The Child Care Ecology Inventory: A Domain-Specific Measure of Home-Based Child Care Quality to Promote Social Competence for School Readiness

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Abstract

This study investigates the reliability and validity of the Child Care Ecology Inventory (CCEI), a measure of the quality of family child care in the social domain. The CCEI focuses on research-based environmental features and caregiving practices for promoting positive social development in preschool-age children. A total of 198 family child care homes in the Northwest USA participated. Good scale reliabilities were found for the measures of the environment (*Enrichment* and *Organization*) and for caregivers' practices (*Monitoring, Positive Attention, Promoting Social Skills,* and *Teaching Rules*) and interrater reliability was adequate for research purposes. The CCEI was associated with other commonly used measures of child care quality that assessed similar environmental and caregiving constructs. Linear regression models were run to determine the features of family child care quality that were concurrently associated with observed child behavior. The child–caregiver ratio, *Environment Organization*, and caregivers' *Teaching Rules* were negatively associated with children's problem behavior (noncompliance and aggression). Caregivers' provision of *Planned Activities/Routines* and *Positive Attention* were associated with positive child behavior. Results indicate that different aspects of quality are related to different aspects of children's social interactions and behaviors.

Keywords: family child care; social development; child care quality; assessment

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An important core indicator of school readiness is social–emotional competence, which enables the development of positive relationships with peers and adults (National School Readiness Indicators Initiative, 2005). A number of social skills in young children have been identified as important to overall social competence, including cooperation and helpfulness, positive initiations and responses with peers and adults, and self-regulatory skills, which facilitate behaviors such as following directions and rules and inhibit behaviors such as aggression (Campbell, Lamb, & Hwang, 2000; Chandler, 1992; Ladd, Herald, & Kochel, 2006; Mashburn & Pianta, 2006). Children with social competency skills are more likely to participate in learning activities and to develop positive relationships with their teachers and other children. Using the National Institute of Child Health and Human Development Study of Early Child Care (NICHD SECC) data, Downer and Pianta (2006) found that social competence at preschool-age was a significant predictor of academic functioning in first grade. Yet, a significant number of children still enter school with social difficulties that negatively impact their school experience. An estimated 10% of children entering kindergarten display aggressive behaviors somewhat frequently, 25% have difficulty making friends, and 13% have difficulty sustaining attention (Zill & West, 2001). Efforts to nurture children's social competence during the preschool years are essential for promoting children's learning and success in school.

One area worthy of attention is the quality of preschool and child care settings, especially home-based child care. Home-based child care is an underresourced and understudied care setting that serves approximately 3.7 million toddlers and preschool-age children in the United States, who spend an average of 26 hours per week in care (Mulligan, Brimhall, West, &

Chapman, 2005). Efforts to improve social outcomes for children in preschool and child care settings have focused on providing a quality early learning environment—one that is caring and enriching. In a comparison of center and home-based child care, more positive caregiving was found in home-based child care for infants and toddlers than in center-based care, but less positive caregiving was found in home-based settings for preschool children (National Institute of Child Health and Human Development Early Child Care Research Network [NICHD ECCRN], 2000). Understanding the links between features of home-based child care and preschool-age children's social competencies related to school readiness is particularly needed. Given the sparse literature on home-based child care factors that promote positive social development, we include evidence from other care settings involving a group of preschool children (i.e., center-based care and preschool).

The evidence for the impact of child care quality on preschool-age children's social development is mixed. In a meta-analysis of studies on child care quality, higher-quality child care was significantly associated with greater social competence and fewer problem behaviors, yet these associations were quite small (Burchinal, Kainz, & Cai, 2011). The strength of effect sizes appears to vary greatly from one study to another, particularly for the effects on children's social outcomes. The child care quality literature is fraught with mixed results on children's social development. For example, in one study (NICHD ECCRN, 2003a), child care quality had significant effects on cognitive skill even when family factors were controlled, but no effect on social outcomes. As these children were followed into kindergarten, time spent in child care also was associated with problem behavior, even when controlling for child care quality and stability (NICHD ECCRN, 2003b). However, when these children were followed into third grade, neither time in child care nor its quality was associated with aggression trajectories (NICHD

ECCRN, 2004). Contrary to the NICHD SECC findings, the Welfare, Children and Families study found that children who spent more time in high-quality child care had fewer externalizing behavior problems (Loeb, Fuller, Kagan, & Carrol, 2004). Burchinal and colleagues (2011) note that the small effect sizes between child care quality and children's social competence may be due in part to the measures of child care quality.

One difficulty in examining the associations between child care quality and children's social development is the lack of a precise definition of quality. The measures used in these child care quality studies vary; many studies use global measures of quality and some use measures of the child–caregiver relationship. Unfortunately, *quality of child care* has become an umbrella term without a clear, empirically supported definition. Divergent research results regarding the impact of child care quality are likely attributed to the use of different measures of quality and to the inadequacies in measurements (Hagekull & Bohlin, 1995; Lamb, 2006). A current challenge in the child care field is the lack of adequate and efficient measures of child care quality.

The Need for a Domain-Specific Measure of Quality for Promoting Social Competence

Measuring specific aspects of the child care environment will improve our understanding of how child care affects child development (NICHD ECCRN, 2003a), yet in a review, Friedman and Amadeo (1999) conclude that we do not yet know all the aspects of the child care environment that are related to developmental outcomes. The measures included in their review are the predominant measures that are still being used, more than a decade later. Despite what we know about the importance of children's social development for school readiness, Hyson and colleagues (2011) found that measures focused solely on child care features that strengthen children's social development are lacking. Available measures are more global (e.g., Family

Child Care Environmental Rating Scale-Revised [FCCERS-R]; Harms, Cryer, & Clifford, 2007), with the social domain being only a small aspect measured. The review also notes that we lack instruments that measure ways in which child care settings can support the development of positive peer relationships. Having reliable and valid measures of child care quality for promoting the social skills that are critical for children's school readiness and healthy development could be of practical value for assisting child care providers in evaluating and enhancing their services.

The Need for Valid Measures of Quality that are Relevant to Home-Based Child Care

There are even fewer measures of child care quality designed for home-based child care settings, particularly those focused on supporting children in social development. A listing of 11 instruments is provided in a review of quality measures for home-based child care settings by Goodson and Layzer (2010). No measures listed include measurement of both supporting social development and child–child interactions. Of the two that do measure supporting social development, one is focused on relative care rather than home-based child care that is provided to a group of children by a nonrelative (Child Care Assessment Tool for Relatives [CCAT-R]; Porter, Rice, & Rivera, 2006), and the other is a global measure of quality with some items in the social domain (Quality of Early Childhood Care Settings: Caregiver Rating Scale [QUEST]; Goodson, Layzer, & Layzer, 2005). What is currently being measured well is caregiver responsiveness, warmth, and emotional support for children in home-based child care with the Child Care HOME Inventory (CC-HOME; Bradley, Caldwell, & Corwyn, 2003), Caregiver Interaction Scale (CIS; Arnett, 1989), and the Observational Record of the Caregiving Environment (ORCE; NICHD ECCRN, 2000). In summary, there is a lack of valid measures that focus on the quality of home-based child care for promoting social development, including

the facilitation of peer interaction skills that are critical for school readiness.

Caregivers in home-based settings are diverse with respect to their demographic characteristics, education, and motivations to provide care in the home (Morrissey, 2007). The social domain is an area in which home-based child care providers have reported a desire for more training, specifically in behavior management, supporting children's social development, and dealing with challenging behavior (Bailey & Osborne, 1994; Mueller & Orimoto, 1995; Rusby, 2002). Having an assessment that focuses on this domain could be used as a consultation tool to provide data-based feedback to child care providers who have goals in this area.

