The Impact of Targeted Classroom Interventions and Function-Based Behavior Interventions on Problem Behaviors of Students With Emotional/Behavioral Disorders

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ABSTRACT: The purpose of this study was to examine the impact of both functional behavior assessment-based interventions and targeted classroom interventions for reducing problem behaviors of children with emotional/behavioral disorders (EBD) in special education classrooms. Specifically, this study was interested in how interventions based on changes in classroom routines and instructional behaviors compared with interventions based on functional behavior assessment. Results demonstrated the effectiveness of incorporating effective classroom practices in reducing problem behaviors in special education classrooms for students with EBD. In addition, results demonstrated a clear additive effect when individually designed behavior interventions, based on functional behavior assessments, were incorporated following classroom intervention. Results confirm the importance of analyzing and manipulating environmental and instructional classroom variables as an essential step in the process of addressing problem behavior. Implications for practice and future research are discussed.

■ Research on effective classrooms has demonstrated a clear relationship between the ecology of the classroom and student academic and social behavior. Student behaviors are at least partially determined by the nature and type of interactions the student has due to features within the classroom environment (Carta, Atwater, Schwartz, & Miller, 1990; Wallace, Anderson, Bartholomay, & Hupp, 2002). Fox and Conroy (1995), in their review of classroom variables and student outcomes, cited pivotal research focusing on classroom factors associated with increases and decreases in problem behaviors, including conditions within the physical setting, types of activities, and instructional methods. In a critical analysis of current research examining antecedent variables within the functional assessment process, Conroy and Stichter (2003) identified potential contextual factors within classrooms including physical, environmental, and instructional factors. Physical factors refer to conditions within the classroom such as physical setup and layout and density of materials and students. Environmental factors refer to the types of tasks and the manner in which tasks are presented. Instructional factors refer to teacher behaviors such as praise or reprimand statements.

Recent studies on physical factors have explored conditions within school settings that affect behavior, such as spatial density (Driscoll & Carter, 2004), effects of crowded rooms and day of the week (McGill, Teer, Rye, & Hughes, 2003), and the physical environment arrangement of the classroom (Davis & Fox, 1999; Kame'enui, 1995). Researchers have found that both spatial density and the physical layout of the classroom are ecological factors that can act as setting events for problem behaviors. Davis and Fox (1999) purported that environmental arrangements (including arrangement of the physical setting, changes in the population of the classroom, and changes in materials available to a student) can be used as an intervention against problem behavior.

Studies on environmental factors have focused primarily on creating and maintaining structured classroom environments through the application of clear expectations (Mayer, 1995) and establishing routines and proce-

dures (Kame'enui, 1995; Simmons & Kame'enui, 1990). Enhancing classroom structure and organization can serve as preventative measures to student problem behavior. Low classroom structure has been found to occasion aggression and out-of-seat behavior, and reduced rates of academic engagement and behavioral compliance for students with emotional/behavioral disorders (EBD). Likewise, the overall level of effective classroom structures in place influences the feasibility of implementing consistent, quality interventions (Kamps, Kravits, Rauch, Kamps, & Chung, 2001). In addition, classroom settings that are positive environments are considered protective factors that help mediate the impact of risk on the development of antisocial behavior. Positive environments are those that actively include all children, ensure a sense of safety and security, and enable children to participate and learn effectively (Keogh, 2000).

Teacher instructional practices have also been shown to influence the rate of problem behavior within classrooms. Research has shown that supportive practices (e.g., positive praise during academic instruction) have been associated with increased student achievement (Brophy & Good, 1986) and appropriate task behavior (Nowacek, McKinney, & Hallahan, 1990). McGill, Teer, Rye, and Hughes (2003) found a strong association between one-to-one support and a decrease in problem behaviors. Research has also demonstrated that increases in teacher praise have resulted in desirable classroom behavior, such as increased task engagement (Sutherland, Wehby, & Copeland, 2000) and fewer disruptions (Gunter, Denny, Jack, Shores, & Nelson, 1993). A teacher's overall tone can also function as a setting event. For example, negative teacher practices (e.g., verbal reprimands, physical restraint) have been linked to increased (a) disruptive behavior (Thomas, Becker, & Armstrong, 1968) and (b) negative behavior (e.g., disruption, off-task behavior of students with EBD; Beyda, Zentall, & Ferko, 2002; Van Acker, Grant, & Henry, 1996), whereas an increase in teacher praise has been shown to enhance the development of positive rapport between teacher and student, leading to fewer problem behaviors (Burnett, 2002). Similar to increasing rates of teacher praise, increasing the rate of opportunities to respond to academic tasks and activities resulted in improved academic performance in reading (Carnine, 1976; Skinner & Shapiro, 1989; Skinner, Smith, & McLean, 1994), math (Skinner, Ford, & Yunker, 1991; Skinner, Belfiore, Mace, Williams-Wilson, & Johns, 1997), task engagement (Carnine, 1976; Sutherland et al., 2000), and decreased disruptive behavior.

