Early Parent–Child Interactions and Early Literacy Development

The relationship between parent–child interactions and early literacy skills for 27 families living in low-income households was examined. Parent–child interactions in “simulated” daily experiences were videotaped when the children were 14, 24, and 36 months old. These tapes were coded with the Parent-Infant/Toddler Interaction Coding System (PICS; Dodici & Draper, 2001), a scale that rates child language, parent language, emotional tone, joint attention, parental guidance, and parental responsivity. These behaviors were related strongly to early literacy skills in the areas of receptive vocabulary, symbolic representation, and phonemic analysis, which were measured in the spring prior to kindergarten entry. In addition, observed parent–child interactions were better predictors of early literacy skills than was a parent report of home literacy experiences.

A sociocultural perspective of child development emphasizes that infants, toddlers, and young children learn many skills through adult–child interactions. Vygotsky (1986) posited that social interactions with an adult within the cultural contexts of society are fundamental to cognitive development. Building on Vygotsky’s theories, Rogoff (1990) proposed the idea that skill development requires the interaction of two parties, a teacher (typically, an adult) and a learner (typically, a child). She called this an “apprenticeship-type relationship” that involved “guided participation” occurring during daily experiences. The central tenet thus is that children learn via daily interactions with their parents and other adults during play, teaching, and routine situations—some of which are frustrating. This work has laid the theoretical groundwork for empirical examination of how specific characteristics of parent–child interactions influence skill development.

RELATIONSHIP OF PARENT–CHILD INTERACTIONS TO LATER SKILL DEVELOPMENT

Researchers funded by the National Institute of Child Health and Human Development (NICHD, Early Child Care Research Network, 1999) have stated that “supportive, warm, and engaged parent-child interactions are associated with the child’s emerging competencies in social, cognitive, and linguistic domains throughout early and middle childhood” (p. 1399). Scientists have demonstrated consistently that these interactions related to positive language and cognitive development contain elements of joint attention (Tomasello & Farrar, 1986), parental responsibility (Bornstein & Tamis-LeMonda, 1989; Landry, Smith, Swank, Assel, & Vellet, 2001), positive emotional tone (Strada, Arsenio, Hess, & Holloway, 1987; NICHD, 1999), and appropriate parental guidance or scaffolding (Adamson & Bakeman, 1984). Furthermore, the amount of talk and the guidance style that parents use with their children have also been related to later language and cognitive development (Hart & Risley, 1995; Walker, Greenwood, Hart, & Carta, 1994). Specific characteristics of these interactions, which are discussed next, are important contributors to young children’s skill development.

Responsivity/Sensitivity

Although defined slightly differently across studies, both responsivity and sensitivity have been related consistently to positive child outcomes. In general, researchers have shown that higher levels of maternal responsivity and sensitivity are associated with better outcomes in the
areas of social, cognitive, and language skills (Barnard, 1997; Lamb-Parker, Boak, Griffin, Ripple, & Peay, 1999; Landry, Smith, Miller-Loncar, & Swank, 1997; Landry et al., 2001). Maternal responsiveness is defined as a mother’s prompt, contingent, and appropriate behaviors in response to a child’s actions (Bornstein & Tamis-LeMonda, 1989). Bornstein and Tamis-LeMonda’s cross-cultural study, completed with families from the United States and Japan, revealed that maternal responsiveness toward 4- to 5-month-old infants was related to children’s competencies at age 4 years.

Parental sensitivity is the degree to which parents adapt to children’s needs and abilities (Beckwith & Rodning, 1996). Beckwith and Rodning observed maternal sensitivity toward preterm infants during parent–infant interactions in a laboratory setting when the infants were 13 and 20 months old to examine the relationship between these interactions and later social, language, and cognitive development. They found statistically significant correlations between later child language and social skills and maternal sensitivity, child engagement, and dyadic fit. These authors demonstrated that a relationship existed between parental responsiveness and later language and social skills; however, measures of early literacy skills were not included in their study.

Emotional Tone
The emotional tone, or affective aspect, of parent–child interactions has also been found to be related to child development (Barnard, 1997; Estrada et al., 1987; Hart & Risley, 1995; Lamb-Parker et al., 1999; Pianta & Egeland, 1994). Positive statements, comments, praise; smiles and laughter; nurturing embraces or touches; and limited negative comments or yelling are some of the parental behaviors that have been related to positive child outcomes (Barnard, 1997). Researchers have shown that the level of positive affect present in parent–child interactions is influenced by a family’s socioeconomic status as well. In their longitudinal study, Hart and Risley (1993) found that children living in low-income households heard twice as many prohibitions as affirmative statements from their parents compared to children living in middle- and upper-income households. These negative comments made by parents to their children in their first years of life appear to have had lasting effects because they were related negatively to the children’s later cognitive and language abilities.