Children may benefit from the smaller group sizes found in home-based child care compared to center-based child care. With the smaller numbers of children in child care homes, there is a potential opportunity for more interactions to take place between the caregiver and children. The research, however, is mixed in this area. Some studies show lower caregiver involvement in family child care, whereas others show greater caregiver involvement with children (Kontos, 1992). Less warmth and sensitivity, less organization, and fewer positive interactions with children and parents were found in home-based child care than center-based child care (Bigras et al., 2010). These process quality variables were also related to the child–caregiver ratio and caregiver training in early childhood education. Conversely, Groeneveld, Vermeer, van IJzendoorn, and Linting (2010) found higher caregiver warmth and lower noise levels in home-based child care compared to center-based child care. Although group sizes are typically smaller in home-based child care, a unique challenge for providers of home-based child care is that they most commonly provide care by themselves. Thus, they have no support and assistance from a coworker (Rusby, 2002) and therefore are less likely to lead structured teaching activities compared to providers of center-based care (Fuller, Kagan, Loeb, & Chang,

2004). The mixed results across studies demonstrate a need for further research on caregiver practices in home-based settings.

Home-based child care providers have reported additional challenges: (a) arranging the environment to suit the different needs of a child care and the caregivers' family home, and (b) meeting the needs of children of multiple ages and different developmental stages (Rusby, 2002; Sandstrom, Moodie, & Halle, 2011). Having children of multiple ages may also present unique opportunities (e.g., older children modeling behaviors and skills for younger children), yet this phenomena has not been studied. A data-based assessment tool could be used by providers of home-based care to evaluate and improve their home child care settings in specific areas that they find challenging.

Unfortunately, there are also very few studies that directly link quality of home-based child care to children's social and behavioral skills. A recent study found that more sensitive and supportive care and more time spent in structured activities in home-based child care were associated with greater social interactions, engagement in activities, and positive mood in preschoolers and toddlers (Kryzer, Kovan, Phillips, Domagall, & Gunnar, 2007). Supportive care was also associated with less aggressiveness in children (Kryzer et al., 2007). Coplan, Findlay, and Schneider (2010) found that children who attended home-based child care showed less anxiety when beginning school than did children who attended center-based child care; however, no differences in children's aggression were found. This study did not examine the differential characteristics of the settings that may explain this outcome. Because of the lack of available relevant studies in family child care, the literature base that identifies important child care features that promote positive social development is derived from research in early childhood settings in general.

The Child Care Ecology Inventory (CCEI)

The Child Care Ecology Inventory (CCEI) was designed to measure the quality of home-based child care settings for promoting social competencies related to school readiness in preschool-age children. Although home-based child care enrolls children of varying ages, we have first developed and studied the assessment that focuses on child care features and practices relevant for preschool-age children's social development. Note that the development and research of similar assessment tools focused on children of other ages is important and such efforts are underway. Ideally, the assessments can work in conjunction with one another in mixed-age care settings.

The CCEI was originally called the Child Care Ecology Checklist (CCEC) and was used to evaluate a video-based program to teach home-based child care providers ways to promote positive social development (Rusby, Smolkowski, Marquez, & Taylor, 2008). The CCEI was adapted from measures of preschool and classroom environments (Kaminski, Stormshak, Good, & Goodman, 2002; Wolfe, Petty, & McNellis, 1990) and has been a useful consultation tool in Head Start classrooms (Kaminski & Stormshak, 2006; Yoshikawa & Knitzer, 1997). The CCEI was developed to be a more focused measure than the currently available global measures of child care quality, specifically focused on multiple facets of child care that are associated with dimensions of children's development in the social domain. Our goal was to develop a tool that is efficient and can be useful in pinpointing what child care providers can change in their home-based child care to improve the social interactions, relationships, and social skills of preschool-age children in their care. Items on the CCEI are based on the literature on effective practices in early childhood educational settings, which are summarized next.

Critical Features of Home-Based Child Care for Promoting Positive Social Development

The conceptual model for the development of the CCEI involves a mediation model depicting the ways in which the child care environment and caregiver practices promote the development of children's social skills and decrease the likelihood of problem behavior when children enter school (see Figure 1). The enrichment and organization of the physical environment, toys and materials, and the planning of activities and routines will provide children with opportunities to engage with peers and learning materials and to practice socially skilled behaviors. A responsive, proactive caregiver who monitors children well, provides positive attention, and directly teaches rules and social skills to children will promote child learning of cooperation, self-regulation, and other social skills. These child care environmental features and caregiver practices are expected to facilitate preschool-age children's positive social development, which will support their social competence by the time they enter school. This conceptual model is considered an early prevention model, as children who begin school with fewer problem behaviors and greater social competence are less likely to develop a trajectory toward behavioral and social adjustment problems in school (Campbell, Spieker, Burchinal, Poe, & The NICHD Early Child Care Research Network, 2006).

The CCEI, therefore, focuses on features of the child care environment that have an impact on children's social skills and behavior in the child care setting, and subsequently social skills and behavior upon entry to school. Many items focus on environmental features that promote positive social interactions among peers. Having an enriched and organized child care environment is critical for promoting social engagement and preventing problem behavior (Hilton, 1987; McEvoy, Fox, & Rosenberg, 1991; Nordquist & Twardosz, 1990; Twardosz & Risley, 1982) and helps prepare children for school (Love et al., 2003). When caregivers plan and organize experiences and routines that are manageable and predictable for young children,

the emotional demands of the daily experiences are reduced, enabling the children to focus on learning new skills (Eccles & Gootman, 2002) including important social skills. Three areas of organization and enrichment have been noted in the literature: (a) the arrangement of the physical space into thematic play areas (Brown, Fox, & Brady, 1987; Clarke-Stewart, 1987; Trawick-Smith, 1992), (b) the organization and enrichment of available toys and materials (Hendrickson, Strain, Tremblay, & Shores, 1981; NICHD ECCRN, 2000; Nordquist & Twardosz, 1990; Wachs, Gurkas, & Kontos, 2004), and (c) the organization of a routine schedule that involves a variety of activities for children (Dunn, 1993; Kryzer et al., 2007; Odom, Peterson, McConnell, & Ostrosky, 1990).

The CCEI also measures caregiver practices that are expected to increase positive behavior and engagement in activities and to decrease problem behavior in preschool-age children, which are essential for school readiness. These include caregiver responsiveness and sensitivity to children (Burchinal et al., 2008; Hamre & Pianta, 2001; Howes & Ritchie, 2002; Kontos, Hsu, & Dunn, 1994; NICHD ECCRN, 2001), the use of effective behavior management (Webster-Stratton, Reid, & Hammond, 2001; Webster-Stratton, Reid, & Stoolmiller, 2008), active monitoring (Howes, Phillips, & Whitebook, 1992), providing children with positive attention (Dunn, 1993; Howes et al., 1992; Whitebook, Howes, & Phillips, 1989), and stimulating child–caregiver interactions that involve teaching of skills (Burchinal et al., 2008; Webster-Stratton et al., 2008). Effective caregiver practices such as these will help children learn a repertoire of social skills and give them practice using those skills to replace, or at least decrease, problem behavior in child care homes. Responsiveness to children's needs in the family child care setting is expected to have a positive impact on children's engagement. Appropriate engagement in play activities will help children gain a better understanding of social

cues and learn to inhibit a problematic response, and subsequently generalize their newly learned repertoire of social skills in new settings and situations. A pattern of socially skilled responses will develop over time and be maintained as the children enter school.

The Current Study

This paper examines results from the combined data from two studies to investigate the reliability and validity of the CCEI, a measure of home-based child care quality in the social domain. We focus on the ways in which environmental features and caregiver practices of the participating child care homes, as measured by the CCEI, are associated with children's socially skilled and problem behaviors.

Specifically, we tested the item reliability and interrater reliability of the a priori scales of the CCEI: *Enriched Environment*, *Organized Environment*, *Planned Activities/Routines*, and caregiver *Monitoring*, *Promotion of Social Skills*, *Teaching Rules*, and *Positive Attention*. We also tested concurrent associations of the CCEI with the Child Care HOME Inventory (CC-HOME; Bradley et al., 2003), the Caregiver Interaction Scale (CIS; Arnett, 1989), directly observed caregiver practices (the provision of active, positive, and negative attention), and observer ratings of effective behavior management. We selected the comparison measures as they have multiple items that focus on child care practices of interest, but because the unique CCEI content does not align perfectly with the other measures, we expected only moderate associations between the CCEI and each comparison measure.