Research has also demonstrated the effectiveness of conducting functional behavior assessments (FBA) to identify pertinent environmental influences that maintain problem behavior of students with EBD. Although students may exhibit similar behavior patterns (e.g., high rates of off-task and disruptive behaviors), influences within the environment that maintain problem behaviors are unique to the individual (Ervin et al., 2000). Problem behaviors of students with EBD can be maintained through the acquisition of teacher attention and escaping undesirable academic tasks (Dunlap et al., 1993; Kerns, Childs, Dunlap, Clarke, & Falk, 1994; Meyer, 1999). Furthermore, peer attention has been shown to increase student off-task behavior (Lewis & Sugai, 1996). In addition, problem behaviors can be maintained through avoiding adult and peer interactions (Shores, Gunter, Denny, & Jack, 1993). Recent research has indicated that behavioral interventions based on functional assessment are more effective at reducing problem behaviors of students with EBD compared with traditional intervention approaches (Newcomer & Lewis, 2004). The impact of intervention plans for students with EBD based on FBA procedures have included improved on-task behaviors as well as a decrease in disruptive behaviors (Ervin et al., 2001; Kamps, Wendland, & Culpepper, 2006).

The purpose of this study was to examine the impact of both FBA-based interventions and targeted classroom interventions in reducing problem behaviors of children with EBD in special education classrooms. Specifically, this study was intended to identify the extent to which targeted changes in classroom variables that can serve as setting events for appropriate social behavior were sufficient in reducing problem behaviors. In addition, this study was interested in examining the additive effect of combining both targeted classroom supports and FBA-based interventions.

Method

Participants and Setting

The study took place in a Midwest school district, at an alternative public school. Con-

tributing factors to placement at the school included mental health needs and/or severe externalizing behavioral difficulties, such as aggression. Three students with externalizing behaviors were selected from 3 multicategorical classrooms at the school. To identify students with significant externalizing behaviors, scores from the *Behavioral Assessment System for Children* (BASC; Reynolds & Kamphaus, 1992) were used. The BASC was given by the school psychologist for the alternative school, and each score was less than 3 months old at the time of the study. The BASC consists of 186 items that yield 12 subscales, and three composite scores that measure overall school adjustment, clinical adjustment, and personal adjustment. Finally, an overall Emotional Symptoms Index can be calculated that assesses overall emotional functioning. Students scoring in the at-risk or clinical levels for externalizing behaviors were selected.

Furthermore, students were also selected based on archival records, behavioral infraction data, teacher nominations, and administrative recommendations. Behavioral infraction data provided information on the chronic nature and patterns of problem behavior exhibited by the student. Discipline referrals were analyzed for patterns of direct, harmful, physical contact with another person; forceful, threatening actions without direct physical contact; and defiance or repeated classroom disruptions (Tobin & Sugai, 1999).

Three classroom teachers participated in the study. These classrooms were selected because they encompassed the elementary grade levels at the alternative school. All three teachers in the elementary classrooms were certified to teach special education. The teachers had at least 5 years of experience working with students with problem behaviors. The teachers had been at the school for 1 to 5 years. In addition, each classroom had one to two paraprofessionals. One student was chosen from each of three classrooms. All 3 students selected for the study were African American boys. The three classrooms in the study included (a) fourth- and fifth-grade combination class, (2) third-grade class, and (3) second-grade class. Each classroom served five to six students.

Data on problem behavior rates in classroom settings at the alternative school included interviews with the three teachers and administrators with the intent of gathering specific information on recurring problem behaviors within the classroom. This information was used to help identify the types of problem behaviors occurring in each classroom and an estimation of the rate that these behaviors occurred. To verify the occurrence of problem behavior in the classroom and that these behaviors adhered to the operational definition of externalizing behaviors, three 15-min partial interval observation probes were conducted across 3 days for each of the 3 students.

"Larry" was an 11-year-old fifth-grade student. He had been identified with an educational diagnosis of emotional disturbance and learning disability in oral expression and listening comprehension. According to standardized achievement assessments, Larry's academic performance in reading, writing, and math were within the low range. Results of teacher ratings on the BASC indicated concerns with aggression, conduct problems, and hyperactivity. His current teacher reported that when Larry is angry he will cry, argue, make accusations of unfair treatment, blame others, yell, growl, become verbally abusive, and threaten others. Larry also often threw objects. For the purposes of this study, Larry's off-task behaviors were the dependent variable of concern. For Larry, off-task behavior was operationally defined as yelling out to teacher and peers, laughing loudly during instruction, getting out of his seat and wandering around the classroom, and arguing in a loud voice with teacher directions. Probe data indicated a mean of 32% of intervals in which the student engaged in problem behavior.