Engagement
Joint attention, the amount of time a parent and child are mutually focused on a single object or activity (Tomasello & Farrar, 1986), is a main element of parent–child engagement. A good number of researchers have demonstrated that joint attention plays a significant role in language and skill development (Harris, Jones, Brookes, & Grant, 1986; Landry et al., 1997; Saxon, 1997; Tomasello & Farrar, 1986; Tomasello & Todd, 1983). In general, these researchers have revealed that children are more likely to acquire novel words and skills when their parents demonstrate joint attention than when children change their attention to a different, adult-selected object not currently in their focus.

Parental Talk
Children from low-income families are less likely to have conversations with adults and are exposed to fewer words than children from families with higher socioeconomic backgrounds (Hart & Risley, 1995; Snow, Tabors, & Dickinson, 2001). An intensive review of the literature revealed a strong, consistent, and positive relationship between the amounts of time a child talked with a parent or adult and later literacy skills (Snow, Burns, & Griffin, 1998). Furthermore, Hart and Risley (1995) found that the number of words parents said to their children per hour was related to the children’s language and cognitive skills at age 3 years and expressive language at age 9 years. Walker and her colleagues (1994) found that children’s vocabulary at age 3 years predicted their school achievement levels (reading and spelling) in kindergarten through third grade. Other researchers have linked the amount of time children engage in conversations with adults to later skill development (DeTemple, 2001; Rush, 1999).

Parental Guidance
Parental guidance style has been defined as the relative amount of prompting that a child experiences or how often the child is asked—rather than told—what to do (Hart & Risley, 1995). In parent–child interactions, this may include various strategies in which the parent provides more control and structure through increased information and less choice (Landry et al., 1997; Landry et al., 2001), depending on the child’s skill levels. The degree of guidance is based on the utterances parents use and can be categorized by the responses their utterances prompt. Directive statements demand prompt action (e.g., “Get your coat on”), whereas questions or suggestive statements ask for a response (e.g., “Can you get your coat on?”). A third type of utterance used by parents, informative statements (e.g., “It’s cold outside; do you think you’ll need your coat?”), give limited or no direction and allow a child to use the information as he or she chooses.

Parental directiveness has been consistently found to inhibit a child’s vocabulary (Landry et al., 1997; Tomasello & Farrar, 1986), is a main element of parent–child engagement. A good number of researchers have demonstrated that joint attention plays a significant role in language and skill development (Harris, Jones, Brookes, & Grant, 1986; Landry et al., 1997; Saxon, 1997; Tomasello & Farrar, 1986; Tomasello & Todd, 1983). In general, these researchers have revealed that children are more likely to acquire novel words and skills when their parents demonstrate joint attention than when children change their attention to a different, adult-selected object not currently in their focus.
have examined later language development (Landry et al., 1997; Rodning, 1996), or on specific developmental periods in specific populations, such as preterm infants (Beckwith et al., 1987). Other researchers have focused on parent–child interactions and later language and cognitive development, but these studies have generally included samples of children over the age of 3 years (Dickinson & Tabor, 2001; Estrada et al., 1987). Still other researchers have focused on specific populations, such as preterm infants (Beckwith & Rodning, 1996), or on specific developmental periods (e.g., between the ages of 6 months and 40 months); few have examined later language development (Landry et al., 1997). Subsequent work by Landry and her colleagues has provided evidence that not only early maternal responsiveness but also consistent responsiveness throughout infancy and the preschool years is related to more optimal cognitive and social development at age 54 months, especially for preterm infants (Landry et al., 2001).

Another research team focused on the long-term effects of parent–infant/toddler interactions, beginning when the children were 6 months of age and related these skills to language and cognitive skills demonstrated in early elementary school (Hart & Risley, 1995; Walker et al., 1994). However, these researchers focused on how early child language skills predicted reading outcomes and academic success in early elementary school (Walker et al., 1994). They did not examine the full range of parent–child interaction variables that may have influenced later outcomes, nor did they measure intermediate outcomes at the early elementary grades (Hart & Risley, 1995). Taken together, their findings emphasize the point that much still needs to be learned about how parent–infant/toddler interactions are related to early literacy skills.

**Parent–Child Interactions in Low-SES Families**

Children who live in low-income households are at risk for (a) consistently scoring lower on measures of intelligence and (b) experiencing academic difficulties (Same-ruff, Seifer, Baldwin, & Baldwin, 1993). These children are also more likely to have difficulty learning to read, compared to children in middle-income households, and the differences are evident as early as kindergarten (Dickinson & Snow, 1987). In the 1960s, the United States began nationwide intervention programs in an effort to help preschool children from low-income households have an “even start” when they entered school. It has been suggested, however, that interventions implemented after children are 3 years old, especially for children living in low-income households, may have a limited impact on later cognitive or other developmental skills due to the cumulative effects of experiences during the first 3 years of life (Hart & Risley, 1995).

