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Associations Between Problem Behaviors and Early Vocabulary Skills Among Hispanic Dual-Language Learners in Pre-K

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Abstract

This study examined the relations between problem behaviors and early learning outcomes among 138 children in dual-language pre-K programs who were identified at the beginning of the school year to be at risk for difficulties in early language and literacy development. Children's expressive and receptive vocabulary, listening comprehension, and conceptual thinking skills were assessed at the beginning of pre-K and again at the end of the school year. Their problem behaviors (externalizing, bullying, hyperactivity, and internalizing) were assessed midyear via teacher ratings. With the exception of internalizing problem behaviors, bivariate correlations indicated virtually no associations between children's entry-level academic skills and midyear ratings of problem behaviors. However, multilevel models controlling for student- and teacher-level variables revealed that midyear ratings of problem behaviors were statistically significant predictors of poor outcomes on several vocabulary-related measures administered at the end of pre-K.

Keywords

early education programs, emergent literacy, language acquisition, behavior, classroom, conduct problems

A substantial body of research underscores associations between problem behaviors and poor academic outcomes (Arnold, Kupersmidt, Voegler-Lee, & Marshall, 2012; Hinshaw, 1992), particularly in the area of early literacy (Al Otaiba & Fuchs, 2002; Hagan-Burke et al., 2011; Morgan, Farkas, Tufis, & Sperling, 2008; Nelson, Benner, & Gonzalez, 2003). Mounting evidence illustrates that these linkages are established early (e.g., Dionne, Tremblay, Boivin, Laplante, & Perusse, 2003; Doctoroff, Greer, & Arnold, 2006; Escalón & Greenfield, 2009) and often strengthen over time (Arnold, 1997; Miles & Stipek, 2006; Pierce, Ewing, & Campbell, 1999; Qi & Kaiser, 2003). Several studies suggest that children's preschool experiences are critical to the achievement trajectories that follow (Baydar, Brooks-Gunn, & Furstenberg, 1993; Cunningham & Stanovich, 1997; Stipek, 2001) and that successful early social and academic development is predictive of long-term academic success (Stipek, 2001). The early onset and persistence of behavior–achievement associations precipitate a need to better understand the extent to which they are present or emerge during children's initial school experiences.

Despite numerous efforts to discern whether problem behaviors and academic outcomes are causally related or perhaps influenced by a third "common cause" (Lonigan et al., 1999; Morgan et al., 2008, p. 417) variable (e.g., inattentiveness, home environmental influences, deficient self-regulatory behaviors), existing studies have failed to produce a definitive explanation (Hinshaw, 1992; Trzesniewski, Moffitt, Caspi, Taylor, & Maughan, 2006). Several have suggested that student attentiveness has some level of influence on problem behavior–achievement associations (e.g., Arnold, 1997; Arnold et al., 2012; Hinshaw, 1992; Lonigan et al., 1999; Morgan et al., 2008). Others

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have pointed to environmental factors common to both reading and antisocial behavior (Trzesniewski et al., 2006). Collective empirical findings suggest that problem behaviors and poor academic performance are intertwined and likely reciprocal in nature (Arnold, 1997; Hinshaw, 1992; Morgan et al., 2008; Trzesniewski et al., 2006). There is also consensus that these relations are often established during the first few years of formal schooling, heightening the need to identify children who may be at greatest risk for problem behaviors and poor learning outcomes in pre-K.

Associations Between Problem Behaviors and Early Learning During Pre-K

As early as preschool, emergent behavior problems are risk factors for more serious problem behavior trajectories and persistent academic difficulties (Qi & Kaiser 2003). Accordingly, a growing body of research is focused on relations between social behavior and academic performance among pre-K children. Although some studies have examined problem behaviors' influence on numeracy and early mathematics skills (e.g., Arnold et al., 2012; Escalón & Greenfield, 2009; Galindo & Fuller, 2010), the majority have focused on early learning in the domains of language development and other aspects of emergent literacy (e.g., Arnold, 1997; Bracken & Fischell, 2007; Doctoroff et al., 2006; Girard & Girolametto, 2013; Lonigan et al., 1999; McWayne & Cheung, 2009; Qi & Kaiser, 2004; Stowe, Arnold, & Ortiz, 2000). Collectively, these investigations identified associations between several types of problem behaviors (i.e., externalizing, internalizing, hyperactivity, inattention, aggression, social skill deficits, composite global ratings) and language or literacy outcomes (e.g., expressive and receptive vocabulary, listening comprehension, letter recognition, phonological awareness, word identification, sound awareness, print knowledge).

Existing pre-K studies of associations between social behaviors and academic learning have involved children from a range of ethnicities, the vast majority of whom were African American (e.g., Arnold, 1997; Arnold et al., 2012, Bulotsky-Shearer, Bell, Romero, & Carter, 2014; Escalón & Greenfield, 2009; Lonigan et al., 1999, McWayne & Cheung 2009; Qi & Kaiser, 2004). This is not entirely surprising given the relatively large proportion of African American children that have been historically served in pre-K programs (Schweinhart, 2004). However, despite rapidly increasing numbers of Hispanic dual-language learners (DLLs) in pre-K programs (Goldenberg, Hicks, & Lit, 2013; Lugo-Neris, Jackson, & Goldstein, 2010), very little is known about potential associations between problem behaviors and early academic skills of DLLs. Among existing studies, few contained samples of which 10% or more were Hispanic/Latino participants (e.g., Arnold, 1997; Doctoroff et al., 2006; Stowe et al., 2000), but none of those indicated whether/to what extent those participants were regarded as DLLs. Moreover, only one prior study (Arnold, 1997) examined findings in relation to ethnicity, reporting that correlations between problem behaviors and academic development were similar for African American ($r = -.54$) and Latino ($r = .68$) participants and noting that the study's small percentage of Caucasian participants (5%) impeded separate analyses for that group.