"Dave" was an 8-year-old student in third grade. Dave had an educational diagnosis of emotional disturbance. According to standardized achievement assessments, Dave's academic performance in reading, writing, and math were all in the average range. Results of teacher ratings on the BASC indicated that Dave's overall behaviors were clinically significant on the externalizing behavior subscale. Past teachers reported that Dave had difficulty following school rules, verbally threatening others, arguing with peers, talking back to authority figures, getting angry easily, having temper tantrums, and withdrawing from group activities. For the purposes of this study, Dave's off-task behaviors were the dependent variable of concern. For Dave, off-task behavior was operationally defined as

folding arms and refusing to work, pounding on his desk, and leaving the classroom without permission. Probe data indicated a mean of 49% of intervals in which the student engaged in problem behavior.

"Jack" was a 7-year-old in first grade. Jack had an educational diagnosis of emotional disturbance. According to standardized achievement assessments, Jack's academic performance was below average in reading, writing, and math. Results of teacher ratings on the BASC indicated that Jack had concerns in externalizing behaviors, such as hyperactivity and attention problems. In addition, school records indicated that Jack has been physically aggressive at school, including behaviors such as throwing chairs, knocking over tables, tantruming, striking, kicking, and harming peers and adults. For the purposes of this study, Jack's off-task behaviors were the dependent variable of concern. For Jack, off-task behavior was operationally defined as putting his head down during instructional time, leaving the room without permission, yelling and making noises, and kicking desks and chairs. Probe data indicated a mean of 74% of intervals in which the student engaged in problem behavior.

Assessment Procedures

Two concurrent assessment tasks took place prior to collection of baseline data: classroom assessments and FBA.

Classroom assessment. Baseline rates of universal classroom strategy use were measured in each classroom using variables from the *Setting Factors Assessment Tool* (SFAT; Stichter et al., 2004). The SFAT is an observational tool designed to measure general environmental variables (i.e., overall classroom structure, the presence of student recognition for academic or behavioral accomplishments, ratings of classroom procedures/routines, and overall accuracy rates of teacher-directed and independent student work products) and instructional variables (instructional talk, prompts, feedback, and wait time) to assess the range of setting events proposed by Conroy and Stichter (2003).

Functional behavioral assessment. An FBA was conducted (a) to operationally define the specific topographies of the target behaviors of each student; (b) to identify the relationship between the behavior, antecedent, and consequence conditions; and (c) to develop hypotheses regarding the function of the problem behavior. The FBA procedure was conducted in two steps: (a) interview data were collected from teachers using the Functional Assessment Interview (O'Neill et al., 1997) and students (Kerns et al., 1994) and (b) direct observation using an A-B-C format (Bijou et al., 1968).

Functional analyses (FA) were conducted to confirm hypotheses developed during the FBA phase of the study (Axelrod, 1987; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982). The FA involved creating conditions in which the effects of attention and escape were systematically tested (Lewis & Sugai, 1996). An alternating treatment design was implemented to measure the effects of each condition (Barlow & Hersen, 1984). Each condition lasted 5 min, and students participated in each condition from two to four times (Hanley, Iwata, & Lindberg, 1999). Both dependent and independent variables were evaluated by measuring the frequency of behaviors using a 6-s partial interval measure. The conditions included easy task with and without adult attention for appropriate behavior and difficult task with and without adult attention for appropriate behavior (see the Results section).

Interventions

Targeted Classroom Interventions

Classroom interventions were based on the effective classroom literature and included recommendations to improve overall classroom structure, to incorporate individual student recognition for academic or behavioral accomplishments, to enhance classroom procedures/routines, and to improve student accuracy on teacher-directed and independent student work products. Based on deficits observed, specific instructional interventions were developed based on recommended rates reported in related literature. For example, wait time was benchmarked to 3 s per prompt (Tobin, 1983), prompts were benchmarked to an average of 3.6 prompts per minute (Sutherland, Alder, & Gunter, 2003), instructional talk was benchmarked to occur between 40% and 50% of the instructional period (Stichter et al., in press), and feedback was adjusted so that positive feedback exceeded negative feedback to a ratio of 4 to 1 (Pfeffner, Rosen, & O'Leary, 1985; see *Table 1* for specific intervention components).

