THE EFFECTS OF FUNCTION-BASED

SELF-MANAGEMENT INTERVENTIONS

BY

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Abstract

Children with emotional and behavioral disorders (E/BD) struggle to achieve social and academic outcomes, a struggle which can adversely impact families, schools, and communities. To help these children, self-management interventions are widely disseminated in schools. Many studies have demonstrated self-management interventions to be effective at reducing problem behavior and increasing positive social and academic behaviors. One method of designing these interventions is functional behavior assessment. The purpose of this study was to link self-management procedures to hypothesized behavior function in three children with E/BD. Results demonstrated that self-monitoring alone could be enhanced using information derived from functional behavior assessment and that consequences delivered by teachers were less effective than a self-management treatment package.

Keywords: self-management, function-based interventions, emotional and behavioral disorders

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Dedication

This project is dedicated to my children: Abigail, Hallie, and Joshua.

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Introduction

Children with emotional and behavioral disorders (E/BD) represent a small but challenging portion of the total school population. Currently in the United States, the special education system serves approximately 450,000 students with E/BD under the emotional disturbance label (Wagner, Kutash, Duchnowski, Epstein, & Sumi, 2005). Problem behaviors typically exhibited by this population include disruptive behavior, off-task behavior, non-compliance, property destruction, and physical aggression. These behavioral problems lead to teacher dissatisfaction and attrition (George & George, 1995), poor social and emotional outcomes for children (Greenbaum & Dedrick, 1996), and crime and delinquency (Katsiyannis, Zhang, Barrett, & Flaska, 2004).

Although these outcomes are dire, there are interventions available that target the underlying problems, often with positive results. Interventions are potentially enhanced by assessing the environmental contingencies prior to implementing self-management interventions. In particular, assessment tools such as functional behavior assessment (FBA) allow practitioners to design effective interventions that combine rewards for appropriate behaviors and strategies to decrease problem behaviors.

While self-management interventions have been demonstrated in multiple studies to be effective, there are unanswered questions regarding the use of FBA in designing these interventions. For example, what is the relationship between FBA and the selected self-management intervention used? The purpose of the present study was to create self-management interventions that were guided by FBA results for children with E/BD.

This introduction will provide an overview of self-management interventions, then define and review the literature on the effectiveness of function-based interventions. Examples of

research studies that have used self-management interventions based on FBA will be provided. Finally, the purpose and research questions for this current study will be stated, as they are built on what remains to be addressed in this literature.

School-Based Self-Management Interventions

Evidence supports self-management interventions as a way to improve the classroom behavior and social skills of children with E/BD (Cancio, West, & Young, 2004; Hoff & DuPaul, 1998; Kern, Dunlap, Childs, Clarke, & Shelley, 1994; Nelson, Smith, Young, & Dodd, 1991; Peterson, Young, Salzberg, West, & Hill, 2006). Multiple reviews support the notion that self-management and self-instruction interventions improve academic and social behaviors in school settings (Fantuzzo & Polite, 1990; McDougall, 1998; Mooney, 2005; O'Leary & Dubey, 1979; Panagopoulou-Stamatalatou, 1990; Rosenbaum & Drabman, 1979; Stage & Quiroz, 1997). For example, Stage and Quiroz (1997) conducted a meta-analysis of interventions that targeted the reduction of disruptive classroom behaviors and found that the effect size of self-management interventions was second only to group contingencies (group contingencies = -1.02; self-management = -0.97). A recent publication by the Institute of Education Sciences (IES) promoted the use of interventions that include self-management, considering such interventions to have a strong evidence base (Epstein, Atkins, Cullinan, Kutash, & Weaver, 2008). The most common forms of self-management interventions include self-monitoring, self-evaluation, and self-management treatment packages.

Self-monitoring. An intervention in which a child observes and records his or her own behavior, self-monitoring is the most frequent type of self-management intervention in school-based literature (McDougall, 1998). Self-monitoring is exemplified by a study conducted by Broden, Hall, and Mitts (1971), in which an eighth-grade girl was taught to monitor her study

behavior and an eighth-grade boy monitored his talk-outs; both students kept track on paper forms. The girl's study behavior increased when she monitored her own behavior, and the boy's talk-outs decreased when he recorded instances of talk-outs. Even though some conditions in Broden et al. provided praise and attention to the on-task behavior, self-monitoring alone produced large gains in on-task behavior and large reductions in talk-outs.

Self-evaluation. Self-evaluation is an intervention in which the child compares his or her performance to a criterion set by someone else. This technique is exemplified by Rhode, Morgan, and Young (1983) who taught this self-evaluation method in two phases. In the first phase, teachers were taught to evaluate and monitor student behavior on a 5-point scale in 15-min intervals. Then, students were taught to evaluate and monitor their own behavior and match their teachers' ratings. Lastly, matching was discontinued for students who met a pre-selected level of behavior. In the second phase, the intervention was implemented in a general education setting where students were taught self-management, provided with feedback on their classroom behavior, and given rewards (i.e., point exchange) until gradually, the feedback and rewards were removed.

Treatment packages. Self-monitoring and self-evaluation are frequently combined, or "packaged," with rewards, feedback, and goal setting. According to a review by McDougall (1998), approximately half of all self-management interventions included external rewards. For example, in both Broden et al. (1971) and Rhode et al. (1983), the participants monitored and evaluated their behavior, self-management behaviors were rewarded, and the children were provided feedback on their performance. Therefore, it is clear that self-management interventions are frequently packaged and contain more components than monitoring or evaluation alone.

Several studies have addressed combining rewards or feedback in some form of self-management intervention. Broden et al. (1971) found a small improvement in study behavior when praise was added to self-recording (80% increased to 88% on average). In addition they found that when self-recording was removed, study behavior reduced to 77%. Lalli and Shapiro (1990) found that external rewards may not produce substantial effects. In their study, self-monitoring alone was compared to self-monitoring combined with contingent reward for the number of sessions it took for the children to reach mastery on a list of sight words. During self-monitoring alone, it required 8.25 sessions on average to reach criterion. During the self-monitoring combined with contingent reward, the students reached criterion within 6.75 sessions. However, in a second group, it took three out of four students more sessions to master sight words with contingent reward than with self-monitoring alone.

Kern et al. (1995) conducted a component analysis of a video self-evaluation program for improving peer interactions for students with E/BD. Following sessions, students evaluated their own behavior while watching a video-tape of their classroom behavior. The researchers assessed rewards alone, rewards combined with a post-session discussion, and self-evaluation combined with rewards. Neither rewards alone nor rewards with discussion were effective. The combination of self-evaluation and rewards was most effective for increasing appropriate interactions and decreasing inappropriate interactions across all participants. Given that few studies have addressed the separate effects of external rewards and self-management components (i.e., self-monitoring and self-evaluation), it is a challenge for researchers and practitioners to determine how and when to deliver rewards, and how to implement self-management interventions with students. An assessment tool for responding to these problems is FBA.

Functional Behavior Assessment Procedures

According to O'Neill et al. (1997), FBA is a "process for gathering information that can be used to maximize the effectiveness and efficiency of behavioral support" (p. 3). O'Neill and colleagues described the following outcomes as a result of the process: (a) description of the problem behavior; (b) identification of the contexts that predict when the problem behavior will occur; (c) identification of maintaining consequences; (d) development of hypotheses describing the problem behavior, the context under which the behavior will occur, and outcomes of the problem behavior; and (e) data collection on the problem behavior through direct observation.