Next, we tested the extent to which caregiver characteristics were associated with the CCEI. The extent of education and training a child care provider has is associated with aspects of child care quality. Home-based child care providers who have higher levels of education and training have been found to provide better overall quality of child care (Norris, 2001; Weaver,

2002). Specific caregiver practices that have been associated with higher levels of training are more frequent engagement with children (Bordin, Machida, & Varnell, 2000), less detachment from children (Burchinal, Howes, & Kontos, 2002), a greater likelihood for planning of child activities (Kontos, Howes, & Galinski, 1996), and a more enriched environment (Clarke-Stewart, Vandell, Burchinal, O'Brien, & McCartney, 2002). We expected that the level of caregiver education and training will be positively associated with the CCEI scales.

Similarly, we expected that the number of years of child care experience would be positively associated with the CCEI scales. Child care experience has been associated with more positive caregiving and stimulating environments (e.g., NICHD ECCRN, 2000); however, some studies have found no relationship between experience and child care quality (e.g., Clark-Stewart, et al., 2002) and others have found a small negative relationship between experience and global quality ratings (e.g., Burchinal, Howes, & Kontos, 2002; Doherty et al., 2006). Given these inconsistent results for experience and child care quality, we wanted to ensure that we were specific in our measures of experience. The above studies measured general child care experience, with the exception of the study by Doherty and collegues (2006), which measured "years working as an unregulated provider in own home". To provide clarity to the measure of experience, we asked caregivers for the number of years experience providing home-based child care and the number of years experience providing center-based child care.

Last, we tested the relationships between the CCEI and child behavior. Based on the previous findings in early childhood education we tested the following hypotheses: (a) child–caregiver ratio would be positively associated and *Organized Environment, Monitoring, Teaching Rules,* and *Promotion of Social Skills* would be negatively associated with observed child problem behaviors (noncompliance and physical aggression), and (b) child–caregiver ratio

would be negatively associated and *Enriched Environment, Planned Activities/Routines, Teaching Rules, Promotion of Social Skills,* and *Positive Attention* would be positively associated with observed children's positive behavior, such as engagement, cooperation, and prosocial skills. Child–caregiver ratio (number of children divided by the number of caregivers) is included in both models given its association with caregiving practices and the child care environment in prior studies (e.g., Bigras et al., 2010; NICHD ECCRN, 2000).

Method

This paper combines data from two similar studies: Study 1 involved 64 child care homes and Study 2 involved 134 child care homes. T-tests and Chi-square difference tests show no differences in demographics between the samples except for in African-American representation (study 1 = 2%, study 2 = 11%) and the percentage of sites operating with only one caregiver (study 1 = 73%, study 2 =54%). Given sample and assessment procedure similarity, the data are combined to present the larger sample size, a total of 198 child care homes.

Participating Child Care Homes and Providers

To be eligible for participation, home-based child care providers must have (a) had at least two preschool-age children in attendance, (b) understood and been able to speak English, and (c) planned to stay in the child care business for the coming year. Those who participated in the Study 1 were ineligible for Study 2.

Registered and certified child care homes were drawn from seven counties in Oregon with populations ranging from 104,059 to 714,657. Ninety-eight percent of caregivers were female, 67% Caucasian, 11% Hispanic or Latino, 6% African American, 4% Asian or Hawaiian or Pacific Islander, 1% American Indian, 5% multiracial, and 6% were of other or unknown ethnicity/race. Most caregivers had taken some college courses (49%), 19% had a high school

diploma or Graduate Equivalency Degree (GED; a degree that certifies U.S. high school-level academic skills), and 28% had an Associates of Arts degree (AA; college degree for completion of a 2-year course of study in the U.S.) or higher. The education level of the home child care providers in this study was somewhat higher than that found in the NICHD Study of Early Child Care (Clarke-Stewart et al., 2002). The caregivers had an average of 10 years of experience providing child care. The caregivers had an average of ten total children enrolled in their child care with an average of five preschool-age children. This included part-time care, so typically not all children were present at once. The majority of child care providers cared for children ages infant through school-age (82%), while 6% cared for preschool-age or younger, 10% cared for preschool-age or older, and only 2% cared solely for preschool-age children. Sixty percent of caregivers provided care by themselves without an assistant.

Assessment Procedures

In child care homes where there was more than one caregiver, the caregiver who provided the most care to the preschool-age children was considered the primary caregiver who participated in the study, and thus was the target caregiver for the assessments. The primary caregiver completed a questionnaire that included demographic measures (e.g., education, years of experience, total number of children).

Three site visit assessments were completed in each child care home. Assessors were randomly assigned to observation sites and time points, so that data at any given site were collected by a variety of assessors. The site visits were scheduled for a time when children were involved in free play and teacher-led play, choosing times when children were typically more active and avoiding nap times. During the first visit, assessors observed in the child care home for one hour before beginning to complete the assessments. After one hour they conducted the

Family Child Care Observerations (FCCO) of caregiver practices and the behavior of preschool-age children (ages 2½ through 5). These observations consisted of real time tallies of caregiver behavior and of behaviors of any preschool-age child present in the child care. These microcoded direct observations lasted for 20 minutes in Study 1 and 30 minutes in Study 2. After conducting the FCCO, assessors completed an observer rating of effective behavior management (EBM) and overall positive child behavior, as well as the Caregiver Interaction Scale (CIS). In Study 2 assessors additionally completed the CC-HOME. Following the observations (after about 1½ hours of observation), assessors completed the CCEI. The FCCO, observer ratings, and CIS were also collected during a second and third site visit and occurred an average of 7 weeks apart to obtain a representative sampling of caregiver and child behaviors. Random reliability checks were completed on 17% of the site visits. Complete data on the CCEI and the CC-HOME were available for all participants. Completion rates for the site visit assessments (the FCCO, observer ratings, and CIS) were 99% at T1, 95% at T2, and 91% at T3.

Measures

The comparison measures used to examine the validity of the CCEI were selected because they had a validated scale or scales with items that specifically measured constructs similar to those that the CCEI intended to assess. Although the FCCERS-R is highly utilized in child care research it was not chosen as a comparison measure due to few items that directly mapped onto the social domain of interest (i.e., one item under Space and Furnishing, one item under activities, and four items on interactions). Alternatively, multiple measurement methods were used to meet this goal, as is recommended given potential method effects (Fiske, 1987). The following measures were used across the two studies: the CCEI, the CIS, and two different measurement methods of caregiver practices and child behaviors—the Family Child Care

Observations, a microanalytic direct observation system with behaviors tallied in real time, and observer ratings, a macroanalytic approach involving global observer ratings. In Study 2, we also collected the CC-HOME, an additional microobservation code(caregiver *Active Attention*), and two additional measures on caregiver characteristics (specialized training and experience providing center-based child care). Except where noted, assessments were identical across Studies 1 and 2 and we combined samples for reliability estimates and analyses. The descriptive statistics and reliability scores are displayed in Table 1 for the CCEI and in Table 2 for the comparison measures.

Child Care Ecology Inventory (CCEI). Prior to study data collection, a team of research assistants was trained on the CCEI. First, a 2-hour training session that involved reviewing the instrument and scoring manual was conducted. Questions about each item content and scoring were answered throughout the training session. Second, the trainee was paired with an experienced and reliable assessor for practice with the instrument for one hour in a child care home. During this practice the trainer described the reason for each score to the trainee. Third, the trainee and trainer scored the CCEI independently during a live practice, which was followed by a reliability check and discussion about any discrepancies. If the trainee was more than one point off on an item they were considered unreliable for that item and further practice occurred. Typically, reliability was reached after two such practices, with a total of 5 hours spent on training and practice. After achieving reliability, the assessors collected study data.