Characteristics of Young Hispanic DLLs

As the fastest growing population of students in U.S. schools, the number of Latino children grew by 39% over the last decade (Lugo-Neris et al., 2010). Approximately one fourth of public school students are Latino (Fry, 2011), nearly 79% of whom come from families where Spanish is the dominant home language (August & Shanahan, 2006; Goldenberg, 2008). Many of these children also live in poverty, with an estimated 34% of Latino children living in poverty compared with 14% of non-Hispanic White children. Due to risk factors associated with economic disadvantage, second language learning, and low parental education, numerous Latino children face considerable challenges in becoming skilled readers (Hoff, 2013; Lonigan, Farver, Nakamoto, & Eppe, 2013) and lag far behind same-age monolingual peers (Phillips & Lonigan, 2009). For example, many Latino children enter and exit early schooling with significant language delays approaching two or more standard deviations below normative standards in both Spanish and English (Hammer, Jia, & Uckihoshi, 2011; Lonigan et al., 2013).

One aspect of young DLLs that has received attention regards their social-emotional development. In a recent synthesis, Halle et al. (2014) summarized the state of existing knowledge with regard to DLL's social-emotional development from birth to 5 years of age. They focused on multiple aspects of children's social-emotional development, including self-regulation, social competence, social cognition, and problem behaviors and examined these dimensions among young DLLs in relation to their non-DLL peers. Ten of the 14 studies reviewed by Halle et al. incorporated one or more measures of problem behavior. Regarding studies focused on pre-K classrooms, Halle et al. noted that some offered evidence of fewer problem behaviors among Spanish-speaking children (e.g., Luchtel, Hughes, Luze, Bruna, & Peterson, 2010), and others suggested that as Spanish-speaking children's English interactions increased, they exhibited more conduct and learning problems along with elevated frustration levels (Chang et al., 2007). Studies in Halle et al.'s review that focused on kindergarten entry

using the Early Childhood Longitudinal Study–Kindergarten cohort (ECLS-K; National Center for Education Statistics, 2001) dataset identified noteworthy linkages regarding DLL's English language proficiency and its negative relation to both internalizing and externalizing problem behaviors (e.g., Dawson & Williams, 2008; Han, 2010; Han & Huang, 2010). In one study, Latino kindergarteners fluent in both English and Spanish had fewer internalizing problem behaviors than their White, English-speaking, monolingual peers (Han, 2010). Overall, Halle et al. concluded that the studies in their review examining the problem behaviors of DLLs in relation to non-DLLs provided converging evidence that DLLs who are the least proficient in English tend to have the worst social-emotional outcomes.

It is noteworthy that only one study in Halle et al.'s (2014) review examined the social behavior of DLLs in relation to academic performance. Galindo and Fuller (2010) observed that Latino children who entered kindergarten with stronger social competence grew more in their mathematical understanding than those with weaker social competencies. However, they also noted that once children's capacity to focus on learning tasks was taken into account, none of the remaining social competence measures (i.e., internalizing, externalizing, interpersonal, and self-control) had any influence on mathematics outcomes.

Purpose of Study

A small but increasing number of pre-K studies are revealing relations between problem behaviors and poor academic performance. However, despite rising numbers of Hispanic DLL children served in pre-K programs, little is known about whether and to what extent this population's social behaviors affect their early learning. The purpose of the present study was to investigate the social behaviors of Hispanic DLLs in pre-K programs in relation to their early vocabulary performance. We posed two research questions:

> **Research Question 1:** Does entry-level performance on vocabulary-related measures predict midyear ratings of problem behaviors among DLLs in pre-K programs?
> **Research Question 2:** Do midyear ratings of problem behaviors predict vocabulary-related outcomes among DLLs at the end of pre-K?

To answer these questions, we administered a battery of vocabulary and language measures (i.e., receptive and expressive vocabulary, listening comprehension, conceptual thinking) at two points in time (beginning and end of the year) and assessed problem behaviors midyear. We hypothesized that children's entry-level vocabulary skills would be associated with midyear teacher ratings of problem behavior. We also hypothesized that those negative relations would strengthen over time and children with higher ratings of midyear problem behaviors (on any subscale measure) would perform lower on language and literacy outcome measures at the end of pre-K. We accounted for the clustered structure of the data (i.e., students nested within teachers) using multilevel modeling (Hox, 2010; Raudenbush & Byrk, 2002; Snijders & Bosker, 2012) for both student- and teacher-level variables.

Method

This study's sample was part of a larger investigation of the efficacy of shared book-reading interventions for preschool children who were DLLs identified at the beginning of the school year to be at risk for vocabulary and language difficulties (Pollard-Durodola et al., 2015). All participants in the present study received the same shared book-reading intervention.

Setting and Participants

Setting. The study occurred in South Texas and involved two school districts targeted for participation because of their dual-language preschool programming. The first district served approximately 28,000 students of whom 99.2% were Hispanic and 95.9% were economically disadvantaged (based on free school meal eligibility). The second district served 31,000 students who were 98.6% Hispanic and 88.6% economically disadvantaged.

