



Impact of HIPPY on home learning environments of Latino families

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ARTICLE INFO

Article history:

Received 6 November 2009
Received in revised form
30 December 2010
Accepted 4 January 2011

Keywords:

Early intervention
Home visiting
Latino families
Self-efficacy
Parenting
Maternal depression
Home environment

ABSTRACT

This study investigated effects of Home Instruction of Parents of Preschool Youngsters (HIPPY), a para-professional home visiting program, on parents and children. The program site served low-income, Spanish-speaking families. On average, mothers were 31 years old ($SD = 4.78$) and children were 3 or 4 years old ($M = 3.92$, $SD = .92$). Participants ($n = 54$) had more parenting self-efficacy and more enriched home environments than families on a waiting list ($n = 54$). In a regression on home environment, participation in the intervention was a stronger predictor than maternal education, depression, and stress. A third-grade follow-up of children in the program showed significantly higher math achievement when compared to low-income Latino third graders in the same school district. These findings appear to validate the HIPPY model, which suggests that parents gain confidence as their children's teachers through their experiences in the program. HIPPY successfully addresses the need for culturally sensitive programming aimed at improving educational achievement among minority children.

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In general, early childhood enrichment programs foster the educational development of young children (Bakermans-Kranenburg, van IJzendoorn, & Bradley, 2005; Shonkoff & Phillips, 2000; Zigler & Styfco, 2001). The success of early intervention programs may be enhanced by effective parenting, parents' positive beliefs about their parenting skills, and the importance of involvement in their child's education. An awareness of parenting skills, parental involvement, and motivation combine to create parenting self-efficacy that has been shown to improve child outcomes (Pelletier & Brent, 2002; Seefeldt, Denton, Galper, & Younoszai, 1999; Sofronoff & Farbotko, 2002). This study examines parenting self-efficacy, parenting, and early academic success among Spanish-speaking families in an early intervention home visiting program, Home Instruction for Parents of Preschool Youngsters (HIPPY).

HIPPY began in Israel as a service for immigrant parents (Lombard, 1981). HIPPY programs throughout the world follow the HIPPY model, which consists of developmentally appropriate curriculum, role play, home visitors from the community, home visits, and group meetings. The HIPPY curriculum consists of activity packets, storybooks, and manipulative equipment for teaching math and science. The goal of the curriculum is the development of language, problem solving, logical thinking, and perceptual, physi-

cal, and social/emotional skills. HIPPY staff consist of home visitors from the community that work directly with parents through the use of role playing with weekly activity packets. Coordinators with graduate degrees in education or counseling supervise home visitors. Additionally, group meetings for all families share curriculum information and community resources for personal growth.

The program focuses on increasing parent involvement and enhancing school readiness for children between the ages of 3 and 5 years. During home visitation, parents are encouraged to be actively involved in their child's learning, leading to later parent involvement with schools and the learning process (Westheimer, 2003). Previous research on the HIPPY program is limited, but some immediate and long-term impacts have been identified. HIPPY participants had higher scores on math and reading achievement tests in the early school years than peers who attended a center-based program (Baker, Piotrkowski, & Brooks-Gunn, 1998; Kagitcibasi, Sunar, & Bekman, 2001). Parents enrolled in HIPPY reported higher expectations of their children's school success and greater involvement in their children's learning at two time points, including a follow-up when the children were adolescents (Kagitcibasi et al.). Additional studies have demonstrated that the HIPPY program has positive effects on later academic achievement (Bradley & Gilkey, 2003; Garcia, 2006; Karoly, Kilburn, & Cannon, 2005).

Few studies have specifically examined immediate outcomes on HIPPY parents and what they do in the home with their children. In addition, little research has specifically investigated HIPPY's impact on Latino immigrant families, which comprise an increasing proportion of low-income families in the United States. The Latino population is expected to reach 102.6 million by the year 2050,

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constituting approximately one-fourth of the U.S. population (U.S. Census Bureau, 2008).

While the number of Latino families is growing, Latino children lag behind European American and Asian American children at all educational levels (Garcia & Jensen, 2009). In low-income, urban areas, Latino children are more likely to show poor achievement in reading and math than other students; additional risks, such as family poverty, increase the odds of school failure (Rouse & Fantuzzo, 2009). Although much research exists on at-risk families, specific studies focused on Latino immigrant parents are relatively scarce. In the present study, one or both of the parents who participated in the program were born outside the United States, primarily Mexico.

Immigrants often experience isolation, alienation from the community, and poverty, circumstances that could interfere with their well-being (Hernandez, Denton, & Macartney, 2008). Poverty alone increases the risk of depression for mothers with young children (Robinson & Emde, 2004). Depressed mothers often lack confidence and self-efficacy skills, which may interfere with their ability to parent effectively (Coleman & Karraker, 1998). Maternal depression during early childhood also has a significant negative effect on children's cognitive development (Pettersen & Albers, 2001). Mothers who are isolated due to language barriers and a lack of resources may experience additional risks of depression. Yet members of a traditional Latino household have strong ties to the extended family, which can be a source of support and strength (Vega, 1995).

Current research on home visiting suggests that programs placed within a framework of cultural competence are more likely to engage parents' involvement in the program, especially within African American and Latino families (Daro, McCurdy, Falconnier, & Stojanovic, 2003; McCurdy, Gannon, & Daro, 2003). Cultural competence may be more essential for program providers working with immigrant Latino families, who face additional challenges as they adjust to a new culture and language. Immigrants, by nature, form a sub-group within the broader culture, with varying degrees of acculturation to the majority culture (Mio, 2003). While diversity exists within this sub-group, language and customs provide a point of common connection. This study focuses on an immigrant community served by native speakers from within the same community, which suggests that cultural competence may not be a challenge.