TABLE 1
Classroom Deficits and Targeted Intervention Strategies by Classroom

Classroom Deficits	Recommendations
Classroom 1, Subject Larry	
General environment	Put exemplar student work on display
Display student work outside the classroom	
Classroom setup	Create a schedule focusing on the broad subjects.
Create and post a daily schedule	
Procedures	
1. More consistency with raising hands to get assistance	1. Teach the students to raise their hand when they need help.
2. More consistency with raising hands to answer questions	2. Develop a procedure in which only students who are raising their hands get called on (even in small-group work).
Evaluation procedures	Students must have 95% or more mastery on independent tasks
Work product	
Classroom 2, Subject Dave	
Evaluation procedures	Put exemplar student work on display
Work product	
Procedures	Reteach the students to raise their hand if they need help.
More consistency with raising hands to get assistance	
More consistency with raising hands to answer questions	Develop a procedure in which only students who are raising their hands get called on.
Evaluation procedures	Students should have 95% or more mastery on independent tasks.
Work product	
Instructional factors	During lessons, increase the time spent providing information to the students.
Instructional talk	
Classroom 3, Subject Jack	
General environment	Put exemplar student work on display.
Display student work outside the classroom	
Classroom setup	Create daily schedule that is visible to students.
Create and post a daily schedule	
Evaluation procedures	Provide some type of feedback on permanent products.
Work product	
Instructional factors	Increase the ratio of positive to negative feedback to 4 to 1.
Positive to negative feedback	

FBA-Based Interventions

It was hypothesized during the FBA and confirmed during the FA that Larry's problem behaviors were attention maintained (see the Results section for details). Therefore, Larry's individually designed behavior intervention focused on teaching replacement behaviors to access attention. Larry's replacement behaviors included raising his hand and asking for permission to model an instructional skill to the class, work with the teacher, or work with a peer. The teacher taught Larry the lesson using a skill-streaming (McGinnis & Goldstein, 1997) lesson format, which included modeling, role-playing, and feedback. The teacher was encouraged to provide precorrects to Larry to let him know what behaviors are expected and what behaviors will give him opportunities to participate. In addition, the teacher was instructed to give attention immediately for demonstrating replacement behaviors and

then provide opportunities to present ideas to class, work with peer tutoring, or work with the teacher.

It was hypothesized during the FBA and confirmed during the FA that Dave's problem behaviors were escape maintained (see Results section for details). Dave's individually designed behavior intervention focused on teaching replacement behaviors to ask for extra time and opportunities to work with a teacher, paraprofessional, or peers. In addition, the teacher was instructed to provide him with a choice of task order. The teacher taught Dave the lesson using a skill-streaming (McGinnis & Goldstein, 1997) lesson format, which included modeling, role-playing, feedback, and transfer of the skill. In addition, the teacher was given strategies to reduce the occurrence of problem behaviors, which included providing him with choices; providing him with a way to continue with the preferred activity or to access the preferred activity again in the near future; providing increased opportunities for Dave to express his ideas; providing Dave increased opportunities to work with teacher, paraprofessionals, or peers; and providing him instructional support by frequently checking understanding. In addition, when Dave exhibited the replacement behaviors, the teacher was instructed to provide opportunities to work with the teacher, paraprofessional, or peers, as well as provide extra time.

It was hypothesized during the FBA and confirmed during the FA that Jack's problem behaviors were attention maintained (see the Results section for details). Jack's individually designed behavior intervention focused on teaching replacement behaviors of having his eyes on the teacher during whole-class instruction or his work during seat work. Also, Jack was taught to wait his turn by sitting quietly with his hand up. The teacher taught Jack the lesson using a skill-streaming (McGinnis & Goldstein, 1997) lesson format, which included modeling, role-playing, feedback, and transfer of the skill. In addition, the teacher was given strategies to reduce the occurrence of problem behaviors, which included providing increased opportunities for Jack to express his ideas, providing Jack increased opportunities to present his skills to the class, providing Jack increased opportunities to work with the teacher or paraprofessional, and providing positive feedback. When Jack exhibited the target behaviors, the teacher was instructed to provide immediate attention and opportunities to participate and give Jack the opportunity to talk with the teacher or paraprofessional.

Intervention Implementation and Treatment Integrity

For teachers to accurately apply the targeted classroom and FBA-based interventions, teachers were trained using the following process. First, the results of the baseline data were shared with the teacher. Second, recommendations for setting event interventions were shared. Upon initial review of the setting event interventions, the teachers were asked their ability to apply these interventions and any complications that need to be addressed before applying the interventions. Third, as necessary, the researcher modeled the intervention for the teacher. To ensure implementation integrity of classroom interventions, the application of classroom universal interventions were measured for integrity of application using the following process. First, the primary author observed each classroom once a week and measured integrity of application of treatment using the SFAT. Second, the primary author met with the teachers independently to review how they believed they were implementing the treatment. Third, the results of the treatment integrity evaluations were reviewed with the teacher, and specific recommendations were made to elevate treatment to the standards in the literature. General environmental variables were measured on a Likert-type scale on three levels of application, including low, medium, and high. Instructional variables were presented as percentages of instructional talk and negative to positive feedback. Prompts were presented as the number of prompts per minute, and wait time was presented as the average number of seconds wait time occurred.

The integrity of individually designed behavior intervention plans was monitored by measuring rates of teacher attention to replacement behaviors.