Teachers. Twenty-three teachers participated, all but one of whom were female. Fourteen (60.87%) regarded English as their primary language; however, all were fluent in both English and Spanish. On average, participating teachers had 3.78 years of experience teaching pre-K (SD = 3.59). Seven teachers were in their first year of teaching pre-K.

Students. The 138 participating students were nested in 23 pre-K classrooms and selected via a two-step screening process to identify those at risk for vocabulary and language difficulties and likely to benefit from intervention. Teachers distributed parental consent forms to the families of each child in their respective classrooms (average 22 students per class). All students with parental consent were screened using the *pre*LAS® (Duncan & DeAvilia, 2000), an assessment of English and Spanish language proficiency, along with the *Peabody Picture Vocabulary Test–Fourth Edition* (PPVT-4; Dunn & Dunn, 2007), a measure of receptive vocabulary knowledge. These instruments are described in a subsequent section's description of measures. Six children per classroom (3 boys and 3 girls) were selected to participate who (a) had the highest language proficiency scores in their class *and* (b) scored at or below the 30th percentile on the PPVT-4. We originally sought participants with high

Table 1. Descriptive Statistics for Student Characteristics.

Student characteristics	*n*	%
Gender		
Female	69	50
Ethnicity		
Hispanic	127	92
Native American	2	1
Missing data	9	7
Mother's level of education		
8th grade or less	10	7
9th–11th grade	24	17
High school/GED	38	28
Some college	16	12
College degree	17	12
Missing data	33	24
English language proficiency[a]		
Pre-functioning	123	89
Beginning	8	6
Intermediate	4	3
Advanced	3	2
Proficient	0	0
Spanish language proficiency[a]		
Pre-functioning	46	33
Beginning	29	21
Intermediate	34	25
Advanced	16	12
Proficient	13	9
Economic disadvantage[b]	127	92
Special education label[c]		
Yes	4	3
	M	*SD*
M age in months	56.88	3.67
Days absent from school	7.28	6.43

Note. GED = General Educational Development.
[a]English and Spanish language proficiency were assessed using the *pre*LAS® (Duncan & DeAvilia, 2000). [b]Eligibility for free and reduced school meals was used as an indicator of economic disadvantage. [c]All students with special education labels were identified under the category of speech/language.

English language proficiency. However, the vast majority scored in the pre-functional English proficiency range, precipitating a need to use high Spanish proficiency in the majority of instances. Demographic characteristics of students are summarized in Table 1. At the beginning of the study, their mean age was 4.75 years (56.88 months). Half were female and the vast majority (92% or more) were Hispanic. (We were missing ethnicity data for 7% of the sample.) *Pre*LAS® assessments indicated that none of the participating children were proficient in English, and only 9% were proficient in Spanish. In addition, 92% were from high-poverty families; 50% had a total family income of less than US$15,000 per year.

Assessment Procedures

During early fall and again in spring, participants were administered a range of measures to assess listening comprehension as well as conceptual, receptive, and expressive language. All assessments were conducted by carefully trained graduate students pursuing advanced degrees in counseling or school psychology. Examiners were bilingual and attended two full-day training sessions led by a licensed school psychologist who had extensive experience administering school-based assessments. Each examiner was evaluated during training simulations to ensure they administered and scored measures accurately (i.e., 100% interrater agreement). Moreover, a project coordinator was present throughout the study's fall and spring testing periods, systematically observing examiners and providing corrective feedback as needed.

Assessments were administered individually in a quiet location outside the classroom; fall administrations took approximately 20 to 30 min per child. Midway through the school year, classroom teachers completed a series of social behavior ratings for each student, which took approximately 20 min per child to complete. At the end of the school year, students were reassessed using the same battery of vocabulary-related assessments administered at the beginning of the school year. Because many children were able to accurately respond to more items by spring, posttest assessments averaged 40 to 60 min depending on the skill level of the child.

Vocabulary-Related Measures

Receptive vocabulary. Basic receptive language was assessed using the PPVT-4 (Dunn & Dunn, 2007), an individually administered, norm-referenced test developed to evaluate receptive vocabulary in English. Two parallel forms (A and B) comprised of 228 items reflect a range of receptive vocabulary levels from preschool through adulthood. During the assessment, an examinee is instructed to point to one of four pictures that most closely matches an object or action named by the examiner. The PPVT-4 takes approximately 15 min to administer. Split-half reliability coefficients (M = .94) for both forms A and B, alternate-form reliability coefficients (M = .89), and concurrent validity correlations with the *Expressive Vocabulary Test–Second Edition* (EVT-2; r = .82) indicate that the PPVT-4 is an adequate measure of receptive language abilities.

We administered a second measure of receptive vocabulary to assess students' understanding of target words that had been explicitly taught as part of a shared book-reading program that took place throughout the school year. This researcher-developed, program-specific measure of children's proximal receptive vocabulary abilities incorporated 18 target words and was created to be similar in procedures,

materials, and response requirements to the PPVT-4. A formerly taught target word was named by the examiner, and the child was asked to point to one of four pictures on a plate that represented the target word. Alpha coefficients based on a previous research sample of children were .66 and .77, and split-half estimates (odd–even test items compared) were .68 and .80 for pre- and posttests, respectively (Gonzalez et al., 2011).