Culture, available resources, and language shape the context of home visiting programs, which aim to improve the child's home environment. In the population studied, Spanish language use and dual language learning may affect children's success in school. Mexican American parents may value education but are less likely to be involved in their child's education (Jacobson, 2005). Mexican Americans generally favor family goals over individual goals; family solidarity is a cultural imperative (Oropesa & Landale, 2004; Torres, 2004). Yet early educational experiences for Spanish-speaking children are important; emergent Spanish literacy in kindergarten predicts later English reading ability (Reese, Garnier, Gallimore, & Goldenberg, 2000). In Spanish-speaking homes, socioeconomic status predicts English reading ability through family literacy practices, as children of higher SES parents are more likely to be exposed to literacy skills in the home. Specifically, Latino family environments that support literacy-related activities are related to school readiness skills (Farver, Xu, Eppe, & Lonigan, 2006).

The theoretical model used to explain the effectiveness of this intervention goes beyond demographic status to examine psychological factors, such as parenting stress, maternal depression, and parental self-efficacy (see Fig. 1). Parenting efficacy may be defined as a belief that parents are responsible for their children's life outcomes combined with a belief in their personal competence (Ozer & Bandura, 1990). Consistent with Bandura's theory, mothers with high parenting self-efficacy would be motivated to invest time in teaching their children through the HIPPY program, thus increas-

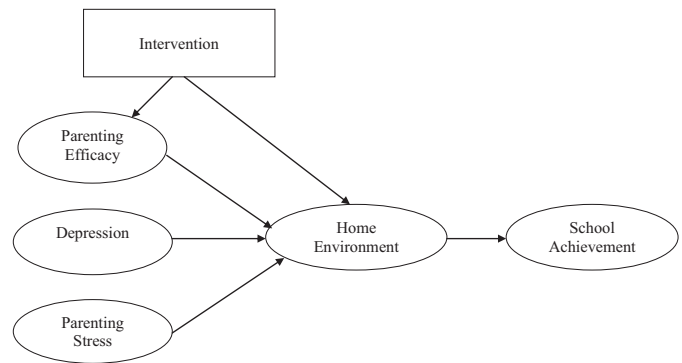


Fig. 1. Theoretical process model of the effects of home visiting intervention on achievement.

ing the likelihood of future academic and social success (Ardelt & Eccles, 2001). In addition, the possession of relevant knowledge and competence to take action influences an individual's sense of self-efficacy in striving for a goal (Cattaneo & Chapman, 2010). HIPPY may impact parenting efficacy through the provision of training and resources that assist mothers to participate more actively in their children's early learning. Furthermore, family stress theory suggests that discrimination, financial strain, and psychological distress affect parenting, which in turn affects child achievement (McCubbin, McCubbin, Thompson, & Thompson, 1998; Nievar & Luster, 2006). As stressful contextual factors increase, maternal depression decreases mothers' attention to children, and negative child outcomes are more likely (Dix & Meunier, 2009). Improvements in parenting efficacy, as a result of home visiting, may mitigate negative environmental effects, thus improving children's outcomes.

Although previous studies have indicated long-term school effects of the HIPPY program, there are few empirical studies of its effects among Spanish-speaking families. The literature also lacks empirical evidence of its effects on parental beliefs or parenting, the hypothesized process whereby home visiting interventions create change. Thus, we contrasted parental self-efficacy beliefs and the home environment of Latinas participating in HIPPY with parental beliefs and the environment of Latina mothers of children on the waiting list. Then, we examined third-grade achievement outcomes from a different cohort of children who had participated in the same school district's HIPPY program. Specifically, we hypothesized that HIPPY participation among Spanish-speaking families with preschool children would predict a more enriched home environment and more parental efficacy after controlling for the effects of maternal education, maternal depression, and parenting stress. We also hypothesized that HIPPY participation would improve the odds of successful reading and math achievement in third grade for low-income, Latino children.

1. Method

1.1. Participants

Participants in the study resided within a diverse urban school district in the Southwest. A quasi-experimental research design was used in the study. Two different cohorts were studied. In Cohort 1, study participants in a home observation and survey included randomly selected mothers and preschool children ($n = 108$) from families participating in HIPPY ($n = 54$) and a comparison group of families on a waiting list for HIPPY ($n = 54$). The average age of the children was 3 years and 11 months; 54% of the children were 3 years old and 45% of the children were 4 years old. All participants were of Latino origin and spoke Spanish; however, 3% preferred to

take the survey in English. The average age of the mothers was 30.8 years of age ($SD = 4.78$); 92.5% were married with 11.2% of these designated as common-law marriages. The average household contained 2.3 ($SD = .68$) adults and 2.3 children ($SD = .96$).

Household income was assessed with an ordinal measure. The median income (37.6% of families) was between \$15,000 and \$25,000; 29.7% had an income of less than \$15,000 and 33% had an income over \$25,000. Only 3% of families had an income over \$45,000. Mother's average education level was high school education; 34.3% had not graduated from high school. Among the spouses or partners, 36.6% had not graduated from high school. In this particular district, the majority of the families eligible for the program were Spanish-speaking Latinos. Although there were three families participating in the program that spoke only English, all of the families randomly selected for participation spoke only Spanish or were bilingual.

All of the mothers were able to read and write in Spanish or English. Our protocol included reading the surveys to the mothers if they were unable to read, but all of the participants said that they did not need help reading the survey. We speculated that mothers who had literacy issues may have self-selected out of HIPPIY because of the recruitment methods and expectations for mothers in the program. First, mothers needed to fill out a form with their personal information in order to enter the program. Second, the program offered written materials and storybooks to help parents work with their children in learning activities, with the expectation that mothers would follow through during the week when the home visitor was not there. Mothers who were in this particular home visiting program or on the waiting list appeared to be educated at basic levels, even though the majority could not speak English.

