

Reading Skills and Function of Problem Behavior in Typical School Settings

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The authors examined the relation between variables maintaining problem behavior and reading performance for elementary-age students. Participants were 51 students in Grades 4, 5, and 6 who had received two or more office discipline referrals in 2003-2004. Students were grouped by teacher-indicated function of problem behavior. The prevalence of behavioral function for students in general and special education is reported, and differences were determined for the number of discipline referrals and oral reading fluency rates. Chi-square analysis indicated differences in base rates of function between students in general and special education. Multivariate analysis of variance indicated significant differences in oral reading fluency by function of problem behavior, and follow-up analyses indicated significantly lower fluency scores for students whose indicated function was escape from academic tasks. These findings provide evidence for a coercion model in the classroom. The results are discussed in terms of the relevance of using functional behavior assessment and behavior support with general education populations.

Keywords: *behavioral assessment; classroom behavior; functional behavioral assessment; academic assessment; reading*

In the current state of assessment and intervention in schools, individual difficulties in academic achievement and social behavior often are addressed as separate problems, with approaches, practices, and systems that assume no relation between academic performance and problem behavior (McIntosh, Chard, Boland, & Horner, 2006; O'Shaughnessy, Lane, Gresham, & Beebe-Frankenberger, 2003). Yet a substantial research base offers evidence that academic problems are related to social behavior problems. Recent studies have focused on the link between academics and problem behavior (e.g., Fleming, Harachi, Cortes, Abbott, & Catalano, 2004; Nelson, Benner, Lane, & Smith, 2004) and improving social behavior through academic interventions (Barton-Arwood, Wehby, & Falk, 2005; Kellam, Mayer, Rebok, & Hawkins, 1998; Lane et al., 2002; Lee, Sugai, & Horner, 1999; Nelson, Stage, Epstein, & Pierce, 2005).

The advent of large, longitudinal databases in academics and behavior has made asking and answering important questions significantly more feasible.

A few principles describing the relationship between academic and behavior problems have become evident. This relationship appears to start as early as school entry: Kindergarten academic variables have been shown to predict problem behavior at the end of elementary school (McIntosh, Horner, Chard, Boland, & Good, 2006). The association increases through schooling and grows stronger in middle and

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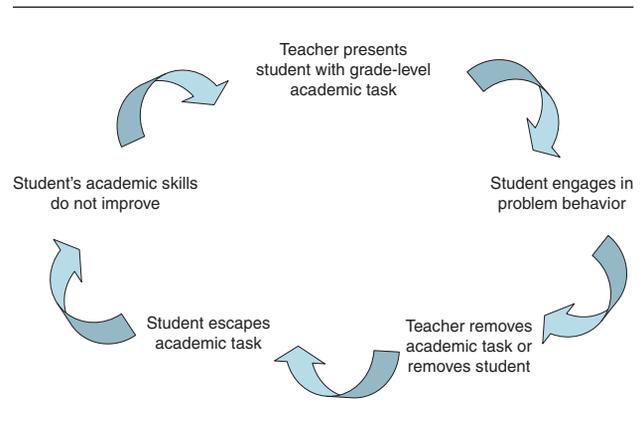
high school (Fleming et al., 2004; Maguin & Loeber, 1995; Morrison, Anthony, Storino, & Dillon, 2001; Roeser & Eccles, 2000). The relationship appears to be strongest for students with externalizing behavior problems (Hinshaw, 1992; Nelson et al., 2004). And, not surprisingly, students with problems in both academics and behavior are at greater risk for school failure than students with problems in only one area (McKinney, 1989).

Given that such a link has repeatedly been documented in the literature, it is important to explore the reasons behind this association. Researchers have hypothesized three possible mechanisms that may explain the relationship between academic difficulty and behavior problems. It is unlikely that any one of these mechanisms would completely explain the relationship; rather, they probably occur concurrently (Roeser & Eccles, 2000). One such mechanism is underlying attentional problems (Fleming et al., 2004; Hinshaw, 1992). These attentional problems may simultaneously interfere with learning and lead to problem behavior. A second possible mechanism is reduced access to instruction as a result of problem behavior (Dishion, French, & Patterson, 1995; Levy & Chard, 2001; Wehby, Lane, & Falk, 2003). When students disrupt the educational environment, they stop teaching from occurring, thereby preventing their own learning.

A third possible mechanism, behavioral function, holds that students' preexisting low academic skills may lead to problem behavior to escape academic tasks (Lee et al., 1999; Roberts, Marshall, Nelson, & Albers, 2001). This mechanism operates on the principle of negative reinforcement for problem behavior and is based on interactions described by Patterson and colleagues (Patterson, 1976, 1982; Patterson, Reid, & Dishion, 1992) as a coercive cycle of parent-child interactions. In this model, a parent presents a child with a demand the child finds aversive, such as a chore. If the child displays problem behavior and the parent then removes the demand, the child learns that problem behavior is an effective tool for escaping demands, and the parent learns that removing the demand is an effective tool for short-term relief from problem behavior. As these interactions continue, the child increasingly uses antisocial behavior to meet social needs, leading to increasingly negative life outcomes.

This cycle may also describe the relationship between academic skills and problem behavior. Figure 1 shows a proposed coercive cycle of academic

Figure 1
A Coercive Cycle of Behavioral and Educational Failure



and behavioral failure (see Figure 1) in which a student with low academic skills finds grade-level academic tasks aversive and engages in problem behavior to escape from the academic tasks. If the teacher responds by removing the task from the student or the student from the task (i.e., the teacher sends the student to a time-out area or the office), this may lead to three outcomes: (a) the student is more likely to respond to future academic tasks with problem behavior (Lee et al., 1999), (b) the teacher is less likely to present academic tasks to the student (Wehby et al., 2003), and (c) the student's academic skills are unlikely to improve at the same rate as the rest of the class (McIntosh, Horner, et al., 2006). The combined impact of this cycle is a widening of academic deficits across the elementary grades, an increasing use of problem behavior when aversive academic demands are presented, and increased use of problem behavior in other settings, leading to a severe risk for negative life outcomes. A direct implication of this mechanism is the importance of identifying behavioral function when designing behavior support for children in elementary grades. Unlike those children with attention or tangibly maintained problem behavior, students with problem behavior maintained by escape from academic tasks may be more likely to require behavioral interventions combined with academic interventions (Lee et al., 1999). These distinctions regarding behavioral function are subtle and require careful assessment.

Functional Behavior Assessment

Over the past several decades, researchers and practitioners have increasingly started to characterize

a person's behavior as serving a particular operant function (Carr, 1977; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982). For example, if a student uses a certain behavior, and that behavior is reliably followed with attention from a teacher or classmates, the student may be more likely to use that behavior in the future to evoke attention. This behavior would be described as being "maintained by attention." Often, these behaviors are problem behaviors. To provide an indication of the function of problem behavior in typical school settings, educators use functional behavior assessment (FBA; O'Neill et al., 1997). School personnel use FBA procedures to determine the environmental context and maintaining consequences for problem behavior and thereby the behavioral function. Once these variables are identified, a behavior support plan is designed to supplant the problem behavior with a prosocial behavior that achieves the same or a similar function (Sugai, Lewis-Palmer, & Hagan, 1998).

The body of research supporting the use of FBA to reduce problem behavior is based largely on its early (and continuing) use with individuals requiring high levels of support for daily functioning, such as those with low-incidence disabilities (Iwata et al., 1994; Repp & Karsh, 1994; Vollmer, Northup, Ringdahl, LeBlanc, & Chauvin, 1996). In the past decade, however, research on FBA has increasingly shifted from use with low-incidence disabilities by experts in analogue settings to use with high-incidence disabilities by practitioners in school settings (Iwata et al., 1982; Scott, Bucalos, et al., 2004; Vollmer et al., 1996). Recent changes in national education policy have hastened interest in FBA as a primary method of providing behavior support in school settings (Ervin et al., 2001), and various training manuals have emerged to teach practitioners how to complete FBAs (e.g., Liaupsin, Scott, & Nelson, 2001; Nelson, Roberts, & Smith 1998; O'Neill et al., 1997).

Some researchers in the behavior analytic field have argued that policy makers and practitioners have moved beyond the extent of knowledge provided by research, that procedures such as FBA have unknown effectiveness in school settings with general education students (Gresham, 2003; Nelson, Roberts, Rutherford, Mathur, & Aaroe, 1999; Sasso, Conroy, Stichter, & Fox, 2001). Two of the broad questions raised are as follows: (a) In terms of behavioral function, how is the population of general education students with problem behavior different from the population of students with disabilities existing in the literature? and (b) Is determining the function of

problem behavior a necessary or useful component of individual behavior support for high-functioning students (general education students or special education students with mild disabilities)?