Expressive vocabulary. Children's expressive vocabulary skills were assessed with the EVT-2 (Williams, 2007). The EVT-2 is an individually administered, norm-referenced test developed to assess expressive vocabulary and word retrieval abilities. The EVT-2 has two parallel forms (A and B) consisting of 190 items that are co-normed with the PPVT-4 and cover a wide age range of receptive language abilities from preschool through adulthood. For each item, an examiner presents the examinee with a stimulus picture and asks corresponding questions requiring a single-word oral response. Administration time is approximately 15 min. Split-half reliability coefficients for forms A and B ($M = .94$ and $M = .93$, respectively), alternate-form reliability coefficients ($M = .87$), and concurrent validity correlations with the PPVT-4 ($r = .82$) suggest that the EVT-2 is an adequate measure of expressive language abilities.

A second measure of children's proximal expressive language growth was aligned with the shared book-reading program children received throughout the school year. This program-specific measure was developed to be similar in administration procedures, materials, and response requirements to the EVT-2. Examinees were provided a series of illustrations, each with a corresponding question requiring a one-word oral response. Alpha coefficients based on a previous research sample were .52 and .77, and split-half estimates (odd–even item comparisons) were .49 and .78 for pre- and posttests, respectively (Gonzalez et al., 2011).

Listening comprehension. Children's listening comprehension was assessed with the corresponding scale from the *Oral and Written Language Scales* (OWLS; Carrow-Woolfolk, 1995). The *Listening Comprehension Scale* is designed to measure a child's understanding of spoken language by examining four linguistic structures: lexical/semantic, syntactic, pragmatic, and supralinguistic. Conversely, the *Oral Expression Scale* measures understanding and use of spoken language by asking an examinee to answer questions, complete sentences, and generate sentences in response to verbal stimuli. The OWLS' *Listening Comprehension Scale* has a reliability coefficient of .84, and for Oral Expression, it is .87 (Carrow-Woolfolk, 1995).

Conceptual thinking. Conceptual thinking was assessed via the corresponding subtest from the *Kaufman Assessment Battery for Children–Second Edition* (KABC-II; Kaufman & Kaufman, 2004). For this subtest, a child views a set of four or five pictures and identifies one picture that does not belong with the others. Conceptual Thinking measures one's ability to classify objects and induce the concept. It is a general indicator of a child's representation of the major concepts in a system (e.g., places people live; what water does). The KABC-II Conceptual Thinking subtest's mean split-half reliability coefficient on outcomes for children aged 3 to 6 is .80.

Social Behavior Measures

The *Problem Behavior Scale* of the *Social Skills Improvement System (SSIS) Rating Scales* (Gresham & Elliott, 2008) was used to establish a measure of children's problem behaviors in four domains: externalizing, bullying, hyperactivity, and internalizing. As reported in the *SSIS Rating Scale Manual* (Gresham & Elliott, 2008), coefficient alphas reflecting the internal consistency of the SSIS Teacher Form (for children aged 3–5) were .94 for the *Problem Behaviors Scale* and .93 (Externalizing), .75 (Bullying), .90 (Hyperactivity), and .81 (Internalizing) for its subscales. Adjusted correlations assessing test–retest reliability for the SSIS Teacher Form were .83 for the *Problem Behaviors Scale* and .86 (Externalizing), .76 (Bullying), .84 (Hyperactivity), and .82 (Internalizing) for its subscales. Interrater reliability was expressed in terms of adjusted correlations and were .61 for the *Problem Behaviors Scale* and .56 (Externalizing), .54 (Bullying), .58 (Hyperactivity), and .48 (Internalizing) for its subscales.

Data Analyses

A data analysis plan was devised in response to research questions regarding associations between problem behaviors and early learning outcomes. We first examined bivariate correlations for participants' entry-level academic measures and midyear problem behavior scores. Next, we examined correlations between the same problem behavior measures and end-of-year academic performance measures. Finally, we accounted for the clustered structure and potential dependency of the data (i.e., students nested within teachers) using multilevel models (Hox, 2010; Raudenbush & Byrk, 2002; Snijders & Bosker, 2012) while controlling for seven student-level variables (i.e., the corresponding pretest score, student gender, student age, number of days attending school, school district, Pre-LAS English score, Pre-LAS Spanish score) and two teacher-level variables (i.e., total years of teaching and years of experience teaching pre-kindergarten) to investigate relations between midyear problem behaviors and end-of-year vocabulary outcomes.

Table 2. Descriptive Statistics for Vocabulary and Language Measures Administered at the Beginning and End of Pre-K.

	Beginning of school year				End of school year			
Vocabulary and language skills	*n*	*M*	*SD*	Range	*n*	*M*	*SD*	Range
Receptive vocabulary (PPVT-4; standard score)	136	63.86	14.76	20–91	129	73.16	14.12	27–112
Receptive vocabulary (program-specific; raw score)	138	6.14	3.45	0–14	129	14.43	4.25	0–18
Expressive vocabulary (EVT-2; standard score)	132	55.87	23.59	20–104	127	63.65	25.09	20–114
Expressive vocabulary (program-specific; raw score)	138	6.34	6.56	0–26	129	18.32	9.59	0–36
Listening comprehension (OWLS; standard score)	132	71.78	11.58	48–100	128	73.13	12.79	46–110
Conceptual thinking (KABC-II; standard score)	135	7.84	2.65	3–16	128	9.61	2.88	3–16

Note. Program-specific measures of receptive and expressive vocabulary were developed to align with a shared book-reading curriculum that all participants received and were designed using parallel formats and administration procedures with PPVT-4 (receptive) and EVT-2 (expressive). PPVT-4 = *Peabody Picture Vocabulary Test–Fourth Edition*; EVT-2 = *Expressive Vocabulary Test–Second Edition*; OWLS = *Oral and Written Language Scales*; KABC-II = *Kaufman Assessment Battery for Children–Second Edition*.
* $p < .05$. ** $p < .01$.

