Scott-Little, C., Kagan, S., & Frelow, V. (2003). Creating the conditions for success with early learning standards: Results from a national study of state-level standards for children's learning prior to kindergarten. *Early Childhood Research & Practice, 5*(2), 1–21.

Shamlin, M. L. (2001). Inquiry in kindergarten: Learning literacy through science. *Primary Voices K–6, 10,* 10.

Shavelson, R. J., & Towne, L. (2003). *Scientific research in education.* Washington, DC: National Academy Press.

Shepard, L., Kagan, S. L., & Wurtz, E. (1998). *Principles and recommendations for early childhood assessments.* Washington, DC: National Education Goals Panel.

Smith, M. W., & Dickinson, D. K. (2002). *The Early Language and Literacy Classroom Observation toolkit (ELLCO).* Baltimore: Brookes.

Snijders, T. A. B., & Bosker, R. J. (1993). Standard errors and sample sizes for two-level research. *Journal of Educational Statistics, 18,* 237–259.

Tenenbaum, H. R., Rappolt-Schlichtmann, G., & Zanger, V. V. (2004). Children's learning about water in a museum and in the classroom. *Early Childhood Research Quarterly, 19*(1), 40–58.

Thissen, D., & Steinberg, L. (1988). Data analysis using item response theory. *Psychological Bulletin, 104,* 385–395.

Tu, T. (2006). Preschool science environment: What is available in a preschool classroom? *Early Childhood Education Journal, 33,* 245–251.

U.S. Department of Health and Human Services. (1996). Head Start program performance standards. Proposed rule making. *Federal Register, 61,* 17754–17792.

U.S. Department of Health and Human Services. (2000). *The Head Start path to positive child outcomes.* Washington, DC: Head Start Bureau, the Administration for Children and Families, U.S. Department of Health and Human Services.

Weiss, I. R., Banilower, E. R., McMahon, K. C., & Smith, S. (2001). *Report of the 2000 national survey of science and mathematics.* Chapel Hill, NC: Horizon Research.

Weitzman, E., & Miles, M. (1995). *Computer programs for qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.

Wenner, G. (1993). Relationship between science knowledge levels and beliefs towards science instruction held by preservice elementary teachers. *Journal of Science Education and Technology 2,* 461–468.

Witt, S. D., & Kimple, K. P. (2008). "How does your garden grow?" Teaching preschool children about the environment. *Early Child Development and Care, 178*(1), 41–48.

Worth, K., & Grollman, S. (2003). *Worms, shadows, and whirlpools: Science in the early childhood classroom.* Portsmouth, NH: Heinemann.

Yoon, J., & Onchwari, J. A. (2006). Teaching young children science: Three key points. *Early Childhood Education Journal, 33,* 419–423.

EARLY EDUCATION AND DEVELOPMENT, *20*(2), 265–284

ISSN: 1040-9289 print / 1556-6935 online
DOI: 10.1080/10409280802595433

Routledge
Taylor & Francis Group

Predictions of Children's Experiences With Latina Family Child Care Providers

Stephen A. Zuniga and Carollee Howes
Department of Education
University of California at Los Angeles

Research Findings: Relatively little is known about the pre-academic experiences of Latino/a children in family child care. In this work we tested the extent to which previously established relations among provider characteristics, scaffolding and responsive behaviors, total quality (Family Day Care Rating Scale), and children's engagement in pre-academic activities would be found among low-income Latino/a children and providers. We observed total quality, scaffolding and responsive behaviors, and pre-academic activities in 115 family child care programs with Latino/a providers and children. Most providers had a high school education or less. There were positive and significant associations among provider education and training, total quality of the program, scaffolding and responsive behaviors, and children's participation in pre-academic activities. The providers' education level and scaffolding of children's activities were significant predictors of total quality. Environmental quality, provider scaffolding of children's activities, and responsive involvement predicted engagement in literacy, math, and science activities. *Practice or Policy:* Family child care providers' teaching strategies drive children's experiences in programs, a finding with implications for practice and policy.

Over 15 years have passed since Kontos (1992) called for the early childhood field to bring family child care "out of the shadows." More than a decade has passed since a large representative study of family child care raised issues about the kinds of experiences provided for children in family child care (Kontos, Howes, Shinn, & Galinsky, 1995). In the intervening years, the NICHD Study of Early Child Care in the United States (Clarke-Stewart, Vandell, Burchinal, O'Brien, & McCartney,

Correspondence regarding this article should be addressed to Stephen A. Zuniga, UCLA GSE&IS Moore Hall, Box 951521, 405 Hilgard Avenue, Los Angeles, CA 90095-1521. E-mail: szuniga@gseis.ucla.edu

2002) and a large-scale Canadian study (Doherty, Foer, Lero, Goelman, & LaGrange, 2006) have raised concerns about children's experiences in family child care. In general these large-scale studies have suggested that providers' formal education and training predict adult–child interaction and children's experiences in care (Burchinal, Howes, & Kontos, 2002; Doherty et al., 2006; Kontos et al., 1995; NICHD ECCRN, 2002). Providers with more formal education and more early childhood training were better able to engage in warm and sensitive interactions with children and to provide children with pre-academic experiences. However, in the research that formed the basis of this conclusion, the majority of children and providers were White and middle class, with the modal providers having some postsecondary education. The purpose of our research was to test these conclusions with a very different group of providers and children—Mexican-heritage low-income Latinos.

Mexican-heritage low-income Latinos are one of the fastest growing minority populations in the United States (Hernandez, Denton, & McCartney, 2007), and there is much to be learned about family child care within this group. In general, children's child care experiences are embedded within social stratifications based on income, race, and ethnicity (Johnson et al., 2003). Most families select child care within their own ethnic and racial communities because there are more cultural connections between child care and home (Johnson et al., 2003). Accordingly, low-income immigrant Latino families tend to use neighborhood-based family child care rather than center-based care (Hernandez et al., 2007; Howes, Wishard Guerra, & Zucker, 2007), in part because this is the care that is available and in part because it is consistent with family beliefs and practices (Hernandez et al., 2007; Zucker, Howes, & Garza-Mourino, 2007).

