.), *Maternal sensitivity: A scientific foundation for practice* (pp. 31–44). Hauppauge, NY: Nova Science.
- Lee K (2016). Impact of child care arrangements on Australian children's cognitive outcome: Moderation effects of parental factors. *Child & Family Social Work*, 21, 176–187. 10.1111/cfs.12127
- Loeb S, Fuller B, Kagan SL, & Carrol B (2004). Child care in poor communities: Early learning effects of type, quality, and stability. *Child Development*, 75, 47–65. 10.1111/j.1467-8624.2004.00653.x [PubMed: 15015674]
- Love JM, Harrison L, Sagi-Schwartz A, van IJzendoorn MH, Ross C, Ungerer JA, ... Chazan-Cohen R (2003). Child care quality matters: How conclusions may vary with context. *Child Development*, 74, 1021–1033. 10.1111/1467-8624.00584 [PubMed: 12938696]
- MacKinnon DP (2008). *Introduction to statistical mediation analysis*. Mahwah, NJ: Erlbaum.
- Mortensen JA, & Barnett MA (2015). Teacher-child interactions in infant/toddler child care and socioemotional development. *Early Education and Development*, 26, 209–229. 10.1080/10409289.2015.985878
- Muthén LK, & Muthén BO (1998–2013). *Mplus user's guide* (7th. ed.). Los Angeles, CA: Author.
- NICHD Early Childcare Research Network. (1998). Early childcare and self-control, compliance, and problem behavior at twenty-four and thirty-six months. *Child Development*, 69, 1145–1170. 10.1111/j.1467-8624.1998.tb06165.x [PubMed: 9768491]
- NICHD Early Childcare Research Network. (2000). The relation of childcare to cognitive and language development. *Child Development*, 71, 960–980. 10.1111/1467-8624.00202 [PubMed: 11016559]
- NICHD Early Childcare Research Network. (2002). Early child care and children's development prior to school entry: Results from the NICHD Study of Early Child Care. *American Educational Research Journal*, 39, 133–164. 10.3102/00028312039001133
- NICHD Early Childcare Research Network. (2003). Does amount of time spent in child care predict socioemotional adjustment during the transition to kindergarten? *Child Development*, 74, 976–1005. 10.1111/1467-8624.00582 [PubMed: 12938694]
- Pianta RC, La Paro KM, & Hamre BK (2008). *Classroom Assessment Scoring System (CLASS)*. Baltimore, MD: Paul H. Brooks.
- Pilarz AR, & Hill HD (2014). Unstable and multiple child care arrangements and young children's behavior. *Early Childhood Research Quarterly*, 29, 471–483. 10.1016/j.ecresq.2014.05.007 [PubMed: 25635158]
- Rao N, & Wong JMS (2018). Early childhood development In Bornstein MH (Ed.), *The SAGE encyclopedia of lifespan human development* (pp. 688–691). Thousand Oaks, CA: Sage.
- Recchia SL, & Fincham EN (2019). The significance of infant/toddler care and education In Brown CP, McMullen MB, & File N (Eds.), *The Wiley handbook of early childhood care and education* (pp. 197–218). Hoboken, NJ: Wiley.
- Ruprecht K, Elicker J, & Choi JY (2016). Continuity of care, caregiver-child interactions, and toddler social competence and problem behaviors. *Early Education and Development*, 27, 221–239. 10.1080/10409289.2016.1102034
- Sandstrom H, & Chaudry A (2012). 'You have to choose your childcare to fit your work': Childcare decision-making among low-income working families. *Journal of Children and Poverty*, 18, 89–119. 10.1080/10796126.2012.710480
- Schmit S, & Matthews H (2013). Better for babies: A study of state infant and toddler child care policies. Retrieved from <https://www.clasp.org/sites/default/files/public/resources-and-publications/publication-1/BetterforBabies2.pdf>
- Schulman K, & Blank H (2004). Child care assistance policies 2001–2004: Families struggling to move forward, states going backward [National Women's Law Center Issue Brief]. Washington, DC: National Women's Law Center.
- Shin M (2015). Enacting caring pedagogy in the infant classroom. *Early Child Development and Care*, 185, 496–508. 10.1080/03004430.2014.940929

