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Internalizing Behaviors and Hyperactivity/Inattention: Consequences for Young Struggling Readers, and Especially Boys

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Abstract

Although evidence of negative associations between early literacy development and children's behavior problems exists, the field still lacks an understanding of the complicated links between these two areas. Children's gender has often not been included in much of the extant research as a potential moderating variable, yet gender differences may provide insights into the nuanced relationship between early literacy development and maladaptive behaviors. Results from the current study of 472 kindergarten and first-grade children suggested that compared with nonstruggling readers, teachers rated struggling readers as higher on internalizing behaviors and hyperactivity/inattention, but not externalizing behaviors, when accounting for children's socioeconomic status. Furthermore, higher levels of internalizing behaviors and hyperactivity/inattention in struggling readers predicted lower reading scores at the end of the school year across a variety of domains, but these negative effects were more prominent for young boys. Implications for early intervention are discussed.

Keywords

behavior problems, struggling readers, internalizing, hyperactivity, inattention

Introduction

The kindergarten and first-grade years are key transitional periods during which children may be susceptible to developing emotional and behavioral problems as learning to read becomes the focus of instruction (Grills-Taquechel, Fletcher, Vaughn, Denton, & Taylor, 2013). Children who experience difficulties with reading during the critical years of early elementary school may be more likely to develop behavior problems and experience ongoing challenges that persist throughout their schooling (Entwisle, Alexander, & Olson, 2007; Miles & Stipek, 2006). There are various possibilities as to why struggling readers may begin to exhibit behavior problems. For

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example, reading struggles can evoke feelings of frustration or task avoidance that contribute to behavior difficulties; behavior difficulties may limit children's abilities to attend to literacy instruction; and there may be overlap in the etiological causes of reading and behavioral difficulties (Garwood, Vernon-Feagans, & The Family Life Project Key Investigators, 2017; Hinshaw, 1992; Morgan, Farkas, Tufis, & Sperling, 2008). Early interventionists have been charged with understanding ways to decrease young children's antisocial behaviors as early as preschool (Feil et al., 2014), but many kindergarten and first-grade children still exhibit significant behavioral struggles (Walker, Ramsey, & Gresham, 2004). Understanding the nuanced relationship between early reading difficulties and children's behavior problems is therefore important. It is equally critical to understand the role of children's gender, as it may be a key demographic variable related to the etiological associations between academic and behavioral difficulties.

Behaviors Displayed by Struggling Readers

Co-occurring reading struggles and behavior problems may present serious challenges for young children and often necessitate early special education services. However, due to concerns regarding overreferrals (Dhuey & Lipscomb, 2010) and variation in school readiness due to immaturity (May et al., 1994), identification for special education is often delayed until children are approximately nine years old (Kauffman & Landrum, 2012; Lerner & Kline, 2006) When young children struggle to learn, the typical response from schools is to deliver academic intervention. Although intervention-based efforts to develop kindergarten and first-grade children's early literacy skills have been successful in remediating reading difficulties (Catts, Nielsen, Bridges, Liu, & Bontempo, 2015; Vernon-Feagans, Kainz, Hedrick, Ginsberg, & Amendum, 2013), reading interventions rarely address both academic and emotional or behavioral needs. The purpose of this study was to untangle the relationship between early reading struggles and behavior problems, with a specific focus on child gender and different types of behaviors, to better inform early intervention efforts.

Hyperactivity/inattention. Learning to read requires students to be attentive, focused, and on task in the classroom, and students who struggle with reading have been shown to display higher rates of hyperactive and inattentive behaviors (Ebejer et al., 2010). Investigations into both inattention and hyperactivity have demonstrated negative associations with early literacy development. In fact, the most commonly co-occurring disorder with reading disabilities is attention-deficit/hyperactivity disorder (ADHD; Maughan & Carroll, 2006). Researchers have found children's inattentive and hyperactive behaviors to predict lower scores in word-reading growth, reading comprehension, print-based reading outcomes, and phonemic decoding (Hagan-Burke et al., 2011; Miller et al., 2014). Dion et al. (2011) found that first-grade children's inattentive behaviors quintupled their chances of being a nonresponder to evidence-based reading interventions. Although a substantive body of research has concentrated on associations between ADHD symptomology and proficiency in reading (Willcutt, Pennington, Olson, Chhabildas, & Hulslander, 2005), other types of behaviors besides hyperactivity/inattention may manifest in the presence of early literacy struggles.

Externalizing and internalizing behavior. Analyses of the Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K) datasets have found that children entering school with early literacy struggles are more likely to display higher rates of internalizing (e.g., anxiety, depression) and externalizing (e.g., aggression, noncompliance) behaviors throughout elementary school (Morgan, Farkas, & Wu, 2009), and that children with higher ratings of externalizing behaviors demonstrate slower initial growth in reading (Lim & Kim, 2011). The associations between reading struggles and behavior problems are not something young children can be expected to simply

"grow out of," as studies have corroborated significant relationships between the two throughout elementary school (Lin et al., 2013) and into adolescence (Arnold et al., 2005). Furthermore, these reading struggles and behavior problems in early schooling have been shown to predict a greater likelihood of grade retention, placement in self-contained settings, and school drop-out (Bierman et al., 2013).