How Is the General Education Population Different?

The essential point raised in this question is to what extent our current understanding of behavioral function applies to the wide range of students and problem behaviors in the general education population. This understanding is limited because of the lack of information regarding the function of problem behavior with the general education population and the difficulties inherent in generalizing results from one population to another. Although there are a number of excellent single-subject or small-number studies using FBA with general education students in the literature today (e.g., Hoff, Ervin, & Friman, 2005; Kennedy et al., 2001; Kinch, Lewis-Palmer, Hagan-Burke, & Sugai, 2001; Stichter, Lewis, Johnson, & Trussell, 2004), there are still few published studies to help us make reasonable inferences about this diverse population.

For example, little is known about prevalence, or base rates of behavioral function, in general education settings (Gresham, 2003). However, two highly regarded studies examining base rates of behavioral function provide some clues about base rates for specific groups of students outside general education settings. Iwata et al. (1994) reported base rates of function for self-injurious behavior in individuals with severe mental retardation with the following results: 38% to escape or avoid social interaction, 26% to obtain attention, 26% to obtain sensory stimulation, and 5% for multiple functions. Generalization to the general education population is limited because the sample included only individuals with low-incidence disabilities with functional analyses completed in analogue settings.

The second important study, a meta-analysis by Ervin et al. (2001), analyzed the prevalence of behavioral functions by sampling the FBA research literature from 1980 to 1999. They found the following rates for individuals without disabilities: 47% to obtain adult attention, 43% to obtain an item or activity, 20% to obtain peer attention, 3% to escape or avoid an academic task, and 37% for multiple functions. The following rates were found for individuals with disabilities: 44% to escape or avoid a task, 26% to obtain adult

attention, 13% to obtain an item or activity, 11% to obtain sensory stimulation, 4% to obtain peer attention, 2% to escape or avoid social interaction, 1% to escape sensory stimulation, and 21% for multiple functions. As shown, there are obvious differences between students with and without disabilities and even more pronounced differences between these rates and those obtained by Iwata et al. (1994).

Although the latter study's sample more closely resembled the general education and high-functioning special education population of interest, these results were obtained from 100 separate studies, and the study's authors questioned whether the sample accurately measured the population or if it more accurately described a population of students who met certain criteria for single-subject designs, namely, students with discrete, high-frequency behaviors that were easy to measure. To date, little is known about base rates of function for the broad range of problem behaviors exhibited by students in general education settings, for which FBA is commonly used (Sasso et al., 2001).

Is FBA a Necessary and Useful Tool for General Education Students?

The central point in this question is whether determining the function of problem behavior is as important for students in general education as it is for students with more severe disabilities and if function-based interventions are more effective than generic, non-function-based interventions in these settings. The validity of classifying behaviors by function depends on the extent to which students differ on meaningful variables on the basis of behavioral function. Many experts would contend that the validity of FBA procedures lies in their treatment utility, that determining function provides information about what interventions would be effective or ineffective (Ervin et al., 2001; Gresham, 2003; Hayes, Nelson, & Jarrett, 1986).

There is increasing evidence in the literature that this is the case, that the effectiveness of interventions in the general education setting depends, at least in part, on the function of problem behavior. A series of recent studies has demonstrated that implementing interventions on the basis of functions indicated by FBA information is likely to result in meaningful reductions in problem behavior, and implementing generic interventions not supported by FBA information may result in either no reductions or increases in problem behavior (Filter & Horner, in press; Ingram, Lewis-Palmer, & Sugai, 2005; Newcomer & Lewis,

2004). In these studies, the authors found poor effects for research-based interventions contraindicated by the FBA procedures and powerful effects for interventions matched to function. Problem behavior maintained by attention was reduced by teaching alternative skills for recruiting attention and making attention contingent on use of that skill only (Ingram et al., 2005; Newcomer & Lewis, 2004). In contrast, problem behavior maintained by escape from academic tasks or social interactions was reduced by teaching alternative skills for escaping aversive events and making escape contingent on use of that skill only (Filter & Horner, in press; Newcomer & Lewis, 2004).

The Role of Function in Academic and Behavior Problems

If students, especially students in general education settings, are different on the basis of the function of their problem behavior, in what ways are they different? As noted previously, students may have different academic skill levels based on behavioral function. On the basis of the function mechanism, it could be presumed that students whose problem behavior is maintained by escape or avoidance of academic tasks have lower academic skills than students whose behavior is maintained by other functions. If students' academic skill levels were shown to be reliably different in terms of behavioral function, different interventions would be indicated. For example, a social behavior intervention may be adequate for students with attention-maintained problem behavior, but it might prove necessary to provide both a social behavior and an academic intervention for students with escape-maintained problem behavior.

Few research studies have explored the role of behavioral function in the interaction between academic and behavioral challenges. What is missing from the research base, and what this study was intended to explore, is information regarding behavioral function for students in general education and students with mild disabilities to determine what differences in reading skills exist between these students on the basis of behavioral function. The specific research questions we proposed were as follows:

1. What are the base rates of maintaining function of problem behavior, and do the base rates vary by grade level and special education status?
2. Are there significant differences in reading skills and the number of discipline referrals among students on the basis of the function of problem behavior?

3. To what extent do longitudinal discipline referral patterns and reading skill trajectories predict the function of problem behavior?

Method

Settings

The settings used in the study were K-5 and K-8 schools in two districts located in a mid-sized city in the Pacific Northwest. At the time of the study, the first district's K-12 enrollment was 5,542 students. The district's ethnic composition was 2.5% African American, 2.4% Asian American or Pacific Islander, 83.6% European American, 9.2% Hispanic or Latino, and 2.3% Native American or Native Alaskan. Six of the seven elementary schools in the district qualified for Title I services, with the average percentage of children receiving free or reduced lunch in the district at 53% (ranging from 32% to 73%). Each of the seven elementary schools had been implementing school-wide positive behavior support (Horner, Sugai, Todd, & Lewis-Palmer, 2005; Lewis & Sugai, 1999) for a minimum of 5 years and had documented School-Wide Evaluation Tool scores exceeding 80% for the current year (Horner et al., 2004). Each of the seven elementary schools was also implementing a school-wide reading improvement model (Simmons et al., 2002). The second district's K-12 enrollment was 17,878 students. The district's ethnic composition was 3% African American, 5% Asian American or Pacific Islander, 80% European American, 7% Hispanic or Latino, and 5% Native American. The average percentage of children receiving free or reduced lunch in the district was 39% (ranging from 6% to 88%). As with the first district, the elementary schools in the second district were implementing both school-wide literacy and school-wide positive behavior support systems at documented criteria.

Participants

Characteristics of participants. Participants in the study consisted of 51 students in Grades 4, 5, and 6 during the 2003–2004 school year (specific numbers varied by analysis). All students in those schools who met the following inclusion criteria participated in the study: (a) they were in Grade 4, 5, or 6 during the 2003–2004 school year; (b) they received two major office discipline referrals (ODRs; for violations such as disrespect, harassment, vandalism, lying, or fighting) during the school year; (c) their parents or guardians

Table 1
Characteristics of Participants

Characteristic	<i>n</i>	%
Grade (2003–2004)		
4	19	37
5	25	49
6	7	14
Sex		
Female	8	16
Male	43	84
Ethnicity		
African American	0	0
Asian/Pacific Islander	0	0
European American	42	82
Hispanic/Latino	7	14
Native American	2	4
Special education		
Identified	20	39
Not identified	31	61
Identified disability		
ADHD	5	10
Autism spectrum	1	2
Communication disorder	3	6
Emotional disturbance	4	8
Mental retardation	1	2
Specific learning disability	8	16
Multiple disabilities	2	4
None	27	53

Note: All percentages are per each characteristic (i.e., types within each characteristic add up to 100%). ADHD = attention deficit/hyperactivity disorder.

provided consent to participate in the study; and (d) they provided assent. The demographics of the sample are described in Table 1. Although the sample was predominantly European American, the ethnicity proportions closely mirrored the proportions of the districts as reported in the previous section.

Measures

Problem behavior. To measure overall levels of significant problem behavior for individual students, we used total major ODRs per year. ODRs are forms that document incidents of problem behavior and track individual student behavior (Sugai, Sprague, Horner, & Walker, 2000). School personnel complete ODRs for specified behavioral violations and major ODRs for severe problem behaviors, such as physical aggression, property damage, bullying, or defiance. To monitor individual levels of problem behavior, personnel enter the information into the School-Wide Information System (May et al., 2002), a Web-based ODR data system, and count total major ODRs per year.