A growing awareness that skill development during the preschool years is related strongly to later academic success has brought increased attention to the understanding and measurement of early predictors of school achievement (Adams, 1990; Snow et al., 1998; Walker et al., 1994). In addition, the level of early academic skills has been found to predict later academic success or failure (Adams, 1990; Cunningham & Stanovich, 1997; Juel, 1988; Slavin, Karweit, Wasik, Madden, & Dolan, 1994). The levels of literacy and language skills that children have at kindergarten and first grade strongly predict school achievement and even completion of high school (Cunningham & Stanovich, 1997). Several specific skills acquired by many children during the preschool years have been found to facilitate literacy development during the early elementary school years. These skills include letter naming (Wagner, Torgesen, & Rashotte, 1994), phonological awareness (Adams, 1990; Snow et al., 1998), and vocabulary development (Adams, 1990; Dickinson, Cote, & Smith, 1993; Hart & Risley 1995; Walker et al., 1994).

The relationship between early academic skills and later school performance, and the academic risks that children from low-income families face, provide a strong rationale for effective early literacy activities and interventions designed to enhance overall academic success. Given this point, efforts to identify key components of early home activities and/or intervention experiences that yield desirable results will be important.

One variable to consider when evaluating factors that influence children’s early literacy skills is the area of literacy experiences within their homes. Ethnographic studies have linked early home experiences with later skill development (Purcell-Gates, 1996; Purcell-Gates & Dahl, 1991); however, these types of ethnographic studies are costly, typically involve a small sample, and may have limited generalizability. Studies utilizing less invasive, less costly objective measures (Whitehurst, 1993) have identified links between home literacy experiences and language skills for children from low-income households (Payne, Whitehurst, & Angell, 1994; Rush, 1999). It should be noted that these relationships were demonstrated with children approximately 54 months old, an
age after which timely opportunities to intervene in early parent–child interactions have passed and possible foundations for early literacy skills have been established. Therefore, broadening understanding of the relationships between early parent–child interactions and early literacy skills needs to be done.

Overall, researchers have established links between early parent–child interactions and early language skills, as well as between language skills and academic skills. The connections between parent–child interactions and early literacy skills have not been well established, however. The current study thus was undertaken to examine the relationships between early parent–child interactions and early literacy skills demonstrated at the end of the preschool period. The study addressed the following three specific research questions:

1. What is the relationship between parent–infant/toddler interactions and early literacy skills for children from low-income families?
2. Do parent–infant/toddler interactions, as measured at 14, 24, and 36 months, or a parent report about home literacy experiences, taken at approximately 54 months of age, better predict early literacy skills?
3. Do parent–infant/toddler interactions from one simulated activity predict early literacy skills as well as parent–infant/toddler interactions from the combination of three different types of simulated activities?

**Method**

This study was part of a larger longitudinal study conducted by a midwestern university, Mathematica Policy Research, Inc., and the Early Head Start National Research Consortium. The primary purpose of the larger study was to investigate the long-term effects of Early Head Start programs. The focus of the current study was investigating the relationship between parent–infant/toddler interactions and early literacy skills.

**Participants**

Participants in this study were families who (a) had a child born between September 1995 and September 1996, (b) were income-eligible for Early Head Start (EHS) services at that time, and (c) had enrolled in the EHS National Evaluation study within a year after their child had been born. All participants in this study completed annual child assessments and parent interviews when their children were approximately 14, 24, and 36 months of age. A similar follow-up assessment was completed the spring or summer prior to the children’s age eligibility for kindergarten. Twenty-seven families met the criteria for this study; 13 (48%) of the children who were assessed were boys. Maternal age ranged from 15 years to 34 years at the time of the child’s birth, with a median age of 23.5 years ($SD = 5.03$). Education levels of the participants ranged from completing: 5th to 8th grades (3%), completing 11th grade (3%), completing high school or the equivalent (44%), attending some college but no degree (41%), and obtaining a bachelor’s degree (7%). All of the participants were Caucasian.

**Measures**

Direct measures of child and parent functioning were gathered when the children were 14, 24, 36, and approximately 54 months of age. Parent–infant/toddler interactions were videotaped during a session structured to elicit teaching, play, and frustration behaviors. These tapes were later coded by research assistants using the Parent-Infant/Toddler Interaction Coding System (PICS; Dodici & Draper, 2001). All predictor and outcome variables, as well as covariates and the times at which these measures were gathered, are presented in Table 1, with brief descriptions provided in the text.