Socialization within Spanish-dominant Latino immigrant families appears to be at odds with the expectations of American schooling. Latino/a children are rated by teachers and according to standardized testing as being lower on school readiness skills than children from other ethnic backgrounds (Brooks-Gunn, Rouse, & McLanahan, 2007). Within Latino families (and Mexican immigrant families in particular), schooling is given a high priority, but actual teaching is considered the responsibility of the teacher, not the family (Gallimore & Goldenberg, 2001). Mexican-heritage mothers tend to be less concerned about shaping their children's academic learning than about shaping their respectful behaviors toward elders (Harwood, Miller, & Irizarry, 1995; Richman, Miller, & Levine, 1992; Ulin, LeVine, & LeVine, 1994).

Thus, previous research on family child care and on ethnic socialization provides competing hypotheses for this study. Child care researchers suggest that providers' professional development experiences will predict both their behavior and their provision of pre-academic experiences in family child care. Alternatively, research on ethnic socialization patterns suggests that Latina family child care providers' behaviors will be shaped by their cultural heritage, which may differ with

practices and behaviors expected to promote children's pre-academic learning. From this line of research we predicted that variations in provider behaviors would best predict children's engagement in pre-academic activities in family child care.

PROFESSIONAL DEVELOPMENT OF FAMILY CHILD CARE PROVIDERS AND CHILDREN'S EXPERIENCES

As discussed above, children's experiences in family child care appear to be dependent on provider formal education and training in early childhood education (Burchinal et al., 2002; Doherty et al., 2006; Kontos et al., 1995; NICHD ECCRN, 2002). Furthermore, some researchers have argued that in order to provide good-quality care, providers should have a bachelor's degree (Early et al., 2006, 2007; Howes, James, & Ritchie, 2003; Howes & Norris, 1997). Alternatively, some research has suggested that training in early childhood education rather than formal education in general is a better predictor of providers' behavior in family child care (Burchinal et al., 2002; Howes & Norris, 1997; Kontos, Howes, & Galinsky, 1996). Few providers in our sample had formal education beyond high school, and many had only grade school educations. Nonetheless, quality improvement initiatives have made a variety of training opportunities available to family child care providers in the geographic area of our sample. Thus, a substantial number of providers had had early childhood professional development in the form of training workshops. We therefore expected that variations in training experiences would predict providers' behaviors with children.

LATINA CHILD CARE PROVIDERS AND LATINO/A CHILDREN

There are culture-specific dimensions to the experiences provided by Latina family child care providers for Latino/a children. An important issue is whether a family child care provider considers herself a teacher or a mother. Within Latino families, mothers are less responsible than teachers for teaching academic school-related skills (Gallimore & Goldenberg, 2001). This highlights the importance of observing interactions and activities within the home. Furthermore, some researchers have argued that adult expectations and behaviors around children's compliance in Latino families may have different dynamics than in dominant-culture families (Halgunseth, Ispa, & Rudy, 2006). Relative to European-American parents, Latina caregivers may not be as likely to promote independence and autonomy in the children they care for, and this may be reflected in their interactions. For example, they may be more likely to do things for the child instead of actively participating with the child in a learning activity. In studies of Latino families,

mothers tended to direct rather than support children's behavior (Halgunseth et al. 2006; Ispa et al., 2004).

Some members of the child care research community have raised questions about the cultural incongruence of the quality measures used in large-scale studies of family child care (Johnson et al., 2003; Lee & Walsh, 2005; Rusby, Taylor, & Marquez, 2004; Taylor, Dunster, & Pollard, 1999; Uttal, 2001). *Cultural incongruence* is the lack in the extent to which quality measures are generalizable to child care environments of different ethnicities. In order to address these concerns and to test our hypotheses regarding variations in adult interaction behaviors, we expanded the assessment of adult–child interaction and children's experiences in family child care beyond the measures used in previous large-scale studies. We directly observed providers' scaffolding of children's engagement in activities.

Early childhood education research suggests that supporting children's learning through scaffolding or structuring children's knowledge (e.g., helping the child expand on his or her answers and thoughts, working to link classroom activities to the child's life and experiences) will promote children's problem solving and increase their knowledge (Bodrova & Leong, 1996; La Paro & Pianta, 2000). A recent small-scale study of Latino/a children with primarily Latina informal providers found that children who experienced more provider scaffolding, defined as the instructional technique in which teachers model the desired learning strategy or task upon children's knowledge and interests, at age 3 had higher school readiness scores prior to kindergarten (Howes & Hong, in press). Therefore, in the current study we expected that children whose providers, controlling for training, engaged in more scaffolding and less didactic behaviors also would provide more pre-academic experiences (e.g., writing, reading, identifying numbers, counting, measuring) for the children.

In order to address concerns that previous research on family child care has been culturally incongruous we defined pre-academic learning activities to include warm and positive adult–child relationships and interactions around everyday activities that are not measured by other traditional measures of total quality. These include a variety of activities such as cooking or gardening as well as traditional early childhood education play settings and school-like activities such as sitting still and learning letters and numbers. In order to be consistent with previous research, we also used the Family Day Care Environment Rating Scale (FDCRS; Harms & Clifford, 1989) as a measure of quality. The FDCRS is an observationally based measure designed to assess program setting characteristics and children's learning opportunities.