We selected ODRs as a measure of problem behavior because they provide an indication of overall problem behavior for students across each school year (Sugai et al., 2000). They may be considered an underrepresentation of problem behavior, because behaviors must be observed for ODRs to be written, but overall, the use of ODRs has been evaluated as both a valid and reliable measure of problem behavior, given strong predictive validity, strong concurrent validity with other behavioral measures, and equivalent reliability compared to other behavioral measures (Gottfredson & Gottfredson, 1999; Irvin, Tobin, Sprague, Sugai, & Vincent, 2004; Tobin & Sugai, 1999; Walker, Cheney, Stage, & Blum, 2005). To ensure the reliability of ODR data, the school districts participating in this study conducted regular training on discriminating between behaviors that do and do not warrant a major ODR, on the basis of definitions used in the School-Wide Information System.

Reading skills. We used curriculum-based measurement of oral reading fluency (ORF) as a measure of reading speed and accuracy. ORF is a useful screening and progress monitoring tool to provide an efficient assessment of reading skills (Deno, 1989). The metric produced by the measure is correct words read per minute during oral reading, a critical measure of reading skills (Shapiro, 2004).

The school districts used ORF data as formative assessments to inform instruction before high-stakes testing measured long-term outcomes (Shinn, Shinn, Hamilton, & Clarke, 2002). School personnel collected ORF data on all students in Grades 1 through 8 three times per year, in September, January, and May. Certified teachers or Title I educational aides administered the measures, and the district provided training and completed regular reliability checks. For Grades 1 through 6, the districts used ORF passages from either *Dynamic Indicators of Basic Early Literacy Skills–6th Edition* (Good & Kaminski, 2002) or the *Test of Reading Fluency* (Children's Educational Services, 1987). Because the school districts used ORF with a standard protocol and calculated local norms, ORF may be considered a standardized, norm-referenced test.

ORF is based on over 20 years of reading research and is still regarded as the best current measure of individual reading skills (Fuchs, 2004; Shinn, 1989; Shinn et al., 2002). The administration of ORF passages has been shown to be accurate in assessing both reading fluency and the more complex skill of

reading comprehension (Deno, Mirkin, & Chiang, 1982; Hamilton & Shinn, 2003). An ORF technical manual (Fuchs, 2002) reports the following technical adequacy data medians (and ranges): .83 (.70 to .89) for concurrent validity, .72 (.65 to .86) for predictive validity, .91 (.91 to .92) for alternate-forms reliability, and .95 (.93 to .97) for test-retest reliability. School specialists have been shown to prefer ORF measures over other standardized norm-referenced reading assessments because of their superior treatment utility (Chafouleas, Riley-Tillman, & Eckert, 2003).

Function of problem behavior. The measure used to indicate function of problem behavior was the *FBA Interview–Teacher* (FIT; copies are available from the first author), a modified version of the *Functional Assessment Checklist–Teachers and Staff* (March et al., 2000). The FIT is a semistructured functional behavior assessment interview tool used to identify a primary problem behavior and the behavior's maintaining function. The FIT takes approximately 15 minutes to complete. The procedure for completing the interview is as follows. A staff member who has experience with the student's problem behavior is identified to act as an informant during the interview. The data collector asks the informant to describe the problem behavior(s). When multiple behaviors are identified, the informant is asked to identify the behavior or class of behaviors that is of greatest concern. Once that behavior is identified and described, the data collector asks what events precede and maintain the behavior. To determine the function of the problem behavior, the informant is asked to provide a function from a specified list, provided in Table 2. If the informant believes that the behavior is maintained by multiple functions, the informant is asked to identify the most powerful function. The psychometric properties of the FIT have not been studied, but there is moderate validity and reliability information supporting the use of teacher interviews in general (Beaver & Busse, 2000; Carr, Langdon, & Yarbrough, 1999), and the *Functional Assessment Checklist–Teachers and Staff* elements in particular, particularly with informants who have had more experience with the problem behavior in question (Borgmeier & Horner, 2006; McIntosh et al., 2008).

Although best practices in FBA call for the confirmation of hypothesis statements through either direct observation (Johnston & Pennypacker, 1993) or functional analysis (Iwata et al., 1982), the size of the sample and the behaviors of the population studied precluded the use of such measures. Because of the

Table 2
Base Rates of Behavioral Function
as Provided by Teachers

Function	Percentage (<i>n</i>) of Students
Obtain adult attention	24 (12)
Obtain peer attention	33 (17)
Obtain item/activity	0 (0)
Obtain sensory stimulation	0 (0)
Subtotal positive reinforcement	57 (29)
Escape/avoid academic task	35 (18)
Escape/avoid social interaction	8 (4)
Escape/avoid sensory stimulation	0 (0)
Subtotal negative reinforcement	43 (22)

wide range of behaviors exhibited by general and special education students in schools (and therefore in the sample), indirect measures may be as useful as direct measures in determining behavioral function for this population of students. Typical students are more likely than students with severe disabilities to have low-frequency behaviors that are difficult to capture using direct observation (Radford & Ervin, 2002; Sprague & Horner, 1999). Students with these behaviors have often been excluded from published studies in the literature for this precise reason (Nelson et al., 1999). Hence, this study's participants may be more reflective of the general education and high-incidence special education population than previous studies examining function (Gresham, 2003).

With respect to functional analysis, these behaviors are also more difficult to manipulate experimentally (Nelson et al., 1999; Sprague & Horner, 1999). Even proponents of functional analysis as best practice in FBA have noted that these experimental procedures may not be feasible in general education settings (Carr et al., 1999; Sasso et al., 2001). Because the functions were not confirmed through experimental manipulation, we caution readers that an accurate description of the data would be that the functions provided by the FIT are the teachers' perceptions of the functions.

To provide some indication of the accuracy of teachers' ratings of function, we collected archival information about behavioral function from student files, existing school-based FBAs, and trends in referral data. Full FBA information (verified through direct observation) was obtained for 16 participants in the sample, and indirect FBA information (not verified through direct observation) was obtained for 5 additional students, for a total of 21 students. Agreement

between the teacher function and FBA function was 86%. Although the school personnel who completed FBAs were trained by individuals with expertise in FBA methodology (Lewis-Palmer, Bounds, & Sugai, 2004), it should be noted that the accuracy of each FBA was not assessed for this study.

A further source of information about behavioral function came from individual ODRs. The ODR form completed by school staff members provides a field to identify the "motivation" (from the list of functions in Table 2) of the problem behavior that prompted the ODR. We reviewed each participant's 2003–2004 ODR record for trends in function. Functions were coded if records met the following criteria: (a) the participant received two or more ODRs for the same behavior and context identified in the interview, and (b) the same function was identified for 75% or more of these referrals. A total of 18 students met these criteria, and agreement on the maintaining function for a student's problem behavior between teacher ODR ratings and FIT summaries was 78%.

Procedures

Recruitment and training of data collectors. Data collectors were doctoral students who had successfully completed coursework in FBA and behavioral interviewing. In addition, data collectors underwent 90-minute training provided by the first author on the procedures and interview forms used for the study. Data collectors were expected to meet a criterion of 95% agreement with an expert interviewer before collecting data, and all met 100% agreement during the checkout portion of the training.

Data collection. As students were identified and consent was obtained, data collectors scheduled 15- to 20-minute interviews with individual teachers to administer the FIT. After the interviews took place, district officials extracted the ODR and ORF information from extant databases using Microsoft Access software and created a database that included demographic information, the behavioral function information, and longitudinal reading and behavior data from 2001 to 2004.

Designs

To answer the research questions, we used multiple analyses of a longitudinal data set. Data were analyzed through analyses of prevalence (descriptive frequency counts, chi-square analyses) and multivariate

analyses of differences in reading and behavior variables based on behavioral function (mixed-design analysis of variance [ANOVA] and logistic regression). Designs and analyses are presented by research question. For all statistical analyses, we set the level of significance at $\alpha = .05$.

Base rate analyses. To determine base rates of behavioral function, we used simple frequency counts of the functions provided by teachers through the FIT. To determine differences in function on the basis of demographic information, we disaggregated the frequency counts by two subgroups, grade level and special education eligibility. When cell sizes allowed, we planned to use chi-square analyses to test if the differences in the proportions of behavioral function were statistically significant. We hypothesized that the overall base rates of behavioral function would be approximately two thirds for obtaining adult or peer attention and one third for escaping or avoiding an academic task. For grade level, we hypothesized more escaping or avoiding an academic task and less obtaining adult attention in higher grades. For special education eligibility, we hypothesized more escaping or avoiding an academic task for students with disabilities.