Some students who are struggling in reading may exhibit externalizing behaviors to avoid experiences of failure in performing literacy tasks that they know are too difficult. An analysis of data from the ECLS-K revealed that struggling readers were almost twice as likely to exhibit externalizing behaviors as nonstruggling readers, and that poor task engagement in first grade predicted reading difficulties in third grade, above and beyond the influence of potentially confounding variables (e.g., socioeconomic status [SES], gender, and inattention; Morgan et al., 2008). It is possible that, when teachers and peers perceive their performance in a negative light, struggling readers may experience embarrassment and act out in anger (Chapman, 1988; Lin et al., 2013). Struggling readers may also become anxious or sad as they begin to attribute their literacy difficulties to personal cognitive deficits (Ackerman, Izard, Kobak, Brown, & Smith, 2007). More recent analyses of ECLS-K data revealed that poor readers self-reported higher rates of anger, sadness, and loneliness (Morgan, Farkas, & Wu, 2012). Others have found first-grade children's self-reported anxiety to negatively predict reading scores at the end of the school year (Grills-Taquechel et al., 2013). Indeed, researchers have shown higher ratings of internalizing behaviors from both teacher report and child self-report to be associated with lower reading achievement among elementary-aged children (Ackerman et al., 2007; Maughan, Rowe, Loeber, & Stouthamer-Loeber, 2003).

Although girls are thought to be at greater risk of developing internalizing behavior problems and boys are more likely to exhibit externalizing behaviors (Walker et al., 2004), differences in the associations between types of behavior problems and early literacy development have not often been differentially explored for boys and girls. In fact, a meta-analysis focused on the academic struggles of students with emotional and behavioral disorders (EBDs) revealed a lack of gender-differentiated outcomes within all of the included studies and missing information on participants' gender in nearly one-third of the studies (Reid, Gonzalez, Nordness, Trout, & Epstein, 2004). This report emphasizes the lack of attention to child gender as an important consideration in conducting research focused on reading struggles and behavior problems. Some researchers have found a stronger association between reading disability and maladaptive behaviors (e.g., overt aggression, ADHD symptomology) for boys than for girls (Trzesniewski, Moffitt, Caspi, Taylor, & Maughan, 2006), but the authors acknowledged the absence of internalizing behaviors in analyses as a limitation of their study.

Gender Gaps in Early Reading

Although research has identified a gap in literacy achievement, with girls performing better than boys (National Assessment of Educational Progress, 2015; Ready, LoGerfo, Burkam, & Lee, 2005), others have not found such differences between boys and girls (Matthews, Ponitz, & Morrison, 2009). Some researchers have found that the magnitude of the gender gap is related to children's SES. For example, Lee and Al Otaiba (2015) found evidence for the gender gap in kindergarten, indicating that even though girls had an advantage in both the high- and low-SES groups, the gender differences were more prominent in the low-SES group.

Household income and parent education, which together often represent SES, influence the quality and quantity of economic and social resources available to children (Sirin, 2005). For example, within low-SES families, there may be limited resources in the home and nonstandard work hours that limit opportunities for parents and children to engage in literacy activities, which collectively puts children at risk of early reading difficulties (Tichnor-Wagner, Garwood,

Bratsch-Hines, & Vernon-Feagans, 2016). Limited financial resources are also related to increased household chaos, parent stress, and more authoritarian parenting styles, all of which could elicit maladaptive behaviors in children (Mitchell & Hauser-Cram, 2009; Shaw, Gilliom, Ingoldsby, & Nagin, 2003). It is possible that these behavior differences, which appear to be related to SES, could also explain a portion of the gender gap in early literacy achievement. In one of the few studies exploring this question, Ready et al. (2005) utilized data from the ECLS-K and, after controlling for SES, found that behavior difficulties explained 15% to 30% of the gender gap in literacy achievement for kindergarten children. The authors hypothesized that part of the gender gap may be attributed to greater self-regulation and behavioral engagement within girls—an assertion partially supported by another study that found girls demonstrated superior levels of engagement in kindergarten (Searle, Sawyer, Miller-Lewis, & Baghurst, 2014).

Purpose and Research Questions

Although some research has been conducted on the relationship between struggles in early literacy development and the manifestation of behavior problems, there are less empirical studies that have accounted for children's SES in these analyses, and even fewer have investigated differences by child gender while exploring externalizing, internalizing, and hyperactive/inattentive behaviors. Consequently, this study utilized an at-risk sample of kindergarten and first-grade children to examine three research questions:

> **Research Question 1:** Are there significant differences in teacher-rated behavior problems between struggling and nonstruggling readers in kindergarten and first grade or between boys and girls who are struggling readers?

We hypothesized that teachers would rate struggling readers higher on all areas of problem behaviors. Moreover, we hypothesized that among struggling readers, boys would be rated higher on externalizing and hyperactive/inattentive behaviors, while girls would be rated higher on internalizing behaviors.

> **Research Question 2:** Do the behavior problems (externalizing, internalizing, or hyperactive/inattentive) of struggling readers in kindergarten and first grade predict their end-of-year performance on standardized literacy assessments?

We hypothesized that behavior problems would negatively predict scores on measures of early literacy development.

> **Research Question 3:** Are there gender differences in the relationship between behavior problems predicting end-of-year performance on standardized literacy assessments for struggling readers in kindergarten and first grade?

Given the lack of research in this area, we investigated this question through an exploratory lens.

Method

Participants and Procedures

All included kindergarten and first-grade children ($N = 472$) and teachers ($N = 70$) were members of the control group from an Institute of Education Sciences funded randomized controlled trial (RCT) of a longitudinal, early literacy intervention. There were 503 children in the original

control group sample, but 31 children were excluded from this study due to missing data on a behavioral screener (see Measures). The original RCT focused on young children in low-wealth rural areas because research has shown that this population has been underresearched and, given greater childhood poverty rates than in urban and suburban areas, rural children are at heightened risk of early reading struggles (O'Hare, 2009; Vernon-Feagans, Gallagher, & Kainz, 2010). Participants were located across 10 schools receiving Title 1 funding in three rural school districts in a Southeastern state.