The various approaches to FBA are classified into two types: indirect and direct. Each type offers different methods for hypothesizing behavioral function. Indirect assessments include interviews, checklists, and questionnaires. Direct assessments include direct observation, scatter plots, and experimental functional analysis. School-based applications of FBA most frequently utilize indirect methods or a combination of indirect and direct methods.

Indirect FBA. Interviews have been used in many school-based studies to assess behavioral function. These interviews are generally completed by a consultant and a teacher. Interviews address questions related to the problem behavior's topography and contexts in which it occurs and that reinforce the problem behavior. Checklists allow teachers to answer some questions related to the behaviors and the conditions under which they occur. After checklists are completed, a consultant uses scoring methodology to rank the hypothesized behavioral function. Questionnaires address the same types of questions as interviews and checklists (Stage, Cheney, Walker, & LaRocque, 2002).

Direct FBA. Direct FBA methods date back to Bijou, Peterson, and Ault's (1968) work on observing behavior in natural environments. With direct FBA, antecedents, behaviors, and

consequences are observed in the contexts in which they occur. The observer can use the information to analyze conditional probabilities under which problems occur. Scatter plots are a direct method of observing when, where, and at what frequency behaviors occur, and recording these data on a chart that lists the activity schedule of a student. Scatter plots are can be particularly useful for schools because activities during the day have consistent time schedules. Hypotheses developed during indirect and direct methods can be tested directly with functional analysis.

Functional analysis. Functional analysis is an experimental method of analyzing the observed behavior by manipulating establishing operations and hypothesized reinforcers. In a functional analysis, experimental conditions are arranged in an analogue environment or the natural environment to determine the function of the problem behavior. For example, to test the function of problem behavior maintained by negative reinforcement, demands are placed on the student before the occurrence of problem behavior. When the problem behavior occurs, then the student is allowed to escape the task.

The types of consequences that maintain problem behavior have been a subject of many functional analysis research studies over the last 30 years (Hanley, Iwata, & McCord, 2003; Scott et al., 2004). The experimental approach to identification of these consequences (i.e., functional analysis) generally assesses functional relationships between problem behavior and positive reinforcement or negative reinforcement. More specifically, Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) identified attention, escape, and automatic reinforcement as the most salient of the possible functions of self-injurious behavior. Since the initial work on functional analysis of self-injury, researchers have studied the functions of aggression, disruption, vocalizations, property destruction, stereotypy, noncompliance, tantrums, elopement,

pica, and other behaviors (Hanley et al., 2003). Researchers have found consistently that positive reinforcement in various forms of attention or self-stimulation, and negative reinforcement in various forms of escape, maintain many different behaviors (see review by Ervin et al., 2001).

Function-Based Intervention

Although intervention plans based on FBA rarely include new intervention techniques, behavioral research largely confirms that such plans are efficient at achieving a desired behavior (Ingram, Lewis-Palmer, & Sugai, 2005; Newcomer & Lewis, 2004; Payne, Scott, & Conroy, 2007). This effect was demonstrated by March and Horner (2002), who designed individual intervention packages for three children with behavior risks. They used research-based interventions, such as tangible and social reinforcers, self-monitoring, and social skill instruction, and packaged them in what they named the "behavior education program." When the three children's behaviors did not improve using the behavior education program, individualized, function-based interventions were implemented. The students' individualized plans were designed to match the function of the problem behavior (i.e., when a child engaged in attention-maintained problem behavior, reinforcing hand raising with attention or praise). March and Horner demonstrated that all three children showed reductions in problem behavior and increases in appropriate classroom behavior following implementation of the function-based intervention.

Several researchers have compared the efficiency and effectiveness of behavior intervention plans created using FBA and those not based on FBA. Ellingson, Miltenberger, Stricker, Galensky, and Garlinghouse (2000) studied the behavior of two students with intellectual disabilities whose teachers designed and implemented FBA-based interventions. Both intervention plans focused on manipulating the consequences. That is, both students'

problem behaviors were maintained by attention. Both function-based interventions removed attention for problem behavior and used differential reinforcement for alternative behaviors (DRA). Comparing the results of the function-based intervention with those of the non-function-based intervention, Ellingson et al. concluded that the function-based was more effective than arbitrarily selected classroom interventions.

Newcomer and Lewis (2004) conducted FBAs and designed individual plans for three elementary school students. Functional assessments identified the hypothesized functions for the students as follows: escape or avoid peers, escape or avoid activities, and obtain adult attention. The researchers explained that the function-based intervention plans were designed to focus on the function of the behavior, while the non-function-based interventions focused on the topography of the problem behavior. For example, if the child was frequently off task, the non-function-based intervention would be to cue and prompt the child to be on task without regard for the difficulty of the assignment. In this example, the student was frequently off task during math tasks. Therefore, the child was placed with a peer tutor to check his work, allowing him access to short breaks while the peer was checking his work. The other two children received similar interventions. Using a multiple baseline design across individuals and over time, with various interventions, Newcomer and Lewis found that behavior plans that were based on FBA information reduced problem behavior to a greater extent than plans that were not.

Ingram et al. (2005) conducted a similar study with two individuals using a reversal design. They found that problem behavior was reduced greatly when intervention plans were function based. Both participants engaged in various escape- or avoidance-maintained behaviors. Some major differences between the function-based and non-function-based plans emerged. For instance, both participants received setting event interventions during the function-

based intervention, and nothing for setting events during the non-function-based interventions. For the setting event interventions, one participant received a 10-min break if he was tired and the other had medication provided at school if it was left at home during the function-based intervention. One participant in that study received a choice of tangible reinforcers during the function-based intervention and praise only during the non-function-based intervention. The other received breaks and preferred rewards during the function-based intervention, and tokens only during the non-function-based intervention. Both participants showed improvements during function-based interventions.

Payne et al. (2007) utilized a similar approach to Newcomer and Lewis (2004) and Ingram et al. (2005), but their function-based interventions included fewer components than those included in Ingram et al. and Newcomer and Lewis. Similar to Elingson et al. (2000), only consequence interventions were compared. Within a reversal design format, Payne et al. alternated between function-based consequences (e.g., praise for attention-maintained behavior) and non-function-based consequences (e.g., breaks for attention-maintained behavior). Results showed decreases in problem behavior when the consequences were based on function. These studies provide evidence that function-based interventions are more effective and possibly more efficient at improving behavior in schools.