Differences in reading and behavior analysis. To determine differences among students on the basis of their perceived function of problem behavior, we used the indicated function of problem behavior as the independent variable and total major ODRs and fall, winter, and spring ORF scores for 2003–2004 as dependent variables. The ODR analysis was a one-way ANOVA. Because the fall, winter, and spring ORF scores represented repeated measurements of the same variable for all participants, we used a mixed-design ANOVA to test group differences in repeated measurement of reading skills. To complete a mixed-design ANOVA, four assumptions of the data must be met: (a) independent observations, (b) random sampling, (c) multivariate normality, and (d) homogeneity of covariance matrices. Because all students underwent one interview (producing one function) and all students receiving multiple ODRs were invited to participate, the design met the first two assumptions. The final two assumptions would need to be tested with plots of each dependent variable by function (multivariate normality) and a combination of Box's test of equality of covariance matrices and Levene's test of equality of error variances (homogeneity). If these assumptions were met, we could use the ANOVAs with confidence.

Conventional mixed-design ANOVA procedures involve a main test of differences in the dependent variables on the basis of behavioral function and, if that test shows a significant overall difference, follow-up analyses to determine more specific differences. If significant, the follow-up analyses would include a planned comparison between escape and all other groups, post hoc Tukey tests for function, and a test for interaction effects between function and observed change of reading skill (i.e., difference in growth rates on the basis of function). We hypothesized a significant overall difference and that students whose identified behavioral function was to escape or avoid academic tasks would have significantly lower ORF values and growth rates than all other students.

Prediction of function analysis. To determine what longitudinal variables (across 3 school years) predicted the function of problem behavior, we used a binary logistic regression analysis to determine if the teacher-identified function would be either attention or escape. The predictor variables used in this analysis were the number of major ODRs received each academic year from 2001 to 2004 and fall, winter, and spring ORF scores from 2001 to 2004. As is common in logistic regression analyses, a likelihood ratio backward stepwise method was used in which all variables are entered initially and then removed if they do not contribute to the model with a significance level of at least $p < .10$ (George & Mallery, 2003; Wright, 1995). We predicted that individual students' reading scores in all 3 years would significantly predict their behavioral function.

Results

Results are provided by research question below. We note here that there were only four students whose identified function was to escape or avoid social interaction. Because of concerns regarding population inferences using a group of only four participants, we omitted these participants from the statistical tests in the base rates and differences in reading and behavior analyses, reducing the number in these analyses. These students are included when appropriate (i.e., in prevalence tables and the longitudinal analysis, which aggregated students into two basic functions). Future research will be needed to determine differences for this group of students.

Base Rate Analyses

Base rates of behavioral function. The base rates of function provided by teachers are provided in Table 2. As shown, teachers identified escape or avoidance of academic tasks as the most common function of problem behavior. No teachers indicated obtaining an item or activity or sensory stimulation as a function of behavior for any participants, and as such, these functions were not included in subsequent tables and analyses. Because of imbalances in the proportions of the sample and unequal distributions of behavioral function, the subgroup tables for grade level had some small cell sizes that precluded chi-square analyses. For this table, results are provided for descriptive purposes only, and the trends identified will need to be validated through future studies with adequate cell sizes.

Base rates by grade level. When disaggregated by grade (as seen in Table 3), two possible trends may be observed, including a decrease in obtaining adult attention from Grades 4 to 6 and an increase in escaping or avoiding an academic task in Grade 6. Given the small sample size for Grade 6, these trends may or may not exist in the larger population.

Base rates by eligibility. Table 4 shows identified function by special education eligibility, either identified (and receiving special education services) or not identified (and not receiving services). On the basis of the information provided by teachers, a greater proportion of students identified for special education had problem behaviors that were maintained by avoiding or escaping academic tasks (55% identified vs. 23% not identified), and these students were also more likely to have behavior maintained by adult attention (30% vs. 20%) than peer attention (10% vs. 48%).

Because there was a greater balance of participants in groups based on special education eligibility, it was possible to perform a chi-square analysis to test if special education status and function of behavior were related at a statistically significant level. As described above, we omitted the escape social interaction function, resulting in a 3×2 chi-square analysis of function by eligibility ($n = 47$). The assumptions of a chi-square analysis were met, namely, that the observations were independent (one rating per participant and no participant in more than one cell) and that cell sizes were adequate (83% of cells with expected counts of 5 or more). The model for this analysis was statistically significant ($\chi^2 = 9.45, p < .01$), demonstrating that behavioral

Table 3
Base Rates of Behavioral Function by Student Grade Level

Function	Percentage (<i>n</i>) of Students		
	Fourth Grade	Fifth Grade	Sixth Grade
Obtain adult attention	26 (5)	24 (6)	14 (1)
Obtain peer attention	26 (5)	40 (10)	29 (2)
Subtotal positive reinforcement	52 (10)	64 (16)	43 (3)
Avoid/escape academic task	32 (6)	32 (8)	57 (4)
Avoid/escape social interaction	16 (3)	4 (1)	0 (0)
Subtotal negative reinforcement	48 (9)	36 (9)	57 (4)

Table 4
Base Rates of Behavioral Function by Special Education Eligibility

Function	Percentage (<i>n</i>) of Students	
	Identified	Not Identified
Obtain adult attention	30 (6)	20 (6)
Obtain peer attention	10 (2)	48 (15)
Subtotal positive reinforcement	40 (8)	68 (21)
Avoid/escape academic task	55 (11)	23 (7)
Avoid/escape social interaction	5 (1)	10 (3)
Subtotal negative reinforcement	60 (12)	32 (10)

function and special education eligibility were significantly related.

Differences in Reading and Behavior Analysis

Missing data. Two students in the sample were missing fall and/or winter reading fluency scores. Because of the particular difficulty of using multivariate ANOVAs with missing data, as well as the inaccuracies associated with extrapolating data, these two students were omitted from the analyses using listwise deletion. Accordingly, all analyses in this section had a sample size of 45.

Preliminary analyses. Descriptive statistics for reading and behavior variables are provided in Table 5 (information on students whose function was to escape social interaction is provided for interested readers). As described in the Method section, the two remaining assumptions of ANOVA needed to be tested. An examination of the values of the dependent variable for each group provided evidence of adequate normality. In

Table 5
Means (Standard Deviations) of 2003–2004 Variables by Behavioral Function

Variable	Obtain		Escape/Avoid	
	Adult Attention	Peer Attention	Academic Task	Social Interaction
Total ODRs	6.2 (5.3)	4.4 (2.3)	4.7 (3.0)	3.5 (2.4)
Fall ORF	93.1 (29.5)	122.7 (38.1)	87.3 (50.6)	115.3 (41.0)
Winter ORF	124.6 (31.5)	136.2 (37.0)	106.1 (43.0)	133.5 (44.7)
Spring ORF	131.2 (40.0)	149.2 (35.6)	111.4 (42.2)	146.0 (54.8)

Note: ODR = office discipline referral; ORF = oral reading fluency.

addition, both Box's and Levene's tests indicated that the data met the final assumption, signifying that the statistical test results provided below are accurate.

ANOVAs. For ODRs, the ANOVA of function was not significant, $F(2, 42) = 0.62, p = .54$, indicating that students did not have different numbers of ODRs on the basis of function. It is possible that the small sample size—and hence the low power (observed power = .15)—of the tests played a role in the analysis outcomes. For example, the difference between students whose identified functions were obtaining adult and peer attention had a moderately strong effect size (Cohen's $d = .5$; Cohen, 1988).

The next analysis conducted was the main effect of function on ORF. As shown in Table 6, this test was statistically significant, $F(2, 42) = 3.53, p = .04$. The significance of this overall test indicated two outcomes: (a) students with different functions had significantly different reading scores, and (b) follow-up tests should be used to determine the specific differences. The planned contrast between reading scores of students with escape-maintained behavior and students with other functions was on the cusp of significance ($p = .05$), and the post hoc tests showed significant differences in ORF between escape and peer attention ($p = .03$). To measure the magnitude of the difference in scores between escape and all other functions, we computed effect sizes for each testing period. The effect sizes for fall ($d = .58$) and winter ($d = .69$) were moderate, and the effect size for spring was strong ($d = .76$). Finally, the interaction between function and change in reading skill was significant, $F(2, 42) = 5.69, p < .01$, indicating significant differences in rate of growth of reading skills on the basis of function.