In summary, we tested four hypotheses generated from large-scale child care studies to answer research questions on this sample of Mexican immigrant family child care providers. First, what scaffolding and responsive behaviors do Latina child care providers exhibit, and how much time do children engage in pre-academic activities in family child care? We hypothesized that we would observe considerable variation in scaffolding and responsive behaviors as well as pre-academic activities. Second, what are the patterns of associations among provider characteristics (e.g., education level), total quality, scaffolding and responsive behaviors toward individual children, and children's engagement in pre-academic activities? We hypothesized that there would be positive associations among provider characteristics, scaffolding and responsive behaviors, and children's engagement in pre-academic activities. Third, to what extent do provider characteristics and provider behavior toward individual children predict total quality of the child care environment? We hypothesized that the providers who engaged with children in scaffold their knowledge would also provide children with more pre-academic learning experiences, and that their family child care homes would have higher global quality scores. Fourth, to what extent do total quality, provider characteristics, and number of children predict child engagement in pre-academic activities? We hypothesized that providers with more formal education and more exposure to early childhood education through training would provide more pre-academic learning experiences (e.g., literacy and math).

METHOD

Participants

Participants were 460 children in 115 family child care programs (all with female and Latina providers) in California, identified through their enrollment in one of several training programs designed to improve children's school readiness. All of the providers self-identified as Mexican in ethnic heritage. Providers either were born in Mexico and had come to the United States as young adults or had mothers born in Mexico. All providers and parents of children were asked by the research team to participate in the study. Although a provider could participate in the training program without participating in the research study, there were no refusals to participate. The sample of 115 providers was selected from a larger group of 175 providers selected for the training programs. There were 27 providers who participated in the research but were not Latina and thus were not included in this sample. There were an additional 33 providers who did not have four children in care and were therefore excluded from participation. All of the family child care homes were located in lower income communities and served low-income children. Within each of the 115 family child care programs, four participating children were observed in this study. Parents reported that 80% of the children were of Latino heritage, 51% were girls, and children averaged 36 months of age.

Procedure

We visited each family child care home for 3 to 4 hr (varying on program availability and scheduling). The visits began after all of the children had arrived in the morning and continued for at least 3 more hours. If the children's nap period began

less than 3 hr after the visit began, the visit continued following nap time. This morning period represented the highest number of enrolled children during the programs' hours of operation and the greatest opportunity to observe interactions between providers and children. An average of 8 children (range = 4–12) were present during the observation. At the beginning of the visit the research staff selected four participating toddlers and preschool-age children present the day of the site visit (two girls and two boys) to be observed.

Measures

Only female Spanish-speaking research staff visited the providers' homes because of concerns for cultural sensitivity. These researchers conducted both the provider interviews and the observations.

Provider-Level Variables

The research staff interviewed the providers about their formal education (e.g., degrees awarded and attempted), their participation in previous training programs or workshops (prior to their current program), their years of experience, and their demographic characteristics. The modal provider was in her 40s with less than a high school education and with more than 3 years of experience (see Table 1). Most (93%) of the providers were observed speaking Spanish in the family child care home. Many (74%) providers spoke to children in English as well as Spanish, indicating a high proportion of bilingual care environments. About 7% of the programs were observed as speaking only English, whereas 19% of the programs were observed as speaking only Spanish. Each provider cared for 9 children on average.

Child-Level Variables

Each of the identified target children in each family child care setting was observed by using a time-interval sampling procedure known as the *Snapshot*. The Snapshot measures provider scaffolding of children's learning, responsive involvement, and children's engagement in pre-academic activities. During the 3 to 4 hr of observation in the home the observers collected Snapshot data in 4 min bouts. That is, observers collected 5 min of data, rested, and then resumed data collection for 4 more minutes. During each 4-min period each child was observed once for 20 s unless he or she was in the bathroom or napping. This process resulted in at least 36 and as many as 48 observations per child.

The frequency of intervals engaged in each activity by each child was summed and averaged, yielding an assessment of proportions of observations in which the children were engaged in each activity or type of interaction (e.g., 12 observed interactions / 36 total interactions = .33). The Snapshot observations were aggre-

TABLE 1
Provider Characteristics

Characteristic	*%*
Age	
16–29	6
30–39	26
40–49	40
50 and older	28
Education level	
Some high school	33
High school graduate or GED	29
Some college (ECE)	28
AA (ECE)	4
BA or more (ECE)	6
Participated in previous training programs or workshops	45
Years experience as provider	
Less than 1	6
1–3	33
More than 3	51
Providers and children observed using	
Spanish	93
English	81
Both English and Spanish	74

Note. GED = general equivalency diploma; ECE = early childhood education; AA = associate's degree; BA = bachelor's degree.

gated at the family child care program level for some analyses but kept at the child level for hierarchical modeling, as it allowed for an analysis respecting the nesting structure of children in programs.

Provider scaffolding of children's learning. Scaffolding was coded in the Snapshot to indicate interactions that build on the child's interests. Scaffolding is based on an awareness of the individual child's needs and is done in a way that extends the child's learning or thinking on a topic. Scaffolding is coded as present when a teacher utilizes the curiosity or interest of the child; uses the child's initiations as an opportunity to add to his or her learning; asks open-ended questions; motivates through personal engagement (plays with the child but does not just demonstrate or model); helps the child expand on his or her answers and thoughts; seeks to link classroom activities to the child's life and experiences; or asks the child questions or poses problems that have multiple solutions, including conflict resolution. For example, a caregiver may use open-ended questions to encourage a child to expand his or her ideas or predict the outcome of his or her actions in an ongoing, reflective conversation. The scaffolding score represented the proportion

of observations in which each target child was engaged in a scaffolding interaction with an adult.

Responsive involvement. The Adult Involvement Scale (Howes & Stewart, 1987) is a rating of caregiver responsive involvement and was coded in the Snapshot observation. It includes both verbal and nonverbal responses. It measures varying degrees of involvement with children in all activities (e.g., literacy, math, science). The scale represents seven levels of increasing complexity and reciprocity in adult–child interactions.