Table 3. Descriptive Statistics for Midyear Teacher Ratings of Students' Problem Behaviors.

SSIS Problem Behavior Rating Scale	*n*	*M*	*SD*	Range
Scale scores				
Raw	136	14.70	12.50	0–59
Standardized	134	101.36	14.73	83–160
Raw subscale scores				
Externalizing	136	6.19	6.29	0–29
Bullying	136	1.65	2.39	0–10
Hyperactivity	136	5.28	4.57	0–19
Internalizing	136	2.85	2.66	0–11

Note. The SSIS does not provide standard scores for subscales. SSIS = *Social Skills Improvement System*.

Results

Early Learning Outcomes

Children's vocabulary and language skills were assessed at the beginning and end of the pre-K school year. Table 2 summarizes descriptive statistics (i.e., mean, standard deviation, range) for their performance on each measure. Standardized scores reflected below-average performance on both pre- and posttest assessments of receptive vocabulary, expressive vocabulary, and listening comprehension. Despite growth across the pre-K school year, end-of-year scores on standardized measures of receptive and expressive vocabulary and listening comprehension remained approximately 2 to 3 standard deviations below average. Measures of program-specific skills incorporating targeted vocabulary words taught during a shared book-reading program indicated growth in proximal vocabulary skills during pre-K.

Problem Behaviors

Ratings of children's problem behaviors were normalized based on age and gender. Table 3 summarizes descriptive statistics for children's scores from teacher ratings using the *SSIS-T Problem Behavior Scale* (Gresham & Elliott, 2008). Scores are also reported for the Externalizing, Bullying, Hyperactivity, and Internalizing subscales. Standard scores on the *Problem Behavior Scale* ranged from 83 (below average) to 160 (well-above average) with a mean standard score of 101.36. The mean scale score fell within the "average" range provided in the *SSIS Rating System Manual* (Gresham & Elliott, 2008). Likewise, mean raw subscale scores for Externalizing, Bullying, Hyperactivity, and Internalizing each fell within the range of scores considered to be average for children aged 3 to 5. Ranges for each subscale spanned from below average to above average.

Correlational Analyses of Problem Behaviors and Academic Skills

We first examined bivariate correlations between six entry-level assessments of vocabulary-related skills and midyear ratings of four types of problem behavior. As reflected in the first half of Table 4, children's entry-level receptive and expressive vocabulary, listening comprehension, and conceptual thinking year were unrelated to midyear ratings of their externalizing, bullying, and hyperactive problem behaviors. However, correlations between entry-level receptive and expressive vocabulary performance and internalizing problem behaviors were statistically significant ($p < .05$). Children who entered pre-K with lower receptive and expressive vocabulary performance were more likely to exhibit internalizing problem behaviors by the middle of the school year, and vice versa.

Next, we examined correlations between children's problem behaviors (rated midyear) and their end-of-year performance on the same set of vocabulary-related academic measures. These data are summarized in the second half of Table 4. The vast majority (i.e., 22 of 24

Table 4. Bivariate Correlations Between Midyear Problem Behavior Ratings and Emergent Literacy Skills Assessed at the Beginning and End of Pre-K.

	Midyear problem behavior ratings			
Language and literacy skill area	Externalize	Bully	Hyperactive	Internalize
Beginning-of-year performance				
Receptive vocabulary (PPVT-4)	−.160	−.154	−.093	−.184*
Receptive vocabulary (program-specific)	−.014	−.004	.059	−.169*
Expressive vocabulary (EVT-2)	−.148	−.169	−.117	−.204*
Expressive vocabulary (program-specific)	−.096	−.091	−.082	−.199*
Listening comprehension (OWLS)	−.099	−.123	−.044	−.162
Conceptual thinking (KABC-II)	−.083	−.117	−.065	−.067
End-of-year performance				
Receptive vocabulary (PPVT-4)	−.296**	−.264**	−.275**	−.270**
Receptive vocabulary (program-specific)	−.349**	−.345**	−.364**	−.384**
Expressive vocabulary (EVT-2)	−.213*	−.188*	−.219*	−.205*
Expressive vocabulary (program-specific)	−.193*	−.191*	−.236**	−.353**
Listening comprehension (OWLS)	−.285**	−.248**	−.210*	−.235**
Conceptual thinking (KABC-II)	−.197*	−.139	−.178*	−.058

Note. PPVT-4 = *Peabody Picture Vocabulary Test–Fourth Edition*; EVT-2 = *Expressive Vocabulary Test–Second Edition*; OWLS = *Oral and Written Language Scales*; KABC-II = *Kaufman Assessment Battery for Children–Second Edition*.
* $p < .05$ (two-tailed). ** $p < .01$ (two-tailed).

correlations) were statistically significant ($p < .05$); more than half of those at the $p < .01$ level. All statistically significant correlations reflected inverse relations; higher midyear problem behavior ratings were associated with lower year-end academic outcomes. The only type of academic outcome that was not influenced by every dimension of problem behavior was conceptual thinking; neither bullying nor internalizing problem behaviors were related to year-end conceptual thinking scores.