FBA and interventions in schools. Functional analysis has rarely been used in school settings by teachers and other school personnel, and more research is needed in this area (Broussard & Northup, 1995; Sasso, et al., 1992; Shumate & Wills, 2010). One explanation for the lack of use is that school settings present challenges and constraints for the various methods of FBA, such as functional analysis, descriptive assessments, rating scales, and direct observations (Ervin et al., 2001; Gresham, McIntyre, Olson-Tinker, McLaughlin, & Van, 2004;

Hanley et al., 2003; Scott et al., 2004). For instance, training, time, and other barriers make FBA difficult for teachers in general education classrooms. In a review of school-based functional assessment, Ervin and colleagues (2001) found that few studies have had school personnel conduct functional analyses without assistance. In response to this need, Scott and colleagues (2005) formed school-based behavior intervention teams who were given the task to develop function-based behavior intervention plans for 31 children. After the plans were created, the FBA information was sent to three individuals who were well-versed in school-based interventions to create plans for these children. The authors found that school-based teams, even with training on the utilization of FBA results to design interventions, were more likely to create punishment-based interventions for problem behavior, while ignoring replacement behaviors. Several factors may have contributed to these findings. For example, teachers may be more likely to punish behavior because in the past, punishment resulted in a reduction in a child's problem behaviors. One limitation pointed out by the authors is that following the training, the intervention selection process was guided by a form that listed intervention options. The form had not been used in a baseline condition, so it is impossible to know if training improved the school personnel's intervention design. Therefore, more research is needed on the use of function-based interventions in school settings, particularly in terms of effective planning and implementation by school personnel.

Utilizing the concept of behavioral function, behaviors that serve the same function can be used to replace the problem behaviors. For example, talking-out and hand-raising can serve the same function (i.e., to obtain attention); likewise, instead of engaging in off-task behavior to obtain escape, a child can request a break. Lane et al. (2007) designed a function-based intervention for an eighth-grade boy who engaged in high rates of non-compliance to academic

demands. Functional assessment procedures indicated that non-compliance was maintained by attention from his teacher. An intervention plan was created that involved a task checklist for the student to monitor his task completion during board work time. In addition, rewards were added for task-list completion, and non-compliance resulted in verbal redirections by the teacher. Results indicated strong increases in compliance behavior and overall improvement in grades. In this way the student's task completion increased when the behaviors were differentially reinforced; when the non-compliance failed to be strengthened by teacher attention, it decreased. These studies provide evidence that school-based interventions that are designed based on FBA can lead to improvements in both desired behaviors and problem behaviors targeted.

Linking Functional Behavior Assessment and Self-Management Intervention

The link between assessment and intervention can be achieved in several ways. First, aligning the consequences to the function of the behavior is done by ensuring that the consequences are logical for the appropriate behavior. This is achieved when the consequences applied to appropriate behaviors are similar to the consequences that maintained problem behavior (Kern & Dunlap, 1999; O'Neill et al., 1997). For instance, if a child's problem behavior is maintained by escape from tasks, then providing break opportunities contingent upon appropriate behavior should be considered. Likewise, if a child engages in talking or makes noises to obtain attention, then attention should be provided differentially to appropriate behaviors.

The second way to link assessment to intervention using FBA is through the selection of behaviors to increase. One concept derived from over 40 years of research in applied behavior analysis is that differential reinforcement can be used to increase desired behaviors. When an appropriate replacement behavior is differentially reinforced, problem behaviors may reduce

when reinforcement is removed (i.e., extinction), especially in instances when desired behaviors and problem behaviors are mutually exclusive. Generally, studies on function-based intervention in schools have demonstrated stronger effects when the intervention includes extinction procedures for problem behaviors (Lane et al., 2007; Umbreit, Ferro, Liaupsin, & Lane, 2007).

The following brief review of the literature focuses on function-based self-management intervention studies. This review is based on a search of the literature on FBA and function-based self-management interventions. To be considered for this review, the interventions had to take place in school settings with school-age students. To be included in this review, the intervention had to be preceded with indirect or direct FBA methods and had to provide a rationale for including self-management interventions.

Frea and Hughes (1997) conducted one of the first studies that used FBA information to identify functionally equivalent replacement behaviors. Two high school students with intellectual disabilities engaged in high rates of inappropriate behavior during classroom activities. Ned, an 18-year-old male, engaged in inappropriate behavior to obtain attention. Donna, a 17-year-old female, engaged in inappropriate behavior to escape from social demands. Ned was taught to say "excuse me" as a replacement behavior each time he engaged in perseverative speech. Each time he said "excuse me," Ned tracked that response on a wrist monitor. He received attention for the replacement response and 5 min of access to newspapers as a reward for self-monitoring. Donna was taught to say "I don't know" as a replacement for inappropriate affect or low rates of eye contact when given a demand. Donna was provided beads to place on a bracelet for each instance she said: "I don't know." For engaging in replacement behavior and accurate self-monitoring, Donna received access to nail polish for 5 min after each session. Results demonstrated increases in replacement behaviors and decreases

in inappropriate behavior. In fact, the replacement behaviors occurred at roughly the same rate at baseline as the problem behaviors occurred during the intervention and vice versa.

Grandy and Peck (1997) utilized a self-management intervention that based its procedures on a functional analysis with a typically developing child, across three regular education activities (story time, art, and seat work). At baseline, a multi-element design was used to compare high rates of teacher attention to diverted teacher attention. Based on the data, the researchers hypothesized that the child engaged in the behavior more frequently when attention was diverted. Procedures were developed to integrate self-monitoring of appropriate and inappropriate behaviors along with a pre-recorded audio prompt to record his behavior. The teacher attended to the student on a variable interval schedule which was progressively increased from shorter to longer intervals throughout the study. Results demonstrated reductions in disruptive behavior similar to the high attention functional analysis condition. The strength of these findings was that the teacher provided continuous attention during the functional analysis, but with student self-monitoring the attention could be provided on a variable interval basis, which made the intervention less obtrusive for the general education teacher, who reportedly taught in a classroom of 23 students.

Teaching a child a behavior that will allow him or her to obtain the same type of consequence as the problem behavior is perhaps the greatest use for FBA. Todd, Horner, and Sugai (1999) demonstrated that a verbal fourth grader with learning disabilities could recruit attention and praise when he monitored replacement behaviors. Problem behaviors reduced to zero levels with the self-monitoring and self-recruitment of praise intervention in place. In addition, on-task behaviors and work completion occurred at higher rates during the intervention than during baseline. This was an important study because, like Grandy and Peck (1997), the

intervention was conducted in a large general education classroom. Self-monitoring and self-recruitment required little effort on the part of teachers, making the intervention simple and effective.

Kern, Ringdahl, Hilt, and Sterling-Turner (2001) extended the work of Frea and Hughes (1997) by applying differential reinforcement to both functionally equivalent behavior and incompatible behavior. In addition, Kern et al. (2001) included participants who were of average intellectual functioning. The four participants were in a self-contained setting for children with E/BD. All four children engaged in different forms of disruptive or aggressive behavior. Each was provided a self-monitoring sheet to evaluate both appropriate communicative responses, such as asking to play with toys or asking for a break, and behaviors that were incompatible with disruptive behaviors, such as playing alone or taking turns. By combining this approach with a token reward system, high rates of problem behavior (as many as 400 per hour in one case) were reduced to zero levels in all three participants. The researchers also increased the time in which the self-monitoring intervention took place. This example is important because it shows how multiple components are added to self-management interventions that target multiple behaviors can improve student outcomes.

Smith and Sugai (2000) used FBA procedures to identify several situations that triggered the problem behaviors of a middle school student with E/BD. This information was used to design an intervention that taught the student to self-monitor replacement behaviors and to recruit attention from the teacher in an appropriate manner. On-task behavior occurred at 30% of intervals for the participant during baseline. During the first intervention phase, on-task behavior increased to an average of 90% of intervals. Reductions in talk-outs were also observed in

intervention phases. In this way, Smith and Sugai demonstrated that considering function of behavior prior to proceeding with interventions is a useful practice.