A small sample of children in each classroom was identified as struggling ($n = 236$) or nonstruggling ($n = 236$) readers using curriculum-based measures (CBMs) from AIMSweb (Shinn & Shinn, 2002) and the Dynamic Indicators of Basic Early Literacy Skills, 6th Edition (DIBELS; Good & Kaminski, 2002). For kindergarten students, we used AIMSweb Letter Sound Fluency (LSF) and DIBELS First Sound Fluency (FSF). For first-grade students, we used DIBELS Phoneme Segmentation Fluency (PSF) and Nonsense Word Fluency (NWF). Children were then identified as *high risk, some risk*, or *low risk* for reading struggles based on AIMSweb and DIBELS grade-level and fall time-point benchmarks. High-risk and low-risk status was then confirmed using the Letter-Word Identification and Word Attack (WA) subtests of the Woodcock Johnson Diagnostic Reading Battery, III (WJ; Woodcock, Mather, & Schrank, 2004). A grade percentile score below 35% on one or both WJ subtests qualified *high-risk* students as struggling readers, while an average score on one or both subtests greater than 50% (with neither below 35%) qualified *low-risk* students as nonstruggling readers. In cases where AIMSweb/DIBELS and WJ scores did not match regarding *high-risk* students' struggling status, consented students from the *some-risk* group were administered the WJ subtests and classified accordingly.

Research assistants (e.g., graduate students, former teachers) attended a two-day training and completed a rigorous certification process prior to administering a full battery of literacy tests (i.e., subtests from WJ) to children in both the fall (September–November) and spring (April–May) of the academic year. The certification process involved research assistants video-recording themselves delivering the full battery to a kindergarten or first-grade child who was not participating in the study. The video was then reviewed and scored by the project coordinator to determine the research assistant's reliability in delivering the assessments. Regarding behavior, teachers completed a standardized behavior screening measure on all participating struggling and nonstruggling readers in their classrooms in the fall and spring. Of the 70 kindergarten (48.53%) and first-grade (51.47%) teachers involved in the current study, 47 (67.14%) had earned at most a bachelor's degree and 23 (32.86%) had earned a master's degree or higher. Regarding race, 76.12% of the teachers were White and 20.90% were African American. A total of 38 (54.29%) teachers had 5 years of experience or less, while 32 (45.71%) teachers had more than 5 years of teaching experience.

Demographic and descriptive data for the 472 participating children involved in the current study are available in Table 1. Boys, $\chi^2(1, N = 471) = 8.15$, $p = .004$, children receiving special education services, $\chi^2(1, N = 456) = 10.97$, $p < .001$, and children from families with a lower SES, $t(465) = 3.33$, $p = .001$, were more likely to be struggling readers. For descriptive purposes only, Table 1 includes interval data on family income and maternal education, which were used to create the composite SES variable for analyses (see Covariates).

Measures

Early literacy achievement. Three subtests from the standardized WJ assessments (Woodcock et al., 2004) were used to measure students' early literacy skills in the fall of the school year and again in the spring. The *W* scores were used in the analysis because they are the most appropriate for detecting differences in literacy growth over time (Jaffe, 2009). The WA ($\alpha = .87$; Woodcock et al., 2004) subtest assessed students' decoding skills and phonemic awareness by requiring

Table 1. Demographic and Descriptive Data for Whole Sample and by Reading Status.

Item	*n*	NS	*n*	S	*N*	WS
Gender (%)						
Male	104	44.07	135	57.20**	239	50.64
Female	132	55.93	101	42.80	233	49.36
Race (%)						
Minority	174	73.93	182	77.78	355	75.85
White	61	26.07	52	22.22	113	24.15
Grade (%)						
Kindergarten	135	57.20	131	55.51	266	56.36
First grade	101	42.80	105	44.49	206	43.64
IEP (%)						
Yes	12	5.24	33	14.47***	45	9.85
No	217	94.76	195	85.53	412	90.15
Socioeconomic status						
M (*SD*)	233	0.12 (0.84)	234	−0.15 (0.90)**	467	−0.02 (0.88)
Income (US$; %)						
<20,000	109	48.65	130	59.91	239	54.21
20,001-40,000	60	27.03	47	21.66	107	24.37
40,001-60,000	30	13.51	15	6.91	45	10.26
60,001-80,000	11	4.95	11	5.07	22	5.01
>80,000	13	5.86	14	6.45	27	6.15
Education (%)						
No HS diploma	37	16.02	63	27.27	100	21.65
HS graduate	44	19.05	61	26.41	105	22.73
AA/some college	113	48.48	82	35.50	195	41.99
BA or higher	38	16.45	25	10.82	63	13.64

Note. Income and education are included only for descriptive purposes and were not include in analyses.
NS = nonstruggling; S = struggling; WS = whole sample; IEP = Individualized Education Program; HS = high school; AA = associate's degree; BA = bachelor's degree; other race = Asian, American Indian, Hispanic, and Multiracial.
**$p < .01$. ***$p < .001$.

them to pronounce the sounds of single letters and read nonsense words aloud. The Passage Comprehension (PC; $\alpha = .83$; Woodcock et al., 2004) subtest assessed students' reading comprehension skills by requiring them to provide missing words from a text passage, identify pictures represented by a phrase, and match pictures with pictographic representations of words. The Spelling of Sounds (SS; $\alpha = .74$; Woodcock et al., 2004) subtest assessed students' orthographical and phonological coding skills by requiring them to write letters that corresponded with a sound, and to spell letter combinations of low-frequency and nonsense words. Table 2 contains children's fall and spring scores.

Child behavior. The Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001) is a norm-referenced behavior rating scale that is designed to assess risk of EBD in children between the ages of 3 and 17. Teachers rated students on the following 15 items: (a) Conduct Problems (e.g., *often loses temper*), which was used to measure children's externalizing behaviors; (b) Hyperactivity/Inattention (e.g., *cannot sit stil*); and (c) Emotional Symptoms (e.g., *often seems worried*), which was used to measure children's internalizing behaviors. All items from the SDQ were scored using a 3-point Likert-type scale (0 = *not true*, 1 = *somewhat true*, 2 = *certainly true*), with scaling reversed for negatively phrased items. All subscales have a range of 0 to 10 with Cronbach's alpha coefficients exceeding .80 (Goodman, 2001).