Cohort 2 consisted of 131 former HIPPIY program participants in the third grade and a comparison group of 131 third-graders with similar demographics. All children within Cohort 2 lived within the same school district as the children in Cohort 1 from kindergarten through third grade. All students who participated in HIPPIY at the school district, which is a three-year program culminating in the kindergarten year, were flagged in the school district database. Within Cohort 2, the comparison group children and children who had participated in home visiting were all from Latino families who qualified for free or reduced lunch. Achievement data were available through the school district database. Demographic information available through the database was limited to ethnicity and income (free or reduced lunch status).

We assumed the sample of former program participants in the third-grade follow-up was similar to the sample of current HIPPIY families. Historically, this particular program has focused on services for Spanish-speaking families. We had concerns, however, about the similarity of non-participating families to those in the participant group. Although we were able to select participants by ethnicity, we lacked information on Spanish language use in the home. In this community, 10.6% of the population is Latino, and 37.3% of Latinos over five years of age spoke Spanish. Thus, our constructed comparison group was likely to include Latino children who were raised in English-speaking homes.

1.2. Procedure

1.2.1. Early intervention program

This study focused on a public school-administered HIPPIY program which served mostly low-income, Latino Spanish-speaking families with children between the ages of three and five years. We did not, however, include 5-year-olds in our study. Following program enrollment in the fall, the program ran for 30 consecutive weeks during the academic school year. Families were recruited through word of mouth or through a sign-up for mothers who

attended an elementary school pre-kindergarten parent meeting in the spring. In the larger metropolitan area, only 3% of the families eligible for the program were served due to limited funding (Nievar, Martinez-Cantu, & Brown, 2009). Thus, active recruitment was not a priority because there were always more interested families than available funds would support.

Mothers in the program received a packet each week containing developmentally appropriate games and activities that taught science, mathematics, language and communications, motor skills, literacy skills, and social competence (Greene, personal communication, 2009). The program and materials presented were in Spanish. Home visitors role played during their weekly visit with parents to teach them how to engage their child in these activities. The home visitor initially demonstrated and played the role of the parent and the parent played the role of the child; subsequently the home visitor played the role of the child with the parent instructing. Often the child was present in the home during the role play, but this was not required. Home visitors received a minimum of 18 h of training by HIPPIY trainers before working with parents; weekly training of 3–4 h prepared home visitors to use the role play technique with the curriculum for the week. Home visitors were generally peers of the mothers in terms of educational level and ethnicity; many were former program participants. In addition to home visits, group meetings gave parents opportunities to share their experiences and learn more about various topics, such as parenting, the school system, and community services (Baker et al., 1998).

Parents worked with their child for 20 min each day, using the curriculum as their guide. Parents also received nine storybooks each school year to encourage literacy development. This site obtained Spanish versions of the books that HIPPIY typically uses for 3–4 year old children, including *Corduroy*; *Goodnight Moon*; *In the Cow's Backyard*; *Is Your Mama a Llama*; *Jump, Frog, Jump*; *The Empty Piñata*; *The Happy Day*; *The Snowy Day*; and *Where's Spot*. Modifications to aid Spanish-speaking families were part of a pilot program 22 years ago (Texas HIPPIY, 2008). Spanish-speaking families have been served continuously since that time, but in-home evaluations of the Spanish version of the program are not reported in the literature.

1.2.2. Cohort 1 research design

To evaluate program effects within the constraints of the existing infrastructure, we used a quasi-experimental design comparing families who had been enrolled in the HIPPIY program for at least 6 months ($n = 54$) with those on the waiting list ($n = 54$). Families in the experimental group were randomly selected from the list of enrolled families; families in the control group were randomly selected from a list of interested families who had not yet received program services.

To create the sample for the in-home observation of preschool children and their mothers, we randomly selected 70 HIPPIY participants and 73 participants from the HIPPIY waiting list. Trained bilingual research assistants then contacted families by telephone. Twenty-nine percent of HIPPIY families and 36% of waiting-list families in our random sample could not be contacted for various reasons, such as disconnected telephones or not answering a call from an unrecognized number. The HIPPIY program itself had additional contact information, including home addresses; however, out of respect for family privacy and confidentiality, our protocol did not allow the research team to solicit participation by contacting families at their homes.

Families were told that the study would examine parents' beliefs and practices and would provide feedback on the HIPPIY program. Only two families refused participation. Mexican American parents place a high value on schooling (Valencia & Black, 2002); therefore, the partnership with the school system may explain our low rate of

refusal for participation in the home observation. Within the intervention group, there was no significant difference in the number of visits actually received between those interviewed and those who were not interviewed.

Two trained research assistants (at least one Spanish-speaking) presented initial consent and demographic forms to interested families in their homes before proceeding with data collection. Mothers completed self-report measures independently. Research assistants completed observation and survey forms for the HOME, a measure of parenting practices, over a period of at least 30 min. It was difficult to blind research assistants to participant status, as mothers often conversed with them either about the HIPPY program or their plans to be enrolled in the HIPPY program in the future. However, research assistants were told that the purpose of the study was to assess mental health and parenting practices among low-income, Spanish-speaking families. This may have reduced researcher bias. In addition, the members of the research team were not affiliated with the HIPPY program in any way. Participants were compensated with \$20 for their time and effort. Measures were completed only once; the participant group completed measures after 6 months of participation in HIPPY.

1.2.3. Cohort 2 research design

In the third-grade follow-up of students who had participated in HIPPY during preschool, achievement test scores were provided by the school district as part of an agreement with the state HIPPY Center. The fourth author worked for the Center and obtained permission from the school district to analyze school data for presentation and publication. Before sending the data for analysis, the school district removed all personal information from the data.