The extent to which self-management procedures can be used across multiple settings has been investigated by several authors. In a study by Brooks, Todd, Tofflemoyer, and Horner (2003), a 10-year-old girl diagnosed with Down syndrome was provided a tape recorder with a self-monitoring prompt and was taught to evaluate her on-task behavior. The monitoring sheet offered several opportunities for the child to recruit attention as an alternative to engaging in attention-maintained disruptive problem behaviors. Therefore, both replacement behaviors (i.e., hand raising) and alternative behaviors (i.e., academic engagement) were taught using the same self-monitoring system. Results showed drastic increases in academic engagement across all phases. During the first intervention phase, academic engagement increased to 77% from 11% of the time. These results were replicated across several phases and in several different settings.

The preceding studies provide a rationale for using self-management interventions as a component of broader function-based interventions. Ingram et al. (2005) took this approach a step further by comparing a function-based intervention that included self-management components to an arbitrarily designed (non-function-based) intervention that included self-management components. The difference between the two plans was primarily that the rewards for appropriate behavior during the function-based intervention were matched to the function that the problem behaviors served (e.g., asking for a break was reinforced using a break). During the non-function-based intervention, replacement behavior was reinforced using a token system for which the child could turn in tokens for tangible rewards. The results showed a drastic difference between interventions that were based on FBA and interventions that were not. For instance, in one case, the disruptions occurred during 49% of all intervals at baseline, 9% of

intervals during the function-based intervention, and 49% of intervals during the non-function-based intervention.

Some research has utilized self-management components for specific purposes such as reducing behaviors in particular classroom settings or during certain classroom activities that students find difficult. Kamps, Wendland, and Culpepper (2006) used a self-monitoring intervention to reduce disruptive behaviors of a child who had difficulty in large group settings. An additional participant in Kamps et al. engaged in off-task behaviors to obtain both sensory stimulation and escape from tasks. This participant was asked to monitor on-task and off-task behaviors in intervals of 1-2 min. Results indicated that disruptive behaviors decreased to near-zero levels when the intervention was in place, while on-task behaviors increased. In one case, 59% on-task behavior during an initial baseline condition increased to over 90% with intervention. While others had conducted functional analyses in the settings in which the behaviors occurred, Kamps et al. used more rigorous procedures for analyzing function in the classroom than had previously been done in the self-management literature.

Christensen, Young, and Marchant (2007) conducted an FBA to address the socially withdrawn behavior of a third-grade student. During the FBA process, the researchers identified that the student's socially appropriate classroom behavior received infrequent reinforcement. In their intervention, the researchers combined social skills instruction, peer-mediated reinforcement, and a self-evaluation system. This study was unique because a peer managed the timer, token reinforcers, and praise for the socially withdrawn student. When prompted by the peer, the socially withdrawn student evaluated himself on overall functioning in the class and on awareness of the need for help. The time intervals for self-evaluation began at once every 4 min and progressed to 50 min at the end of the study. The child's classroom behavior showed a

marked improvement using this approach. One interesting aspect of this study is that the researchers hypothesized that the withdrawn behavior was maintained by escape from peers and social situations, yet the peer provided attention and the frequency of interactions showed a marked improvement.

Functional behavioral assessments can frequently result in hypotheses of multiple maintaining variables. In school settings, there are many limitations to controlling for variables that influence child problem behavior. Stahr, Cushing, Lane, and Fox (2006) conducted a functional assessment using interviews and direct observations and identified both escape from tasks and attention as potential functions of the problem behavior. Therefore, they addressed this issue with a multi-component intervention that included a communication system for receiving assistance and attention, a self-monitoring system, and extinction for problem behavior. On-task gains were demonstrated within a reversal design. The total percentage of non-overlapping data for language class was 89% and for math class was 50%.

School-based studies frequently address behavior problems maintained by escape or avoidance and attention from teachers or peers. There are fewer examples of self-management studies that address stereotypic behaviors. O'Reilly et al. (2001) conducted one of these studies in a general education setting with a child who had a moderate developmental disability. She engaged in rocking and hand gazing so frequently that her on-task behavior in regular education settings was limited. Functional assessment was conducted in an outpatient setting and the intervention was designed for use in the regular education classes. Rather than conducting a functional analysis, researchers observed the child in controlled contexts in the classroom with adult attention diverted, during continuous instruction, and when the child was alone. During the alone and diverted attention conditions, she engaged in the highest rates of stereotypic behaviors.

An intervention was designed that combined self-monitoring of on-task behaviors and frequent attention for self-monitoring accuracy. The intervention was implemented in three settings and showed a consistent increase in on-task behavior in all settings within a multiple baseline design. This study is unique because the contingencies were applied to the accuracy of self-monitoring rather than a goal or to the actual on-task behavior itself. This is a contrast from other studies, and it adds evidence for accuracy as an important variable in self-monitoring.

While the majority of self-management studies have demonstrated effects of replacement behaviors compared to baseline, some researchers have compared therapist-administered interventions and self-monitored interventions. Tiger, Fisher, and Bouxsein (2009) addressed self-injurious skin picking in an adolescent with Asperger syndrome. Functional analysis indicated that skin picking was most likely to occur during periods of less-preferred work. Prior to treatment, the participant was taught several skills. First, awareness training involved showing the participant several examples of his skin picking behavior in a mirror. Second, in his competing response training, he was taught to place his hands in his pockets or his lap as an alternative to skin picking. During the first phases of the study, differential reinforcement of other behavior (DRO) was administered after 5 min without skin picking behavior. After approximately 10 sessions, the participant was taught to set the timer and self-administer reinforcers for complete periods without skin picking. If the participant engaged in skin picking, he was taught to reset the timer himself. Skin picking reduced to zero levels during both therapist-administered and self-monitored DRO. As in other studies (e.g., Christensen et al., 2007; Kern et al., 2001) the time period was extended. Extending other studies, Tiger et al. also implemented the intervention to different situations (i.e., alone in the room and in a novel room) with similar results. Another interesting facet of Tiger et al. was that accurate self-monitoring

was not placed on a separate set of contingencies by comparing teacher and student evaluations as other authors have done. The participant was 100% accurate without a contingency for accurate self-monitoring.

Taken together, these studies present some common findings. First, function-based interventions that include self-management components are effective for addressing both problem behaviors and replacement behaviors. Second, differential reinforcement of incompatible, alternative, or other behaviors are the most common consequence types in self-management programs. Third, while self-management programs contain components that require the children to control their own behavior, teachers and caregivers are still required to perform some components, such as helping students to determine their goals and ensuring that any rewards and consequences are delivered appropriately.

Purpose and Research Questions

Questions emerge from the available research on this topic. First, even though self-monitoring and self-evaluation can be effective without additional consequences (Lalli & Shapiro, 1990), research on function-based interventions frequently includes examples of rewards for the behavior being monitored. Thus, the added effect of consequences derived from FBA to self-monitoring is unclear. Second, teachers can be effective change agents for problem behavior by delivering consequences for replacement or alternative behaviors on varying reinforcement schedules (Hall et al., 1968). In some instances, if schedules of reinforcement are too lean for a given behavior, behaviors may remain unchanged.