Table 2. Reading Achievement Scores.

		NS		S		WS
Score	*n*	*M* (*SD*)	*n*	*M* (*SD*)	*N*	*M* (*SD*)
Fall *W* score						
WA	236	445.85 (25.23)	236	408.37 (30.21)***	472	427.11 (33.54)
PC	235	433.19 (29.34)	229	411.07 (21.69)***	464	422.28 (28.09)
SS	235	479.56 (14.25)	232	454.19 (26.35)***	467	466.96 (24.64)
Fall standard score						
WA	236	108.52 (9.84)	236	92.37 (12.65)***	472	101.11 (13.80)
PC	235	100.92 (12.67)	229	89.46 (11.81)***	464	95.27 (13.52)
SS	235	111.41 (11.39)	232	87.70 (16.77)***	467	99.63 (18.58)
Spring *W* score						
WA	229	470.14 (19.77)	218	444.29 (26.89)***	447	457.53 (26.81)
PC	229	456.04 (22.97)	218	430.55 (24.92)***	447	443.61 (27.10)
SS	229	490.95 (8.06)	218	478.43 (14.87)***	447	484.85 (13.42)
Spring standard score						
WA	229	111.33 (10.92)	218	100.31 (12.32)***	447	105.96 (12.85)
PC	229	105.35 (13.25)	218	91.27 (13.02)***	447	98.49 (14.89)
SS	229	115.45 (11.35)	218	102.90 (13.55)***	447	109.33 (13.95)

Note. Tests of significant differences were only conducted between nonstruggling and struggling readers. The standard score is included only for descriptive purposes. NS = nonstruggling; S = struggling; WS = whole sample; WA = Word Attack; PC = Passage Comprehension; SS = Spelling of Sounds.
***$p < .001$.

Children's teacher-rated scores (0-10) on each subscale in the fall and spring were averaged together to create three behavior scores for the school year. In cases where children were missing behavior rating scores in either the fall or spring ($n = 51$; 5.41%), the available scores were counted as their average behavior ratings for the year. The stability of students' maladaptive behaviors across time is variable (Booth-LaForce & Oxford, 2008; Ladd & Burgess, 1999) and somewhat dependent upon their interactions with teachers (O'Connor, Dearing, & Collins, 2011). Therefore, we averaged SDQ scores from the fall and spring together to create one score for the school year because it provided the clearest picture of students' overall behavior. Scores on the SDQ can be treated as continuous or categorical (Goodman, 2001). For Externalizing Behaviors, the categorization of scores is as follows: 0-2 = *normal*, 3 = *borderline*, 4-10 = *abnormal*. No significant differences were found in the distribution of students by reading status for externalizing behaviors. For Hyperactivity/Inattention, the categorization of scores is as follows: 0-5 = *normal*, 6 = *borderline*, 7-10 = *abnormal*. Struggling readers were less likely to be rated in the *normal* category, $\chi^2(1, N = 471) = 13.20$, $p < .001$, and more likely to be rated in the *abnormal* category, $\chi^2(1, N = 471) = 19.43$, $p < .001$. For Internalizing Behaviors, the categorization of scores is as follows: 0-4 = *normal*, 5 = *borderline*, 6-10 = *abnormal*. Struggling readers were less likely to be rated in the *normal* category, $\chi^2(1, N = 471) = 5.51$, $p = .019$, and more likely to be rated in the *borderline* category, $\chi^2(1, N = 471) = 5.78$, $p = .016$. The average scores (continuous, and used in analysis) for all children in the sample were as follows: Externalizing Behavior ($M = 1.33$, $SD = 1.74$), Hyperactivity/Inattention ($M = 3.46$, $SD = 2.76$), and Internalizing Behavior ($M = 1.25$, $SD = 1.73$).

Covariates. Parents of participating children completed a family demographic questionnaire in the fall of the school year. As expected, *family income* and *maternal education* were significantly correlated with one another ($r = .50$, $p < .001$), but not to the degree that multicollinearity was an issue.

Therefore, we created a continuous *SES* variable that was the combination of *family income* and *maternal education*. First, we coded family income (0 = US$0-US$20,000, 1 = US$20,001-US$40,000, 2 = US$40,001-US$60,000, 3 = US$60,001-US$80,000, 4 = US$80,001, and above) and maternal education (0 = *no high school diploma*, 1 = *high school graduate*, 2 = *associate's degree or some college*, 3 = *bachelor's degree or higher*) as continuous variables. Then, we standardized (M = 0, SD = 1) and averaged these two variables together. The SES variable showed significant (all ps < .001) associations with children's WA (r = .21), PC (r = .22), and SS (r = .23) end-of-year scores.

In addition to children's gender (0 = *male*, 1 = *female*), race (0 = *White*, 1 = *Minority*), and grade (0 = *kindergarten*, 1 = *first grade*), we controlled for a host of school-related variables. Approximately 10% of students were receiving special education services. Parents of consented students responded to a Yes or No question about their child having an Individualized Education Program (IEP), but parents did not disclose the nature of the IEP. Therefore, *IEP* was included as a dichotomous control variable (0 = *no*, 1 = *yes*). We also included children's *fall scores* on the respective WJ subtests to establish a baseline for each child. In addition to child-level variables, teachers' level of education and years of teaching experience have been related to children's early literacy development (Connor, Son, Hindman, & Morrison, 2005). Therefore, we included *teacher education* (0 = *bachelor's degree only*, 1 = *bachelor's and master's degree or higher*) and *teacher experience* (0 = *teaching for 5 years or less*, 1 = *teaching for more than 5 years*) as covariates in our models.