As part of an ongoing evaluation effort, the school district has tracked students who participated in the HIPPY program since kindergarten entry. The school district also funded and administered the HIPPY program itself, using Title I funds for low-income families. The state HIPPY Center did not receive funds from the school district, and none of the Center's employees worked for this HIPPY program site or the school district. Students in this district were eligible for the same local program that participants in the Cohort I research attended. School achievement was contrasted between participants in the program and randomly selected non-participants who were eligible for the program, using third grade data from the school district with names of students removed. Information on free and reduced lunch was included as a covariate.

To address the question of additional interventions explaining positive results, we investigated two possible center-based interventions that preschoolers may have attended previous to kindergarten. We obtained information from previous unpublished research that no children at this program site also attended Head Start (Brown, personal communication, 2010). It is possible that the Head Start in this school district did not provide extra services for Spanish-speaking families, although some Head Start programs primarily serve Latinos and encourage Spanish use (e.g., Farver et al., 2006).

The second intervention that we tested was a pre-kindergarten school-based program serving low-income families. We obtained a separate dataset through the state HIPPY Center that allowed for the evaluation of the pre-kindergarten program in this district. We verified that HIPPY children did attend this program, but there were insufficient numbers tracked in the dataset to run separate analyses for participation in HIPPY. Available math and reading test scores for all low-income pre-kindergarten program participants and non-participants were compared, with free or reduced lunch as a covariate.

1.3. Measures

1.3.1. Spanish translations

Spanish versions of the Parenting Stress Index, Parental Involvement and Efficacy, and the Center for Epidemiological Survey-Depression were obtained from the publishers. These self-report measures showed internal reliability and convergent validity in previous studies with low-income Latino families (Diener, Nievar, & Wright, 2003; Nievar, Brophy-Herb, Fitzgerald, & Diener, 2007). We adjusted the layout of the questionnaires to account for mothers who may have less experience with formal education. Three families used the English version of the measures; readability was United States grade level 4.4 in English.

We translated and back-translated the HOME to confirm validity. Translators were instructed to use simple words and sentence construction where possible. A final version was developed through consensus with translators and bilingual native speakers on the research team. Although the HOME survey was translated into Spanish for convenience, bilingual research assistants delivered the HOME in a semi-structured conversational style.

We were unable to determine whether the outcome measure, a standardized achievement test, was given in Spanish or English; however, all of the students had been in the school system since kindergarten. We can assume that it is unlikely that these students did not transition to an English language test after four years of school, even if they were placed in a bilingual classroom at school entry.

1.3.2. Parenting Stress Index

The 35-item short form of the Parenting Stress Index measured overall parenting stress and stressors that affect other areas of parents' lives on a 5-point scale. This widely used measure has been previously validated in other studies (Abidin, 1995). Sample items include, "I often have the feeling that I cannot handle things very well," and "Since having this child, I have been unable to do new and different things." Parents rated their opinion on a 1–5 scale, with anchors of 1 = *strongly disagree* to 5 = *strongly agree*. A higher score indicated more stress. Internal reliability was acceptable at .81.

1.3.3. Parental Involvement and Efficacy

This measure addresses mothers' perceived control over areas of children's health, social skills, and cognitive development (Diener et al., 2003). It also assesses parents' perceptions of their potential effectiveness as parents. These items were scored on a 5-point Likert scale, with anchors ranging from 1 = *strongly disagree* to 5 = *strongly agree*. A higher score on the measure indicated a stronger belief in efficacy and involvement ($\alpha = .77$). A sample item is: "I can do a lot to help my child be excited about learning." Data for this variable were centered around the mean to optimize normality and address multi-collinearity.

1.3.4. Center for Epidemiological Survey-Depression (CES-D)

This 20-item measure has been widely used as a survey instrument and screening tool (Radloff, 1977). Items assessed depressive symptoms over the previous week (e.g., During the past week, I did not feel like eating; my appetite was poor). Item anchors ranged from 0 = *Rarely/none of the time/1 day*, 1 = *Some/A little of the time/1–2 days*, 2 = *Occasionally/Moderate amount of the time/3–4 days*, and 3 = *Most/All of the time/5–7 days*. Research on the CES-D scale shows no significant differences between groups with different ethnic backgrounds (Roberts, 1980). The Cronbach's alpha for the present study was .84.

Table 1
Correlations between study variables.

Variables	1	2	4	5	6	7	8	9	10	11	12	13	14
1. Income	–												
2. Maternal Education	.10	–											
3. Parental Efficacy	.15	.25*											
4. Depression	–.05	–.13	–										
5. Parenting Stress	–.10	–.12	.33*	–									
6. Learning Materials	.11	.21*	–.08	–.14	–								
7. Language Stimulation	.14	.12	–.13	–.13	.43*	–							
8. Physical Environment	.07	.11	–.23*	–.30*	–.02	.23*	–						
9. Responsivity	.02	.06	–.07	–.22*	.27*	.31*	.13	–					
10. Academic Stimulation	.05	–.05	.02	.01	.39*	.45*	.00	.17	–				
11. Modeling	–.01	.07	–.07	–.03	.10	.24*	–.04	.02	.08	–			
12. Variety	.12	.16	–.15	–.18	.49*	.26*	.03	.07	.41*	.18	–		
13. Acceptance	.05	.08	–.30*	–.26*	.12	.14	.11	.04	.10	.03	.14	–	
14. HOME total	.14	.20*	–.22*	–.30*	.75*	.68*	.34*	.54*	.57*	.33*	.62*	.31*	–
M	2.16	2.26	9.81	2.18	7.20	5.99	5.57	4.68	4.27	2.27	6.56	3.61	40.16
SD	1.03	1.21	7.46	.47	2.23	.93	1.38	1.60	.96	1.02	1.37	.75	5.75
Range	1–5	1–5	0–35	1.0–3.8	.2–1.0	.4–1.0	.1–1.0	.1–1.0	.2–1.0	0–1	.4–1.0	0–1	.4–.9

Note: $N = 108$.