Assessors completed the CCEI following about 1½ hours of observation during the first study site visit. Items on the CCEI were rated on a 4-point scale, from *not at all in place* (0) to *consistently in place* (3), and were averaged to create the seven a priori scales: *Enriched Environment, Organized Environment, Planned Activities/Routines, Monitoring, Positive*

Attention, Promoting Social Skills, and *Teaching Rules.* A short description of items for each scale is provided in the Appendix.

Chronbach's alpha was used to assess the internal consistency. Nunnally (1978) reports that alpha should be above .70, but not much higher than .90. Very good internal consistency was found for the CCEI scales (ranging from .72 to .88). One-way random effects intraclass correlation coefficients (ICCs) were calculated to assess the interrater reliability (McGraw & Wong, 1996; Shrout & Fleiss, 1979). The guidelines for interpreting the interrater reliability ICC scores are: 0–.20 slight reliability, .21–.4 fair, .41–.6 moderate, .61–.80 substantial, and .80–.90 nearly perfect (Donner & Eliasziw, 1987; Landis & Koch, 1977). Across the two studies, moderate to substantial interrater reliability, .48 to .65, was obtained for all scales except the fair reliability ICC for *Teaching Rules*, .30. Given greater experience with the instrument, the interrater reliability scores for the CCEI were higher in Study 2, where ICCs ranged from .54 to .71. Using data from the entire sample, the number of items, means, standard deviations, item reliability alphas, and interrater reliability ICC for each scale, as well as correlations among the scales of the CCEI, are in Table 1.

Caregiver Interaction Scale (CIS). The CIS (Arnett, 1989) measures caregiver sensitivity and involvement and has four factors: positive interaction, punitiveness, permissiveness, and detachment. Items are answered on a 4-point scale, from *not at all* (1) to *very much* (4). The internal consistency of the CIS sub-scales ranged from .72-.89 and the inter-rater reliability ICCs ranged from .33-.72 (see Table 2).

Child Care Home Observation for Measurement of the Environment (CC-HOME). The CC-HOME (Bradley et al., 2003), which originated from the HOME (Caldwell & Bradley, 1984) was collected only in Study 2 ($N = 134$). It measures the extent to which materials and

experiences in the child care home are stimulating. The scales from the CC-HOME used in this study included learning materials, physical environment, responsivity, and variety of stimulation. These scales and preschool-age children's social adjustment are strongly associated (Bradley & Corwyn, 2005). The CC-HOME consists of dichotomous scoring of whether the toys and materials, activities, or practices were absent (0) or present (1), and items were added to create the composite score. Following the recommendations provided by Bradley et al. (2003), the creators of the CC-HOME, interobserver agreement was used to establish the reliability of the scales from the CC-HOME. The CC-HOME scales had moderate to substantial interrater reliability, .45 to .63, shown in Table 2.

Family Child Care Observations (FCCO) of caregiver practices and child behavior. The Family Child Care Observations involves microsocial direct observations in which the caregiver and preschool-age children's behaviors are tallied within one-minute segments. Caregivers' *Positive Attention* to children (e.g., praising, approving) and *Negative Attention* (e.g., criticizing, disapproving) were tallied. In Study 2, the frequency of caregiver's *Active Attention* (i.e., neutral interactions with children) was also tallied. A rate-per-minute score (number of tallies divided by number of minutes) was computed from each of the frequency tallies. The rates per minute of children's noncompliance (not following a caregiver's directive to do or stop doing a behavior) and physical aggression were added to create a composite score of children's *Negative Behavior.* In addition, the number of adult caregivers and children were recorded during each observation for the calculation of the child–caregiver ratio.

ICCs were used to calculate interrater reliability for the FCCO scores across the two studies, and all estimates fell into the substantial to nearly perfect reliability range. The interrater ICC for caregiver *Positive Attention* to children was .79, *Negative Attention* was .92, and *Active*

Attention was .94. The interrater ICC for children's *Negative Behavior* was .70.

Observer ratings of *Effective Behavior Management* (EBM) and child positive behavior. Observers also rated the extent to which the caregiver used effective behavior management practices and how much the preschool-age children were engaged in positive behavior. The observer ratings of EBM are rated on a 5-point scale, from *did not occur* (1) to *constantly occurred* (5). Items were adapted from the coder impression inventory on teacher classroom management skills (Webster-Stratton et al., 2001), which were originally derived from the Oregon Youth Study observer impressions of parent monitoring and discipline (Capaldi & Patterson, 1989). This scale has 14 items: encouraged active participation, intrusive (reverse coded), gave clear instructions or directions, prepared children for transitions, made unreasonable requests (reverse coded), monitored children, gave reminders of expected behavior, had good influence on children, modeled positive behaviors, problem-solved with children, was responsive to children's individual differences, was positive and reinforcing toward children, consistent with rules and consequences, and had little or no influence over children (reverse coded). Items were averaged to create the scale. Good internal consistency (alpha = .83) was obtained for caregiver *Effective Behavior Management*.

Items for the ratings of positive child behavior were derived from the Classroom Atmosphere Rating Scale (Greenberg & Wehby, 1995). Eight positive child behavior items were rated on a 5-point scale from *very low* (1) to *very high* (5): compliance, handled transitions well, cooperation, followed rules, engaged in problem solving social difficulties, expressed feelings appropriately, level of enthusiasm and involvement, and level of focus and engagement. Internal-consistency alpha for this scale across the two studies in family child care was .94.

Child care provider characteristics. The primary caregiver completed a survey that

included questions on their ethnicity, race, gender, age, education, specialized training, and experience providing home- and center-based child care. One hundred and seventy-four (88%) of the participants provided this information via a caregiver questionnaire.

Analytic Procedures

To begin the analyses, mean scores were created for measures collected on more than one occasion (the FCCO, observer ratings, and CIS). Scales and observation data (rate-per-minute) displaying nonnormal distributions were normalized using a square root transformation. Pearson product-moment correlation coefficients were used to measure the strength of relationship, or convergent validity, of the CCEI scales with the CC-HOME (Bradley et al., 2003), the CIS (Arnett, 1989), the caregiver's years of experience providing in-home child care, and years of experience providing center-based child care. Spearman correlation was used to test the extent to which caregiver education and specialized training in early child care were associated with the CCEI scales. A partial correlation was used to measure the strength of relationship between the CCEI and observed caregiver practices controlling for child–caregiver ratio. This gives the degree of association between the measures after accounting for the common variance associated with the child–caregiver ratio.

Linear regression models with variables mean-centered were run to test our hypotheses regarding the concurrent associations between the CCEI and children's negative and positive behaviors. Regression models with mean-centered variables show the effect for each variable when other variables are at the mean, increasing interpretability of results. Models including hypothesized predictors were evaluated for collinearity. Collinearity can have devastating effects on regression statistics and as a result render them useless or misleading (Pedhazur, 1997). To avoid such misleading results, predictors having a variance inflation factor (VIF)

above 2.0 and a tolerance score below .40 were investigated for potential collinearity. When necessary, a principle components regression was run to identify predictors loading on a single factor. When multiple predictors loaded on a single factor, the predictor with the highest variance proportion was maintained in the model. With established predictors, a linear regression was performed with a single backwards step to remove variables that did not contribute to the model. Variables not contributing to the model were defined as having a *p*-value greater than .15. The final reduced model was run with the degrees of freedom associated with the full model to account for the cost of testing those variables removed (Harrell, 2001). In the model results, the Adjusted R^2 statistic is reported in addition to the *F* ratio and *p*-value. The Adjusted R^2 measures the proportion of variance in the dependent variable captured by the explanatory variables while taking into account the ratio of the number of explanatory variables in the model and the total sample size. For each predictor, we report the unstandardized B, its standard error (*SE*), and its standardized value, β. All analyses were conducted using IBM SPSS version 19.