Figure 2 provides a graph of reading fluency in fall, winter, and spring by indicated function of problem behavior. As shown, the mean reading fluency trajectories showed distinct separation, with no overlapping points. Students with obtain peer attention as

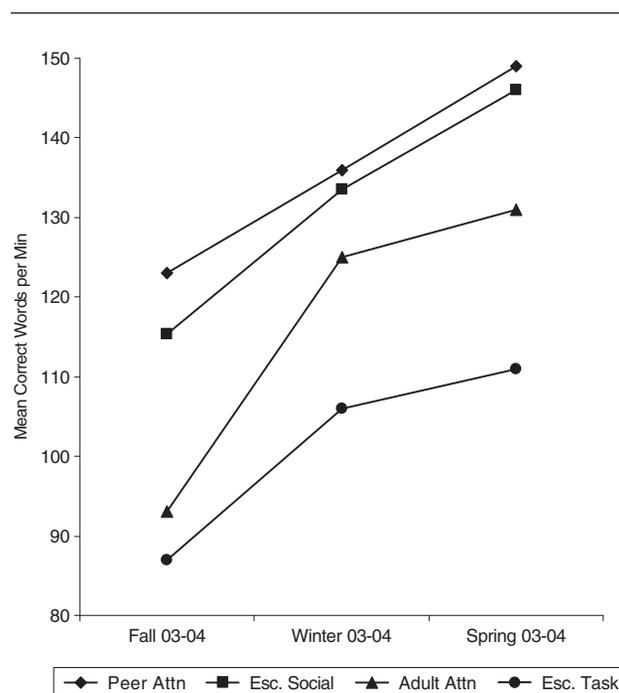
Table 6
Repeated-Measures Analysis of Variance
Summary Table for the Effects of
Function on Reading

Group	<i>df</i>	<i>F</i>	η^2	<i>p</i>
Function	2	3.53*	.14	.04
Error	42	(4,443.76) ^a		

a. Mean square error.

* $p < .05$.

Figure 2
Mean Oral Reading Fluency Trajectories by
Indicated Function of Problem Behavior



Note: Attn = attention; esc. = escape.

a function had the highest reading fluency rates, and students with escape academic task had the lowest.

Significant differences in reading fluency among all functions were observed in fall and spring, and students whose behavior was identified as maintained by escape academic task had lower mean reading fluency scores than all other functions in fall, winter, and spring. Visual and effect size analyses demonstrated that the gap widened over the course of the year. In addition to being statistically significant, the differences were also large in magnitude and educational significance (38 correct words per minute at the end of the year).

Prediction of Function Analysis

Table 7 shows results from the logistic regression analysis, used to determine what variables (ODRs and ORF scores from 2001–2004) predicted teacher-identified basic function (attention or escape). The sample used in the analysis ($n = 24$) included all students from the previous analyses with complete ODR and reading fluency scores for the 2001–2002, 2002–2003, and 2003–2004 academic years. The final model was statistically significant ($\chi^2 = 14.13$, $p < .01$). This model explained 60% of the variance in whether students' behavior was attention or escape maintained, as identified by teacher interview. The model had the following correct classification percentages: 91% for attention, 77% for escape, and 83% overall. This indicated that the variables included in the model were strong predictors of function and that the model correctly predicted function in a great majority of the cases. The two variables that were significant predictors were ORF in spring 2004 ($p = .02$) and ORF in fall 2001 ($p = .04$). Effect sizes were calculated for the significant variables. Effect sizes were modest for ORF in fall 2001 ($d = .29$) and moderate for ORF in spring 2004 ($d = .59$).

Figure 3 offers a graph of these data. Similar to the previous graph, there is a distinct separation between the two groups, and because the slope of the attention group is steeper than the slope of the escape group, the gap widens over the course of the 3 years. Differences were significant 3 years before the interviews took place, and the differences in reading fluency scores increased in magnitude over the 3-year period.

Discussion

This study was designed to determine differences among students on the basis of the operant functions

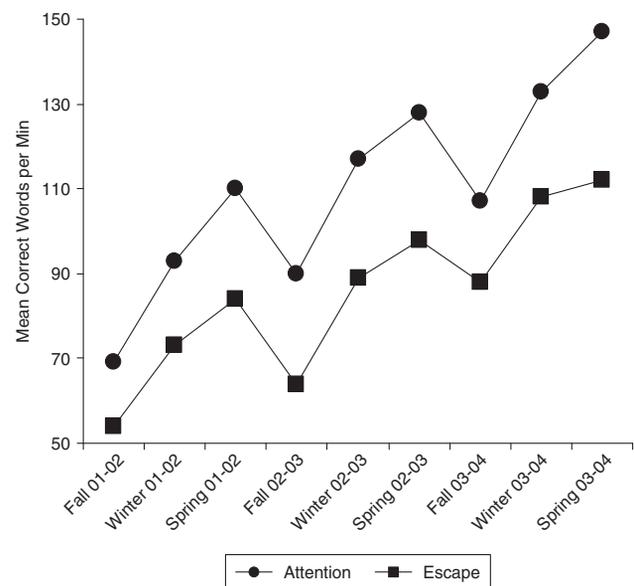
Table 7
Logistic Regression Analysis for Predicting Basic Function From 2001 to 2004 Reading and Behavior Variables

Variable	β	SE	exp(B)	p
2001–2002 fall ORF	.10*	.05	1.11*	.04
2003–2004 spring ORF	-.10*	.05	0.90*	.02
2002–2003 ODRs	-.39	.22	0.68	.08

Note: β = standardized β ; exp(B) = e^B , used to interpret the regression equation; $-2 \log$ likelihood = 18.98, model $\chi^2 = 14.13$ ($p < .01$), $df = 3$, Nagelkerke $R^2 = .60$.

* $p < .05$.

Figure 3
Mean Oral Reading Fluency Trajectories by Indicated Basic Function of Problem Behavior (obtain attention vs. escape) Across 3 Years



maintaining their problem behavior. Differences were explored in terms of demographics (grade level and special education eligibility), level of problem behavior (ODRs), and reading skill level (ORF). In addition, these variables were used over a 3-year period to determine the extent to which they could predict function of problem behavior. The results indicated that base rates of behavioral function were significantly different on the basis of special education eligibility and that students' rates of ORF were significantly different on the basis of the teacher-indicated functions of their behavior. Students whose identified

function was to escape academic tasks had lower levels and growth rates in reading skills than students with other identified functions. These lower skill levels were durable across multiple years and became more discrepant over time.

Differences in Base Rates of Behavioral Function

Base rates of problem behavior as identified by teachers were similar to those we hypothesized but different from those in previous studies, particularly in special education eligibility and possibly by grade level. The base rates of function for students eligible for special education were more consistent with the rates for students with mild disabilities in the most recent meta-analysis (Ervin et al., 2001), but there were greater differences for the students in general education.

The differences by special education eligibility (primarily in the prevalence of escaping or avoiding academic tasks and obtaining adult attention) are consistent with theory and logic: Students are more likely to receive special education services if they find academic tasks more aversive. Past research has also demonstrated a greater prevalence of escaping or avoiding tasks as a function in students with disabilities (Ervin et al., 2001). The increase in the prevalence of obtaining adult attention for students in special education may be due to reduced access to peer attention resulting from poor social skills (Gresham, 2002; Hughes & Sullivan, 1988) or rejection by peers (Pope, Bierman, & Mumma, 1989).

The base rates for students without disabilities differed from those in the meta-analysis by Ervin et al. (2001) in that peer attention was indicated more often. This is consistent with general notions that peer attention may be a more powerful reinforcer to students in general education and less available to students in special education (as described above). This and the two previous meta-analyses (Ervin et al., 2001; Iwata et al., 1994) provide some support for the following conclusions on the basis of disability:

- Students without disabilities are more likely to have problem behavior maintained by peer or adult attention.
- Students with mild to moderate disabilities may also have problem behavior maintained by peer or adult attention but are more likely than their nondisabled peers to engage in problem behavior maintained by escape from aversive tasks or demands.

- Students with severe disabilities may engage in problem behavior maintained by any functions but may be more likely than their less disabled peers to engage in problem behavior maintained by sensory stimulation.

The differences in function by grade level (a decrease in obtaining adult attention from fourth to sixth grade and an increase in escaping or avoiding academic tasks in sixth grade) may provide some preliminary evidence that the rates of functions of problem behavior in general education vary as students progress through grade levels. This phenomenon could be explained by two possible factors. First, students may find teacher attention less reinforcing as they move through elementary school, leading to a decrease in behaviors that occasion this maintaining consequence. Second, academic tasks increase in difficulty throughout the school years, making academic activities more aversive to students who do not have the prerequisite skills to complete them (Iwata et al., 1994; Levy & Vaughn, 2002). Because the sample sizes in this study were small, this information is descriptive only, and we caution that more research will be needed to understand this phenomenon.

Differences in Reading and Behavior Variables

The differences in reading skills by function increased throughout the year, and the results of most of the analyses were statistically significant. Effect sizes increased throughout the year as well. This trend of increasing disparity highlighted a growing gap in reading skills between students whose identified function was to escape or avoid academic tasks and students with all other identified functions. The longitudinal analysis showed that the differences in reading fluency were present not just in the year in which the interviews took place but for at least 3 years. These durable differences in academic skills provide evidence that there are meaningful differences in students on the basis of the function of their problem behavior.