* $p < .05$.

1.3.5. Demographic survey

Two items from the demographic survey, family income and mother's education, were used in the analyses. Income was an ordinal measure, ranging from 1 = less than \$14,999 to 7 = above \$65,000. Income categories increased by \$10,000 at each ordinal level. Mother's education was also ordinal, with anchors of 1 = Some high school or less, 2 = High school graduate, 3 = Some college or technical school, 4 = College or technical school graduate, and 5 = Professional/graduate degree.

1.3.6. Home Observation for Measurement of the Environment (HOME)

This widely used measure of the home environment predicts children's later achievement in school (Caldwell & Bradley, 1984). It assesses positive parenting practices through observation in the home and survey questions. Research assistants were trained on three mock visits and required to reach at least 85% agreement before being considered reliable. The intraclass correlation coefficient (ICC) for inter-observer reliability was .87 with a 95% confidence interval from .82 to .91 ($n = 104$).

The early childhood version of the HOME includes eight subscales: (a) Learning Materials, (b) Language Stimulation, (c) Physical Environment, (d) Warmth, (e) Academic Stimulation, (f) Modeling, (g) Variety, and (h) Acceptance. An example of an item on the Learning Materials subscale is "Child is encouraged to learn shapes." Other examples from additional subscales include, "Child is encouraged to learn the alphabet" (Language Stimulation), "Child's outside play environment appears safe and free of hazards" (Physical Environment), "Mother caresses, kisses or cuddles child at least once during visit" (Warmth), "Child is encouraged to learn colors" (Academic Stimulation), "Family has TV, and it is used judiciously, not left on continuously" (Modeling), "Real or toy musical instrument" (Variety), and "Mother does not scold or derogate child more than once during visit" (Acceptance). The total HOME score had an internal reliability of .75. Items were given a score of '1' if parents met the described criterion. An average item score was used for analyses; higher scores indicated a more enriched home environment.

1.3.7. State achievement test

In order to track success of individual schools, legislation has increasingly required standardized testing. Annual assessments are required of each state to monitor academic standards that are defined by each state (Education Trust, 2003). Reading and mathematics achievement tests were required of third grade public school

children in the state where the study was conducted. Performance on these standardized achievement tests of basic knowledge and skills were evaluated against academic standards beginning in the third grade. Spanish and English versions of the tests were available.

Test blueprints established the length of each test and the number of test items measuring each objective to provide consistency from one test administration to the next. The 3rd grade reading test blueprint included 36 objectives for basic understanding, literary elements, analysis using reading strategies, and analysis using critical thinking skills. The 3rd grade mathematics test blueprint included 40 objectives for numbers, operations, quantitative reasoning, patterns, relationships, algebraic reasoning, geometry and spatial reasoning, measurement, probability and statistics, mathematical processes and tools.

Reliability data was based on internal consistency measures including the Kuder Richardson Formula 20 (KR20). Reliabilities as assessed by state evaluators ranged from .87 to .90. Test validity was content based and tied directly to the statewide curriculum. To ensure the highest level of content validity, the process of aligning test objectives and items to the curriculum was carefully implemented and included review by numerous committees of educators (Texas Education Agency, 2009).

2. Results

2.1. Preliminary analyses

Preliminary analyses of data from the first cohort included intercorrelations among study variables, means, and standard deviations, as shown in Table 1. Parenting stress was associated with less parenting efficacy and higher levels of depressive symptoms. Overall, mothers with higher home environment scores were less depressed, less stressed as a parent, and reported more parental self-efficacy.

Demographic characteristics of participant and control groups were compared with the independent sample t -tests using the Bonferroni correction to verify similarities within the sample while decreasing the probability of Type I error. There were no significant differences between groups on the number of adults in the home, number of children in the home, education level of the mother, education level of the father, income, and age of mothers listed as dependent variables.

A post-hoc analysis indicated that only 64% of the families on the waiting list enrolled in the program within the following year. In

Table 2
Hierarchical regression analyses predicting home environment ($N = 108$).

Variable	Step 1			Step 2			Step 3			Step 4		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Income	.01	.01	.12	.01	.01	.09	.01	.01	.08	.01	.01	.06
Maternal Education	.02	.01	.19*	.01	.01	.14	.01	.01	.13	.01	.01	.14
Parental Efficacy				.05	.02	.21*	.03	.03	.11	.01	.03	.03
Depression							-.03	.03	-.11	-.03	.02	-.13
Parenting Stress							-.03	.02	-.20*	-.04	.02	-.20*
Participant Group										.05	.02	.26*
R^2	.06	.10	.15	.21								
F for ΔR^2 (df_1, df_2)		4.72* (1, 104)	3.13* (2, 102)	7.67* (1, 101)								

Note: Participant group (0 = control, 1 = HIPPY intervention).

* $p < .05$.

order to test for homogeneity within the control group, a multivariate analysis of variance (MANOVA) contrasted scores of maternal depression, parenting efficacy, subscales of the HOME, and parenting stress between families on the waiting list who enrolled in the program and those who did not enroll, $F(11, 41) = 1.23$; $p = .30$. Overall, there were no significant difference on study variables between those who eventually entered the program and those who did not.