The first level of the Adult Involvement Scale, "ignore," is coded as present when the adult is apparently unaware of the children. She may be doing paperwork, talking to another adult, or physically out of the room. The second level, "monitor," is coded if the caregiver is close to the children but does not engage in interaction with any child. However, the caregiver is actively monitoring the classroom and the children's participation. The third level, "routine," is coded when the caregiver touches the children for changing or other routine caregiving. She may ask or direct the class to do something (e.g., clean up or come to snack, or she reads a book straight through without making any attempts to engage the children). The fourth level, "minimal," is coded when the caregiver touches the children only for necessary discipline or to move one child away from another. She answers direct requests for help or gives verbal directives with no reply encouraged. The fifth level, "simple," is coded when the caregiver uses some warm or helpful physical contact (beyond the essential routine care) or verbally answers the children's verbal bids but does not elaborate. During whole-group activities, the adult might respond to children with short sentences. The sixth level, "elaborated," is when the caregiver is engaged with the children, is asking and answering complex questions, acknowledging children's statements, and soliciting active participation and extending knowledge. It is important to note that while a provider is scaffolding, but elaborated responsive involvement can be coded if present. The seventh and final level, "intense," is coded when the caregiver engages the children in conversations over play activities, plays interactively with children in a game-like manner, or sits and eats with the children in a social conversational atmosphere. In group situations, "intense" is coded if the caregiver is physically responsive and verbally to many members of the group, individualizing her responses to the children in order to restate and elaborate children's ideas, engage them in conversations, and extend their learning.

Each mutually exclusive level of adult involvement was coded as present or not present. Adult involvement scores for each 20-s interval of "simple," "elaborated," and "intense" were summed and averaged over all intervals during which an adult was within 3 feet of the target child, yielding a proportion of adult responsive involvement ranging from 0 to 3.

FDCRS

The FDCRS (Harms & Clifford, 1989), is a widely used measure of total quality in family child care environments. FDCRS items are rated on a 7-point scale, with a 3 indicating *barely adequate quality*, a 5 indicating *good quality*, and a 7 indicating *excellent quality*. Settings receiving scores less than 3 are considered generally unacceptable. FDCRS items measure space and furnishings (e.g., child-size chairs), basic care (e.g., handwashing), language and reasoning (e.g., talking with children), learning activities (e.g., play with blocks), social development (e.g., peer play), and adult needs (e.g., breaks). For this study, an average overall item score was calculated. Cronbach's alphas ranged from .88 to .90 and matched the high reliability reported by the creators of the FDCRS. The number of children and adults present during the observation and the language predominantly used by the provider (English, Spanish, or English and Spanish) were recorded at the time of the FDCRS scoring.

Child Engagement in Pre-Academic Activities

Literacy, math, and science. Pre-academic activities were coded in the Snapshot measure and included looking at books, being read to, exploring letters and sounds, oral language use, prewriting, math, and science. We used a principal components factor analysis with a varimax rotation accounting for 61% of the variance to create two pre-academic learning factors: language and literacy (looking at books, being read to, letter–sound, and oral language) and combined math and science activities (writing numbers and math puzzles, and using science equipment such as magnets and magnifying glasses).

Observer Training and Reliability

Prior to making observations we trained all observers on the Snapshot observation instrument, the Adult Involvement Scale, and the FDCRS. Following training, reliability between the trainers and the observers was assessed during visits to family child care homes not used in the sample. Linear-weighted kappas were used to evaluate interrater agreement after adjusting for agreement due to chance. Kappas of .40 to .75 are considered to have fair to good agreement, and kappas of .75 or more are considered excellent (Fleiss, 1981). For the Snapshot, kappas were calculated any time an activity was seen four or more times by the trainer. The kappas for scaffolding and responsive involvement were .68 (SD = .18) and .82 (SD = .13), respectively. For the FDCRS, data collectors' mean weighted kappa with the trainer was .78 (SD = .04). The mean kappa across data collectors for literacy was .81 (SD = .12), and the kappa for math and science activities was .84 (SD = .32).

Analytic Strategy

In our analysis we first examined descriptives and associations among provider characteristics, number of children (to assess the influence on the frequency of provider interactions), total quality (FDCRS), and the observed Snapshot variables (pre-academic activities, scaffolding, and responsive involvement). We then used hierarchical regression modeling to test the predictions for the extent to which provider characteristics and provider behavior predicted overall quality. We predicted overall total quality scores from provider characteristics, size of family child care home, and scaffolding and responsive involvement (aggregated across children). Finally, individual children's engagement in key pre-academic activities was predicted, again using hierarchical linear modeling (HLM), from global environmental quality, scaffolding, and provider educational level.

RESULTS

Experiences of Children

The experiences of children in the family child care homes are described in Table 2. Children spent less than one quarter of the observation time in literacy and math and science activities. Providers did not often scaffold children's experiences; the average child experienced scaffolding for less than one fifth of the observation, and some children never experienced scaffolding. In contrast, providers were very responsive, with the average child experiencing responsive involvement for over three quarters of the observation period. Most behaviors were distributed normally except for math and science (skewness = 1.06, $SE = .18$; kurtosis = 1.58, $SE = .35$). HLM in subsequent analyses allowed for analysis of nonnormal data, with the assumption that residuals were normally distributed.

Total Environmental Quality

The mean total quality (FDCRS) score was 4.04 ($SD = 1.07$), indicating that on average, family child care settings were rated as providing care that was safe but only within the range of high quality (recall that a "good quality" rating is 5 and above).