Measures of Problem Behaviors

Direct observations of all student problem behaviors during each phase of the study (assessment, baseline, and intervention) were measured using a 6-s partial-interval recording instrument. Measurements were conducted on student problem behavior directed toward

peers, adults, or other (including problem behaviors directed toward objects or materials) and on-task behavior (including focusing on task or participating in group activities). Student problem behaviors were individually determined and were consistent with the operational definition of externalizing behaviors. In addition, data were collected on rate of teacher attention to target student's adherence to replacement behaviors to verify teacher implementation of individual behavior intervention.

Data collectors were trained using videotaped samples and in vivo during nontargeted times. These practice sessions encompassed approximately 34 sessions, and interobserver agreement ranged between 57% and 100%, with a mean of 87%. Interobserver agreement of dependent and independent variables was established through interrater reliability analysis within 56% of total observations (Kazdin, 1982). The accuracy of the direct observations ranged from 85% to 100%, with a mean of 96%.

Results

Results are presented in the following order. First, the results of the FBA and FA data for each subject are described. Second, classroom and FBA-based interventions will be presented. Third, integrity of classroom and FBA-based interventions will be described. Fourth, reliability data will be shown. Student daily percentage of intervals of problem behavior were plotted across the three baselines and visually analyzed to ascertain functional relationships across the study (Kazdin, 1982).

Functional Behavioral Assessment and Functional Analysis

Based on the direct and indirect assessment strategies, a hypothesis statement was developed for each student. Results of the FBA and FA are presented by student.

Larry. During group activities with the students and the teacher, when Larry was ignored or not provided opportunities to participate, or when Larry had to wait his turn, he went off task by talking out, talking with peers, laughing out, or leaving the table. When Larry engaged in these behaviors, he gained attention. The results of the FA confirmed the hypothesis that Larry's problem behaviors were attention maintained (see *Figure 1*).

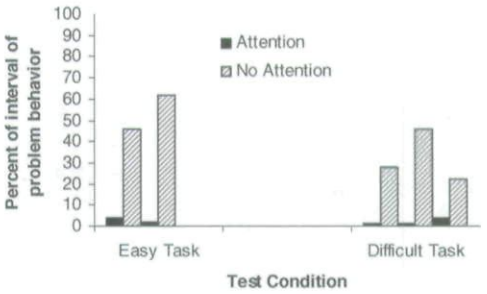

Figure 1. Larry: Functional analysis across attention/no-attention and easy and difficult tasks.

Dave. The teacher interview suggested that problem behaviors occurred to escape difficult tasks. Two hypothesis statements were developed for Dave. Hypothesis Statement 1 stated that when Dave was asked to change from a preferred activity to a nonpreferred activity or when he was not allowed to participate in a preferred activity, he talked back to the teacher in a loud voice, hit, and stomped at his desk. When Dave engaged in these behaviors, he escaped the demand. Hypothesis 2 stated that during group activities with the students and the teacher, when Dave was ignored or not provided opportunities to participate or when Dave had to wait his turn, he went off task by talking out, talking with peers, putting his head down, or leaving his desk. When Dave engaged in these behaviors he gained attention. The results of the FA neither confirmed nor disproved one or both of these hypothesis statements but rather showed that Dave's problem behaviors served multiple functions under different antecedent conditions (see *Figure 2*). A limitation of the FA was that only a few antecedent conditions were implemented to assess the function of behavior. This limitation made it difficult to identify the specific antecedent conditions associated with the two functions. As a result, information from both the FBA and the FA were used to develop the behavioral intervention plan. This information suggested that Dave's problem behaviors were primarily escape/avoidant of difficult tasks, but the presentation of attention mediated the aversiveness of the tasks.

Jack. Condition 1 stated that during group activities with the students and the teacher, when Jack was ignored or not provided opportunities to participate, or when Jack had to wait his turn, he went off task by putting his head down, banging his desk, or leaving the table/classroom. When Jack engaged in these

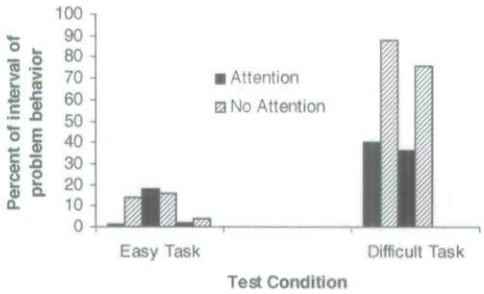

Figure 2. Dave: Functional analysis across attention/no-attention and easy and difficult tasks.