The purpose of the present study was to implement function-based self-management interventions for three children with E/BD. A secondary purpose was to analyze the intervention

components by implementing self-monitoring and rewards separately and together. This study addressed the following questions:

1) To what extent can functional behavior assessment be used to design self-management interventions as measured by (a) interview responses, (b) direct observation of student classroom behaviors, and (c) observation of student disruptive behaviors during functional analysis conditions of escape, adult attention, and peer attention?
2) What are the effects of the separate components of a function-based self-management intervention as measured by student on-task, disruptive, and compliance behaviors during self-monitoring alone, function-based consequences alone, and self-monitoring plus function-based interventions?
3) To what extent can teachers implement function-based self-management interventions with fidelity and what are some collateral effects of function-based intervention on teacher behavior as measured by direct observations of teacher behaviors and fidelity checklists?

Method

Participants and Setting

Teachers. Three teachers participated in the present study (see Table 1). The teachers had varying degrees of experience ranging 3 to 15 years, and each held full certification. All teachers had participated in the students' most recent Individualized Education Plan (IEP) meetings. Teacher 1 was the special education teacher in charge of managing the students' IEP documentation, designing behavior interventions, and coordinating extra services for each student. Teachers 2 and 3 were general education teachers who served students from Teacher 1's self-contained special education class at different times of the day. They were responsible for implementing behavior and academic interventions in their classrooms.

Table 1

Teacher Demographic Information

	Teaching experience (yrs)	Gender	Ethnicity	Highest degree	Current grade	Teaching certificate
Teacher 1	15	Female	Caucasian	Master's	SPED 1-6	Special Education
Teacher 2	6	Female	Caucasian	Master's	2	Elementary Education
Teacher 3	3	Female	Caucasian	Master's	3	Elementary Education, English as a Second Language

Students. Three students participated in the present study (see Table 2). The students were from a self-contained public school program for children with serious emotional and behavioral disorders (E/BD) and were nominated by their classroom teacher to participate in the study. Signed consent forms were received for each student. During the course of the study,

each student was receiving special education services under different special education labels, but each had been placed in the self-contained program due to high rates of problem behavior and failed interventions in their previous school placements. All students functioned at or below grade level. Jeremiah and Ben participated in grade-level academic work, while Isaac performed at least three grades below in all core skill areas. All students and their parents spoke English as their native language. Isaac had been served in the self-contained program since first grade, Jeremiah had been served in a self-contained program since kindergarten, and Ben had been served in a self-contained program since first grade.

All students had vastly different social and developmental histories. Isaac had a history of abuse and neglect. This abuse led to his adoption by his maternal grandparents. Jeremiah lived with his mother as an only child in a single-parent home. He moved before his first grade year to the district where he lived at the time of the study. In his previous placement he was served in a self-contained special education program for children with E/BD. In the year prior to the present study, Ben's pediatrician had concerns regarding Ben's development due to behavioral characteristics similar to children diagnosed with autism, but a formal diagnosis had not been given.

Setting. The school in which this study took place was in a large urban area in the Midwest. At the time of the study, the school had over 460 students in grades 1 through 6. Of the students, 54.53% were Caucasian, 18.75% were Hispanic, 15.75% were African-American, and 10.99% were other ethnic minorities. Over 72% of the students at the school were economically disadvantaged.

Table 2

Student Demographic Information

Name, Gender	Age, Ethnicity	Grade	IDEA label	Psychiatric diagnoses	IQ
Isaac Male	12-4, Caucasian	6	Emotional Disturbance	Post- traumatic stress disorder, reactive attachment disorder	67[a]
Jeremiah Male	7-1, Caucasian	2	Other Health Impairment	Attention deficit hyperactivity disorder, oppositional defiance disorder, post-traumatic stress disorder	Average[b]
Ben Male	9-8, Caucasian	3	Developmental Delay	Attention deficit disorder, oppositional defiance disorder	94

Note. [a] Caution urged by psychodiagnostician regarding score interpretation due to student non-compliance during testing. [b] Score unavailable, reported as "average" in IEP and psychological report.

Isaac received all instruction in a special education classroom. Staffing for Isaac was either 1 or 2 adults (teacher and paraprofessional). For more than 50% of the day, Isaac was the only student in the classroom. Jeremiah received instruction in general education classes. During the study, there were several paraprofessionals in the room, but paraprofessionals rarely interacted with Jeremiah. Ben received instruction in general education classes. During the study sessions, there was a paraprofessional in the classroom, but the paraprofessional rarely interacted with Ben. In Jeremiah's and Ben's classrooms, there were approximately 20 other students, and the classroom was arranged with tables of 3-5 students.

Prior to baseline data collection, the teacher was asked which time of day the child engaged in problem behavior most frequently, and observations were conducted to confirm the teacher's assessment. Both baseline and intervention sessions were then scheduled during the time of day that the teacher reported that the children engaged in the highest rates of problem behavior. Isaac and Ben were observed during math lessons, and Jeremiah was observed during writing lessons.

Dependent Measures

Multiple methods of data collection were used throughout the course of the study. The *Multiple Option Observation System for Experimental Studies* (*MOOSES*; Tapp, Wehby, & Ellis, 1995) event recording was used for the behavioral measures (a) on-task behavior, (b) disruptive behavior, (c) student compliance, (d) teacher attention, and (e) opportunities to respond. *MOOSES* is a customizable observation system that is used on a Windows Mobile®-based PDA device. *MOOSES* allows observers to code duration (i.e., the number of seconds that a behavior occurs) and frequency (the number of occurrences of a behavior). *MOOSES* screen displays boxes for coding, a second timer, and start and stop buttons.

All observers for the study were trained on the observation system using practice videos and live opportunities until they reached a minimum of 85% agreement across all measures prior to observing. During practice opportunities, all observers observed for a total of 15 min per session. All observers were reliable following live practice opportunities.

Student Behavior Measures

On-task behavior. On-task was defined as the student attending to the material and the task (e.g., answering/asking questions related to the assignment, reading, writing, etc.), requesting assistance in an acceptable manner, making appropriate motor responses such as hand

raising, remaining seated, or waiting appropriately for the teacher to begin or continue with instruction. On-task behavior was coded as a duration code. To be coded, on-task behavior had to occur for at least 3 s (3 seconds) before the code was entered. Observers could toggle between on-task behavior and off-task behavior using the *MOOSES* program. The two behaviors were mutually exclusive and each had to occur for 3 s for toggling to occur. At the end of the observation, on-task behavior would be summarized as a percent of total session time that the child was on-task.

Disruptive behavior. Disruptive behavior was defined as behavior that included talking to adults or peers when not appropriate, making noises with mouth or materials, or making motor movements that generate noise in the classroom. Disruptive behavior was coded as a frequency code. A cessation of 3 s was required for disruptions to be considered separate occurrences. Talking to peers and other vocal behaviors were counted with specific starts and stops in an interchange, as long as 3 s occurred in between each interchange. At the end of the observation, disruptive behavior was summarized as rate of occurrences per minute.

Compliance. Compliance was defined as student responses to a request, prompt, or demand from the teacher and had to occur within 5 s. To be considered compliance, the response had to match the teacher's request. Compliance was a frequency code and was presented on the graphs as percentage of responses coded as compliance by dividing compliance by the total of compliance and non-compliance.

Non-compliance. Non-compliance was defined the absence of a response following a teacher demand, prompt, or request. To be considered non-compliance, the absence of a response occurred following a 5 s pause after the teacher's demand, prompt, or request. Frequency of non-compliance was used to calculate the total percentage of compliance.