Associations Among Child- and Provider-Level Variables

We examined associations among provider characteristics, scaffolding and responsive behaviors, total quality (FDCRS), and children's engagement in pre-academic activities (see Table 3). Providers with more education and more children tended to scaffold children's behavior more often and were somewhat less likely to have children involved in math and science activities. Providers with more education tended

TABLE 2
Children's Experiences in Family Child Care

	Percentage of the Observation Period	
Variable	*M*	*SD*
Pre-academic activities		
Literacy	21.37	14.01
Math and science	22.67	20.34
Provider behavior		
Scaffolding	17.75	10.52
Responsive involvement	77.64	14.34

TABLE 3
Associations Among Provider Characteristics, Provider Behaviors, Total Quality, and Pre-Academic Activities

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Education	—								
Training	−.05	—							
Experience	.13**	−.14**	—						
Number of children	.23***	−.03	.17***	—					
Scaffolding	.10**	.17***	.02	.18***	—				
Responsive involvement	.01	.28***	−.08*	.05	.34***	—			
Total quality	.29***	.05	.13**	.31***	.35***	.07*	—		
Literacy	.01	.15***	.00	.04	.55***	.19***	.20***	—	
Math and science	−.08*	.10**	.02	−.06	.08*	.24***	−.04	.11***	—

Numbers in table are Pearson product–moment correlations. $N = 115$.
*$p < .05$. **$p < .01$. ***$p < .001$.

have more experience and cared for more children. Provider participation in previous training was positively associated with scaffolding, responsive involvement, and children's pre-academic activities but negatively associated with experience. Years of provider experience was positively associated with caring for more children. Provider scaffolding of children's learning and children's engagement in literacy pre-academic activities were most highly correlated with total quality score.

Predicting Total Quality

We used a hierarchical regression of total quality to assess the predictive strength of provider characteristics and aggregated behaviors with children for outcomes.

We created three models based on previous predictive models (Doherty et al. 2006; Kontos et al., 1995; NICHD ECCRN, 2002; see Table 4). The first model tested the predictive power of provider education (five levels listed in Table 1) and was significant. The second model added additional training, experience, and the number of children cared for in the family child care home to education level. In this model, provider education, additional training, experience, and the number of children were all positive and significant predictors of total quality. The third model departed from previous research by adding scaffolding and responsive involvement to provider characteristics as predictors of total quality scores. In this model only education level and scaffolding remained as significant predictors. As can be seen in Table 4, the R^2 increase for each model was significant, with the largest R^2 increase in the third model.

Predicting Children's Involvement in Pre-Academic Activities

Our final analytic step was to predict children's involvement in pre-academic activities. HLM allowed us to examine the impact of program-level variables (education level, number of children, and total quality) on child-level outcomes (pre-academic activities). We also examined provider behaviors on involvement in pre-academic activities and expected that scaffolding and responsive involvement toward individual children would predict more engagement in pre-academic activities.

TABLE 4
Linear Regression Coefficients: Contribution of the Level of General Education, FCC Training, FCC Experience, and Provider Behaviors to Total Quality (FDCRS)

	Model 1		*Model 2*		*Model 3*	
Independent Variable	*B*	*t*	*B*	*t*	*B*	*t*
Intercept	3.83	41.95***	3.19	14.10***	2.86	10.91
Education level	0.26	6.79***	0.25	6.46***	0.27	7.16
FCC training			0.41	2.28*	0.04	0.21
FCC experience			0.01	2.17*	0.01	1.31
Number of children			0.02	2.28*	0.02	1.81
Provider behavior						
Scaffolding					0.03	6.80
Responsive involvement					0.00	0.07
R^2	0.08		0.10		0.28	
R^2 change	0.08***		0.02*		0.18***	

Note. Total degrees of freedom = 114. FCC = family child care; FDCRS = Family Day Care Rating Scale.
$^*p < .05$. $^{**}p < .01$. $^{***}p < .001$.

ties. An intraclass correlation was calculated using the variance components of the models, with 57% of variance in literacy activities and 66% of variance in math and science activities found between programs. Examining both child-level and provider-level factors with hierarchical modeling allowed for a study of variation found within and between sites.

A two-level model was created to predict child engagement in pre-academic activities that examined child-level and provider-level variables. The first level included child-level data (scaffolding, responsive involvement, literacy, and math and science activities). The proportions of intervals coded with pre-academic activities were used as outcome variables. The second level included the total quality score and providers' education level. Because the contextual effects of the model were measured at the provider level but the outcomes were found at the child level, a simple random-intercept model was used (Raudenbush & Bryk, 2002). We created two models, one for each outcome, with child-level and provider-level predictors identical throughout the hierarchical modeling.

A general Level 1 model follows:

$$Y_{ij} = B0_j + B1_j\,(\text{scaffolding}) + B2_j\,(\text{responsive involvement}) + r_{ij}, \qquad (1)$$

where Y_{ij} is the post-intervention outcome score (on literacy) for child i in program (1–115). $B0_j$ represents the mean outcome scores for home j. $B1_j$ is the scaffolding effect, holding responsive involvement constant; $B2_j$ is the responsive involvement effect, holding scaffolding constant. Scaffolding and responsive involvement were of main interest because they represented the important provider–child interactions for this study. Both were continuous variables that reflected the percentage of observations during which the provider and child were interacting. The slope increased according to each additional percentage of increased time spent scaffolding or in responsive involvement. The errors (r_{ij}) were assumed to be independent and normally distributed, with a mean equal to 0.

A key facet of HLM is that the effects of the predictors at Level 1 become outcomes at Level 2. The Level 2 model follows with only the Level 1 intercept varying at Level 2:

$$B0_j = \gamma_{00} + \gamma_{01}\,(\text{FDCRS post-intervention}) + \gamma_{02}\,(\text{education level}) + \gamma_{01}\,(\text{number of children}) + \mu_{0j}$$
$$B1_j = \gamma_{10} \qquad (2)$$
$$B2_j = \gamma_{20},$$

where γ_{00}, γ_{10}, and γ_{20} represent the grand means for the outcome score, scaffolding slope, and responsive involvement slope, respectively. These predictors represent the influence of the presence of a Level 2 variable on a Level 1 parameter,

holding constant the other variables. Analysis of the $B0_j$ predictor variables indicated the impact of predictors on the general sample of children. The random effect residuals were modeled to vary randomly; thus, μ_{0j} is the deviation of the mean outcome score around the Level 2 predictors.