Multi-Level Analyses

We next used hierarchical linear modeling (HLM) to examine the influence of four types of problem behaviors on vocabulary outcomes assessed at the end of pre-K. Analyses controlled for each academic outcome measure's corresponding pretest score, student age, student gender, days of school attendance, school district, beginning-of-year *pre*LAS® English and Spanish scores, teachers' total years of teaching experience, and years of experience teaching pre-K. We defined multiple hierarchical linear model equations that substituted each type of problem behavior (i.e., externalizing, bullying, hyperactivity, and internalizing) one at a time with a particular vocabulary outcome measure (i.e., PPVT-4, program-specific receptive vocabulary, EVT-2, program-specific expressive vocabulary, OWLS Listening Comprehension, KABC-II Conceptual Thinking), which resulted in the following common model:

Level 1 (student-level) model:

$$\begin{aligned}\text{Posttest}_{ij} = {} & \beta_{0j} + \beta_{1j}\,\text{Pretest}_{ij} + \beta_{2j}\,\text{Gender}_{ij} + \\ & \beta_{3j}\,\text{Age}_{ij} + \beta_{4j}\text{Attendance}_{ij} + \\ & \beta_{5j}\,\text{District}_{ij} + \beta_{6j}\,\textit{pre}\text{LAS® English}_{ij} + \\ & \beta_{7j}\,\textit{pre}\text{LAS® Spanish}_{ij} + \\ & \beta_{8j}\,\text{Problem behavior}_{ij} + e_{ij}\end{aligned}$$

Level 2 (group-level) model:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\text{Years of teaching}_{j} + \gamma_{02}\text{Years of teaching in Pre-K}_{j} + U_{0j}$$

$$\beta_{1j} = \gamma_{10}\left(\begin{array}{l}\text{the fixed effect of the corresponding}\\ \text{pretest measure on the posttest}\end{array}\right)$$

$$\beta_{2j} = \gamma_{20}\left(\begin{array}{l}\text{the fixed effect of gender}\\ \text{on the posttest measure}\end{array}\right)$$

$$\beta_{3j} = \gamma_{30}\left(\begin{array}{l}\text{the fixed effect of age on}\\ \text{the posttest measure}\end{array}\right)$$

$$\beta_{4j} = \gamma_{40}\left(\begin{array}{l}\text{the fixed effect of attendance}\\ \text{on the posttest measure}\end{array}\right)$$

$$\beta_{5j} = \gamma_{50}\left(\begin{array}{l}\text{the fixed effect of district}\\ \text{on the posttest measure}\end{array}\right)$$

$$\beta_{6j} = \gamma_{60}\left(\begin{array}{l}\text{the fixed effect of }\textit{pre}\text{LAS® English}\\ \text{score on the posttest measure}\end{array}\right)$$

$$ß_{7j} = \gamma_{70}\left(\begin{array}{l}\text{the fixed effect of } \textit{pre}\text{LAS® Spanish}\\ \text{score on the posttest measure}\end{array}\right)$$

$$ß_{8j} = \gamma_{80}\left(\begin{array}{l}\text{the fixed effect of a type of problem}\\ \text{behavior rating on the posttest measure}\end{array}\right)$$

$Posttest_{ij}$ was one of the four vocabulary outcome measures at posttest (i.e., end of year) while $Pretest_{ij}$ was the corresponding vocabulary outcome measure at pretest (i.e., entry-level assessment). The target effect we were interested in was γ_{80}, which captured the effect of a specific type of problem behavior on one of the end-of-year vocabulary measures after controlling for the corresponding entry-level assessment, along with other student- and teacher-level covariates. A total of 24 different multilevel models were examined.

Table 5 summarizes the results of these multilevel analyses for each type of problem behavior on vocabulary-related outcomes. After controlling for both student- and teacher-level variables, all four types of problem behaviors (i.e., externalizing, bullying, hyperactivity, and internalizing) were negatively associated with multiple vocabulary-related outcomes. All of the statistically significant relations indicated inverse associations between corresponding behavioral and academic measures, that is, students with higher ratings of problem behaviors achieved lower scores on vocabulary-related outcome measures at the end of school year.

Midyear ratings of externalizing problem behaviors were statistically related to most of the year-end academic measures with the exception of the two expressive vocabulary measures. For example, the significant effect of externalizing problem behaviors on receptive vocabulary (−0.36) indicated that every one-point increment on the SSIS-T Externalizing Problem Behavior subscale was associated with a 0.36-point decrement on the PPVT-4.

Midyear ratings of bullying behaviors were negatively associated with both standardized (−0.83, $p < .05$) and researcher-developed (−0.34, $p < .01$) measures of receptive vocabulary. However, after controlling for student- and teacher-level variables, teacher ratings of bullying behavior were no longer predictive of the remaining vocabulary outcomes measures. Similarly, midyear ratings of hyperactivity predicted lower year-end performance on standardized (−0.51, $p < .005$) and researcher-developed (−0.27, $p < .005$) measures of receptive vocabulary as well as listening comprehension (−0.44, $p < .05$) and program-specific measures of expressive vocabulary (−0.29, $p < .05$).

HLM analyses produced two statistically significant relations regarding internalizing problem behavior, which was negatively associated with program-specific measures of receptive (−0.48, $p < .005$) and expressive (−0.91, $p < .005$) vocabulary. Every one-point increment in internalizing problem behavior ratings predicted a reduction of 0.48 of a point on the program-specific receptive vocabulary measure (out of 18 possible points) and nearly one point (0.91) on the program-specific expressive vocabulary measure (out of 36 possible points). There were no statistically significant associations between internalizing behaviors and the remaining vocabulary-related outcomes.