Analysis Plan

The 472 children (Level 1) in our study were nested within 70 classrooms (Level 2). We explored Level 3 nesting but found no significant variation at the school level. Therefore, we conducted two-level nested models to account for the dependency of the data regarding children within classrooms. Missing data were present in 1.77% of child demographics, 0.01% of children's fall WJ outcomes, and 5.30% of children's spring WJ outcomes. To account for missing data and reduce the possibility of bias in our models (Spratt et al., 2010), we used multiple imputation procedures (m = 20) in SAS 9.2 with the PROC MI function.

For Research Question 1, we descriptively examined the three behavior variables for struggling and nonstruggling readers, and for boys and girls within the group of struggling readers. We then conducted two separate analyses using MANCOVA, with the three behavior scores as dependent variables, to determine whether significant differences were present in either of the following group comparisons: (a) the whole sample with struggling status (0 = *nonstruggling*, 1 = *struggling*) as the comparison variable, and gender, SES, and IEP as covariates; and (b) struggling readers with gender as the comparison variable, and SES and IEP as covariates. For Research Question 2, which focused on the degree to which behavior problems among struggling readers predicted children's end-of-year literacy performance, we used hierarchical linear modeling. For Research Question 3, we explored the possibility of gender differences in the relationship between behavior problems and literacy scores for struggling readers by conducting moderation analysis to test for significant interactions (Aiken & West, 1991). All variables were entered in a block-wise fashion. The first block contained all covariates and the three types of behavior problems. The second block contained interaction effects. Cohen's d (Cohen, 1992) was used for effect sizes.

Results

Differences in the Expression of Behavior Problems by Reading Ability and Gender

Our first research question explored possible differences in ratings of problem behaviors between struggling and nonstruggling readers and between boys and girls who were struggling readers. In

Table 3. Differences in Behavior Problems by Reading Status and Child Gender.

	Nonstruggling readers (n = 236)			Struggling readers (n = 236)			Effect size
Whole sample	*M*	*SD*	Range	*M*	*SD*	Range	*d*
Behavior							
Internalizing	0.92	1.57	0-8.5	1.58***	1.83	0-10.0	**0.40**
Externalizing	1.14	1.71	0-8.5	1.52†	1.76	0-8.5	0.17
Hyper/inatten	2.52	2.38	0-10.0	4.39***	2.81	0-10.0	**0.64**
	Girls (n = 101)			Boys (n = 135)			Effect size
Struggling readers	*M*	*SD*	Range	*M*	*SD*	Range	*d*
Behavior							
Internalizing	1.90	2.04	0-8.5	1.48†	1.65	0-6.5	0.17
Externalizing	1.28	1.81	0-7.0	1.71	1.70	0-7.5	−0.14
Hyper/inatten	3.59	2.50	0-10.0	5.00***	2.89	0-10.0	**−0.44**

Note. Hyper/inatten = hyperactivity/inattention. Bolded *d*s are significant effect sizes.
†$p < .10$. ***$p < .001$.

partial support of our hypotheses, we found that teachers rated struggling readers significantly higher on two of the three domains of behavior (see Table 3). Struggling readers were rated significantly higher than nonstruggling readers on internalizing behaviors, $F(1, 467) = 4.21$, $p < .001$, $d = 0.40$, and hyperactivity/inattention, $F(1, 467) = 6.80$, $p < .001$, $d = 0.64$. There was no significant difference on teacher-rated externalizing behaviors between struggling and nonstruggling readers, $F(1, 467) = 1.78$, $p = .076$, $d = 0.17$. Among the sample of struggling readers, there were no significant differences between boys and girls on externalizing behaviors, $F(1, 232) = -1.45$, $p = .231$, $d = -0.14$, or internalizing behaviors, $F(1, 232) = 1.42$, $p = .089$, $d = 0.17$. As hypothesized, however, we found that boys were rated significantly higher on hyperactivity/inattention, $F(1, 232) = -3.48$, $p < .001$, $d = -0.44$.

Behavior Problems Predicting Literacy Outcomes Among Struggling Readers

Main effects. Our second research question examined the extent to which struggling readers' behavior problems predicted their end-of-year performance on early literacy assessments (see Table 4). Results suggested significant main effects for some of the behavior variables of interest, providing partial support for our hypotheses. Regarding the WA subtest, we found a significant main effect for students' hyperactive/inattentive behaviors ($b = -3.37$, $p = .045$), which indicated that higher ratings of hyperactivity/inattention across the school year predicted lower scores on the WA subtest in the spring, with an effect size of −0.40. Regarding the PC subtest, we found a significant main effect for students' internalizing behaviors ($b = -6.90$, $p < .001$) and hyperactivity/inattention ($b = -3.37$, $p = .004$), which indicated that higher ratings of internalizing behaviors and hyperactivity/inattention across the school year predicted lower scores on the PC subtest in the spring, with effect sizes of −0.50 and −0.45, respectively. Regarding the SS subtest, the negative effects for all behavior variables were nonsignificant.

Interaction effects. Our third research question explored moderation with respect to significant and nonsignificant main effects. Although we tested for significant interactions by all three behavior variables on each WJ outcome, we included only significant effects in Table 4. For the

Table 4. Multilevel Effects of Behavior Problems on Spring Early Literacy Scores for Struggling Readers.