Results

Concurrent Validity—Associations of the CCEI with the CIS, CC-HOME, and FCCO

To test the concurrent validity of the CCEI, we examined correlations between the CCEI scales and the CIS and the CC-HOME scales, the FCCO, and observer ratings (see Table 3). All the associations between the CCEI and the CC-HOME scales were significant; however, associations were higher between the two CCEI environment scales with the CC-HOME *Learning Materials* and *Physical Environment* scales (.51–.58) and between CCEI scales pertaining to child–caregiver interactions (*Positive Attention, Promoting Social Skills,* and *Teaching Rules)* and *Planned Activities/Routines* with the CC-HOME *Responsivity Scale* (.52–

.60). All other correlations ranged between .21–.49. All associations between the CCEI and CIS were also significant. The strongest associations were between the CCEI scales pertaining to child–caregiver interactions and the CIS *Positive Interaction* scale (.65–.78). The strongest negative associations were between CCEI *Monitoring* with CIS *Detachment* (-.61) and between CCEI *Teaching Rules* with CIS *Permissiveness* (-.58).

The observations of caregiver *Active Attention* and *Positive Attention* were moderately related to CCEI *Monitoring, Positive Attention, Promoting Social Skills,* and *Teaching Rules* (.23–.35), whereas very small statistically significant negative correlations were found between observed caregiver *Negative Attention* with CCEI *Enriched Environment* and *Organized Environment* (-.16 and -.14). The observer ratings of caregiver *Effective Behavior Management* had medium to high associations with all the CCEI scales (.43–.77); the highest associations were between *Effective Behavior Management* with CCEI *Positive Attention* (.75) and *Teaching Rules* (.77).

Associations between Caregiver Characteristics and the CCEI

We next examined the associations between the CCEI and caregiver education, specialized training in early child care, years of experience providing in-home child care, and years of experience providing center-based child care. Note that information about specialized training and experience providing center-based child care was collected in Study 2 only (N = 134). We report these results in Table 4. Education included five levels: high school or GED, some college courses, associate's degree, bachelor's degree, and some graduate level courses or degree. Level of education was modestly associated with *Enriched Environment, Organized Environment, Planned Activities/Routines, Positive Attention*, and *Promoting Social Skills* whereas specialized training was associated with *Organized Environment*. The number of years

of experience providing in-home child care was not associated with any of the CCEI scales, whereas years of experience providing center-based child care was moderately associated with all of the CCEI scales.

Associations between CCEI and Children's Social–Emotional Functioning

We examined concurrent associations between the CCEI and children's negative and positive behavior with multiple regression and report the results in Table 5.

Child negative behavior. Following our hypotheses, we first included child–caregiver ratio*, Monitoring, Organized Environment, Teaching Rules,* and *Promoting Social Skills* in the model with children's negative behavior. Collinearity diagnostics detected linearity between *Teaching Rules* and *Promoting Social Skills*. The condition indices and variance-decomposition proportions identified *Promoting Social Skills* and *Teaching Rules* as loading on the same factor. Though close in strength, *Promoting Social Skills* was removed from the model and *Teaching Rules* was maintained based on the variance-decomposition proportions (*Promoting Social Skills* = .79 and *Teaching Rules* = .84). With the predictors selected, a linear regression was run to assess predictor contribution. *Monitoring* had a *p*-value above .15 so was removed from the final model. The final model included child–caregiver ratio, *Organized Environment*, and *Teaching Rules.* The child–caregiver ratio and CCEI scales accounted for 8% of the variance in the rate of child negative behavior, $F(4,169) = 4.86$, $p = .001$, Adjusted $R^2 = .08$. Family child care with higher child–caregiver ratios had higher rates of child negative behaviors ($t = 2.31$, $p = .022$). Caregivers who organized the environment ($t = -2.45$, $p = .027$) had lower rates of child negative behaviors in their child care home. The model did not detect a significant effect for *Teaching Rules* ($t = -1.55$, $p = .106$).

Child positive behavior. Child–caregiver ratio*, Enriched Environment, Planned*

Activities/Routines, Teaching Rules, and *Positive Attention* were included in the model with children's positive behavior. Collinearity diagnostics detected linearity between *Teaching Rules* and *Planned Activities/Routines*. The condition indices and variance-decomposition proportions identified *Planned Activities/Routines* and *Teaching Rules* as loading on the same factor. *Teaching Rules* was removed from the model and *Planned Activities/Routines* was maintained based on the variance-decomposition proportions (*Planned Activities/Routines* = .86 and *Teaching Rules* = .38). With the predictors selected, a linear regression was run to assess predictor contribution. Child–caregiver ratio and *Enriched Environment* had *p*-values above .15 so they were removed from the final model. The final model included *Planned Activities/Routines* and *Positive Attention.* These CCEI scales accounted for 34% of the variance in the rate of child positive behavior, $F(4,190) = 26.17$, $p < .001$, Adjusted $R^2 = .34$. Children exhibited more positive behaviors in child care homes in which caregivers provided planned activities and routines ($t = 4.31$, $p < .001$) and positive attention to children ($t = 4.27$, $p < .001$).

Post Hoc Analysis. Given the potential for child–caregiver ratio to moderate the relationship between the CCEI constructs and child behavior, we conducted a post hoc analysis on the regression models that included child–caregiver interaction terms. For example, the relationship between organized environment and child behavior may be stronger for a child care home with 10 children and one caregiver compared to that with three children and one caregiver. We added the interaction terms of the predictor variables and child–caregiver ratio to each model. None of the interaction terms were significantly related to child negative behaviors ($p > .15$). Although child–caregiver ratio had a direct relationship with child negative behavior, it did not moderate the associations between the CCEI scales and child negative behavior. None of the interaction terms were significantly related to child positive behavior ($p > .15$). Child–caregiver

ratio did not have a direct or moderating relationship with child positive behavior.

Given the strong associations found between CCEI *Enriched Environment* and *Organized Environment*, we combined these two scales into one (alpha = .91) and conducted a post hoc analysis. This combined environment scale was entered into the above regression models, replacing the *Organized Environment* scale in the model for child problem behavior and added into the model for child positive behavior. Similar model results were obtained with this combined environment variable; it was significantly and negatively associated with child problem behavior (β = -.193, 95% CI for *B* [-.086, -.005], t = -2.23, p = .027), and was not significantly associated with child positive behavior.

Discussion

The aims of this paper were to demonstrate the reliability of the Child Care Ecology Inventory (CCEI) scales; examine the extent to which the CCEI is associated with other relevant measures of the family child care environment and caregiver practices; examine the extent to which caregiver education, training, and experience are associated with child care quality in the social domain as measured by the CCEI; and model the extent to which the CCEI scales are concurrently associated with children's social–emotional functioning in child care homes. Our overall goal was to demonstrate the promise of the CCEI as a measure of specific characteristics of the quality of home-based child care pertaining to the promotion of young children's positive social–emotional development for school readiness.

Moderate to substantial interrater reliability estimates were obtained for the CCEI scales, with the exception of a fair reliability for *Teaching Rules*. We believe that our training in the CCEI has improved over time, which resulted in improved interrater reliability scores for Study 2. Overall, the interrater reliability of the CCEI is adequate for research purposes. The

item-scale reliability for the CCEI scales was quite good, demonstrating strong internal consistency for the a priori scales.