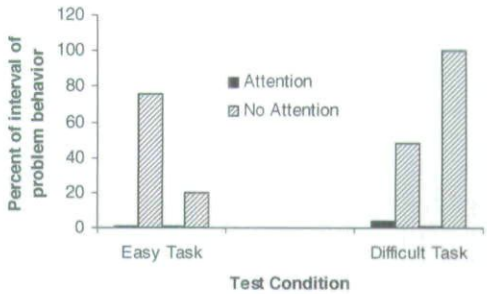

Figure 3. Jack: Functional analysis across attention/no-attention and easy and difficult tasks.

behaviors, he gained attention. Condition 2 stated that during activities in which Jack was given negative feedback or prompted to take a time out, he went off task by banging or kicking objects. When Jack engaged in these behaviors, he gained attention. The results of the FA confirmed the hypothesis that Jack's problem behaviors were attention maintained (see *Figure 3*).

Classroom and FBA-Based Interventions

Direct observation data across baseline and the two intervention phases were plotted and analyzed for trend and level changes (see *Figure 4*). Overall, across the three teacher-student dyads, the data indicate that targeted classroom interventions decreased the percentage of intervals of problem behavior. Furthermore, there appears to be an additive effect when individual interventions based on function were introduced. Data patterns are described further across the three subject pairs.

Classroom 1: Larry. Baseline data showed a slight descending trend (mean of 20% with a range of 9% to 39%). Following introduction of the classroom intervention, data showed a descending trend (mean of 12% with a range of 0% to 39%). Visual analysis of classroom-targeted interventions indicates similar levels compared with baseline levels of problem behaviors during the first six data points and then a decrease during the last six data points. The impact of the targeted classroom intervention reduced Larry's overall level of problem behaviors. Visual analysis of the classroom intervention with individually designed FBA-based interventions showed an overall descending trend and level change compared with baseline and classroom intervention alone (mean of 8% with a range of 0% to 37%).

Classroom 2: Dave. Baseline data showed an increasing trend (mean of 38% with a range of 26% to 92%). Following the introduction of targeted classroom interventions, data showed a descending trend (mean of 20% with a range of 4% to 50%). Visual analysis of classroom intervention data indicated an increase in problem behaviors during the first four data points and then a level change. Visual analysis of the classroom interventions with individually designed FBA-based interventions showed an overall decreasing trend and slight level change over baseline and classroom intervention alone (mean of 12.36% with a range of 0% to 72%).

Classroom 3: Jack. Baseline data showed a decreasing trend with variability (mean of 29% with a range of 11% to 100%). Following introduction of targeted classroom intervention, data showed a descending trend (mean of 12% with a range of 5% to 22%) and a slight level change. Visual analysis of the classroom intervention with individually designed FBA-based interventions showed a slight increasing trend due to one data point and a level change over baseline and classroom intervention alone (mean of 3% with a range of 0% to 12%).

Treatment Integrity

Integrity of Universal Classroom Interventions

Classroom 1. Weekly observations occurred to assess the teacher's application of universal classroom interventions. The results of these observations showed that the structural rating of the classroom remained in the low range for the first two observations and in the moderate range for the final observations. A daily schedule was posted and accessible during all observations. Consistency with giving students assistance only when their