Teacher Behavior Measures

Teacher attention. Teacher attention, directed toward either disruptive or appropriate behavior, was included as a variable that can potentially influence student behavior (Hall, Lund, & Jackson, 1968; Sutherland, Lewis-Palmer, Stichter, & Morgan, 2008). Two types of teacher attention were coded for the present study. Praise was defined as positive statements directed at appropriate behavior (i.e., to the individual or to the group in which the child being observed was a part). Reprimands were defined as negative statements directed at disruptive individual or group behavior (i.e., the group in which the child being observed was a part). Both praise and reprimands were frequency codes and were summarized as total number of praise or reprimands per session.

Opportunities to respond. Because increased opportunities to respond have been associated with increases in student academic engagement (Skinner, Pappas, & Davis, 2005), opportunities to respond were included as a variable in the study. These opportunities were recorded and analyzed as part of experimental control to ensure that they occurred at similar rates across phases. Opportunities to respond were defined as the number of opportunities that a child had to follow an academic or behavioral request, prompt, or demand from the teacher. Opportunities to respond were calculated by adding the total number of the student's compliance and non-compliance frequencies per session. Opportunities to respond were coded as frequency per session and displayed on the graphs as such.

Functional Behavior Assessment Measures

Functional Assessment Interview (FAI; O'Neill et al., 1997). Teacher interview data were collected using the structured interview in the O'Neill et al. (1997) manual. Sections included were (a) a description of the behavior of concern, (b) ecological events that predict

problem behaviors, (c) definitions of the antecedents, (d) consequences that follow the problem behaviors, and (e) a history of attempts to intervene on behalf of the child's behavior. Sample questions consisted of topography, frequency, and duration of problem behaviors; daily routines that may affect the child's behavior; how long the behavior has been a problem; and interventions that have been attempted.

ABC assessment tool. To observe antecedents, behaviors, and consequences, an adapted version of the Functional Behavioral Assessment Observation Form (Crone & Horner, 2003) was used. There were four columns on the form: (a) time, (b) antecedents, (c) behaviors, and (d) consequences. Observations were recorded on this form during all observation sessions. A sample of a completed form is found in Appendix D.

Implementation Quality Measures

Teacher fidelity. Fidelity was measured before, during, and after sessions. Fidelity was measured using a 5-item questionnaire that addressed variables before the session (goal setting, timer usage, and whether or not the self-monitoring sheet was used). During sessions, intervention components (i.e., reinforcer use and whether or not the timer was set appropriately) were measured using the aforementioned questionnaire. After sessions, an item was scored to note whether contingent reinforcement was provided to the student. Fidelity was summarized as a percent of total items delivered with fidelity on the fidelity form. The form used can be found in Appendix A. Fidelity information was only recorded during self-monitoring and the function-based self-management package interventions. The only fidelity item needed during the function-based consequences phase was whether or not the teacher provided the reinforcer at the end of the session. Fidelity during the self-monitoring averaged 50% (range = 40% to 60%)

across all self-monitoring phases. Fidelity during the function-based self-management package intervention was consistently 100% across all teachers and phases of the study.

Student self-monitoring accuracy. On the fidelity form (referenced above and in Appendix A), self-monitoring accuracy was measured. The time on the PDA when the student's timer emitted a beep was recorded on this form along with a Y (indicating *yes*) or N (indicating *no*) for student on-task behavior. At the end of a session, the student's self-monitoring sheets were compared to the fidelity form and instances of inaccuracy were circled. Accuracy was summarized as the percent of total responses that were accurate. Accuracy for Isaac for self-monitoring phases averaged 77.42% (range = 0% to 100%); for Jeremiah, 66.50% (range = 0% to 100%); and for Ben, 54.27% (range = 0% to 100%). During the function-based treatment package phases, the average accuracy remained at 100% across all students.

One factor that influenced self-monitoring accuracy was that the timer served as a cue for on-task behavior. Students were frequently observed off-task when the timer went off, and the student came back to the task and marked a "1" for on-task on their form. Therefore, from the observer's view, the child was off-task when the timer went off, and therefore the child's recording was inaccurate if he marked a "1" This could explain how students could be on-task for 50-70% of the time, yet still be considered inaccurate on their recording.

Implementer Satisfaction Measures

Treatment acceptability. A modified version of the Treatment Acceptability Rating Form (TARF-R; Reimers & Wacker, 1988; Van Norman, 2005) allowed teachers to rate the intervention on several levels of acceptability. The TARF-R rating scale covers (a) willingness (items 3, 4, 15, and 19), (b) acceptability and reasonability (items 2 and 8), (c) fit with the classroom (items 11 and 20), (d) cost (items 5 and 13), (e) effectiveness (items 7, 9, and 12), (f)

preference for the intervention (item 14), (g) understanding of the procedures (item 1), (h) disadvantages (items 6, 16, and 17), and (i) student seriousness of problem behavior (items 10 and 18). All items are on a 7-point Likert scale. There are a total of 20 questions on the TARF-R. All 3 teachers completed the TARF-R form. A copy of the TARF-R form can be found in Appendix B.

Social validity. A nine-question social validity questionnaire was created using a 7-point Likert scale. Questions asked about (a) the goals of the proposed intervention (items 1, 2, and 3), (b) acceptability of the intervention (items 4, 5, and 6), and (c) effectiveness of the intervention (items 7, 8, and 9). Teachers were provided the students' graphs along with the social validity questionnaire and told to refer to the graphs as they answered the questions. A copy of the social validity questionnaire can be found in Appendix C.

Data Collection Procedures

Session data. Data were collected, across all conditions, in the students' classrooms during the time of day that was selected by the teacher as the most difficult for the child (e.g., the time that the teacher reported that the child engaged in highest rate or intensity of problem behavior). Generally the class periods in which the observations occurred ranged between 15 and 30 min, but due to school schedules, the length of class time varied. All sessions began at the same time each day for each student. Sessions were 5 min in length, and multiple sessions could be held each day, during the designated content time. If more than one session was held in a day, then there were 2 to 5 min between each observation. The purpose of this interval was to ensure time during the various phases that the child could receive rewards, short breaks, or score his self-monitoring sheet. Sessions were not held if the child's schedule was different for that day or if the child was unavailable due to testing or extra services (i.e., speech and language

intervention, social worker, medical, or counselor). Data were collected over the period of three months and sessions were held as frequently as possible. During the course of the study, data were not collected due to student absences, several Fridays when school was not in session, and one week of spring break. On the days when data were collected, an average of three sessions were held per day per child during all phases (range = 2.94 to 3.64).

Functional behavioral assessment data. Data collected during the FBA condition consisted of (a) teacher interviews, (b) ABC direct observation assessment of problem behavior in the classroom, and (c) disruptive behavior recorded with *MOOSES* during functional analysis conditions (see Procedures section).