The first hierarchical model examined the outcome of percentage of children's observations in literacy activities (see Table 5). Scaffolding behavior and total quality scores were significant and positive predictors of literacy activities. Only responsive involvement was a significant and positive predictor of math and science activities in the second hierarchical model. The between-site variance remained the greater source of variation remaining after HLM for both models.

DISCUSSION AND IMPLICATIONS

Our findings suggest that within a sample of family child care providers who are quite different from those studied in prior research—that is, Mexican-heritage women with relatively low levels of formal education—formal education and training predict global environmental quality as measured with the FDCRS. These findings are consistent with previous research on environmental quality in family

TABLE 5
Predicting Child Engagement in Pre-Academic Activities

	Literacy		*Math & Science*	
Outcome	*Coefficient*	*t*	*Coefficient*	*t*
Learning activity	8.98	1.97*	30.99	4.14***
FDCRS	3.76	3.89**	0.43	0.37
Education level	–0.72	–0.78	–1.35	–0.89
Number of children	–0.05	–0.15	–0.70	–1.37
Scaffolding	0.82	8.84***	0.17	1.13
Responsive involvement	0.06	1.26	0.21	3.46**
Variance Components	*Estimate*	χ^2	*Estimate*	χ^2
Between site				
Variance in site mean scores	137.16	3630	329	1018
Variance in site scaffolding effects	0.73	550	1.83	721
Variance in site RI effects	0.14	411	0.56	610
Within site				
Residual variance	26.47		69.77	

Note. Main effects and interactions were tested hierarchically. The approximate degrees of freedom at the child level were 456 and at the provider level 114. FDCRS = Family Day Care Rating Scale; RI = responsive involvement.
*$p < .05$. **$p < .01$. ***$p < .001$.

child care (Burchinal et al., 2002; Doherty et al., 2006; Kontos et al., 1995). Our finding that formal education is linked to environmental quality scores is particularly interesting because the range and distribution of formal education in this sample was distinct, with most providers having very little formal education and many having been educated in Mexico rather than in the United States.

All the providers in the sample had some early childhood education training, so they had some exposure to the constructs that underlie the environmental quality score. Future research is needed to more clearly explain and elaborate the role of cultural belief systems in the links between formal education, ECE training, and implemented teaching practices.

It is important to note that very few of the providers in this sample had BA degrees; higher levels of formal education almost always meant community college degrees in child development. Training in almost all cases meant workshops rather than a college major. Thus, further understanding these results will also require research that directly examines the curriculum content received within the education and training programs available to low-income family child care providers.

Cultural Expectations and Professional Development

What little is known about child care in Latino families is that parents seek out care according to their social stratifications, often resulting in family child care being provided by other Latinas because of its availability and consistency with cultural beliefs (Hernandez et al., 2007; Zucker et al., 2007). Spanish-speaking Latino families' expectations of U.S. schooling often differ from what U.S. child care expects of parents in terms of parental teaching of pre-academic material (Gallimore & Goldenberg, 2001). Mexican-heritage families tend to believe that academic learning is the responsibility of teachers and the school, whereas instilling respectful behavior is the responsibility of the mother (Harwood et al., 1995; Richman et al., 1992; Uribe et al., 1994). Our findings suggest that Latina providers with more experience and, more important, training and education demonstrate scaffolding behaviors and are more responsive compared to providers with less training.

A majority of children observed in the programs were Latino/a. Although there is generally a cultural match between providers and children, future studies should include the interactions between Latina providers and children who do not share the same heritage to observe if the interactions vary between different groups of children.

Observing Provider–Child Interactions

Because of the diversity in child care beliefs and expectations, researchers have raised issues about the cultural authenticity of the quality measures used in large-scale studies of family child care. Our research incorporated measurement of

more adult interaction behaviors, especially everyday activities and scaffolding. Only provider education and scaffolding remained in the final predictive model for global environmental quality. These findings are important in illustrating the impact of observed teaching strategies on children's experiences in programs (Early et al., 2006, 2007). They also are important because they suggest that culturally appropriate measures of caregiver and child behaviors can predict a more standardized measure of child care quality. The measure of scaffolding found in the Snapshots offers more insight into how we think about family child care program quality. Future research is needed to extend these findings to include associations between scaffolding and child outcomes.

We compared the measurement of scaffolding and responsive behaviors with the FDCRS, a commonly used measure of total quality. Provider scaffolding predicted children's engagement in pre-academic literacy activities as well as global environmental quality. It is important to note that pre-academic activities were defined to include everyday activities found in homes rather than schools. These activities include measuring, having conversations about daily activities, or telling stories, as well as more standard activities like letter–sound correspondence at circle time. We observed a lot of rich conversation and book reading and found, as expected, that providers' scaffolding behaviors predicted children's experiences in literacy activities. Recall that all of these providers were in training programs funded to improve school readiness and had been given examples of how to enhance literacy within everyday activities and settings.

We might have expected similar predictive results from provider scaffolding for children's engagement in math and science activities. Although scaffolding was a significant predictor of literacy activities, it was not predictive of math and science activities. This may be partially due to the wide distribution of observed math and science activities and the generally low occurrence of such activities. Math and science activities represented two activities and represented roughly the same percentage of observations as literacy.

However, responsive involvement was found to be a significant and positive predictor of math and science activities. We believe that although math and science activities were emphasized less in training, the belief in providing more responsive adult involvement was still prevalent during these activities. The teaching strategy of scaffolding requires more content knowledge, whereas responsive involvement is more consistent across pre-academic activities. We suspect, based on our anecdotal reports from the observers, that math and science activities in these settings involved sitting still and chanting numbers rather than counting tablespoons of sugar while making cookies. Prior research found little use of "home-like" learning opportunities in observations in family child care homes (Kontos et al., 1995). It is possible that providers were not aware of how to promote math and science in home settings and that direct training and instruction in how to provide enriching math activities as well as literacy activities would be helpful. Other studies of preschool children and their caregivers found little engagement in math and science activities (Howes et al., 2008). Further research is needed to explore why providers and children are not involved in such activities and to determine which types of interventions might increase these activities.