- Snow CE (1999). Social perspectives on the emergence of language In MacWhinney B (Ed.), *The emergence of language* (pp. 126–133). Mahwah, NJ: Psychology Press.
- Suggate S, Schaughency E, McAnally H, & Reese E (2018). From infancy to adolescence: The longitudinal links between vocabulary, early literacy skills, oral narrative, and reading comprehension. *Cognitive Development*, 47, 82–95. 10.1016/j.cogdev.2018.04.005
- Tran H, & Weinraub M (2006). Child care effects in context: Quality, stability, and multiplicity in nonmaternal child care arrangements during the first 15 months of life. *Developmental Psychology*, 42, 566–582. 10.1037/0012-1649.42.3.566 [PubMed: 16756446]
- Vandell DL, Belsky J, Burchinal M, Steinberg L, Vandergrift N; NICHD Early Child Care Research Network. (2010). Do effects of early child care extend to age 15 years? Results from the NICHD Study of Early Child Care and Youth Development. *Child Development*, 81, 737–756. 10.1111/j.1467-8624.2010.01431.x [PubMed: 20573102]
- Vernon-Feagans L, Bratsch-Hines ME; Family Life Project Key Investigators. (2013). Caregiver-child verbal interactions in child care: A buffer against poor language outcomes when maternal language input is less. *Early Childhood Research Quarterly*, 28, 858–873. 10.1016/j.ecresq.2013.08.002 [PubMed: 24634566]
- Vernon-Feagans L, Cox M; Family Life Project Key Investigators. (2013). The Family Life Project: An epidemiological and developmental study of young children living in poor rural communities. *Monographs of the Society for Research in Child Development*, 78, 1–150. 10.1111/mono.12046
- Vernon-Feagans L, & Manlove E (2005). Otitis media, the quality of child care, and the social/communicative behavior of toddlers: A replication and extension. *Early Childhood Research Quarterly*, 20, 306–328. 10.1016/j.ecresq.2005.07.003
- Vesely CK, Brown EL, & Mahatmya D (2013). It takes two: Sensitive caregiving across contexts and children's social, emotional, and academic outcomes. *Early Education & Development*, 24, 960–978. 10.1080/10409289.2013.825185
- Wechsler D (2002). *Wechsler Preschool and Primary Scale of Intelligence, third edition (WPPSI-III) administration and scoring manual*. San Antonio, TX: The Psychological Corporation.
- Werthamer-Larsson L, Kellam SG, & Wheeler L (1991). Effect of first-grade classroom environment on shy behavior, aggressive behavior, and concentration problems. *American Journal of Community Psychology*, 19, 585–602. 10.1007/BF00937993 [PubMed: 1755437]
- Woodcock RW, McGrew K, & Mather N (2001). *The Woodcock-Johnson Tests of Achievement (3rd ed.)*. Itasca, IL: Riverside.
- Yazejian N, Bryant DM, Hans S, Horm D, St. Clair L, File N, & Burchinal M (2017). Child and parenting outcomes after 1 year of educare. *Child Development*, 88, 1671–1688. 10.1111/cdev.12688 [PubMed: 28176302]
- Zimmerman IL, Steiner VG, & Pond RE (2002). *Preschool Language Scale (4th ed.)*. San Antonio, TX: The Psychological Corporation.

Figure 1.

Structural equation model predicting kindergarten academic and social skills from direct and indirect effects of 6- to 36-month caregiver-child verbal interactions, caregiver sensitivity, and caregiver stability. Model fit statistics: $\chi^2(159, N = 1,055) = 396.15, p < .001$; RMSEA = .04 (CI [.03, .04]), CFI = .94. Significant indirect effects: verbal interactions → language → academic skills, $\beta = .11, p = .002$; verbal interactions → language → social skills, $\beta = .04, p = .01$.

Note. Boldface standardized path coefficients (interpretable as effect sizes) on solid lines indicate $p < .05$. Dashed gray lines indicate nonsignificant relations. PLS = Preschool Language Scale; WPPSI = Wechsler Preschool and Primary Scale of Intelligence; CVI = Child-care Verbal Interaction; HOME = Home Observation for Measurement of the Environment; SDQ = Strengths and Difficulties Questionnaire; WJ = Woodcock Johnson; SCS = Social Competence Scale.

Table 1Descriptive Data ($N = 1,055$)

Variable	<i>M</i> or %	<i>SD</i>
Predictors of interest		
Caregiver-child verbal interactions (CVI), 6–36 months	1.00	0.55
6 months	0.76	0.48
15 months	1.01	0.63
24 months	1.14	0.74
36 months	1.07	0.76
Caregiver sensitivity (HOME), 6–36 months	0.86	0.09
6 months	0.88	0.11
15 months	0.90	0.10
24 months	0.89	0.09
36 months	0.77	0.12
Caregiver stability, 6–36 months	1.82	0.96
One caregiver	49.15	
Two caregivers	27.64	
Three caregivers	15.51	
Four caregivers	7.69	
Child skills, 36 months		
Language skills		
Expressive language (PLS)	98.77	15.19
Receptive vocabulary (WPPSI)	98.94	17.47
Social skills, parent report		
Prosocial (SDQ)	1.28	0.40
Total problems, reverse-scored (SDQ)	1.01	0.29
Child skills, kindergarten		
Academic skills		
Picture vocabulary (WJ)	99.01	9.63
Letter-word identification (WJ)	107.73	12.13
Applied problems (WJ)	100.61	13.34
Social skills, teacher report		
Prosocial (SDQ)	1.52	0.47
Total problems, reverse-scored (SDQ)	1.19	0.33
Social competence (SCS)	4.31	1.16
Emotion regulation (SCS)	4.34	1.16
Aggressive-oppositional behaviors, reverse-scored (SCS)	4.06	0.98
Child characteristics		
Gender (male)	52.23	
Race (African American)	47.77	
Mental development index, 6 months	99.80	8.29
Family characteristics, 6–36 months		

Variable	<i>M</i> or %	<i>SD</i>
State (North Carolina)	64.45	
Income-to-needs ratio	1.81	1.51
Maternal sensitivity (HOME)	0.84	0.11
Maternal education (highest years achieved)	14.97	2.56
Child-care characteristics		
Number of observed time points in child care, 6–36 months	2.40	1.14
Quantity (weekly hours in child care), 6–36 months	23.62	15.25
6 months	23.39	22.68
15 months	24.63	21.22
24 months	22.82	20.65
36 months	25.33	19.23
Type (proportion formal child care), 6–36 months	27.90	34.78
6 months	20.58	40.45
15 months	27.90	44.87
24 months	29.99	45.85
36 months	37.13	48.34
Kindergarten classroom quality (CLASS)	4.41	0.73

Note. CVI = Childcare Verbal Interaction; HOME = Home Observation for Measurement of the Environment; PLS = Preschool Language Scale; WPPSI = Wechsler Preschool and Primary Scale of Intelligence; SDQ = Strengths & Difficulties Questionnaire; WJ = Woodcock Johnson; SCS = Social Competence Scale; CLASS = Classroom Assessment Scoring System.