The results may also lend credence to a functional correlate to Stanovich's (1986) "Matthew effect" in which students with early literacy deficits fall further and further behind students with better reading skills throughout elementary school. Students whose behavior was maintained by escape from academic tasks fell further and further behind in reading skills than other students, even those with problem behavior maintained by other functions. Such findings indicate

that the coercive cycle described in Figure 1 plays a part in academic failure for students with escape-maintained problem behavior. As in the coercive family process, neither the student nor the teacher is the sole source of the problem. The cycle would naturally result from the contribution of disruptive behavior from the student and an underreliance on proactive behavior support and overreliance on exclusionary discipline from the teacher. Through these experiences, the student increasingly learns to meet social needs through antisocial behavior, and the teacher increasingly learns to manage behavior through lowering academic standards and removing students from the classroom.

When examining the graphs, a pattern emerges that shows three distinct groups of students, all with significant problem behavior but only some with reading deficits. Students with problem behavior maintained by peer attention had mean fluency scores that were above average, and students with problem behavior maintained by escaping academic tasks had mean fluency scores that were far below average. One explanation for this disparity is the possibility that these students were highly successful in escaping or avoiding reading tasks, thereby self-reducing access to the curricula and reducing skill growth. Students with low academic skills experience a different educational environment than students with higher skills, an environment with increased exposure to aversive events and reduced access to reinforcement for academic responding.

This study presents initial evidence that behavioral function can be a mechanism in the relationship between academics and behavior and may play a mediating role in the link. It also suggests that academic variables play a role in occasioning and maintaining problem behaviors for students with escape maintained behavior, but not others. As such, it appears that FBA procedures can provide meaningful information to inform interventions.

Implications

Current debates in the field of behavior support focus on the relevance of behavioral function in providing effective and efficient behavior support in applied settings, particularly with higher functioning students in general education. The results of this study provide initial evidence documenting significant differences in students on the basis of function, including increasing disparities in reading skill, clearly an important variable in general education

settings. These results support the use of FBA in effective assessment and intervention for students with chronic problem behavior, whether they are in general or special education.

The base rates of behavioral function provided in this study are potentially useful for researchers and practitioners because they indicate how the value of each maintaining function varies by the continuum of disability and grade level. These differences in prevalence have implications for the prevention of problem behavior through effective general education classroom management techniques. For example, school personnel might use this information to determine what social skills to teach groups of students. It may be more effective to focus on teaching appropriate skills for obtaining adult attention to a lower elementary class, obtaining peer attention to an upper elementary or middle school class, and requesting assistance for difficult tasks for a special education class.

The differences in reading skills by behavioral function suggest that interventions will need different components on the basis of the function of problem behavior. Although a purely behavioral intervention may be effective for students with attention-maintained problem behavior, students whose behavior is maintained by escaping from difficult academic tasks may not stop exhibiting problem behavior without additional academic support or differentiated instruction. In these cases, the simple behavioral contingency management procedures that some researchers have proposed for use in school settings in place of FBA procedures (see Gresham, 2003) are unlikely to be effective, because they may not address the academic skill deficits that occasion problem behavior (Lee et al., 1999).

Moreover, understanding the cycle of escape-maintained behavior can be used to prevent problem behavior. Because students' low academic skills set the stage for problem behavior, improving students' academic skill levels would make academic tasks less aversive and may reduce the likelihood of problem behavior. This reduction in problem behavior would result in increased access to the curriculum, and the cycle of academic-behavioral failure would be broken. Such an understanding could lead practitioners to consider current academic intervention as a form of future behavior prevention.

Practitioners may also consider academic skill assessments as possible indicators of behavioral function. Because low reading skills significantly predicted the indicated behavioral function, such information

could be used to improve the accuracy of FBA procedures. In cases in which practitioners are unable to distinguish between obtaining attention and escaping or avoiding academic tasks as functions, they may complete curriculum-based measurement in subjects in which problem behavior is likely and unlikely to occur (Roberts et al., 2001). Lower academic skill levels may indicate escaping or avoiding academic tasks as a maintaining function, particularly if students have higher skill levels in subjects with no problem behavior. Higher skill levels may indicate obtaining attention as a function, particularly if students can complete grade-level tasks with little difficulty. However, such assessments should be used only in combination with current FBA measures rather than in place of them.

Limitations

Although the information produced from this study is promising, it is important for readers to consider the study's limitations when interpreting the results. First, though the sample size was rather large compared with other studies using FBA procedures, the sample size was smaller than most group designs. The sample was not large enough to provide for a statistical test of differences in base rates by grade level. Also, the results may not extend to populations that are significantly different from the participants in the study. The study's participants all came from two districts in the same geographic region. Both districts used a systematic approach to reading and behavior support and received technical assistance provided by a nearby university, and it is unknown if the results would be similar for districts lacking school-wide support programs. In addition, students whose caregivers did not consent to participate in the study were not sampled, so their patterns of behavior and function were not included in this study. As such, additional replications of these results are needed. One potential method that might mitigate some of these challenges is a multisite clinical replication design in which students from a number of school districts and regions could be analyzed together, increasing both the sample size and the range of students sampled (Barlow, Hayes, & Nelson, 1984).

A discussion of the measures used in the analyses is also pertinent in understanding the results. There are a number of concerns about the psychometric properties of FBA procedures in general (Sasso et al., 2001) and of indirect measures used in FBA in particular (Barton-Arwood, Wehby, Gunter, & Lane, 2003; Stage, Cheney, Walker, & LaRocque, 2002). Because

the study did not use direct observation or functional analysis, it was noted that functions of problem behavior were neither confirmed nor determined through experimentation. Therefore, the measures of functions used in the study were labeled as indications or perceptions of functions rather than confirmed functions. The functions provided by teachers may not have been accurate, and readers should take this information into account when interpreting the results of this study.

Future Research

This study provides evidence that FBA may be a relevant tool for approaching problem behavior in general education settings. To some practitioners, this may be a foregone conclusion, because FBA procedures are used on a regular (though perhaps not effective) basis across the nation. Yet there is a general consensus that our knowledge base in this area is not robust (Ervin et al., 2001; Gresham, 2003; Sasso et al., 2001). Although some research has shown that school personnel can complete accurate FBAs (Bergstrom, 2003; Hoff et al., 2005; Wallace, Doney, Mintz-Resudek, & Tarbox, 2004), other research has shown mixed results (Scott, McIntyre, Liaupsin, Nelson, & Conroy, 2004). The potential for FBA procedures to improve general education student outcomes may be seen only when we better understand how practitioners can effectively use FBA procedures in applied, general education settings. Continued research focusing on the effectiveness of practitioner-level FBA procedures in schools is needed.

References

- Barlow, D. H., Hayes, S. C., & Nelson, R. O. (1984). *The scientist practitioner: Research and accountability in clinical and educational settings*. Elmsford, NY: Pergamon.
- Barton-Arwood, S. M., Wehby, J. H., & Falk, K. B. (2005). Reading instruction for elementary-age students with emotional and behavioral disorders: Academic and behavioral outcomes. *Exceptional Children, 72*, 7–27.
- Barton-Arwood, S. M., Wehby, J. H., Gunter, P. L., & Lane, K. L. (2003). Functional behavior assessment rating scales: Intrarater reliability with students with emotional or behavioral disorders. *Behavioral Disorders, 28*, 386–400.
- Beaver, B., & Busse, R. T. (2000). Informant reports: Conceptual and research bases of interviews with parents and teachers. In E. S. Shapiro & T. R. Kratochwill (Eds.), *Behavioral assessment in the schools: Conceptual foundations and practical applications* (2nd ed., pp. 257–287). New York: Guilford.
- Bergstrom, M. K. (2003). *Efficacy of school-based teams conducting functional behavioral assessment in the general education environment*. Unpublished doctoral dissertation, University of Oregon.