**Predictor Variables.** The PICS was used to rate six items relevant to the quality of parent–child interactions:

1. infant/toddler language (the amount of age-appropriate language demonstrated by the infant/toddler);
2. parent language (the amount of developmentally appropriate language the parent used with the infant/toddler);
3. emotional tone (positive or negative, including verbal comments);
4. joint attention (the amount of time the parent and infant/toddler were looking at/interacting with the same object);
5. parental guidance (ratio of informative vs. directive statements used by the parent when interacting with the infant/toddler); and
6. parental responsiveness (degree to which the parent responded to the child’s cues).

Each item was rated on a 5-point scale (higher scores represented better quality). These six items were used to rate videotaped parent–infant/toddler interactions during simulated play, teaching, and frustration activities when the child was 14, 24, and 36 months of age. The ratings were then summed or averaged to create various PICS scores.
Four measures were derived from the PICS rating system: Item scores, Age-Related scores, Activity scores, and the Overall PICS score. Item scores were simply the rating given to each of the six items (child language, parent language, emotional tone, joint attention, parental guidance, and parental responsivity) observed during the simulated activities. Age-Related scores were created by summing the Item scores at each of the three age points, resulting in 14-, 24-, and 36-month PICS scores. The Age-Related scores from each of the three different simulated types of parent–child activities were then averaged to create Activity scores for the play, teaching, and frustration activities. These Activity scores then were averaged to provide a summary score for each child, resulting in one Overall PICS score. Averages were used to create the Activity and Overall PICS scores in an effort to include all possible videotapes but not penalize for missing data, because it was not possible to code two tapes due to audio problems. The maximum score for the play, teaching, frustration, or Overall PICS scores was 30.

The Stony Brook Family Reading Survey (SFRS; Whitehurst, 1993) is a 52-item interview that asks parents to answer nine questions related to their children’s reading interests and habits, as well as their own reading habits. An adaptation of the SFRS, which includes the nine home literacy environment questions, had been used previously to measure family literacy activities (Payne et al., 1994; Rush, 1999) and was used for this study. The maximum SFRS score was 36 in this study.

Outcome Variables. The Peabody Picture Vocabulary Test–Third Edition (PPVT-III; Dunn & Dunn, 1997) presents four black-and-white pictures on an easel paired with one verbally presented target word. Children are required to point to the target picture in order to assess their receptive language skills. The Woodcock-Johnson Tests of Achievement–Revised (WJ-R, Letter-Word Identification; Woodcock & Johnson, 1989) Letter-Word Identification subtest initially presents rebus figures with pictures and requires a child to match these items, to indicate a beginning understanding of symbolic representation. This subtest moves into basic letter and word identification if these skills are intact. For the Test of Language Development–Primary: Third Edition (TOLD-P:3, Phonemic Analysis subtest; Newcomer & Hammill, 1997) Phonemic Analysis subtest, a child is verbally presented with compound words and then asked to say the target word without the first or last word in an effort to assess his or her ability to segment words. The scores for these measures were reported as standard scores: PPVT-III and WJ-R subtest—$M = 100, SD = 10$; TOLD-P:3 subtest—$M = 10, SD = 3$.

Covariates. Parental vocabulary skills, as measured by the Picture Vocabulary subtest of the WJ-R, and children’s vocabulary at 24 months of age, measured using the MacArthur Communicative Development Inventories–Second Edition (CDI; Fenson et al., 1993), were used as covariates in this study. The Picture Vocabulary subtest required parents to name pictures; the CDI asked parents...

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to indicate if their child used the words from a list of 100 words. The number of correct responses was the reported score and was used in this study for the WJ-R Picture Vocabulary (maximum score = 50) and the CDI (maximum score = 100) scales. Maternal age at the time of enrollment was also included as a covariate.

**Data Collection**

Data were collected from each participating family in their home around the children’s 14-, 24-, and 36-month birthdays, as well as in the spring or summer prior to the fall the children were age-eligible for kindergarten. All data were collected as part of the EHS National Evaluation Study and were made available to the first author. The standardized assessments were completed as per protocol at the times listed in Table 1.

The PICS was used to code the videotapes of parent-child interaction activities. As noted previously, these videotaped interactions consisted of three separate activities: a semistructured play activity, a teaching activity, and a frustration activity. For the teaching activity, mothers were given the choice of teaching their 14-month-old infants or toddlers to stack blocks or point to body parts in a book, and they were given the choice of having their 24-month-old children sort blocks by color or point to clothing articles in a book. At the 36-month assessment, the children were given an age-appropriate puzzle, which was followed by a more challenging puzzle after the first puzzle was completed. These activities lasted for 4 minutes, but only the first 3 minutes of interaction were coded.