2.2. Multivariate tests of intervention effects and hierarchical regression analysis

To examine if the participants in the control group and in the HIPPY program differed on the major study variables, multivariate analysis of variance was conducted on measures of maternal depression, parenting efficacy, parenting stress, and subscales of the HOME. The multivariate test was significant, Wilks's $F(11, 93) = 7.60$, $p < .001$. Follow-up univariate analyses revealed families participating in the intervention had more positive scores than the control group on the Parental Involvement and Efficacy measure ($F(1, 103) = 11.13$, $p = .001$, $d = .66$), and certain HOME subscales, including Learning Materials ($F(1, 103) = 17.28$, $p = .001$, $d = .82$), Academic Stimulation ($F(1, 103) = 13.6$, $p = .001$, $d = .73$), Modeling ($F(1, 103) = 4.26$, $p = .04$, $d = .41$), and Variety ($F(1, 103) = 42.93$, $p = .001$, $d = 1.30$). The subscale, Physical Environment, showed that families on the waiting list had a more favorable physical environment than those in the participant group ($F(1, 103) = 8.01$, $p = .006$, $d = .66$). We found no significant difference between the two groups of participants on the CES-D (depression), Parenting Stress Index—Short Form, and the Warmth, Acceptance, and Learning Stimulation subscales from the HOME.

Multiple regression analyses were then conducted using MPlus (v. 5.21, Muthén & Muthén, 1998–2009) to test the hypothesized effects of parental efficacy, depression, parenting stress, and HIPPY intervention on home environment. Previous to these analyses, tests of skewness and kurtosis indicated no substantial deviations from normality according to the cutoff values of two for skewness and seven for kurtosis (West, Finch, & Curran, 1995). According to attrition analyses, 2% of data on variables in the analysis were missing at random. To address missing data, the models were analyzed using the full information maximum likelihood (FIML) method under Mplus, which applies the expectation maximization algorithm described in Little and Rubin (2002).

Hierarchical regression analysis was conducted for home environment in four steps (see Table 2). In the first step, covariates including parental income and education were entered to account for their potential influence on home environment. To account for potential parenting effects, parental efficacy was entered in the second step. Next, depression and stress were entered in the third step. The participant group was entered in the final step. Because find-

ings are reported in tables, we highlight the significant predictions of home environment from the regression analyses.

As shown in Table 2, parental efficacy significantly predicted home environment, above contributions from parental income and education ($\beta = .21$, $p = .03$). The increment in R^2 was significant ($F(1, 104) = 4.72$, $p = .032$). In addition, parenting stress significantly predicted home environment, above parental income, maternal education, and parental efficacy ($\beta = -.20$, $p = .05$), with a significant increment in R^2 ($F(2, 102) = 3.13$, $p = .048$). Finally, participant group significantly predicted home environment above parental income, maternal education, parental efficacy, maternal depression, and parenting stress, with home environment more enriched ($\beta = .26$, $p = .005$) for children in the HIPPY intervention program ($F(1, 101) = 7.67$, $p = .007$ for ΔR^2).

In addition, four separate regression analyses were conducted to test for interaction effects between intervention status and parental efficacy, maternal education, child age, and child gender. Results showed that there were no interaction effects between intervention status and any of these four variables.

2.3. Academic outcomes at third grade follow-up

We measured the effectiveness of the same home visiting program on third-grade reading and math performance using a different cohort of former home visiting participants. Children in the third grade whose families had participated in HIPPY did not score significantly higher ($M = 2234.53$, $SD = 157.52$) than the comparison group of low-income Latino third graders on the reading section of the state achievement test ($M = 2225.09$, $SD = 157.80$), $t(230) = .46$, $p = .65$. The participant group scored significantly higher ($M = 2253.13$, $SD = 199.41$) on the math section of the state achievement test than the comparison group of third graders ($M = 2172.09$, $SD = 179.87$), $t(228) = 3.24$, $p < .01$. The magnitude of the difference of means approached a medium effect ($d = .43$).

In addition, we performed two regressions on third-grade achievement, as shown in Table 3. HIPPY participation had no

Table 3
Regression models predicting reading achievement and math achievement for third grade low-income Latino children.

Variable	B	SE B	β
Predictors of reading achievement			
Income	15.60	30.36	.04
HIPPY participation	7.15	21.21	.02
Predictors of math achievement			
Income	77.51	35.00	.14*
HIPPY participation	72.28	25.14	.19*

Note: For reading achievement, $R^2 = .002$. $N = 232$. In the control group and participant group, $n = 116$. For math achievement, $R^2 = .06$. $N = 230$. In the control group and participant group, $n = 115$.

* $p < .05$.

significant effect on third-grade reading achievement, while controlling for family income, $F(2, 229) = .24, p = .79$. A statistically significant effect was found for HIPPY participation on third-grade math achievement, while controlling for family income, $F(2, 227) = 7.78, p < .001$.

Other early education interventions, such as pre-kindergarten and Head Start, could have accounted for effects of HIPPY on math achievement. For example, students already involved in HIPPY may have been more likely to attend an educational preschool because of their connection with the school system. We assumed, then, that if an additional preschool program was successful, that effects of HIPPY on third grade achievement may simply be a result of their connection to a successful preschool program rather than a result of HIPPY itself. Therefore, additional analyses were conducted to rule out confounding effects.

As none of the former HIPPY participants attended Head Start, only pre-kindergarten enrollment was included in the model. This sample consists of low-income, Latino children who had been tracked by the school since their entry into the school system. Insufficient numbers of former HIPPY program participants had been tracked in this sample, so we were unable to test HIPPY and Pre-K effects simultaneously. We controlled for income within this low-income sample with a dichotomous variable of free or reduced lunch. Tests of reading achievement, $F(2, 45) = .55, p = .58$, and math achievement, $F(2, 79) = 1.88, p = .16$, showed no significant differences in the third grade between those who attended pre-kindergarten and those who did not. Although we cannot rule out all possible confounds, the third grade follow-up analyses suggest that the HIPPY program had lasting effects on children of Spanish-speaking families.