- Borgmeier, C., & Horner, R. H. (2006). An evaluation of the predictive validity of confidence ratings in identifying accurate functional behavioral assessment hypothesis statements. *Journal of Positive Behavior Interventions, 8*, 100–105.
- Carr, E. G. (1977). The motivation of self-injurious behavior: A review of some hypotheses. *Psychological Bulletin, 84*, 800–816.
- Carr, E. G., Langdon, N. A., & Yarbrough, S. (1999). Hypothesis-based intervention for severe problem behavior. In A. C. Repp & R. H. Horner (Eds.), *Functional analysis of problem behavior: From effective assessment to effective support* (pp. 9–31). Belmont, CA: Wadsworth.
- Chafouleas, S. M., Riley-Tillman, T. C., & Eckert, T. L. (2003). A comparison of school psychologists' acceptability, training, and use of norm-referenced, curriculum-based, and brief experimental analysis methods to assess reading CBA acceptability. *School Psychology Review, 32*, 272–281.
- Children's Educational Services. (1987). *Test of Reading Fluency*. Minneapolis, MN: Author.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Deno, S. L. (1989). Curriculum-based measurement and special education services: A fundamental and direct relationship. In M. R. Shinn (Ed.), *Curriculum-based measurement: Assessing special children* (pp. 1–17). New York: Guilford.
- Deno, S. L., Mirkin, P. K., & Chiang, B. (1982). Identifying valid measures of reading. *Exceptional Children, 49*, 36–47.
- Dishion, T. J., French, D. C., & Patterson, G. R. (1995). The development and ecology of antisocial behavior. In D. Cicchetti & D. Cohen, J. (Eds.), *Developmental psychopathology, Vol. 2: Risk, disorder, and adaptation* (pp. 421–471). New York: John Wiley.
- Ervin, R. A., Radford, P., Bertsch, K., Piper, A., Ehrhardt, K., & Poling, A. (2001). A descriptive analysis and critique of the empirical literature on school-based functional assessment. *School Psychology Review, 30*, 193–210.
- Filter, K. J., & Horner, R. H. (in press). Functionally-indicated academic interventions for problem behavior. *Journal of Positive Behavior Interventions*.
- Fleming, C. B., Harachi, T. W., Cortes, R. C., Abbott, R. D., & Catalano, R. F. (2004). Level and change in reading scores and attention problems during elementary school as predictors of problem behavior in middle school. *Journal of Emotional and Behavioral Disorders, 12*, 130–144.
- Fuchs, L. S. (2002). *Curriculum-based measurement technical manual*. Nashville, TN: Vanderbilt University.
- Fuchs, L. S. (2004). The past, present, and future of curriculum-based measurement research. *School Psychology Review, 33*, 188–192.
- George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference* (4th ed.). Boston: Allyn & Bacon.
- Good, R. H., & Kaminski, R. A. (Eds.). (2002). *Dynamic indicators of basic early literacy skills* (6th ed.). Eugene, OR: Institute for the Development of Education Achievement.
- Gottfredson, G. D., & Gottfredson, D. C. (1999). *Development and application of theoretical measures for evaluating drug and delinquency prevention programs: Technical manual for research editions of What About You (WAY)*. Ellicott City, MD: Gottfredson Associates.
- Gresham, F. M. (2002). Teaching social skills to high-risk children and youth: Preventative and remedial strategies. In M. R. Shinn, H. M. Walker, & G. Stoner (Eds.), *Interventions for academic and behavior problems II: Preventive and remedial approaches* (pp. 403–432). Bethesda, MD: National Association of School Psychologists.
- Gresham, F. M. (2003). Establishing the technical adequacy of functional behavioral assessment: Conceptual and measurement challenges. *Behavioral Disorders, 28*, 282–298.
- Hamilton, C., & Shinn, M. R. (2003). Characteristics of word callers: An investigation of the accuracy of teachers' judgments of reading comprehension and oral reading skills. *School Psychology Review, 32*, 228–240.
- Hayes, S. C., Nelson, R. O., & Jarrett, R. B. (1986). Evaluating the quality of behavioral assessment. In R. O. Nelson & S. C. Hayes (Eds.), *Conceptual foundations of behavioral assessment* (pp. 463–503). New York: Guilford.
- Hinshaw, S. P. (1992). Academic underachievement, attention deficits, and aggression: Comorbidity and implications for intervention. *Journal of Consulting and Clinical Psychology, 60*, 893–903.
- Hoff, K. E., Ervin, R. A., & Friman, P. C. (2005). Refining functional behavioral assessment: Analyzing the separate and combined effects of hypothesized controlling variables during ongoing classroom routines. *School Psychology Review, 34*, 45–57.
- Horner, R. H., Sugai, G., Todd, A. W., & Lewis-Palmer, T. (2005). School-wide positive behavior support. In L. Bambara & L. Kern (Eds.), *Individualized supports for students with problem behaviors: Designing positive behavior plans* (pp. 359–390). New York: Guilford.
- Horner, R. H., Todd, A. W., Lewis-Palmer, T., Irvin, L. K., Sugai, G., & Boland, J. B. (2004). The School-Wide Evaluation Tool (SET): A research instrument for assessing school-wide positive behavior support. *Journal of Positive Behavior Interventions, 6*, 3–12.
- Hughes, J. M., & Sullivan, K. A. (1988). Outcome assessment in social skills training with children. *Journal of School Psychology, 26*, 167–183.
- Ingram, K., Lewis-Palmer, T., & Sugai, G. (2005). Function-based intervention planning: Comparing the effectiveness of FBA function-based and non-function-based intervention plans. *Journal of Positive Behavior Interventions, 7*, 224–236.
- Irvin, L. K., Tobin, T. J., Sprague, J. R., Sugai, G., & Vincent, C. G. (2004). Validity of office discipline referral measures as indices of school-wide behavioral status and effects of school-wide behavioral interventions. *Journal of Positive Behavior Interventions, 6*, 131–147.
- Iwata, B., Dorsey, M., Slifer, K., Bauman, K., & Richman, G. (1982). Toward a functional analysis of self injury. *Analysis and Intervention in Developmental Disabilities, 2*, 3–20.
- Iwata, B., Pace, G., Dorsey, M., Zarcone, J., Vollmer, T., Smith, R. G., et al. (1994). The functions of self-injurious behavior: An experimental epidemiological analysis. *Journal of Applied Behavior Analysis, 27*, 215–240.
- Johnston, J. M., & Pennypacker, H. S. (1993). *Strategies and tactics of human behavioral research* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Kellam, S. G., Mayer, L. S., Rebok, G. W., & Hawkins, W. E. (1998). Effects of improving achievement on aggressive behavior and of improving aggressive behavior on achievement through two preventive interventions: An investigation of causal paths. In B. P. Dohrenwend (Ed.), *Adversity, stress, and*