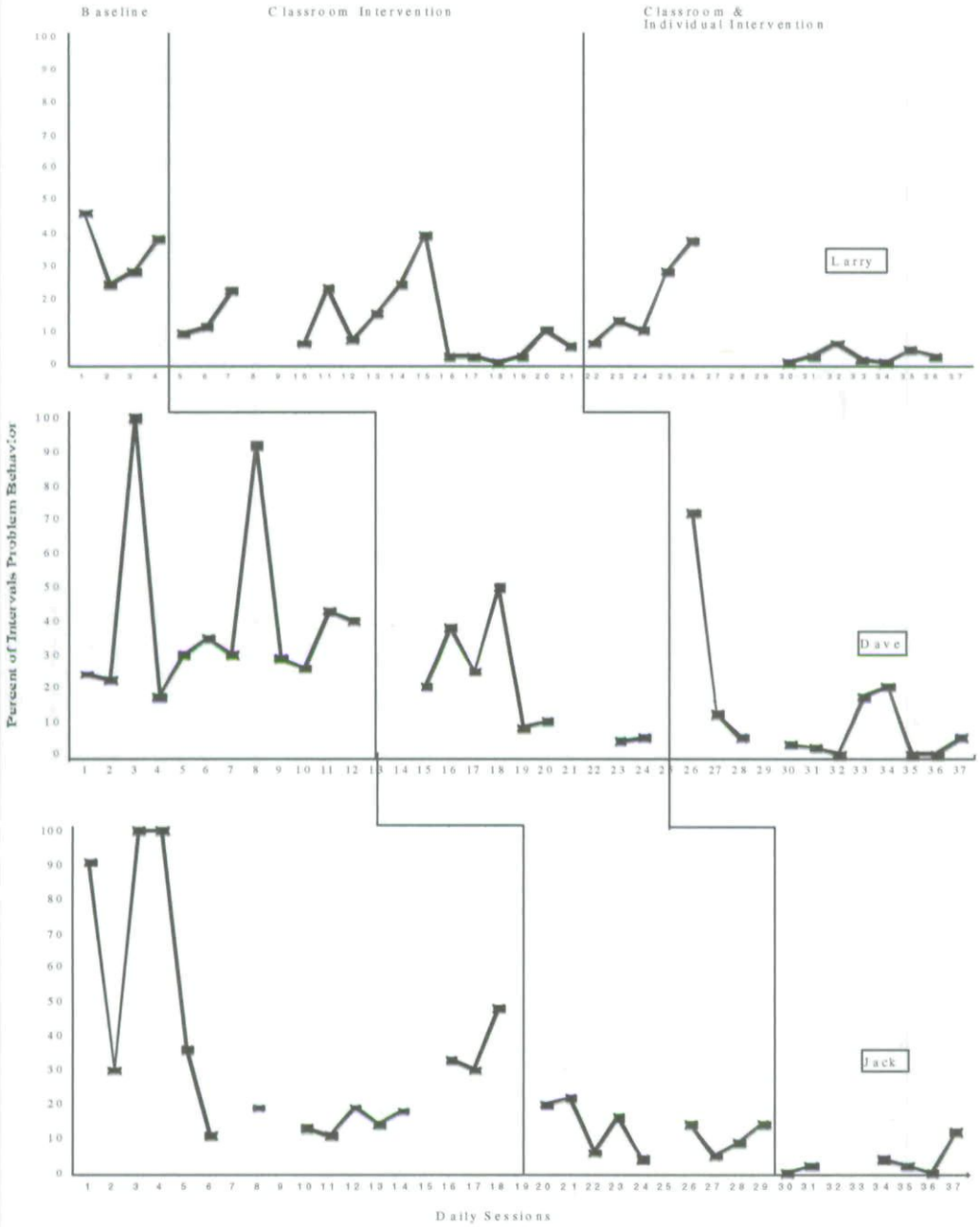

Figure 4. Percentage of problem behavior across baseline, classroom universal interventions alone, and classroom universal interventions with individually designed behavior interventions.

hands were raised was in the low range for the first observation and in the moderate range for the final observations. Consistency for allowing students to answer questions only when their hands were raised was in the low range for the first observation and in the moderate range for the final observations. Providing feedback on permanent products occurred during the first three and the final observations but not during the fifth observation. Results indicated that 90% to 95% mastery with independent tasks occurred during the first four observations but only 80% accuracy on the final observation.

Teacher 2. Weekly observations occurred to assess the teacher's application of universal

TABLE 2
Integrity of Individual Interventions

	Rate per Minute of Teacher Attention to Replacement Behaviors			
	Baseline	Range	Universal With Individual	Range
Teacher 1	1.13	0.8–1.3	2.93	0.2–5.2
Teacher 2	1.36	0.86–2.06	2.43	0.6–6.1
Teacher 3	1.61	0.3–3.13	1.83	0.8–3

classroom interventions. The results of these observations showed that individual student work was displayed in the classroom during all observations after baseline. Consistency with giving students assistance only when their hands were raised was in the low range for the first observation and in the moderate range for the final observations. Consistency for allowing students to answer questions only when their hands were raised was in the low range for the first observation and in the moderate range for the final observations. Results indicated that 90% to 95% mastery with independent tasks occurred during all of the observations. Instructional talk occurred with a mean of 41.9% of instructional time with a range of 34.9% to 46.8%

Teacher 3. Weekly observations occurred to assess the teacher's application of universal classroom interventions. The results of these observations showed that individual student work was displayed outside the classroom during all observations after baseline. Feedback on permanent products was not observed during the first observation but did occur on 100% of permanent products during the rest of the observations. Providing 75% positive feedback to 25% negative feedback occurred during the final observations, with a mean of 79.7% positive feedback and a range of 73% to 90%.

Integrity of Individually Designed Behavior Interventions

Teachers were instructed to provide high rates of attention for replacement behaviors based on FBA and FA data. Integrity data were collected daily by data collectors (see *Table 2*). Teacher attention was operationally defined as verbally acknowledging the student, making eye contact with the student, or being in close proximity to the student contingent on the elicitation of a replacement behavior. Direct observation data were collected using a paper-and-pencil recording sheet and cassette recordings of 6-s intervals. Data collectors used the same cassette recording simultaneously to ensure compatibility of interval data.

Reliability

Interobserver agreement data were collected in 70% (25 of 36 sessions) of the observations during the functional analysis. The mean agreement was 85% with a range of 79% to 100% agreement across all subjects. Across direct observation sessions in the three classrooms during baseline, classroom, and FBA-based interventions, 56% of the sessions included a second observer. The mean agreement across all data points was 96% with a range of 85% to 100% agreement.