Good convergent validity was demonstrated for the CCEI with comparison measures of the child care environment and caregiver practices. Stronger associations were found among the scales that were measuring similar domains. For example, the CCEI *Enriched Environment* and *Organized Environment* were more strongly associated with the CC-HOME *Learning Materials* and *Physical Environment* scales, whereas the CCEI *Planned Activities/Routines* scale was more strongly associated with the CC-HOME *Responsivity* and *Variety of Stimulation* scales. As expected the CCEI *Positive Attention* and *Promoting Social Skills* scales were more strongly associated with the CC-HOME *Responsivity* and the CIS *Positive Interaction* scales. However, we did not expect the CCEI *Teaching Rules* to be related to these same scales as well. It may be that when caregivers teach children the expectations and rules proactively, they have more opportunities to be responsive and have more positive interactions with children. The stronger negative association between CCEI *Teaching Rules* and CIS *Permissiveness* was expected, as was the negative association between CCEI *Positive Attention* and CIS *Punitiveness.*

The direct observations of caregiver practices were not as highly associated with the CCEI as we expected; however, correlations were in the expected direction. The CCEI scales pertaining to the environment were not associated with observed caregiver *Active Attention* and *Positive Attention,* whereas small negative associations were found with observed caregiver *Negative Attention*. Modest associations were found between observed *Active Attention* and *Positive Attention* with the CCEI measures of caregiver practices. The highest associations were as expected, between observed *Positive Attention* and CCEI *Positive Attention* (.35) and between observed *Active Attention* and CCEI *Monitoring* (.31). Yet no associations were found between

observed *Negative Attention* and CCEI caregiver practices. As generalizability studies have shown, however, microsocial coded data tend to vary from session to session (e.g., McWilliam & Ware, 1994) and perhaps the relationships would have been stronger with more than three observations.

On the other hand, moderate to strong positive associations were found between the observer ratings of caregiver EBM with all of the CCEI scales. The strongest associations were found for EBM with CCEI *Positive Attention* and *Teaching Rules.* Since the items for the observer ratings of EBM mainly focus on proactively teaching rules and providing positive attention, the strongest associations with the CCEI *Positive Attention* (.75) and *Teaching Rules* (.77) scales were expected. We expected modest correlations between EBM and CCEI *Monitoring* and *Promoting Social Skills,* because there is one item on monitoring and one item on helping children to problem solve in the EBM scale. We were surprised to notice the significant correlations between EBM and the CCEI scales pertaining to the environment and planning of activities. Perhaps the observer ratings of EBM reflect a more global rating of child care quality than originally expected.

The relationships between caregiver education, training, and experience were notable. First of all, caregiver education was only modestly related to five of the CCEI scales, *Enriched Environment, Organized Environment, Planned Activities/Routines, Positive Attention* and *Promoting Social Skills.* On the other hand, having specialized training in child development or early childhood education was only modestly related to *Organized Environment.* These results may indicate that even well-educated caregivers and those with specialized training are not necessarily prepared for creating a quality home child care that helps promote children's positive social development. It may be that these aspects of quality are not specifically taught, or that it

takes more than course work or one-time workshops to acquire and bring these skills into practice. None of the CCEI scales were related to caregivers' experience in providing home-based child care, yet caregivers' experience in providing center-based child care was modestly associated with each of the CCEI scales. Although the correlations are modest and were merely exploratory (asked in Study 2 only, $N = 134$), experience in center-based child care appears to be valuable. Having a variety of experiences working with a group of young children may strengthen a caregivers' repertoire. It may be that alternative models for training that include field experience in good quality child care (both center- and home-based) and mentorship with experienced, skilled caregivers could improve home-based caregiver practices.

As outlined in our conceptual model (Figure 1), we expected that specific caregiver practices and features of the child care environment would contribute to positive social developmental competencies in preschool-age children that are related to subsequent school readiness. The mixed results in our findings demonstrate that different environmental characteristics and caregiver practices are associated with different aspects of children's social development. These results suggest a need for further specificity of the model and that more research is needed to validate conclusions. Our results indicate that the CCEI scales show promise for assessing important features in home-based child care that are related to children's social–behavioral functioning. The child–caregiver ratio was positively associated with children's negative behaviors (noncompliance and aggression) while the CCEI *Organized Environment* and *Teaching Rules* were negatively associated with children's negative behaviors. The child–caregiver ratio did not moderate the relationship between the child care environment and caregiver practices with child problem behavior as expected, however. CCEI *Monitoring* was not concurrently associated with children's negative behaviors as expected. Children

exhibited fewer behavior problems when the environment was organized, when caregivers taught children the rules, and when there was a lower child–caregiver ratio. This finding aligns with the earlier research showing the importance of organizing the play spaces and toys in early childhood settings, including home-based child care, for preventing problem behaviors (e.g., NICHD ECCRN, 2000; Trawick-Smith, 1992; Wachs et al., 2004). Causality cannot be inferred from these multiple regression models, so we do not yet know whether improvements in any of these child care variables will lead to decreases in children's problem behavior.

On the other hand, children demonstrated more socially skilled behaviors when caregivers planned activities and routines and when they provided more positive attention to children. This supports the importance for preplanning activities and following routines in family child care, similar to findings of Kryzer and colleagues (2007). This also confirms that the relationships found between providing positive attention to children and positive child behavior in center-based care (Howes et al., 1992) hold true in family child care as well.

It is important to note that we accounted for only 8% of the variance in children's problem behavior with the CCEI scales. This translates to a moderate effect size (Cohen, 1988) and is larger than those found in the review of associations between quality child care measures and children's behavior problems (Burchinal et al., 2011). Accounting for a small portion of the variance is likely in part due to the low frequency yet high variability of problem behaviors. It is also an indication that the CCEI scales may not be measuring all the important aspects of the home-based child care environment that promote socially skilled behavior in children. Moreover, even when effective child care environments and caregiver practices are in place, some children may continue to exhibit challenging behavior. At times, children may present problem behaviors for reasons outside of the child care setting (e.g., illness, tiredness, stressful

events at home). The combination of family and child care environments a child is exposed to more strongly predicts children's problem behaviors than one of the environments alone (Watamura, Phillips, Morrissey, McCartney, & Bub, 2011). Children who exhibit consistently elevated rates of problem behavior likely need a more individualized approach for clearly defining the problem behaviors and analyzing the contextual factors that maintain those behaviors, such as using functional assessment and the development of individual behavior support plans (Carr, 1994; Duda, Dunlap, Fox, Lentini, & Clarke, 2004; Dufrene, Doggett, Henington, & Watson, 2007; O'Neill et al., 1997).

The variables in our conceptual model that were not associated with children's behavior were enrichment of the environment and caregiver monitoring. Our hypothesis was based on earlier findings from others showing that an enriched environment, one with an activity center and a variety of toys that promote social engagement, provides greater opportunity for positive interactions among children (e.g., Hendrickson et al., 1981). It may be that if the environment is not well organized or is highly chaotic, then the enrichment of the environment no longer matters. We did find that lack of organization of the family child care environment was associated with problem behaviors. It is also possible that enrichment of the environment promotes more interactions among children, but in absence of clear rules, those interactions may not be positive. Similarly, although monitoring is an important aspect of safety in child care, it may not be enough to facilitate positive interactions among children. One needs to monitor or know what children are doing in order to provide positive attention and to use teachable moments to prompt and remind children of rules. In other words, monitoring may be a minimum requirement, but not sufficient for promoting socially skilled behavior in children.

The development of the CCEI was informed by research of features in child care settings

that contribute to the promotion of children's social competencies (see introduction). Because there is a scarcity of research examining these links in home-based child care settings, much of what we know is based on research in center-based settings. There may be important features of home-based child care that have not been included in the CCEI measures. For example, there may be an advantage of having group care in a home-like setting to aid in children's transition from the home to a school setting. This may be particularly true for some subgroups of children (e.g., children who exhibit anxiety), as results from Coplan et al. (2010) could imply. We need to continue to expand our knowledge base regarding ways to facilitate young children's social development in a variety of care settings.

Study Limitations

This study was correlational in that it investigated concurrent associations of the CCEI with other measures of the family child care environment, caregiver practices, and children's behavior. Inferences of causation in any of the results are therefore not appropriate.

A second limitation is that this study is limited to child care homes in one state, Oregon. Regulations regarding requirements for family child care providers differ by state (National Association of Child Care Resource & Referral Agencies [NACCRRA], 2010). Although we believe that these regulations are likely to have only a minimal impact on the associations examined in this study, generalizability may be limited. According to the NACCRRA (2010) report, Oregon ranked 23rd out of 50 states on licensing requirements for home-based child care such as caregiver education and training, safety and health inspections, child–caregiver ratios, and employee background checks (lower rankings indicate lower requirements). The sample includes child care homes in a variety of communities (rural, suburban, urban) and has some diversity of participants. There is limited representation across all race and ethnic categories,

limiting the generalization of study results.