	Word Attack				Passage Comprehension				Spelling of Sounds			
	Block 1		Block 2		Block 1		Block 2		Block 1		Block 2	
	B	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
Covariates												
Fall score	0.21**	0.07	0.22**	0.07	0.40***	0.06	0.41***	0.06	0.34***	0.06	0.35***	0.06
Race	−0.72	4.06	1.37	3.77	−1.03	2.87	1.03	2.95	−4.81*	2.22	−4.36	2.18
Gender	0.08	3.11	−2.14	2.99	3.84†	2.19	2.60	2.24	0.51	1.74	0.89	1.77
SES	2.39	1.85	2.04	1.78	1.35	1.33	1.32	1.35	0.88	1.08	0.38	1.06
Grade	22.49***	5.11	22.54***	5.01	24.73***	3.01	24.63***	3.11	0.24	3.43	0.43	3.23
IEP status	−12.59**	4.23	−13.38**	4.34	−4.93†	3.01	−5.05	3.23	−3.85†	2.34	−4.39†	2.31
Texp	0.06	0.23	0.10	0.23	0.07	0.13	0.13	0.15	0.04	0.12	0.05	0.12
Tedu	1.64	4.02	1.59	3.90	2.45	2.56	3.03	2.66	1.10	2.05	1.57	1.99
Main effects												
Int	−4.22†	2.51	−3.03	2.27	−6.90***	1.73	−8.41***	2.23	−0.86	1.40	−0.37	1.24
Ext	−2.23	3.23	−0.75	2.77	−0.55	2.32	2.00	2.01	−0.06	1.90	0.44	1.55
HI	−3.37*	1.68	−5.53**	1.84	−3.37**	1.18	−3.95***	1.18	−1.17	0.94	−2.03*	1.01
Interactions												
HI × Gender			5.69*	2.70			—	—			2.96*	1.25
Int × Gender			—	—			5.86*	2.84			—	—
Variance components												
Level 2	75.76*	36.48	75.73*	35.52	19.01	21.26	22.91	20.98	12.23	10.65	12.23	10.16
Level 1	373.56***	43.92	361.70***	41.53	201.47***	23.48	208.73***	24.71	125.94***	15.01	120.14***	13.71

Note. SES = socioeconomic status; IEP = Individualized Education Program; Texp = teacher experience; Tedu = teacher education; Int = internalizing behaviors, Ext = externalizing behaviors, HI = hyperactivity/inattention.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

significant main effect of hyperactivity/inattention on WA, we found a significant interaction by gender ($b = 5.69$, $p = .040$), which is displayed in Figure 1. Analysis of the slopes indicated that the negative effect was significant ($d = -0.44$, $p = .002$) for boys ($n = 135$) but not for girls ($n = 101$). For the nonsignificant main effect of hyperactivity/inattention on SS, we found a significant interaction by gender ($b = 2.96$, $p = .043$), which is also displayed in Figure 1. For boys ($n = 135$), analysis of the slope indicated that the negative effect was significant ($d = -0.21$, $p = .037$), but no significant effect was found for girls ($n = 101$). For the significant main effect of internalizing behavior on PC, we found a significant interaction by gender ($b = 5.86$, $p = .039$), which is displayed in Figure 2. The negative effect was significant ($d = -0.57$, $p < .001$) for boys ($n = 135$) but not for girls ($n = 101$).

Discussion

The current study examined behavior difficulties within a subset of children who were vulnerable to developing persistent reading struggles. Our first research question investigated whether there were differences in how teachers rated behavior problems within groups of struggling and nonstruggling readers in kindergarten and first grade, and within groups of girls and boys identified as struggling readers. Findings suggested that struggling readers were rated higher on internalizing behaviors and hyperactivity/inattention. Our results draw attention to the behavioral differences within struggling and nonstruggling readers at an early age. Compared with externalizing behaviors, internalizing behaviors within children are more difficult to detect. Consequently, our findings of the prevalent effects of internalizing symptomology within struggling readers are important for understanding another dimension of the complex interplay between behavior and reading difficulties. Students who struggle to read may experience anxiety and low morale when faced with the difficult task of reading. Early intervention is therefore critical to improving long-term outcomes for these children, as research has shown that adolescent struggling readers are at greater risk of suicidal ideation and action (Daniel et al., 2006).

Our second research question explored the associations between struggling readers' behavior problems and their end-of-year literacy achievement, and our third research question probed these associations by examining gender-based moderation effects. We found that struggling male readers with higher ratings of hyperactivity/inattention were less proficient than their female peers on two of the three literacy skills measured: decoding words and spelling. We also found a negative effect in the association between struggling male readers' internalizing behaviors and their proficiency in comprehending passages. Our study adds to other evidence that greater anxiety and withdrawal may be detrimental to early literacy achievement (Grills-Taquechel et al., 2013), particularly for young boys (Maughan et al., 2003). Even though the majority of struggling readers were rated as having normal levels of internalizing (90%) and hyperactive/inattentive (66%) behaviors, we still found moderate negative associations between these behaviors and young boys' early literacy development. Consistent with findings of prior research, young boys may experience greater difficulties in attending to more solitary activities and stationary tasks in school (Coplan, Gavinski-Molina, Lagace-Seguin, & Wichmann, 2001). Regarding the robust negative effect of hyperactivity/inattention as related to reading comprehension, this may have been a product of the cognitive demand required to perform successfully. Boys or girls with elevated hyperactive/inattentive behaviors may not be able to attend to tasks that require them both to deduce meaning from text and to apply that knowledge.