- psychopathology (pp. 486–505). London: Oxford University Press.
- Kennedy, C. H., Long, T., Jolivet, K., Cox, J., Tang, J.-C., & Thompson, T. (2001). Facilitating general education participation for students with behavior problems by linking positive behavior supports and person-centered planning. *Journal of Emotional and Behavioral Disorders, 9*, 161–171.
- Kinch, C., Lewis-Palmer, T., Hagan-Burke, S., & Sugai, G. (2001). A comparison of teacher and student functional behavior assessment interview information from low-risk and high-risk classrooms. *Education & Treatment of Children, 24*(4), 480–494.
- Lane, K. L., Wehby, J. H., Menzies, H. M., Gregg, R. M., Doukas, G. L., & Munton, S. M. (2002). Early literacy instruction for first-grade students at-risk for antisocial behavior. *Education and Treatment of Children, 25*, 438–458.
- Lee, Y., Sugai, G., & Horner, R. H. (1999). Using an instructional intervention to reduce problem and off-task behaviors. *Journal of Positive Behavior Interventions, 1*, 195–204.
- Levy, S., & Chard, D. J. (2001). Research on reading instruction for students with emotional and behavioural disorders. *International Journal of Disability, Development & Education, 48*, 429–444.
- Levy, S., & Vaughn, S. (2002). An observational study of teachers' reading instruction of students with emotional or behavioral disorders. *Behavioral Disorders, 27*, 215–235.
- Lewis, T. J., & Sugai, G. (1999). Effective behavior support: A systems approach to proactive schoolwide management. *Focus on Exceptional Children, 31*, 1–24.
- Lewis-Palmer, T., Bounds, M., & Sugai, G. (2004). Districtwide system for providing individual student support. *Assessment for Effective Intervention, 30*, 53–65.
- Liaupsin, C. J., Scott, T. M., & Nelson, C. M. (2001). *Functional behavioral assessment: An interactive training module* (3rd ed.). Longmont, CO: Sopris West.
- Maguin, E., & Loeber, R. (1995). Academic performance and delinquency. In M. Tonry (Ed.), *Crime and justice: An annual review of research* (Vol. 20, pp. 145–264). Chicago: University of Chicago Press.
- March, R. E., Horner, R. H., Lewis-Palmer, T., Brown, D., Crone, D., Todd, A. W., et al. (2000). *Functional Assessment Checklist—Teachers and Staff (FACTS)*. Eugene, OR: Educational and Community Supports.
- May, S., Ard, W. I., Todd, A. W., Horner, R. H., Glasgow, A., Sugai, G., et al. (2002). *School-Wide Information System*. Eugene: Educational and Community Supports, University of Oregon.
- McIntosh, K., Borgmeier, C., Anderson, C. M., Horner, R. H., Rodriguez, B. J., & Tobin, T. J. (2008). Technical adequacy of the Functional Assessment Checklist—Teachers and Staff (FACTS) FBA interview measure. *Journal of Positive Behavior Interventions, 10*, 33–45.
- McIntosh, K., Chard, D. J., Boland, J. B., & Horner, R. H. (2006). Demonstration of combined efforts in school-wide academic and behavioral systems and incidence of reading and behavior challenges in early elementary grades. *Journal of Positive Behavior Interventions, 8*, 146–154.
- McIntosh, K., Horner, R. H., Chard, D. J., Boland, J. B., & Good, R. H. (2006). The use of reading and behavior screening measures to predict non-response to school-wide positive behavior support: A longitudinal analysis. *School Psychology Review, 35*, 275–291.
- McKinney, J. D. (1989). Longitudinal research on the behavioral characteristics of children with learning disabilities. *Journal of Learning Disabilities, 22*, 141–150.
- Morrison, G. M., Anthony, S., Storino, M., & Dillon, C. (2001). An examination of the disciplinary histories and the individual and educational characteristics of students who participate in an in-school suspension program. *Education and Treatment of Children, 24*, 276–293.
- Nelson, J. R., Benner, G. J., Lane, K. L., & Smith, B. W. (2004). Academic achievement of K-12 students with emotional and behavioral disorders. *Exceptional Children, 71*, 59–73.
- Nelson, J. R., Roberts, M. L., Rutherford, R. B., Mathur, S. R., & Aaroe, L. A. (1999). A statewide survey of special education administrators and school psychologists regarding functional behavioral assessment. *Education and Treatment of Children, 22*, 267–279.
- Nelson, J. R., Roberts, M. L., & Smith, D. J. (1998). *Conducting functional behavioral assessments: A practical guide FBA manual—Good functions*. Longmont, CO: Sopris West.
- Nelson, J. R., Stage, S. A., Epstein, M. H., & Pierce, C. D. (2005). Effects of a prereading intervention on the literacy and social skills of children. *Exceptional Children, 72*, 29–45.
- Newcomer, L. L., & Lewis, T. J. (2004). Functional behavioral assessment: An investigation of assessment reliability and effectiveness of function-based interventions. *Journal of Emotional and Behavioral Disorders, 12*, 168–181.
- O'Neill, R. E., Horner, R. H., Albin, R. W., Sprague, J. R., Storey, K., & Newton, J. S. (1997). *Functional assessment and program development for problem behavior: A practical handbook* (2nd ed.). Pacific Grove, CA: Brooks/Cole.
- O'Shaughnessy, T. E., Lane, K., Gresham, F. M., & Beebe-Frankenberger, M. E. (2003). Children placed at risk for learning and behavioral difficulties: Implementing a school-wide system of early identification and intervention. *Remedial and Special Education, 24*, 27–35.
- Patterson, G. R. (1976). The aggressive child: Victim and architect of a coercive system. In E. J. Mash, L. A. Hamerlynck, & L. C. Handy (Eds.), *Behavior modification and families* (pp. 267–316). New York: Brunner/Mazel.
- Patterson, G. R. (1982). *Coercive family process*. Eugene, OR: Castalia.
- Patterson, G. R., Reid, J. B., & Dishion, T. J. (1992). *Antisocial boys*. Eugene, OR: Castalia.
- Pope, A. W., Bierman, K. L., & Mumma, G. H. (1989). Relations between hyperactive and aggressive behavior and peer relations at three elementary grade levels. *Journal of Abnormal Child Psychology, 17*, 253–267.
- Radford, P. M., & Ervin, R. A. (2002). Employing descriptive functional assessment methods to assess low-rate, high-intensity behaviors: A case example. *Journal of Positive Behavior Interventions, 4*, 146–155.
- Repp, A. C., & Karsh, K. G. (1994). Hypothesis-based interventions for tantrum behaviors of persons with developmental disabilities in school settings. *Journal of Applied Behavior Analysis, 27*, 21–31.
- Roberts, M. L., Marshall, J., Nelson, J. R., & Albers, C. A. (2001). Curriculum-based assessment procedures embedded within functional behavioral assessments: Identifying escape-motivated

- behaviors in a general education classroom. *School Psychology Review*, 30, 264–277.
- Roeser, R. W., & Eccles, J. S. (2000). Schooling and mental health. In A. J. Sameroff, M. Lewis, & S. M. Miller (Eds.), *Handbook of developmental psychopathology* (2nd ed., pp. 135–156). New York: Kluwer Academic/Plenum.
- Sasso, G. M., Conroy, M. A., Stichter, J. P., & Fox, J. J. (2001). Slowing down the bandwagon: The misapplication of functional assessment for students with emotional or behavioral disorders. *Behavioral Disorders*, 26, 282–296.
- Scott, T. M., Bucalos, A., Liaupsin, C., Nelson, C. M., Jolivette, K., & DeShea, L. (2004). Using functional behavior assessment in general education settings: Making a case for effectiveness and efficiency. *Behavioral Disorders*, 29, 189–201.
- Scott, T. M., McIntyre, J., Liaupsin, C., Nelson, C. M., & Conroy, M. (2004). An examination of functional behavioral assessment in public school settings: Collaborative teams, experts, and methodology. *Behavioral Disorders*, 29, 384–395.
- Shapiro, E. S. (2004). *Academic skills problems: Direct assessment and intervention* (3rd ed.). New York: Guilford.
- Shinn, M. R. (1989). Identifying and defining academic problems: CBM screening and eligibility procedures. In M. R. Shinn (Ed.), *Curriculum-based measurement: Assessing special children* (pp. 90–129). New York: Guilford.
- Shinn, M. R., Shinn, M. M., Hamilton, C., & Clarke, B. (2002). Using curriculum-based measurement in general education classrooms to promote reading success. In M. R. Shinn, H. M. Walker, & G. Stoner (Eds.), *Interventions for academic and behavior problems II: Preventive and remedial approaches* (pp. 113–142). Bethesda, MD: National Association of School Psychologists.
- Simmons, D. C., Kame'enui, E. J., Good, R. H., Harn, B. A., Cole, C., & Braun, D. (2002). Building, implementing, and sustaining a beginning reading model: Lessons learned school by school. In M. R. Shinn, H. M. Walker, & G. Stoner (Eds.), *Interventions for academic and behavioral problems II: Preventive and remedial approaches* (pp. 403–432). Bethesda, MD: National Association of School Psychologists.
- Sprague, J. R., & Horner, R. H. (1999). Low-frequency high-intensity problem behavior: Toward an applied technology of functional assessment and intervention. In A. C. Repp & R. H. Horner (Eds.), *Functional analysis of problem behavior: From effective assessment to effective support* (pp. 98–116). Belmont, CA: Wadsworth.
- Stage, S. A., Cheney, D., Walker, B., & LaRocque, M. (2002). A preliminary discriminant and convergent validity study of the Teacher Functional Behavioral Assessment Checklist. *School Psychology Review*, 31, 71–93.
- Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, 21, 360–406.
- Stichter, J. P., Lewis, T. J., Johnson, N., & Trussell, R. (2004). Toward a structural assessment: Analyzing the merits of an assessment tool for a student with E/BD. *Assessment for Effective Intervention*, 30, 25–40.
- Sugai, G., Lewis-Palmer, T., & Hagan, S. (1998). Using functional assessments to develop behavior support plans. *Preventing School Failure*, 43, 6–13.
- Sugai, G., Sprague, J. R., Horner, R. H., & Walker, H. M. (2000). Preventing school violence: The use of office discipline referrals to assess and monitor school-wide discipline interventions. *Journal of Emotional and Behavioral Disorders*, 8, 94–101.
- Tobin, T. J., & Sugai, G. M. (1999). Using sixth-grade school records to predict school violence, chronic discipline problems, and high school outcomes. *Journal of Emotional and Behavioral Disorders*, 7, 40–53.
- Vollmer, T. R., Northup, J., Ringdahl, J. E., LeBlanc, L. A., & Chauvin, T. M. (1996). Functional analysis of severe tantrums displayed by children with language delays. *Behavior Modification*, 20, 97–115.
- Walker, B., Cheney, D., Stage, S. A., & Blum, C. (2005). Schoolwide screening and Positive Behavior Supports: Identifying and supporting students at risk for school failure. *Journal of Positive Behavior Interventions*, 7, 194–204.
- Wallace, M. D., Doney, J. K., Mintz-Resudek, C. M., & Tarbox, R. S. (2004). Training educators to implement functional analyses. *Journal of Applied Behavior Analysis*, 37(1), 89–92.
- Wehby, J. H., Lane, K. L., & Falk, K. B. (2003). Academic instruction of students with emotional and behavioral disorders. *Journal of Emotional and Behavioral Disorders*, 11, 194–197.
- Wright, R. E. (1995). Logistic regression. In L. G. Grimm & P. R. Yarnold (Eds.), *Reading and understanding multivariate statistics* (pp. 217–244). Washington, DC: American Psychological Association.
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