Interobserver agreement. A second observer recorded behavior simultaneously during all phases of the study to ensure that observers were reliable and accurate. During the course of the entire study, interobserver-observer agreement (IOA) data were collected for 25.58% of all sessions. IOA was calculated using the *MOOSES* computer-based software. IOA was calculated by the program using time window analysis, which separates the total observation time into 3 s intervals. If both observers recorded an occurrence of behavior in the same interval, then it was considered an agreement. Then, the *MOOSES* software divided the number of agreements by the sum of agreements and disagreements. The resulting ratio was converted to a percentage. Agreement was 94.91% (range = 55.23% to 100%) for on-task behavior, 84.94% (range = 77.11% to 93.18%) for disruptive behavior, 73.42% (range = 61.78% to 85.07%) for compliance, and 90.85% (range = 84.17% to 95.83%) for teacher attention. Agreement was not calculated for opportunities to respond because there was no specific code for opportunities to respond; they were analyzed post-hoc by dividing compliance by the sum of compliance and non-compliance. Agreement was 85.82% (range = 61.78% to 94.91%) across all variables.

Procedures

Materials. Materials used for this study were a silent timer, self-monitoring sheet, and reinforcer tickets. The silent timer was the Polder® Buzz & Beep kitchen timer that could emit a "beep" noise or vibrate. Throughout the study, Isaac was the only student in his classroom, so he could choose to use the beep or the vibration. Jeremiah and Ben had their timers set to vibrate so that the classroom was not disturbed. The self-monitoring sheet was the same for all participants. The skills on the sheet were reminders to the student which behaviors were "on-task" behaviors. Figure 1 displays the self-monitoring sheet. Reinforcer tickets were provided to the students during the function-based self-management package phase. Tickets were exchanged for 1 min of break time (either with peers or without depending on identified behavioral function). Break tickets are shown in Figure 2.

On Task Sheet

Date: _____

Goal: ____

Do the following to be on task:

1. Follow directions the 1st time
2. Ignore others' inappropriate behavior
3. Stay in your seat
4. Raise your hand to get the teacher's attention

1.	2.	3.	4.	5.
6.	7.	8.	9.	10.

1 = Yes! ☺ I was on task!
0 = No ☹ I was not on task.

Figure 1. Self-monitoring sheet.

Figure 2. Break tickets.

Baseline. During baseline, the child was observed during the time that he engaged in the highest rate of problem behavior during the day. This time remained the same throughout all conditions. Teachers were told to conduct their classroom teaching, including assignments, instructional tasks, and classroom management as they normally would. When stability in both level and trend was established for on-task behavior and disruptive behavior, self-monitoring was implemented.

Self-monitoring training. Before the self-monitoring phase, the teacher was taught the steps of the procedure. The researcher then set up a time to observe the intervention and to assist with its implementation. Students learned about the self-monitoring process in the setting in which the self-monitoring intervention was supposed to take place. The child was taught how to set a goal (i.e., how to divide the 5 min session according to their goal), how to mark the form, and how to show the teacher the completed form. During initial training sessions, the students were prompted to set a goal for 3 points to be earned during the 5 min session. The students were then prompted to set the timer for 1 min. Doing so provided the student opportunities to reach their goal with opportunities for mistakes. After several sessions, the students determined their own goal. Teachers assisted the students to ensure that the timer intervals would provide enough opportunities to reach the goal. After initial training, all three students frequently set goals of 4

and set 1 min intervals on their timers. The skills for on-task behavior were also taught to the students during this phase, using examples and non-examples of rule following. The rules were as follows: (a) follow directions the first time, (b) ignore others' inappropriate behavior, (c) stay in your seat, and (d) raise your hand to get the teacher's attention.

Self-monitoring sessions. During self-monitoring sessions, the child was provided the self-monitoring sheet, timer, and a pencil. The teacher reviewed with the child the skills that constituted on-task behavior. Then the child was asked to set a goal for the next 5 min. The child set the timer, and the teacher began normal instruction. When the timer vibrated or emitted a beeping sound, the child determined whether or not he was on-task. If he determined he was on-task, he would write a "1" in a box. If he determined he was not on-task, he would write a "0" in a box. At the end of the session, the child determined if he met the goal he had set based on the total number of "1" marks in the boxes. During self-monitoring sessions, the teacher was instructed not to praise, give breaks, or otherwise reinforce the child's behavior for accuracy, on-task behavior, or reaching the goal. When stability in both level and trend was established for on-task and disruptive behavior, a functional behavior assessment was conducted.

Functional behavior assessment. Several functional behavior assessment (FBA) methods were used. First a structured interview was conducted using the interview found in O'Neill et al. (1997). The goal of the interview was to obtain a clear definition of the child's problem behavior, times of day that were associated with higher rates of problem behavior, and hypothesis statements regarding antecedent and consequent stimuli that prompt and reinforce problem behavior. Following the interview, the teacher was provided with the hypothesis statement (for example, "Johnny throws his papers on the floor to escape from the academic demand") and asked to rate on a scale of 1 – 10 how confident she was with that statement.

Following the interview, at least two observations per student were conducted that focused on observing antecedents and consequences to the problem behavior (ABC observations). Each observation was approximately 20 min and each observation had a second observer present for reliability. An example form is provided in Appendix D.

After interviews and observations were conducted, functional analyses were conducted in the student's respective classroom with his classroom teacher. Each functional analysis was brief, with 3 or fewer sessions per condition. All functional analysis conditions were 5 min in length. The purpose was to support the hypotheses identified during interviews and observations with experimental data. The protocol published in Bessette and Wills (2008) and Skinner, Veerkamp, Kamps, and Andra (2009) was used for the escape, attention, and control conditions. If the child engaged in destructive, aggressive, or self-injurious behavior during the functional analysis conditions, the condition would be terminated, but at no time did any behavior on this scale occur. The protocol for all functional analysis conditions can be found in Appendix E.

During the escape condition, the teacher prepared 5 low-preference tasks for the student. Then, the teacher asked the student to work on the assignment while she set the timer for 1 min. If the child began working on the assignment within 5s, the teacher praised him; if not, the teacher would prompt the child a second time, and praise if the child complied. If the child did not comply after the second prompt, the teacher told the child to take a short break. At the end of the 1 min, the teacher repeated the demand for a different assignment. This was repeated until five trials had been completed.

During the teacher attention condition, the teacher provided the student with a neutral task (i.e., a task that the student neither preferred nor disliked). The student was asked to work on that task. If the child engaged in the disruptive behavior, then the teacher provided attention

in the form of mild reprimands (i.e., “don’t do that”). If the child did not engage in the problem behavior he was ignored by the teacher for the duration of the 5 min.

A peer attention condition was created for Jeremiah. Peers at his table were told to ignore him until he talked to them. When Jeremiah talked to them, they could respond. Peer attention was on a fixed ratio schedule of reinforcement for each response (FR1).

During the play (control) condition, the child was allowed to engage in a highly preferred task (i.e., computer games). The child was left at the task by the teacher, while the teacher sat away and worked with other children or materials. Each minute the teacher provided some form of positive attention (i.e., praise) if the child was engaging in the activity.

Function-based self-management. After the functional behavioral assessment was conducted, treatment packages containing self-monitoring and consequences for appropriate and disruptive behavior were created for each participant. Table 3 provides specific interventions for each participant, as designed to address the identified function from the functional analysis results. Disruptive behaviors of two students were found to be maintained by escape from demands. For Jeremiah, peer attention maintained problem behaviors. The self-monitoring procedures were the same as the self-monitoring condition. Consequences for appropriate behavior were contingent upon reaching the goal. These consequences included break tickets to be turned in for 1 min breaks, or break tickets for 1 min with a friend. Consequences for problem behavior were in the form prompts for on-task behavior and were contingent upon disruptive responses. A protocol was distributed to the teachers and reviewed and practiced with the teachers prior to implementing the intervention. The protocol can be found on Table 4.