For the play activity at each age level, the parents and children were given three separate cloth bags containing toys. Each bag was marked with the numerals 1, 2, or 3. The parents were instructed to play with their children as they wished but to start with Bag 1, move to Bag 2, and then move to Bag 3. No other instructions were given. The bags contained age-appropriate toys. This activity lasted for 10 minutes. For coding purposes, three separate 3-minute intervals were coded during this activity; the final minute of interaction was not coded.

During the frustration activity, which occurred at the 14- and 24-month assessments, a scenario was presented. For the 14-month assessment, the mother was asked to sit approximately 6 ft. to 8 ft. behind the infant and draw a picture of her family while the infant was secured in a high chair. The mother was told that she could interact with the child in whatever manner she wanted, but she could not give the infant anything or take the infant out of the seat. During the 24-month assessment, a set of keys or a toy was placed approximately 2 ft. in front of the child and the parent. The parent was informed that the toddler should not touch the keys or toy, which was the only limitation. No additional directions were given for either scenario. These two scenarios were selected to simulate frustrating situations commonly encountered during daily activities. There was no frustration task at the 36-month assessment. Instead, the frustration activity was replaced with an activity selected by the parent and child. For coding purposes, the first 3 minutes of each frustration activity were rated.

Seven research assistants were trained using practice tapes, and they attained interrater reliability with the authors prior to coding any tapes independently. Interrater reliability levels for the PICS were targeted for 85% for each item, within 1 point. The 85% reliability level for this study was computed using ratings for individual items coded at each age level. Because the PICS was used to code five interaction activities (three play activities, one frustration activity, and one teaching activity) at each age level, and 6 items were rated for each, there were 30 items to be rated at each age level. Therefore, if the two coders failed to rate at least 26 items within at least 1 point, those interaction activities were reviewed and rescored by the entire research team until reliability above 85% agreement was met.

 Interrater agreement estimates were calculated for 23 (28%) randomly selected tapes coded for this study. Five of the 23 tapes did not meet the 85% reliability target; therefore, the entire research team recoded these tapes, discussed disagreements, and reached consensus on an item-by-item basis until 85% agreement within at least 1 point on all items was met. Across all tapes, interrater reliability was 88%, (exact agreement on 47% of the items). Interrater reliability for each of the six predictor items was as follows: child language–90% (40% exact), parent language–86% (38% exact), emotional tone–96% (77% exact), joint attention–89% (54% exact), parental guidance–90% (52% exact), and parental responsivity–77% (27% exact).

The spring or summer prior to the children being eligible for kindergarten, a follow-up assessment and an interview were completed with each family. During this follow-up assessment, the children completed various subtests of standardized assessments, including the PPVT-III, WJ-R, and TOLD-P:3. At this time, the parents answered questions from the SFRS as well.

**RESULTS**

Descriptive statistics for all predictor, outcome, and covariate variables are presented in Table 2. Findings related to each research question are presented in this section.

**Correlating Early Literacy and PICS**

Research Question 1. What is the relationship between parent–infant/toddler interactions and early literacy skills for children from low-income families? This question was
examined using zero-order correlations. The Overall PICS score, as well as the Age-related 14-, 24-, and 36-month PICS scores, were correlated with the outcome variables. The results are presented in Table 3.

These analyses revealed a statistically significant correlation between the PPVT-III and the 36-month PICS scores, the Overall PICS score, and the 24-month PICS scores. Statistically significant correlations also were found between (a) the WJ-R and the 24-month PICS scores, (b) the WJ-R and the Overall PICS score, and (c) the TOLD-P:3 and the 36-month PICS scores.

Because young children’s language may correlate with their early literacy skills and possibly inflate these correlations, additional analyses were completed. Correlation matrices comparing the Age-Related and Overall PICS scores, without the component of child language, with outcome variables were completed; the results are presented in Table 4. The 14-month PICS scores without child language revealed no statistically significant correlations, which was consistent with the initial findings when child language was included. The 24-month PICS scores without child language revealed that correlations dropped from statistically significant levels of .47 on the PPVT-III and .51 on the WJ-R when child language was included to .33 for both the PPVT-III and WJ-R when child language was removed. For the 36-month PICS scores, statistically significant correlations between the PPVT-III and the TOLD-P:3 remained even after the child language component was removed. Finally, the Overall PICS score without child language decreased slightly, revealing statistically significant correlations between the PPVT-III and WJ-R and the Overall PICS at a .05 level versus a .01 level.

**PICS Versus SFRS: Predicting Early Literacy Skills**

Research Question 2. Do parent–infant/toddler interactions at 14, 24, and 36 months or a parent report (SFRS) regarding literacy habits completed when the child is approximately 54 months old better predict early literacy skills? was examined using regression. Results are presented in Table 5.