3. Discussion

Findings from the present study indicate that HIPPY, a home visiting intervention program for mothers of young children, has a positive effect on the home environment of preschoolers from Spanish-speaking homes as well as the math achievement of these children in third grade. Intervention participation predicted more cognitive stimulation in the home environment, even when controlling for contextual factors unrelated to the intervention. Furthermore, mothers in the HIPPY program developed more parenting efficacy than those in the comparison group as they carried out the parent-as-teacher role. These outcomes are consistent with the goals of the HIPPY curriculum, which is designed to motivate parents as their child's first teacher and provide them with a specific set of teaching skills (*Innovations in Civic Participation, 2005*).

In this study, families involved in the HIPPY program had more learning materials in their home and offered their preschool children a greater variety of learning experiences than families on the waiting list. Mothers in the program were more likely to encourage types of academic activities that prepared their children for school. These findings suggest that the intervention increases low-income parents' involvement in their children's learning experiences. Further, mothers of these at-risk children who participated in the program had significantly higher parenting self-efficacy, indicating that the program empowered participants to actively engage as teachers of their children.

A number of factors may contribute to the success of the HIPPY program in enhancing the home environment and increasing parenting self-efficacy. The use of role play provides parents with concrete examples of how to help their children learn. According to *Bandura (1982)*, an increase in competence together with reinforcement by peers or teachers leads to an increase in motivation. Thus, as home visitors teach parents skills that help them prepare their children for school, they are motivated to continue

participation in their children's education. The theory-of-change model described in *Fig. 1* suggests that changes in parental beliefs and parenting practices within the home learning environment lead to improved school achievement. Home visitors discuss the educational purposes of each activity with parents, and over time, this may contribute to parents viewing their role in their child's education as increasingly important. HIPPY also provides each family with learning materials, including storybooks, manipulative shapes, scissors, and crayons, that enhance the home learning environment. Finally, home visitors are members of the same community and past participants in the HIPPY program. Parents may form a more effective collaboration with home visitors who share their language and have similar backgrounds than with professionals from outside the community (*Korfmacher et al., 2008*).

This study also examined the influence of maternal factors on the home learning environment. Consistent with previous research (*Diener et al., 2003*), both maternal depression and parenting stress were associated with the hardship of a poor home environment in the present study. Although psychosocial factors were related to the early learning environment, participation in the HIPPY program was the best predictor of home environment in our regression analysis which included parental efficacy, parenting stress, depression, and education. In this sample, the added benefit of program services appears to have had a significant influence on the learning environment of at-risk preschoolers. Although diverse gender roles exist in Latino families, Hispanic culture traditionally emphasizes the importance of the mother and her sacrifices for her children (*McLoyd, Cauce, Takeuchi, & Wilson, 2000*). The influence of this cultural value may enhance Latina mothers' motivation to overcome personal struggles and be actively involved in their children's education. This is consistent with the family stress process described in the Double ABCX model of adjustment and adaptation in which the family's resources for meeting the demands of hardship prevent crisis in a family (*McCubbin & Patterson, 1983*). Family solidarity within the Hispanic culture is a resource which may help families manage stress and fully participate in the intervention.

Those who participated in the program did not differ significantly from the control group on measures of depression or parenting stress. These results are not surprising considering the HIPPY program does not specifically address social-emotional needs of the mother. Although positive teaching experiences promote positive parent-child interaction, the HIPPY model focuses on educational needs of the child. Other home visiting program models, such as the Parent-Child Home Program, equally emphasize socioemotional development (*Gfeller, McLaren, & Metcalfe, 2008*). Home visiting models sometimes add a component of family support and provide additional time to discuss personal issues. Certainly, high-risk families may require additional time to work through personal problems before addressing parenting issues. HIPPY focuses on curriculum delivery, and the curriculum does not specifically address the mother's personal needs.

The third grade follow-up supports previous research suggesting that participation in HIPPY has effects on later academic achievement (*Baker et al., 1998; Garcia, 2006; Kagitcibasi et al., 2001; Karoly et al., 2005*). Program impact on mathematics may be due to the HIPPY activities that focus on math and science. Although HIPPY is frequently viewed as an early literacy program, modules also include significant components aimed at advancing emergent mathematical reasoning in preschool. Specifically, games and activities help children learn about spatial relationships, quantities, matrices, sequencing, and categorizing. Emerging mathematical skills at school entry strongly predict later school achievement, even more so than early literacy (*Duncan et al., 2007*). Given the importance of early math experiences, adherence to the HIPPY program of math and science during preschool may have accounted for the sustained programmatic impact through third grade.

Reading scores for HIPPY students were higher than the waiting list comparison group, but there was no significant difference. This may be due to disparities in English fluency between the participant and control groups. The HIPPY program in this study primarily served Spanish-speaking immigrant families, as demonstrated by the fact that 97% the mothers in the home observation of preschool children spoke only Spanish. Considering only 37% of the Latino population in this area speaks Spanish in the home, the comparison group is more likely to have contained second-generation families who spoke English more fluently than families in this HIPPY program.

Previous research has shown that English proficiency and oral language skills in kindergarten are associated with English reading ability in later grades for Spanish-speaking students (Manis, Lindsey, & Bailey, 2004; Miller et al., 2006; Reese et al., 2000). As many of the Latino students in our comparison sample likely entered school proficient in English, they would be expected to outperform the HIPPY students on measures of reading ability. Nonetheless, the students in the intervention group performed slightly better in reading than the lower-risk comparison group, suggesting that early intervention may help narrow the achievement gap. Although the difference is not statistically significant, the HIPPY program may have helped these students attain a higher level of later achievement than expected based on their at-risk status. Emergent Spanish literacy is an important predictor of English reading ability in later grades (Reese et al., 2000). Preschoolers' exposure to Spanish literacy activities as part of the HIPPY curriculum may have contributed to the findings in the present study.