Discussion

Despite rapidly increasing numbers of Hispanic children in pre-K, surprisingly little is known about the extent to which this population's social behaviors may affect their early learning. This study uniquely contributes to a growing body of research examining social behavior–academic achievement associations by investigating these relations among a sample of Hispanic children served in dual-language pre-K programs. Entry-level language proficiency scores indicated that less than 10% of participants were proficient in Spanish and none were proficient in English; all were considered to be at risk for academic difficulties.

Does Entry-Level Vocabulary Performance Predict Problem Behavior?

We considered prior studies indicating language delay among preschool children was a statistically significant predictor of problem behaviors (Qi & Kaiser, 2004) and hypothesized that entry-level vocabulary skills would be inversely related to midyear ratings of problem behavior among our sample of DLLs. However, initial correlational analyses indicated that none of the entry-level vocabulary measures predicted any of the acting out domains of problem behavior (i.e., externalizing, bullying, and hyperactivity) assessed midyear. In contrast, receptive vocabulary and expressive vocabulary *were* statistically significant predictors of internalizing problem behaviors. This is similar in some ways to Bulotsky-Shearer et al. (2014), who also reported relations between preschoolers' internalizing behaviors and academic outcomes. However, they did not use beginning-of-year academic measures, relying instead on fall measures of internalizing behaviors to predict academic outcomes assessed in the following spring. Our finding that entry-level vocabulary performance had no influence on acting out domains of problem behaviors was not anticipated and contrasts with previous research with other pre-K populations. Qi and Kaiser (2004) reported that language delays among pre-K children were associated with elevated levels of both internalizing and externalizing problem behaviors. However, their sample was predominantly African American (85%); only one child was Hispanic.

Our findings are difficult to place in context due to limited prior research with DLLs. To our knowledge, only two prior studies examined associations between Latino,

Table 5. Findings From Hierarchical Linear Modeling Examining Problem Behaviors' Influences on End-of-Year Language and Literacy Skills (*N* = 138).

End-of-year language and literacy outcome measures	Midyear Problem Behavior subscale scores			
	Externalizing	Bullying	Hyperactivity	Internalizing
Receptive vocabulary (PPVT-4)	−0.36**	−0.83*	−0.51***	−0.36
Receptive vocabulary (program-specific)	−0.17***	−0.34**	−0.27***	−0.48***
Expressive vocabulary (EVT-2)	−0.35†	−0.60	−0.51†	0.11
Expressive vocabulary (program-specific)	−0.17†	−0.38	−0.29*	−0.91***
Listening comprehension (OWLS)	−0.37**	−0.68	−0.44*	−0.46
Conceptual thinking (KABC II)	−0.07*	−0.11	−0.08	−0.05

Note. All coefficients are unstandardized coefficient and controlling for the corresponding pretest score, students' gender, age, days attending school, school district, Pre-LAS English score, Pre-LAS Spanish score, teachers' total years of teaching, and teachers' years of teaching in pre-kindergarten. PPVT-4 = *Peabody Picture Vocabulary Test–Fourth Edition*; EVT-2 = *Expressive Vocabulary Test–Second Edition*; OWLS = *Oral and Written Language Scales*; KABC-II = *Kaufman Assessment Battery for Children–Second Edition*.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .005$.

preschool-aged children's problem behavior, and academic achievement. Arnold (1997) reported negative correlations between externalizing problem behaviors and language/literacy development for both African American and Latino participants. However, his study focused exclusively on externalizing behaviors, included only male participants in a daycare facility, and provided no indication of whether Hispanic participants were also DLLs. Galindo and Fuller (2010) reported associations between entry-level social competence and mathematics performance among Latino kindergarteners, although once measures of children's approaches to learning (i.e., task persistence, attentiveness, eagerness to learn, learning independence, flexibility, organization) were taken into account, none of the remaining social behaviors (i.e., internalizing, externalizing, interpersonal, and self-control) were related to mathematics outcomes.

Does Problem Behavior Predict Vocabulary Outcomes?

Our hypothesis that problem behaviors would be predictive of lower vocabulary outcomes was based on several prior studies reporting similar associations. However, with the exception of Galindo and Fuller (2010), none of the studies we reviewed targeted DLLs. Moreover, Galindo and Fuller focused on mathematics achievement. In our study, initial bivariate correlations suggested that, with the exception of conceptual thinking, children's vocabulary outcomes were negatively influenced by all of the domains of problem behavior assessed. Given the host of other relevant variables likely to influence such associations (Lonigan et al., 2013), we followed up with multilevel modeling to control for student- and teacher-level variables and observed that 10 of the relations suggested by bivariate correlations were no longer statistically significant. However, all four types of problem behaviors remained statistically significant predictors of two or more vocabulary-related outcomes, suggesting that these negative associations may begin to form during pre-K.