Limitations

A key component of child care quality is the knowledge that providers bring to their programs. Most of the providers we studied had no formal child care education. However, many of those same providers demonstrated teaching practices associated with high-quality family child care programs. Our design and measures do not provide answers to how this process occurred. Understanding how Latina providers learn and practice good child care behaviors is an important next step needed in our research.

The main limitation to this study was the need for more measures of providers' teaching strategies. The methods by which Latina providers' teaching practices and activities engage children in learning need further study. Although their daily routines are observable, the way in which providers plan on building upon learning opportunities is unclear. Understanding the origins of providers' teaching strategies is equally important. As providers gain experience, they often supplement their knowledge of child care with training, education, and other sources. These sources may include but are not limited to books and journals, as well as discussions with child care peers, mentors, and parents. Future studies should include provider questionnaires to determine how providers learn about child care and how these sources influence their teaching strategies.

More research is needed to understand the associations between the content as well as the form of providers' education and training and teaching practices in the programs. Because the providers' education level was low, participating in training is important, as this may be one of the only formal opportunities for them to learn about child care. Although there was a strong association between provider training and children's pre-academic activities, the predictive strength of provider training for providers' teaching behaviors shown through hierarchical modeling was weak. This may be due in part to multicollinearity but also to the level of implementation of the family child care training. Most of the providers received some training, but the level to which they implemented their training was unknown. Varying degrees of training implementation may represent varying degrees of success. Future studies should include the level of implementation of training, the provider's beliefs about the credibility of the training, and interactions of training with level of experience.

As discussed earlier, cultural beliefs and expectations are often integrated into the Latina provider's goal of serving her community. A limitation of our study is that we did not measure when the cultural beliefs and child care training clashed

with or complemented each other. Understanding how and when the providers move from "mothering" to teaching in their programs should help in explaining the variation in teaching practices and the credibility of training. Future research on this topic will require qualitative as well as quantitative research to be sure that the rich cultural-specific nuances are well described.

CONCLUSION

We predicted that Latina providers with more formal education and training would provide more pre-academic learning experiences and more scaffolding of learning behaviors. We predicted a strong association between exposure to engagement in scaffolding and pre-academic activities. There were significant associations between provider characteristics, provider behaviors (e.g., scaffolding, responsive involvement), family child care quality, and pre-academic activities. Results show that the greater frequencies of time that the providers spent scaffolding were significantly related to family child care environmental quality and literacy activities. Providers' level of education, training, and years of experience were also associated with the same outcomes but to a lesser degree. Examining the sources of variation in teaching practices should provide a better understanding of the quality of family child care provided by Latinas as well as all other providers.

Examining how providers with little education and training demonstrate positive teaching practices is important in understanding program success. The snapshot provides a measure of scaffolding and the opportunities providers have to build on their students' knowledge. A commonality of successful family child care programs is good teaching practices. When observing programs that are not commonly studied, researchers should examine them with additional lenses. Although programs in Latino communities and dominant-culture communities differ, the findings suggest that traditional measures of child care quality apply. However, additional measures of teaching practice may supplement our understanding of child care quality in diverse settings.

REFERENCES

Bodrova, E., & Leong, D. J. (1996). *Tools of the mind: The Vygotskian approach to early childhood education.* Upper Saddle River, NJ: Prentice Hall.

Brooks-Gunn, J., Rouse, S. E., & McLanahan, S. (2007). Racial and ethnic gaps in school readiness. In R. Pianta, M. J. Cox, & K. L. Snow (Eds.), *School readiness and the transition to kindergarten in the era of accountability* (pp. 283–306). Baltimore: Brookes.

Burchinal, M., Howes, C., & Kontos, S. (2002). Structural predictors of child care quality in child care homes. *Early Childhood Research Quarterly, 17,* 87–105.

Clarke-Stewart, A., Vandell, D., Burchinal, M., O'Brien, M., & McCartney, K. (2002). Do regulable features of child-care homes affect children's development? *Early Childhood Research Quarterly, 17,* 52–86.

Doherty, G., Foer, B., Lero, D. S., Goelman, H., & LaGrange, A. (2006). Predictors of quality in family child care. *Early Childhood Research Quarterly, 21,* 296–312.

Early, D. M., Bryant, D., Pianta, R. C., Clifford, R., Burchinal, M., Ritchie, S., et al. (2006). Are teacher education, major, and credentials related to classroom quality and children's academic gains in pre-kindergarten? *Early Childhood Research Quarterly, 21,* 174–195.

Early, D., Maxwell, K. L., Burchinal, M., Alva, S., Bender, R. H., Bryant, D., et al. (2007). Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. *Child Development, 78,* 558–580.

Fleiss, J. L. (1981). *Statistical method for rates and proportions* (2nd ed.). New York: John Wiley.

Gallimore, R., & Goldenberg, C. (2001). Analyzing cultural models and settings to connect minority achievement and school improvement research. *Educational Psychologist, 36,* 45–56.

Halgunseth, L. C., Ispa, J., & Rudy, D. D. (2006). Parental control in Latino families: An integrative review. *Child Development, 77,* 1282–1297.

Harms, T., & Clifford, R. M. (1989). *Family Day Care Rating Scale (FDCRS).* New York: Teachers College Press.

Harwood, R. L., Miller, J. G., & Irizarry, N. L. (1995). *Culture and attachment: Perceptions of the child in context.* New York: Guilford Press.