3.1. Limitations

Although this study showed positive intervention effects, it is limited to a particular location and point in time. It is not possible to generalize this study to all HIPPY programs or all Spanish-speaking Latino families. Additionally, all findings were correlational, and it cannot definitively be stated that the intervention caused the differences between groups. For instance, it is possible that mothers enrolled in the program already had greater parenting self-efficacy than those on the waiting list. However, it is also likely that efficacious parents were placed on the waiting list due to insufficient funding and the necessity of limiting program services to a certain number of families. Future studies will need a randomized controlled trial design to make a stronger case for attributing changes in parenting efficacy, home environment, or school achievement to the intervention.

In discussing results for the HOME measure, it is important to note the issue of economic and cultural bias across cultures (Bradley, 1999). For example, one of the items asks about the father eating meals with the children, which is not the custom in some cultures. Other items look at parental conversation and providing opportunities for the child to show a talent or a toy to the visitor. In cultures other than the European-American culture, parents may not frequently engage in play or even converse with their children (Morelli, Rogoff, & Angelillo, 2003). Other studies that have used this measure with Latino families suggest that indicators on the HOME may not be equally applicable to all ethnic or income groups (Bradley, Corwyn, McAdoo, & García Coll, 2001; Diener et al., 2003). Nonetheless, improvements in the items on the HOME correspond to improvements in school readiness and academic achievement in the United States (Bradley, 1999). Although it may be an inadequate measure for cultural comparisons, within-group comparisons of indicators on the HOME may identify families who are involved with their children in ways that predict positive academic performance in later years.

Another notable limitation of the HOME for this study was the minimum observation time of 30 min. The National Institute of

Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD) used a minimum observation time of 45 min for their preschool assessment of the HOME (NICHD SECCYD, 1994). Additional time in observation may have yielded more accurate results.

A limitation of the follow-up assessment in third grade is the necessity to use school district data that is de-identified, precluding us from identifying students by name (or other demographic information) to match to parents who participated in the HIPPY program in previous years. Lacking pertinent demographic information, it is difficult to know how similar or different the constructed comparison group is to the group of past HIPPY participants. This study lacks complete data on whether HIPPY students may have received additional interventions which the control group did not receive. The superior performance of the possibly less-advantaged participant group makes a good case for program effectiveness; however, longitudinal tracking of interventions and academic outcomes of both HIPPY participants and a control group is needed to definitively establish long-term effects of the HIPPY program on this population.

3.2. Implications and future directions

We assume one reason for the program's success is the use of paraprofessional home visitors from the same community as the participants, particularly native speakers of their language. Home visitors who adjust the program to fit families' needs enhance their participation and involvement in services, thus making the program itself more effective (Korfmacher et al., 2008). Cultural and linguistic competencies are essential components in adapting the program for Latino families, ensuring a connection between families and their home visitors. Home visitors who are parents in the same community may be able to effectively build a relationship of trust, adding to the effectiveness of the program.

Paraprofessional home visitors are able to establish relationships with families and provide services at a much lower cost than nurse home visitors. A recent meta-analysis indicates that nurse home visiting is no more effective than paraprofessional programs (Nievar, Van Egeren, & Pollard, 2010); it is possible that paraprofessionals are most effective in working with certain minority groups. Recently, government agencies in the United States propose funding home visiting programs, and some parties have argued that only the Nurse–Family Partnership home visiting model is effective with the result of a preferred funding stream suggested in legislation (Haskins, Paxson, & Brooks-Gunn, 2009). Yet the Nurse–Family Partnership models has not been subjected to external evaluation, nor have outside attempts to test effects of nurses versus paraprofessionals shown nurses to be more successful (Barnes-Boyd, Norr, & Nacion, 2001).

Considering the cost of professional services and shortages of clinical workers, programs that use paraprofessionals may offer a higher cost–benefit ratio. A meta-analysis of several early interventions indicates that achievement effects have a positive cost–benefit ratio, with school administrations saving \$1.80 for every dollar spent on HIPPY (Karoly et al., 2005). The cost–benefit ratio is probably somewhat higher, however. The study analyzed in this meta-analysis tested differences between participants who received both the home visiting program and a preschool center-based intervention and a control group that received only the center-based intervention (Baker et al., 1998). Thus, this test of HIPPY's influence is particularly stringent, as both groups received an intervention.

Future research could also examine the delivery of the program and fidelity to the model. Information about dosage and fidelity of the program was not gathered in this study, but future work could examine differences in effects based on such factors as attendance

of home visitors at training sessions or the number and length of home visits. Coded observations of home visitors and parents could measure the fidelity of program delivery.

With regards to long-term effects, such as school achievement, research should examine the effects of multiple interventions. Low-income families often access more than one service throughout their child's school years, and longitudinal studies that test the presence or absence of more than one program are preferable for informing policy decisions. To further understand how the HIPPY program works, future research could test for improvements in parental involvement in the schools as a result of program participation. Tests of group meeting effects could establish the need for social experiences with other mothers and group instruction as opposed to in-home instruction. Qualitative studies would allow for a richer understanding of mothers' and HIPPY educators' experiences as they bridge the gap between English-speaking schools and Latino families.

3.3. Conclusion

Unlike previous studies of the HIPPY program, the present study explores the process of parenting within the context of home visiting. In addition, we explored domains that were not officially addressed by the HIPPY program, such as maternal depression and parenting stress. In general, Latino immigrant families are under stress. Recent studies suggest that first-generation, low-income Hispanic children are more likely to have problems in school than any other socioeconomic or generational group in the United States (Reardon & Galindo, 2006). Yet Latino families tend to be invested in providing a high quality education for their children in the early years (Hernandez et al., 2008). Home visiting, in this case, may fill the gap between the investment of immigrant parents in their children's education and their ability to prepare their children to navigate the American school system. Importantly, this study reveals that we still have much to learn about the strengths and struggles of immigrant families and their participation in preparing their children for school.

Acknowledgement

This research was supported by a grant from the Timberlawn Psychiatric Foundation.

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