The third limitation is that the CCEI focuses on ways in which home child care providers can facilitate social competency skills for preschool children. We purposefully focused the measure for this age group with the goal of improving school readiness in children who attend home-based child care. However, home child care providers typically care for children of multiple ages. Although not addressed in the present study, methods for promoting positive social development in infants and toddlers are likely to differ in some ways than those for preschool-age children. For this reason, we are developing a CCEI measure for infants and toddlers and are currently pilot-testing interrater reliability on the instrument.

A fourth limitation to note is the fair interrater reliability for the CCEI *Teaching Rules* scale (ICC = .30) and the CIS *Permissiveness Scale* (ICC = .33). We have improved the interrater reliability for the CCEI scales by refining the scoring protocol, which was accomplished following the first study and prior to the second study. In the second study the interrater reliability for *Teaching Rules* was greatly improved (ICC = .54). Although the internal consistency of these scales was good, .88 for CCEI *Teaching Rules* and .72 for CIS permissiveness, given the fair interrater reliability results, the associations with these scales may have underestimated the associations between the underlying constructs. Until improved interrater reliability can be established, however, we suggest some caution when interpreting results for these scales.

A fifth limitation is that the observer rating of children's positive behavior which was used as a comparison measure in this study does not measure a breadth of prosocial peer interaction behaviors; one item measures cooperation (this includes cooperation with other children and with the caregiver), another measures the children's attempts to problem solve

social difficulties, and another pertains to expressing feelings appropriately (which can involve encounters with other children). The other five items of this comparison measure focus on important school-readiness classroom skills, such as following rules and engagement in activities. Further study of the ways in which the CCEI scales are related to a wider breadth of prosocial peer interaction skills is warranted.

Implications for Practice, Policy, and Future Research

This study demonstrates the reliability and concurrent validity of the CCEI for measuring the quality of the family child care environment in the social domain. Since this study investigated concurrent correlations, it will be advantageous for future work to investigate predictive relationships, such as how home-based child care quality in the social domain as measured by the CCEI predicts children's socially skilled behavior over time. A longitudinal study that examines children's behavioral outcomes as they enter school will provide further support for our conceptual model. Additionally, investigating intervention efficacy in changing these child care environmental features and caregiver practices and subsequently improving children's social behaviors will also contribute to the field. An exploration of mediation that examines the extent to which changes in the child care environment and caregiver practices are associated with changes in children's behavior will provide additional validation for the importance of these family child care quality constructs for promoting social competence.

Preliminary results from this study show promise for the CCEI as a measure of quality of family child care in the social domain. As the CCEI was derived from a measure that was used as a consultation tool, we expect that it will be useful for that purpose. It is easy to use and easy to interpret which areas in the child care home may need improvement. Further work needs to be conducted before promoting large-scale dissemination of the measure for this purpose.

The correlational work demonstrates that different aspects of home-based child care quality in the social domain are related to negative behavior and positive behavior of preschool-age children. This indicates that effective methods for decreasing challenging behavior may differ from those that are effective in increasing positive behavior, although the causal relationships are yet to be tested.

This study also highlights the need for research that examines the ways in which environmental features and caregiver practices in home-based child care relate to, and potentially impact, child behavior. Studies have examined the link between family child care quality and caregiver characteristics (e.g., Doherty, Forer, Lero, Goelman, & LaGrange, 2006; Raikes, Raikes, & Wilcox, 2005) and how training impacts family child care provider practices (e.g., Bordin et al., 2000; Burchinal et al., 2002; Kontos et al., 1996), but research showing direct associations between those quality indicators and child behavior in family child care and subsequent developmental outcomes is sparse. Quality practices that foster positive social competencies are important regardless of care setting. The findings of this study suggest that many of the CCEI scales are relevant for family child care settings (i.e., having an organized environment, teaching rules, having planned activities and routines, and providing positive attention). The study results also indicate that there are likely other important factors that may contribute to children's social development that were not measured in this study. Given the variance among states regarding regulations and policy for family child care, it is essential to gain a more in-depth understanding of specific aspects of family child care quality that are directly linked to children's social competencies and school readiness skills.

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Table 1

Descriptive Statistics, Reliability Data, and Intercorrelations for the CCEI Scales

CCEI Scale	Number of Items	*M*	*SD*	Min	Max	Internal Consistency α	Interrater Reliability ICC	Intercorrelations among Scales					
								2	3	4	5	6	7
1. Enriched Environment	6	2.07	0.61	0.50	3.00	.88	.65	.79*	.61*	.33*	.44*	.52*	.48*
2. Organized Environment	6	1.81	0.58	0.33	3.00	.83	.55	--	.64*	.43*	.44*	.53*	.52*
3. Planned Activities/ Routines	8	1.75	0.56	0.00	3.00	.86	.61	--	--	.55*	.65*	.70*	.71*
4. Monitoring	4	2.04	0.52	0.00	3.00	.72	.60	--	--	--	.51*	.48*	.53*
5. Positive Attention	5	1.85	0.52	0.40	3.00	.77	.48	--	--	--	--	.74*	.73*
6. Promoting Social Skills	4	1.81	0.71	0.00	3.00	.86	.50	--	--	--	--	--	.77*
7. Teaching Rules	5	1.75	0.64	0.00	3.00	.88	.30	--	--	--	--	--	--

Note. $N = 198$. Internal consistency was estimated with Cronbach's α.
*$p < .05$.

Table 2

Descriptive Statistics and Reliability Data for the Comparison Measures

	Number of Items	*M*	*SD*	Min	Max	Internal Consistency α	Interrater Reliability ICC
Caregiver Interaction Scales (CIS)							
Positive Interaction	10	2.94	0.51	1.30	4.00	.89	.66
Punitiveness	9	1.28	0.28	1.00	2.56	.73	.51
Permissiveness	3	1.58	0.47	1.00	3.33	.72	.33
Detachment	4	1.31	0.31	1.00	4.00	.82	.72
CC-HOME Scales[a]							
Learning Materials[a]	7	5.06	1.74	0.00	7.00	-	.53
Physical Environment[a]	7	6.66	0.63	3.00	7.00	-	.45
Responsivity[a]	7	6.49	0.79	2.00	7.00	-	.51
Variety of Stimulation[a]	9	7.34	1.25	3.00	9.00	-	.63
Family Child Care Observations (FCCO)[b]							
Positive Attention	1	0.53	0.20	0.00	1.24	-	.79
Negative Attention	1	0.13	0.13	0.00	0.67	-	.92
Active Attention[a]	1	1.27	0.22	0.76	1.71	-	.94
Negative Child Behavior	2	0.22	0.14	0.00	0.71	-	.70
Observer Ratings							
Effective Behavior Mngt.	14	3.78	0.44	2.14	4.64	.83	.60
Positive Child Behavior	8	3.59	0.69	1.50	5.00	.94	.52

Note. The CIS, FCCO, and observer ratings were collected three times and scores are an average across the three time points. The CC-HOME scales were collected once during the first observation.
[a]Study 2 only ($N = 134$). [b]The FCCO are rate-per-minute with square root transformation.