Analyses of the predictive nature of the Overall PICS score versus the SFRS for the PPVT-III and the WJ-R revealed that the Overall PICS score added significant increments in the multiple correlation squared ($R^2$) at the point of entry for each test. The SFRS did not predict the PPVT-III or the WJ-R. Analyses of the predictive nature of the Overall PICS score versus the SFRS for the TOLD-P:3 yielded results that were not statistically significant.

**Predicting Early Literacy Skills From a Single Type of Parent–Child Activity**

Research Question 3. Do parent–infant/toddler interactions from one simulated activity predict early literacy skills as well as parent–infant/toddler interactions from the average of three simulated activities combined? This question was examined using regression analyses. When entered separately into regression equations, none of the Activity scores (play, teaching, or frustration) predicted early literacy skills as measured by the PPVT-III, WJ-R, or TOLD-P:3. Multicollinearity between the Activity scores most likely accounts for this; therefore, these results should be interpreted with caution.

In an effort to evaluate the third research question in an alternate manner, zero-order correlations were completed for the play, teaching, or frustration Activity scores; Overall PICS score, and the outcome variables. This was
Examination of the correlation matrix revealed statistically significant correlations between the PPVT-III and the play, teaching, and frustration Activity scores, as well as the Overall PICS score. The Overall PICS score yielded the strongest relationship with the PPVT-III. Statistically significant correlations were found for the WJ-R and the teaching Activity score, the play Activity score, and the Overall PICS score. The play Activity score yielded the strongest relationship with the WJ-R. The TOLD-P:3 correlated only modestly with the play, teach-
ing, or frustration Activity scores and with the Overall PICS score.

**Discussion**

The current study examined the relationship between parent–infant/toddler interactions and early literacy skills for children from low-income households. It appears that the quality of parent–child interactions, even at very early child ages, is related to early literacy skills. Furthermore, the PICS seems to be a fairly powerful predictor of early literacy skills. It predicted early literacy skills better than did the SFRS. Unfortunately, none of the PICS Activity scores predicted early literacy skills better than the Overall PICS score. The play, teaching, frustration, and Overall PICS scores instead tended to be related to the outcome variables in similar ways and, when combined, predicted early literacy skills. These findings will be discussed further in the following sections.

**Interactions and Early Literacy Skills**

Results of this study showed that parent–infant/toddler interactions are related to the early literacy skills of receptive vocabulary, symbolic representation, and phonemic analysis. The PPVT-III scores were related most strongly to the 36-month PICS scores, and they were related strongly to the Overall PICS score and the 24-month PICS scores. The WJ-R Letter-Word Identification subtest scores were related most strongly to the Overall PICS score and the 24-month PICS scores. The 36-month PICS scores were related to phonemic analysis skills as measured by the Phonemic Analysis subtest of the TOLD-P:3. Furthermore, the mean scores on the PPVT-III, WJ-R, and TOLD-P:3 for the children in this study were close to the norm-referenced standard scores and deviations (see Table 3), indicating that the children in this study performed similarly to the overall population on those tasks.

To determine whether including a rating of child’s language in the PICS inflated the relationships between PICS scores and early literacy scores, additional analyses were completed. The Activity and Overall PICS scores without the child language component and outcome variables, while somewhat depressed, were generally consistent with the PICS scores in which the child language component was included. This result suggests that the component of child language did not significantly inflate the relationship between the PICS scores and scores on the outcome variables; therefore, maintaining child language as part of the PICS rating system was supported. The observational data provided through the PICS rating system is gathered in a more natural manner than that used in other measures of child language (e.g., the PPVT-III) and may help to provide additional information about how children use their language to interact with adults in simulated daily activities.

The relationships between parent–child interactions and early literacy skills found in this study extend previous researchers’ findings regarding relationships between early parent–child interactions and later skills development. For example, mothers’ responsiveness has been shown to correlate with later language development (Bornstein & Tamis-LeMonda, 1989) and with cognition and social development (Landry et al., 2001), joint attention has been shown to correlate with acquisition of words (Tomasello & Farrar, 1986), and parental guidance has been shown to correlate with social development (Landry et al., 1997). These researchers demonstrated that parent–child interactions were related to skills that developed later, which was consistent with the results in the current study. In each of these previous studies, however, only one aspect of the parent–child interaction was analyzed. This study combined ratings of six aspects of parent–child interactions into one scale in an effort to determine how this combination of early parent and child behaviors, considered globally, influences early literacy skills.