Discussion

The purpose of this study was to examine the impact of targeted classroom interventions and FBA-based interventions on reducing problem behaviors of children with EBD in special education classrooms. This study demonstrated that targeted changes in classroom variables that serve as setting events (including manipulations of context-specific, environmental, and instructional factors) were sufficient in reducing problem behaviors across all three subjects. In addition, results demonstrated the additive effect of combining both classroom and individually defined FBA-based interventions.

Previous research with EBD students has provided preliminary information on the relationship between classroom structure and the effectiveness of behavior interventions (Kamps et al., 2000). The application of consistent classroom supports had a clear additive effect to the individually designed behavior interventions. This addition expands the knowledge base in several ways. Analyses and manipulation of environmental and instructional factors are shown to be an essential first step in the

process of developing individual interventions. The effectiveness of the individually designed behavior intervention will be dependent on the environment in which it operates.

The FBA literature to date has focused primarily on understanding and manipulating consequent variables that maintain behavior or immediate antecedents that set the occasion for behavior (Carr et al., 1999; Conroy & Stichter, 2003). This study extends the knowledge base by demonstrating a relationship between classroom practices and the function of behavior for individual students. Classroom supports were designed to help create and maintain optimal levels of structure and instruction based on observed deficits among three teachers. Equally important, clear procedures were created for the teacher to consistently give attention and/or assistance. The study showed that classroom supports may have provided a means for students to access attention or escape opportunities in an acceptable way. From an applied behavioral analytic perspective, consistent classroom supports can provide students with a predictable means to getting their needs met, similar to individually designed behavior interventions in that both address the function of the problem behavior and both alter the environment to make problem behavior less effective than a targeted replacement behavior. Students with high attention needs engaged in both appropriate and inappropriate behaviors to get attention prior to intervention. When classroom factors for giving and receiving student attention were consistently implemented for all students, problem behaviors increased momentarily but then decreased, suggesting that the students' appropriate behavior came under new stimulus control.

An important component of FBA-based interventions is altering the environment so that problem behaviors no longer result in meeting student needs. Therefore, targeted classroom factors may be one means of creating classroom environments that support the appropriate behavior among students with EBD. Many students with problem behaviors already have the replacement in their repertoire, but problem behavior is often more efficient in accessing reinforcement. Targeted classroom supports provided an environment in which replacement behaviors become more efficient than problem behaviors.

A secondary purpose of this study was to explore the additive effect on problem behaviors of incorporating individually designed behavior interventions, based on FBA. Previous literature has provided evidence that the FBA process yields information that can be used to design effective behavioral interventions (Dunlap et al., 1993; Kerns et al., 1994; Lewis & Sugai, 1996; Meyer, 1999; Newcomer & Lewis, 2004; Shores et al., 1993). In addition, previous literature has demonstrated that the level of classroom structure influences the feasibility of implementing consistent, quality interventions (Kamps et al., 2000). The current study compared the additive impact of individually designed behavior interventions in classrooms in which the structure had already been manipulated to optimal levels. Results indicated that the combination of classroom supports with individually designed behavior interventions reduced problem behaviors across all three subjects and that there was and additive (albeit a minor) effect of FBA-based interventions when compared with classroom factors alone.

Limitations

The results of this study are promising, yet several limitations must be considered. First, 2 of the 3 subjects were determined to exhibit problem behaviors maintained primarily by attention. The FBA literature indicates that there are a number of potential functions that maintain problem behaviors, including escape/avoid, autosensory, or acquisition of objects or activities (Horner, 1994; Iwata et al., 1982; O'Neill et al., 1997; Reed, Thomas, Sprague, & Horner, 1997). Students with problem behaviors who have different maintaining functions may respond to targeted classroom variables differently than those in the present study, who, with the exception of 1 subject, were primarily attention maintained. A second limitation of this study is the small number of subjects and classrooms. Research using single-subject design has provided evidence that the information gained from these studies is valid for the particular setting and subjects with whom the research was conducted, but making generalizations to the larger population will take repeated studies across multiple subjects and settings (Kazdin, 1982). Although statements can be made about the impact of classroom factors alone and about individually designed behavior interventions across classrooms and subjects within the present study, the ability to gener-

alize these results to other settings and other students is limited. Additional replications are needed across various problem behaviors and classrooms to provide support for the findings of this study.

Implications for Future Research

Because of the inherent limitation of the ability of single-subject research to generalize broadly, additional replications are needed across grades, settings, instructional activities, and types of behaviors. In addition, because this research occurred with elementary school-aged students, future research needs to explore the impact of classroom universals and individually designed interventions on early childhood and secondary school-aged students in both special education and general education settings. Future research should also include exploring the long-term impact of targeted classroom strategies alone on problem behaviors. During this study, classroom interventions occurred as the primary intervention for a limited period of time. The present study was able to demonstrate changes in levels of problem behavior between classroom strategies alone and classrooms with individually designed behavior interventions. These level changes demonstrate an additive effect of combining these interventions. A question arises when trying to delineate effects of classroom supports from effects of individually designed interventions.

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