Table 3

Concurrent Correlations among CCEI Scales and between the CCEI and the CC-HOME, CIS, and Observations

Measures	CCEI Enriched Environ.	CCEI Organized Environ.	CCEI Planned Activities	CCEI Monitoring	CCEI Positive Attention	CCEI Promote Soc. Skills	CCEI Teach Rules
CC-HOME[a]							
Learning Materials[a]	.55*	.53*	.39*	.23*	.22*	.34*	.30*
Physical Environment[a]	.51*	.58*	.49*	.43*	.36*	.42*	.41*
Responsivity[a]	.37*	.34*	.54*	.47*	.60*	.52*	.55*
Variety Stimulation[a]	.31*	.32*	.43*	.21*	.28*	.37*	.35*
CIS							
Positive Interaction	.45*	.44*	.60*	.47*	.78*	.65*	.72*
Detachment	-.21*	-.27*	-.37*	-.61*	-.46*	-.44*	-.44*
Permissive	-.16*	-.21*	-.42*	-.40*	-.40*	-.38*	-.58*
Punitive	-.26*	-.32*	-.30*	-.14	-.47*	-.39*	-.38*
FCCO							
Active Attention[a]	.05	.07	.17*	.31*	.29*	.26*	.29*
Positive Attention	.13	.10	.26*	.23*	.35*	.25*	.25*
Negative Attention	-.16*	-.14*	-.03	.08	-.02	.02	-.07
Observer Ratings							
Effective Behavior Management	.44*	.43*	.63*	.52*	.75*	.64*	.77*

[a]Study 2 only (N = 134).
*$p < .05$.

Table 4

Concurrent Correlations between Caregiver Education, Training, and Experience with the CCEI

CCEI Scale	Level of Education	Specialized Training[a]	Experience Home-Based Child Care	Experience Center-Based Child Care[a]
Enriched Environment	.22*	.17	.12	.24*
Organized Environment	.18*	.23*	.01	.18*
Planned Activities/Routines	.19*	.06	-.04	.21*
Monitoring	.13	.05	.01	.17*
Positive Attention	.21*	.03	-.10	.23*
Promoting Social Skills	.17*	.03	-.09	.25*
Teaching Rules	.13	-.07	.02	.17*

[a]Study 2 only ($N = 134$).
*$p < .05$.

Table 5

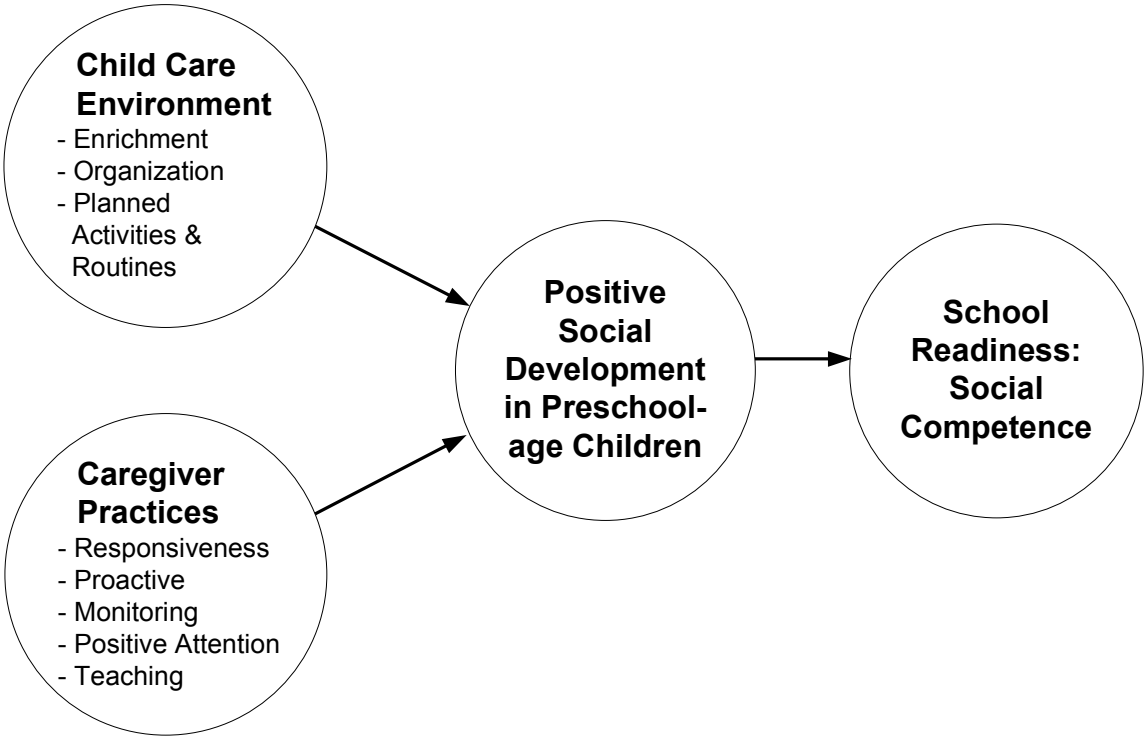
Multiple Regression of CCEI Scales on Child Negative and Positive Behavior

	Unstandardized Coefficients		Standardized Coefficients		95.0% Confidence	
Child Care Quality	*B*	*SE*	β	*p*	Lower Bound	Upper Bound
			Children's Negative Behavior[a]			
Child–Caregiver Ratio	.013	.006	.169	.022	.002	.025
Organized Environment	-.048	.020	-.209	.015	-.087	-.009
Teaching Rules	-.028	.018	-.131	.124	-.064	.008
			Children's Positive Behavior[b]			
Planned Activities/Routines	.404	.094	.329	< .001	.220	.589
Positive Attention	.435	.102	.326	< .001	.234	.635

Note. We regressed the hypothesized CCEI scales on child negative behavior and child positive behavior in two separate multiple regression models and report the unstandardized coefficients, standardized coefficients, *p*-values, and 95% confidence intervals of *B*. Scales that did not predict child behavior ($p > .15$) were removed. Observed children's negative behavior is rate-per-minute with square root transformation.

[a]For children's negative behavior $F(4,169) = 4.86$, $p = .001$, Adjusted $R^2 = .08$. [b]For children's positive behavior $F(4,190) = 26.17$, $p < .001$, Adjusted $R^2 = .34$.

Figure 1. Conceptual Model of Critical Child Care Features



Appendix

Items for Each of the CCEI Scales

Enriched Environment • Activity centers designed to promote social interactions (e.g., dramatic play) • Materials that encourage children to engage in a variety of play with others • Children actively engaged with materials in all child care play areas • Amount of materials in each area adequate for the number of children • Variety of materials that encourage cooperative play and social interactions • Materials match developmental level of children
Organized Environment • The child care space is divided into clearly defined activity centers/areas • Space within activity centers are not overcrowded • Activity centers are designed to promote the intended activities • Activity spaces that are next to each other are compatible • Toys and materials are accessible to children during free play activities • Toys and materials are organized and stored so that children can easily put them away in the correct place
Planned Activities/Routines • Activities organized in a sequence within time periods with clear beginnings and endings • Schedule showing daily routines with pictures and words is posted • The schedule minimizes waiting time • The schedule provides opportunities for structured and unstructured activities. • The schedule provides opportunities for active and quiet, calm activities. • The activities appear to have been planned ahead of time • Transitions are planned and organized so that they run smoothly • Materials for activities are prepared ahead of time.
Monitoring • Activity centers/areas have low boundaries so that all children are visible • Caregiver scans the assigned areas at least once a minute • Caregiver circulates through the child care or assigned area • Caregiver maintains proximity to children likely to need extra assistance/support

Positive Attention • Children receive positive attention when doing what is expected of them • Caregiver uses descriptive praise to encourage appropriate behavior • Caregiver uses prompts and feedback to encourage children to interact positively with one another throughout daily routines and activities • Caregiver interacts with children who are playing appropriately without interrupting their concentration and interactions • Caregiver ignores inappropriate behaviors that are not infractions of rules or that do not jeopardize safety
Promoting Social Skills • Sharing and turn taking is promoted • Schedule includes planned activities for promoting development of social skills • Caregiver promotes social skills by prompting children to interact positively with one another • Caregiver promotes self-regulation by prompting children to manage and monitor their own behavior throughout child care activities
Teaching Rules • Rules and expectations seem to be clear to the children • Children are reminded of child care rules proactively, prompting appropriate behavior • Caregiver handles rule infractions in a consistent manner • Children are taught expectations for new or unfamiliar activities • Children are reminded of expectations for activities, routines, and transitions proactively— before the activity/transition occurs.