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

Mary E. Bratsch-Hines
University of North Carolina at Chapel Hill

Eleni Zgourou, and Lynne Vernon-Feagans
University of North Carolina at Chapel Hill

Robert Carr
Duke University

Michael Willoughby
RTI International

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, & Vandegrift, 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; Giro-lametto & 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; Vernoon, Bratsch-Hines, & Family Life Project Key Investigators, 2013).

Caregiver sensitivity, measured in this study by observer ratings of caregiver responsivity 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, & Carroll, 2004), whereas others did not find associations with cognitive or language skills at 15 months (Tran & Weinraub, 2016) 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.

**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. 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 \((\alpha = .73)\) and Total Problems (reverse-scored; \(\alpha = .68)\) subscales were calculated. Additional items from the Social Competence Scale (SCS; Conduct Problems Prevention Research Group, 1995; Werther, Larson, 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 → language → academic skills, $\beta = .11, p = .002$) and social skills (verbal interactions → language → 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, Carr, Zgourou, Vernon-Feagans, and Willoughby, 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 (Giro-lametto & 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.

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 $\rightarrow$ language $\rightarrow$ academic skills, $\beta = .11, p = .002$; verbal interactions $\rightarrow$ language $\rightarrow$ 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 = Childcare Quality and Stability; HOME = Home Observation for Measurement of the Environment; SDQ = Strengths and Difficulties Questionnaire; WJ = Woodcock Johnson; SCS = Social Competence Scale.
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 IJzendoorn, & 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.
References