Externalizing and hyperactive problem behaviors remained associated with the majority of vocabulary outcome measures. These findings align with numerous studies reporting negative associations between problem behaviors and early learning outcomes among non-DLL preschoolers (Bracken & Fischell, 2007; Doctoroff et al., 2006; Lonigan et al., 1999; McWayne & Cheung, 2009; Qi & Kaiser, 2004; Stowe et al., 2000). Patterns were less pronounced for bullying, which only remained a statistically significant predictor of receptive vocabulary. One of the more interesting HLM findings regarded internalizing problem behavior. Despite numerous statistically significant bivariate correlations, once other student- and teacher-level variables were taken into account, internalizing behaviors failed to predict student outcomes on any of the standardized academic measures. However, internalizing behaviors remained predictive of program-specific measures of expressive and receptive vocabulary, each of which was directly aligned with a shared book-reading curriculum taught throughout the school year. Bulotsky-Shearer et al. (2014) observed that internalizing problem behaviors predicted lower academic performance at the end of kindergarten. However, they did not use specific language-related outcome measures, opting instead to use a composite measure of children's emergent literacy, numeracy, and problem solving competence.

Another interesting finding focuses on receptive vocabulary and acting out domains of problem behavior (i.e., externalizing, bullying, and hyperactivity). Overall, receptive vocabulary outcomes were stronger relative to expressive vocabulary performance, which is not surprising given the participants were Latino DLLs and the measures were in English. However, receptive vocabulary performance was

negatively impacted by all three domains of acting out problem behaviors (i.e., externalizing, bullying, and hyperactivity), while expressive vocabulary outcomes were largely uninfluenced by any type of acting out behaviors. Prior research with preschool populations fails to shed much light on this issue as many relied on composite measures of academic ability (e.g., Arnold, 1997; Arnold et al., 2012; Bulotsky-Shearer et al., 2014) and did not report specific findings for expressive language.

Limitations and Future Research Considerations

Findings of this study must be considered in light of its limitations, a number of which regard the assessment of social behavior. We relied on teacher ratings to measure problem behaviors (externalizing, bullying, hyperactivity, internalizing). Although the feasibility of behavior rating scales make them appealing for larger studies, other measurement approaches such as direct observation may have captured important contextual information about the occurrence of problem behaviors. Moreover, assessing additional domains of problem behaviors may have been informative, particularly attention, as earlier studies have suggested that attentiveness has some level of influence on problem behavior–achievement associations (e.g., Arnold, 1997, 2012; Hinshaw, 1992; Lonigan et al., 1999; Morgan et al., 2008). In addition, our study did not include measures of children's social competence. Future studies should incorporate a broader range of social behavior indictors, particularly those that are likely to be valued and reinforced in Latino families. Finally, in an effort to minimize additional time demands placed on teachers (particularly at the end of the school year), we elected to ask teachers to complete problem behavior ratings once at midyear. This prohibited evaluation of social behavior change during the school year. Benchmarking students' social behavior performance and examining concurrent growth on both social behavior and early learning measures would likely have led to a more informed understanding of any observed relations.

Another area of limitation is the study's sampling and length. We included only children in dual-language pre-K programs identified to be at risk of early learning problems without regard to problem behavior. Investigations involving Hispanic DLLs with a more heterogeneous range of language and literacy skills would be informative. In addition, following children longitudinally as others have done (e.g., Miles & Stipek, 2006; Morgan et al., 2008) would enable further investigation of language development, stability of problem behaviors over time, and persistence of negative behavior–achievement associations.

Last, there are variables beyond those we assessed that are relevant to behavior–achievement associations and could influence the types of relations we observed. For instance, the nature and quality of instruction may influence the extent of problem behaviors' impact on learning outcomes (Hagan-Burke et al., 2011, 2013). There is also evidence that preschoolers with behavioral problems receive less instruction than their peers with more typical social behaviors (Arnold, 1997; Bracken & Fischell, 2007). Moreover, the nature and extent of teachers' classroom management and use of positive behavioral supports could influence the strength of these associations. Future research should incorporate a broader range of contextual variables to help explain observed relations between problem behaviors and poor academic outcomes.

Implications and Conclusion

Consistent with prior research with predominantly monolingual young children, we observed that a portion of Hispanic DLLs were at risk for language-related academic difficulties with comorbid behavior problems that may have impeded their early learning development. This finding has implications for meeting the needs of young DLLs, signifying a potential need to better address their social development during preschool. Teachers may need to tailor unique opportunities and activity structures to engage Latino DLLs in pre-K classrooms (Galindo & Fuller, 2010). Moreover, a dual-intervention approach targeting social behavior development and early learning success may be warranted. Although a dual approach is often emphasized in multitiered systems of support (MTSS), interventions may need to be contextualized for young DLLs.

Many Hispanic DLLs come from low-socioeconomic status (SES) home environments, but it is important for schools to resist characterizing DLLs based only solely risk factors. Galindo and Fuller (2010) cautioned that teachers may fail to recognize Latino children's behavioral strengths. Moreover, language barriers may impede awareness and appreciation of social competencies nurtured in Latino homes. Schools should focus on a broader range of social behavior indictors, particularly those likely to be valued and reinforced in Latino families. At the same time, schools must also be mindful that embedded learner characteristic (i.e., family SES, immigration status, exposure to native language, child motivation) are relevant to children's success in both academic and social behavior domains (Halle et al., 2014).

Little research exists to suggest *how* dual-language learning affects the social development of DLLs in pre-K (Qi & Kaiser, 2004). Clearly, if children lack sufficient language skills to convey their thoughts and understand others, this may affect social development and lead to problem behaviors. Schools must consider potential contextual influences to better understand social behavior–academic achievement relations. They must also determine whether social behavior interventions, academic interventions, or a combination of the two may sufficiently moderate negative relations between problem behavior and early learning outcomes.

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