It was somewhat perplexing to find that even though the higher rating for girls on internalizing behaviors approached significance ($p = .089$), it was actually only boys' internalizing behaviors that predicted lower reading comprehension scores. The display of internalizing behaviors in boys stands in contrast to gender norms, and it is possible that teachers were unsure how to respond to boys displaying these behaviors. It is also possible that other behaviors more

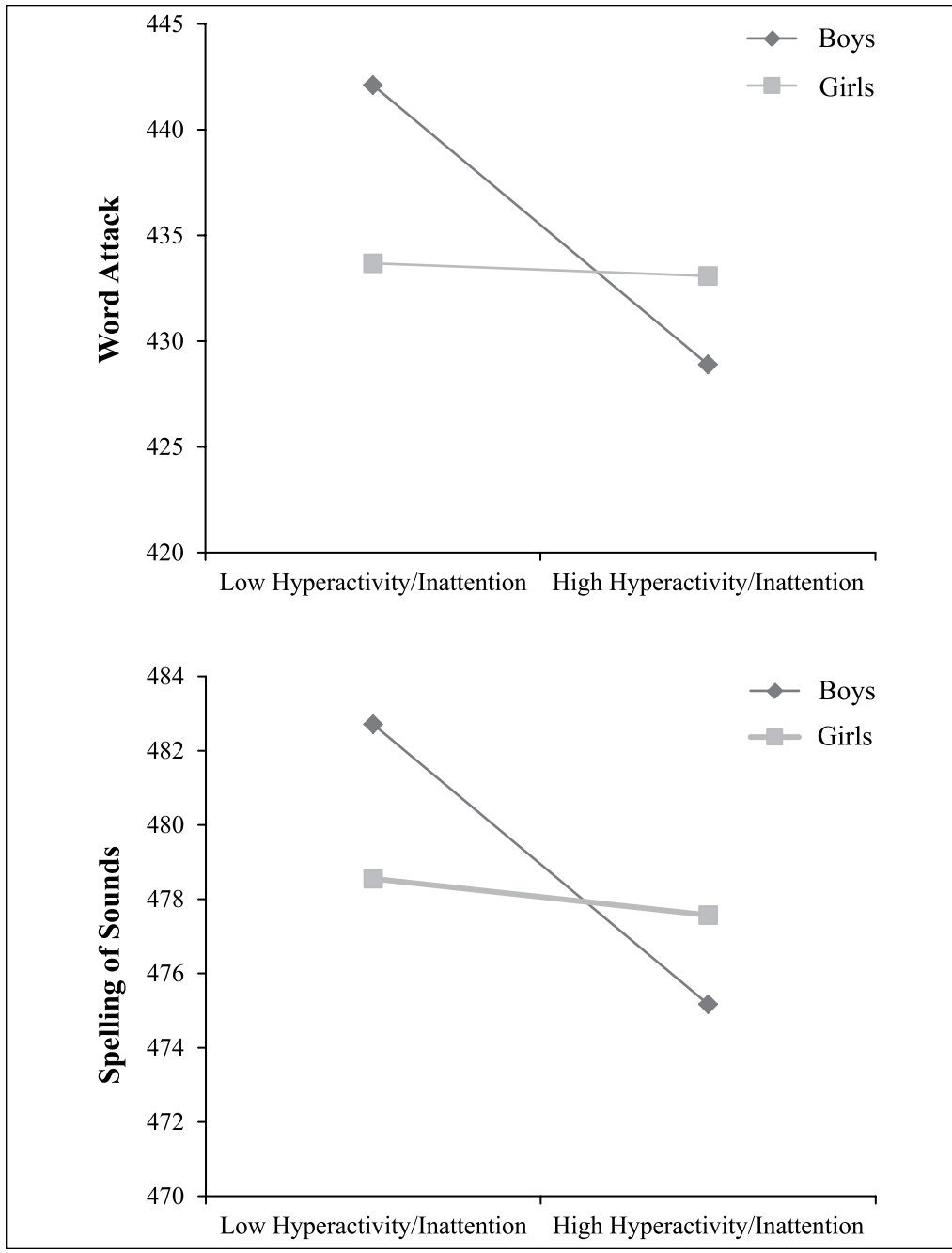

Figure 1. Interaction by gender and hyperactivity/inattention for Word Attack and Spelling of Sounds.

commonly found in young girls, such as high task engagement (Searle et al., 2014), may buffer the negative effects of internalizing behaviors on reading outcomes. In addition, boys' hyperactive/inattentive behaviors predicted lower scores on both phonemic decoding and orthographical and phonological coding tasks. Teachers may have perceived these young boys as less "teachable" (Keogh, 2003), which may have resulted in fewer teaching interactions for those children.

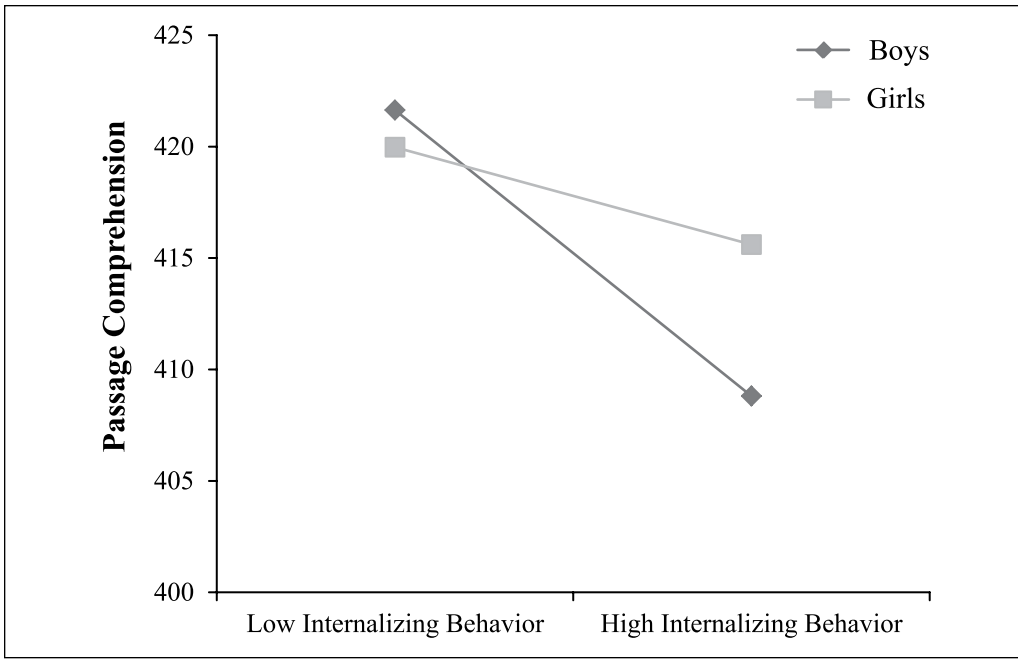

Figure 2. Interaction by gender and internalizing behaviors for Passage Comprehension.