Furthermore, it should be noted that the studies referenced above tended to measure skill development over a very short time. For example, in the study conducted by Tomasello and Farrar (1986), adult–child interactions were analyzed and then language acquisition skills were assessed after only 1 week. Consistent with the results of the current study, some researchers have demonstrated a relationship between early parent–child interactions and skill development longitudinally. For example, Hart and Risley (1995) found that the variety and amount of words parents used with their children prior to age 3 were related to receptive language skills at age 9. Beckwith and Rodning (1996) found that the parent–child interaction characteristics of maternal sensitivity, child engagement,
and dyadic fit measured at 20 months influenced social development at 60 months. Landry et al. (2001) discovered that parental responsiveness at 6, 12, and 24 months was related to social and cognitive development at 48 to 60 months.

**Interactions Versus Reported Literacy Experiences**

In this study, the Overall PICS score predicted early literacy skills better than the SFRS did. Correlations between the Overall PICS score and all outcome variables were stronger than those between the SFRS and all outcome variables. Furthermore, the correlations between the Overall PICS score and the outcome variables in this study were as strong, or stronger, than correlations between the SFRS and outcome variables found in previous studies (Payne et al., 1994; Rush, 1999).

Specifically, Rush (1999) found significant correlations between (a) the SFRS and (b) the PPVT-R and a letter-naming task that was similar to the WJ-R subscale used in this study. In the Rush study, which had 39 participants, the SFRS correlated with the PPVT-R at \( r = .61, p < .01 \), and with the letter-naming task at \( r = .48, p < .01 \). In this study, the PICS correlation with the PPVT-III was \( r = .57 \) and with the WJ-R was \( r = .49 \). In a study of 323 participants, Payne and his colleagues (1994) also found a significant correlation between a derived score taken from the SFRS, which included the nine questions used in the Rush study, and the current study, and the PPVT-R (\( r = .48, p < .01 \)). In both the Rush and Payne et al. studies, the SFRS was completed at approximately the same time that the PPVT-R and other measures were completed but revealed similar correlations among the predictor and outcome variables when compared to the results in the current study. The correlations reported in the current study, which are as strong or stronger than the Rush and Payne et al. results, suggest that the PICS is a good predictor of early literacy skills. The fact that the PICS, which was based on parent–child interactions prior to a child age of 3 years, was able to predict early literacy skills better than the SFRS, which was based on parent reports at a child age of 54 months, holds possible implications for earlier interventions and assessment related to early literacy skills.

The differences between the results in the current study and those for the Rush (1999) and Payne et al. (1994) studies are puzzling. In both the Rush and the Payne et al. studies, the SFRS was completed by the mother when the child was between the ages of 48 and 66 months, similar to the time at which the measure was completed in the current study. Furthermore, the populations were similar; all studies included only low-income families. Sample size, however, may have played a role in the conflicting results. In the Rush study, the sample size was slightly larger (39) than in the present study, whereas in the Payne et al. study, the sample size was much larger (236).

The different findings noted between the current study and the Rush study may be influenced by the fact that in the former study, the parent–infant/toddler interactions were observed and rated over a 3-year period, versus a 1-hour observation session that occurred when the children were between the ages of 48 and 66 months in the latter study. The number of observations and the ratings that occurred over a 3 years versus 1 hour may indicate that the cumulative effect of parent–child interactions over the first 3 years of life has more influence on early literacy skills than do later parent–child interactions. This speculation supports the conclusions presented in the Hart and Risley (1995) study. Hart and Risley proposed that interventions for children introduced after the age of 3 years may have limited impact on developmental skills due to the cumulative effect of the first 3 years of parent–child interactions.

**Relationships Between PICS Activity Scores and Outcomes**

A high level of multicollinearity existed between the PICS Activity scores and the Overall PICS score, making it impossible to determine if any one individual PICS Activity score better predicted early literacy skills than the Overall PICS score. One might suspect that parents use similar behaviors and techniques with their children when dealing with frustrating circumstances, teaching novel tasks, or playing, which certainly was true in this study. To further analyze how the Overall PICS and the PICS Activity scores related to early literacy skills, we examined the variables via a correlation matrix. The PPVT-III was strongly related to the three PICS Activity scores of teaching, frustration, and play, as well as to the Overall PICS score. The WJ-R was strongly related to all of these variables, except for the frustration Activity score. In general, it appears that the Overall PICS score is a better predictor of early literacy skills than any one PICS Activity score.

**Limitations**

Limitations of this study included the small sample size, the homogeneity of the participants, the correlational nature of the analyses, and possible intrusiveness of videotaping parent–infant interactions. All of the participants were Caucasian and had similar educational levels. These two variables may have restricted the variability and the overall generalizability of this study. Expanding the population to include ethnically diverse families from middle-income and high-income households may provide additional information regarding the external valid-
ity of the PICS scores. Because of the small sample size, correlation was the most appropriate—but limiting—statistical analysis. Furthermore, the fact that the parent–child interactions were videotaped could have altered normal parent–child interactions.