Hernandez, D. J., Denton, N. A., & McCartney, S. (2007). Demographic trends and the transitional years. In R. Pianta, M. J. Cox, & K. L. Snow (Eds.), *School readiness and the transition to kindergarten in the era of accountability* (pp. 217–281). Baltimore: Brookes.

Howes, C., Burchinal, M., Pianta, R. C., Bryant, D., Early, D., Clifford, R., et al. (2008). Ready to learn? Children's pre-academic achievement in prekindergarten. *Early Childhood Research Quarterly, 23,* 27–50.

Howes, C., & Hong, S. S. (in press). Early emotional availability: Predictive of pre-kindergarten relationships among Mexican-heritage children? *Journal of Early Childhood and Infant Psychology.*

Howes, C., James, J., & Ritchie, S. (2003). Pathways to effective teaching. *Early Childhood Research Quarterly, 18,* 104–120.

Howes, C., & Norris, D. (1997). Adding school age children: Does it change quality in family child care? *Early Childhood Research Quarterly, 12,* 327–342.

Howes, C., & Stewart, P. (1987). Child's play with adults, toys, and peers: An examination of family and child-care influences. *Developmental Psychology, 23,* 423–430.

Howes, C., Wishard Guerra, A. G., & Zucker, E. (2007). Cultural communities and parenting in Mexican heritage families. *Parenting: Science and Practice, 7,* 1–36.

Ispa, J., Fine, M. A., Halgunseth, L. C., Harper, S., Robinson, J., Boyce, L., et al. (2004). Maternal intrusiveness, maternal warmth, and mother-toddler relationship outcomes: Variations across low-income ethnic and acculturation groups. *Child Development, 75,* 1613–1631.

Johnson, D. J., Jaeger, E., Randolph, S. M., Cauce, A. M., Ward, J., & NICHD ECCRN. (2003). Studying the effects of early child care experiences on the development of children of color in the United States: Towards a more inclusive research agenda. *Child Development, 74,* 1227–1244.

Kagan, S. (1992). *Family child care: Out of the shadows and into the limelight.* Washington, DC: National Association for the Education of Young Children.

Kontos, S., Howes, C., & Galinsky, E. (1996). Does training make a difference to quality in family child care? *Early Childhood Research Quarterly, 11,* 427–445.

Kontos, S., Howes, C., Shinn, M., & Galinsky, E. (1995). *Quality in family child care and relative care.* New York: Teachers College Press.

La Paro, K. M., & Pianta, R. C. (2000). Predicting children's competence in the early school years: A meta-analytic review. *Review of Educational Research, 70,* 443–484.

Lee, J., & Walsh, D. (2005). Introduction to the special issue: Unpacking quality in early childhood programs. *Early Education and Development, 16,* 403–404.

National Institute of Child Health and Human Development Early Child Care Research Network (2002). Structure > Process > Outcome: Direct and indirect effects of caregiving quality on young children's development. *Psychological Science, 13,* 199–206.

Raudenbush, S., & Bryk, S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Richman, A., Miller, P., & Levine, R. (1992). Cultural and educational variations in maternal responsiveness. *Developmental Psychology, 28,* 614–621.

Rusby, J. C., Taylor, T. K., & Marquez, B. (2004). Promoting positive social development in family childcare settings. *Early Education and Development, 15,* 449–470.

Taylor, A. R., Dunster, L., & Pollard, J. (1999). … And this helps me how? Family child care providers discuss training. *Early Childhood Research Quarterly, 14,* 285–312.

Uribe, F. M. T., LeVine, R., & LeVine, S. (1994). Maternal behavior in a Mexican community. In P. M. Greenfield & R. R. Cocking (Eds.), *Cross-cultural roots of minority child development* (pp. 41–62). Hillsdale, NJ: Erlbaum.

Uttal, L. (2001). *Racial safety and cultural maintenance: The child care concerns of employed mothers of color.* Belmont, CA: Wadsworth.

Zucker, E., Howes, C., & Garza-Mourino, R. (2007). *Early childhood care and education preferences among Latino families in Los Angeles.* Los Angeles: University of California, Los Angeles, Department of Education.

EARLY EDUCATION AND DEVELOPMENT, *20*(2), 285–304

ISSN: 1040-9289 print / 1556-6935 online
DOI: 10.1080/10409280902773351

Routledge
Taylor & Francis Group

Measuring the Quality of Teacher–Child Interactions in Toddler Child Care

Amy C. Thomason and Karen M. La Paro
Department of Human Development and Family Studies
The University of North Carolina at Greensboro

Research Findings: The toddler stage is a unique developmental period of early childhood. During this stage, children are developing autonomy, self-regulation, and language capabilities through interactions with significant adults in their lives. Increasing numbers of toddlers are being enrolled in child care. This article focuses on the need to assess quality in child care classrooms serving children ages 15 to 36 months based on the developmental needs of toddlers. It suggests and provides preliminary validation information for a measure of teaching behaviors centered on teacher–child interactions adapted from the Classroom Assessment Scoring System and discusses results from observations in 30 toddler classrooms. *Practice or Policy:* Findings are discussed in terms of policy implications for toddler child care and future directions for research.

Toddlerhood is a developmental period defined by the need for "autonomy with connectedness" (Sroufe, 1996, p. 206). Toddlers rely on relationships with significant adults in their lives to help them make sense of their experiences and regulate their developing emotions, and to use as a secure base while exploring the world around them (Sroufe, 1996). Parents have generally been the focus in research on the need for "connectedness" in toddlerhood, but child care providers are becoming increasingly important participants in the promotion of healthy development in toddlers. Currently, 59% of children in the United States are enrolled in nonparental care for more than 30 hr per week by 24 months of age (Mulligan, Kinball, West, & Chapman, 2005; National Institute of Child Health and Human

Correspondence regarding this article should be addressed to Karen M. La Paro, Department of Human Development and Family Studies, The University of North Carolina at Greensboro, Greensboro, NC 27402. E-mail: kmlaparo@uncg.edu