Implications for Schools

Coaching-based professional development models as a means of improving outcomes for children at risk of school failure are gaining popularity (Dinnebeil, McInerney, & Hale, 2006; Powell & Diamond, 2013; Vernon-Feagans et al., 2013), but coaches who have expertise in both early literacy development and emotional/behavioral problems may be needed to maximize the efficacy of early intervention efforts. Even slightly elevated behavior problems that fall in the normal range could be detrimental to students' early literacy development. These minor issues in very young children could eventually contribute to widening gaps in literacy and emotional/behavioral development between struggling and nonstruggling readers (i.e., Matthew effects; Stanovich, 1986). Although multitiered systems of support are gaining popularity in schools, it is still rare that a school's academic and behavior intervention teams collaborate in a problem-solving approach to holistically support children (Kuchle, Edmonds, Danielson, Peterson, & Riley-Tillman, 2015).

As schools move toward more proactive models of prevention, helping students overcome early signs of problem behaviors is a critical step in developing their competence in reading (Bowen, Jenson, & Clark, 2004). Early elementary school teachers may need to be especially attuned to the needs of boys in their classrooms who struggle with reading and display overt or covert behavior problems, as both seem to have interrelated effects during the earliest years of schooling (McIntosh, Chard, Boland, & Horner, 2006). Results from the current study, and others (Chapman, Tunmer, & Prochnow, 2000), suggest that as early as kindergarten and first grade, struggling readers may begin to exhibit traits of low academic self-concepts. Early interventions for struggling readers, then, are critical for ensuring that children can both develop positive academic self-concepts and acquire key literacy skills before negative feelings about reading and school become engrained within them (Ackerman et al., 2007).

Limitations and Future Directions

As in all empirical studies, significant findings must be considered in the context of research limitations. First, the models in our analysis did not include detailed information about students' IEPs. Although we included IEP status as a dichotomous covariate, our analysis may have benefited from specific information about the nature of the special education services that students received. Second, although researchers have consistently found teachers' perceptions of child performance within the classroom to be related to academic outcomes (Konold & Shukla, 2014), teachers' reports of child behavior problems may be susceptible to biases (Dinnebeil et al., 2013). As suggested by Dinnebeil and colleagues, future studies could benefit from including multiple perspectives of children's classroom behavior and utilizing strengths-based behavior screening instruments. Furthermore, other behavior screening tools, such as Systematic Screening for Behavior Disorders (SSBD; Walker & Severson, 1992), which include a multigate screening process, may be more accurate in detecting different types of maladaptive behaviors in young children. Regardless, teachers' perceptions of students' behaviors have clear implications for the struggling readers in their classrooms, and the findings of this study provide further support that this is an area in need of more attention. Finally, our study focused on students in low-income rural schools, and our findings may not generalize to children outside of this context. Still, rural parents have reported their children as having lower levels of emotional/behavioral development than their urban and suburban counterparts upon school entry; therefore, students in rural areas are an especially at-risk group of young learners in need of attention (Sheridan, Koziol, Clarke, Rispoli, & Coutts, 2014).

Competency in academic tasks is widely recognized as having positive effects on healthy child development (Vanderstaay, 2006). For example, students with learning disabilities are known to experience higher levels of depression and anxiety than their peers (Nelson & Harwood, 2011; Sideridis, 2007). Much less attention has been given to the role that gender stereotypes may play in children's literacy and emotional/behavioral development in school (Aina & Cameron, 2011). Young boys and girls who struggle to read appear to experience maladaptive behaviors differently in the earliest years of schooling, and the consequences for boys seem especially dire. Do reading struggles and behavior problems exhibit bidirectional effects? Most likely. But it may be that the overrepresentation of boys among those classified as struggling readers is driving this relationship. Patterns of behavioral difficulties within young struggling male readers and the methods by which teachers address signs of early emotional/behavioral problems appear to be highly complex and warrant further attention.

Conclusion

Even when young children receive one-on-one reading instruction, those who have even slightly elevated levels of emotional or attention problems may not be able to benefit from the individualized support (Al Otaiba & Fuchs, 2002). Although reading interventions may collaterally improve student behavior and behavior interventions may have a positive impact on reading outcomes (Cook et al., 2012), a more comprehensive approach that simultaneously addresses both areas is needed. The higher levels of hyperactivity/inattention found within boys in this sample may explain some of the gender differences in the associations between reading struggles and behavior problems, but we still know very little about why boys experience stronger associations between internalizing behaviors and struggles to acquire requisite early literacy skills.

Researchers have found that teachers interact differently with boys and girls (Beaman, Wheldall, & Kemp, 2006), but there is no research available on how teachers' behavior management practices with boys versus girls are related to children's early literacy growth. One study found that teachers' self-efficacy in behavior management positively predicted kindergarten and

first-grade students' growth in early literacy skills across the school year (Varghese, Garwood, Bratsch-Hines, & Vernon-Feagans, 2016), but clearly there is more work to be done. Although some maladaptive behaviors displayed by children may be regarded as falling into the normal range, results from this study suggest that they may still result in collateral damage to early literacy development.

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