**Implications**

Understanding how everyday interactions of parents with their infants and toddlers may influence early literacy skills, and possibly later school success, is critical, especially for parents from low-income households. Many parents may believe that because infants and most toddlers do not talk, talking to their young children is irrelevant, or they may think that a child should be seen and not heard. The findings of this study and other studies (Hart & Risley, 1995; Walker et al., 1994) indicate this is not true. The first 3 years of parent–child interactions predict early literacy skills. In fact, previous research has shown that early literacy skills predict later academic success (Juel, 1988). It therefore seems imperative that parents be made aware of the influence their everyday interactions may have on their children’s success in school.

Parents need to be made aware that it is not only literacy activities, such as reading with their children or going to the library, that influence later literacy skills. Although the importance of these activities cannot be minimized, parents should also be informed that children learn from everyday interactions (Rogoff, 1990). Parents have the opportunity to guide their children’s participation in life and teach them through daily experiences, not just during reading and literacy activities. Parents need to seize teachable moments as they occur all day long, and many parents may need education and/or support to do this effectively.

**Future Research**

Establishing the reliability and validity of the PICS with additional data from larger and more diverse samples sizes needs to be done. If psychometrically appropriate parameters for the PICS are established, developing a version suitable for use by interventionists working in family’s homes would be useful. For example, developing a PICS checklist that would negate the need for videotaping and coding could assist an interventionist to not only monitor parent–child interactions but also determine the focus of future interventions.

**Conclusions**

This study provides support for the theory that a strong relationship between early parent–child interactions and later skill development exists. We have demonstrated that the PICS has captured early parent–child interactions in relatively naturally occurring situations and have related these interactions to early literacy skills. It is our hope that further investigation will provide better, earlier interventions to parents and children from low-income families in an effort to decrease the problems that children may face when learning to read.

The longitudinal nature of the current study highlights the importance of these findings and argues for the potential usefulness of the PICS. In this study, the quality of parent–child interactions, observed when children were 24 months old, was related to early literacy skills measured when children were approximately 54 months old. This 30-month difference between when the interactions were observed and language skills were measured represents an important window for development. It is possible that interventions designed to enhance parent–child interactions could be implemented during that time and in turn could influence literacy skills at the pre-kindergarten level and beyond.◆

**AUTHORS’ NOTES**

1. The findings reported here are based on research conducted as part of the national Early Head Start Research and Evaluation Project funded by the Administration on Children, Youth and Families (ACF), U.S. Department of Health and Human Services under contract 105-95-1936 to Mathematica Policy Research, Princeton, New Jersey, and Columbia University’s Center for Children and Families, Teachers College, in conjunction with the Early Head Start Research Consortium. We also acknowledge funding from the Head Start Bureau through Grant 90YF01401 to Iowa State University and funding to support the graduate study of the first author from the Iowa State University College of Family and Consumer Sciences. The research is part of the independent research Iowa State University conducted with the Mid-Iowa Community Action, Inc. Early Head Start Program, which is one of 17 programs participating in the national Early Head Start study. The Consortium consists of representatives from 17 programs participating in the evaluation, 15 local research teams, the evaluation contractors, and ACF. Research institutions in the Consortium (and principal researchers) include ACF (Rachel Chazan Cohen, Judith Jerald, Esther Kresh, Helen Raikes, and Louisa Tarullo); Catholic University of America (Michaela Farber, Lynn Milgram Mayer, Harriet Liebow, Nancy Taylor, Elizabeth Timberlake, and Shavaun Wall); Columbia University (Lisa Berlin, Christy Brady-Smith, Jeanne Brooks-Gunn, and Alison Sidle Fuligni); Harvard University (Catherine Ayoub, Barbara Alexander Pan, and Catherine Snow); Iowa State University (Dee Draper, Gayle Luze, Susan McBride, and Carla Peterson); Mathematica Policy Research (Kimberly Boller, Jill Constantine, Ellen Eliason Kisker, John M. Love, Diane Pabell, Christine Ross, Peter Schochet, Cheri Vogel, and Welmoet van Kammen); Medical University of South Carolina (Richard Faldowski, Gui-Young Hong, and Susan Pickrel); Michigan State University (Hiram Fitzgerald, Tom Rischl, and Rachel Schiffman); New York University (Mark Spellmann and Catherine Tams LeMonda); University of Arkansas (Robert Bradley, Richard Clubb, Andrea Hart, Mark Swanson, and Leanne Whiteside-Mansell); University of California at Los Angeles (Carollee Howes and Claire Hamilton); University of Colorado Health Sciences Center (Robert Emde, Jon Korfman, ...
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