Table 3

Function-Based Interventions for Each Student

Student	Antecedents	Disruptive behavior	On-task behavior	Replacement behavior
Isaac	Provided self-monitoring sheet, and set a goal	Prompts to remain on-task	1 min break ticket for reaching self-monitoring goal	1 min break if student requested a break using ticket
Jeremiah	Provided self-monitoring sheet, and set a goal	Prompts to remain on-task	1 min break with a friend ticket for reaching self-monitoring goal	1 min with a peer if the student requested using ticket
Ben	Provided self-monitoring sheet, and set a goal	Prompts to remain on-task	1 min break ticket for reaching self-monitoring goal	1 min break if student requested a break using ticket

Table 4

Function-Based Self-Management Intervention Protocol

1. Gather all materials for academic instructional period.

2. Provide the student a copy of the self-monitoring sheet.

3. Review the rules with the student. Check for understanding as necessary.

4. Ask the student to set his goal and calculate time intervals as necessary.

5. Set your timer or record the time for 5 min

6. Make sure that the student sets his timer.

7. Prompt student to set timer during the session (as necessary).

8. If the student reaches his goal, he may receive his ticket. Whichever ticket the child received (break alone or break with peers, as indicated by FBA), he may use the ticket at the end of the 5 min session or he may delay it for another time. If the student does not receive a ticket, tell him to do better next time.

Function-based consequences. After a demonstration of the effects of the function-based self-management package, the self-monitoring component was removed and the ticket consequences remained. Tickets had to be delivered slightly differently than during the packaged intervention. The teacher controlled the dispersion of the tickets. After 5 min, if the student had been on-task according to the teacher's judgment, then he would receive one ticket. During each session, the teacher and child reviewed the on-task skills, and the student was told that if he was on-task that he would receive 1 ticket. After the child received the ticket, he was told he could use the ticket for a break or time with a friend at that moment (as in other conditions) or later. This phase was conducted until stable levels and trends were determined.

Research Design

A single-case, ABCBCDC reversal design (Kennedy, 2005) was used to demonstrate experimental control. Conditions were the baseline (A), effects of the self-monitoring component alone (B), the function-based self-management package (C), and the function-based consequences component (D). This allowed the effects of the function-based self-monitoring package to be compared to self-monitoring alone and consequences alone.

Analysis

Visual analysis. Visual analysis was conducted by observing within- and between-phase patterns. Within-phase patterns included level, trend, and variability. Between-phase patterns included overlap and immediacy of the effect. Visual analysis was conducted throughout the study to select times to implement interventions or remove interventions. The primary dependent variables inspected using visual analysis methods were on-task and disruptive behavior.

Quantitative analysis. Descriptive statistics were used to summarize the effects of the intervention on the various dependent measures. Mean and range summarized the level and variability of the measure. Effect size was calculated by pooling the participants' means and standard deviations across all conditions using Cohen's *d* (Cohen, 1988). Cohen's *d* is calculated by subtracting the pooled baseline means from the pooled intervention means, divided by the pooled standard deviations of both intervention and baseline conditions. Effect size was not calculated for the function-based consequences condition because there was only one phase and the conditions that occurred and followed function-based consequences were the function-based self-management treatment package.

Results

The results section is organized as follows. First, results from the functional behavior assessment interviews, observations, and functional analyses will be provided for each student. Then results from on-task behavior, disruptive behavior, compliance, and teacher behaviors (attention to appropriate behaviors and disruptive behaviors, and providing opportunities to respond) are provided. The study phases for all student participants was baseline (BL), self-monitoring (SM), functional behavior assessment (FBA), function-based self-management (FBSM), SM, FBSM, function-based consequences (FBC), and FBSM. The observational data are followed by information on treatment acceptability and social validity.

Isaac

FBA interview. A structured interview was conducted with Teacher 1 in a separate room away from the classroom. The teacher was most concerned with Isaac's behavior during low-preference academic tasks. Teacher 1 indicated that Isaac frequently engaged in disruptive behaviors when he was given assignments that required writing (primarily worksheets). Teacher 1 mentioned that if demands persisted, then Isaac would progress from disruptions, to throwing himself on the floor, to property destruction and physical aggression. Generally, the ordinary consequences for disruptive behavior included point loss from a token reward system and removal of demands; frequently Isaac was allowed to sleep through difficult or less-preferred tasks. The hypothesis that the majority of Isaac's disruptions are maintained by escape from difficult or low preference assignments was given a 90% likelihood rating by the teacher.

FBA (ABC) observation. Two 20-min observations resulted in mixed results. When Isaac engaged in frequent problem behaviors, he received reprimands and prompts to return to task. While reprimands are generally associated with a form of teacher attention, Isaac was also

disengaged (e.g., escaping) from the academic task. Given this confusion, a functional analysis was conducted to examine the escape hypothesis from the interview and the frequent attention noted during the observation.

Functional analysis. Functional analysis results are displayed in Figure 3. During the play (control) condition, Isaac engaged in problem behavior on the average of 0.20 disruptions per min (range = 0.00 to 0.40). During the escape condition, Isaac engaged in problem behavior on the average of 1.47 disruptions per min (range = 0.80 to 2.60). During the attention condition, Isaac engaged in problem behavior on the average of 0.20 disruptions per min (range = 0.00 to 0.40). Given these results, the functional analysis supported the interview and clarified the observations.

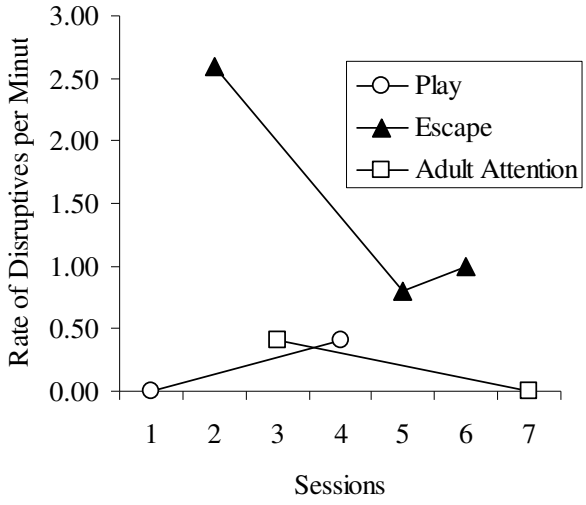

Figure 3. Functional analysis data for Isaac.

On-task behavior. Isaac's on-task data are shown in Figure 4. During baseline, Isaac remained on-task an average of 47.6% of the time (range = 12.7% to 81.0%). When self-monitoring was implemented, his on-task behavior increased slightly to an average of 56.3% (range = 17.7% to 100.0%). After the self-monitoring phase, the function-based intervention

was added to self-monitoring, increasing on-task behavior to 98.7% (range = 94.7% to 100.0%). Withdrawing the function-based intervention resulted in an average of 59.5% (range = 36.7% to 96.3%). When the function-based interventions were added a second time, the average time on-task increased to 97.9% (range = 95.3% to 100.0%). When function-based consequences condition began, on-task behavior decreased to an average of 63.8% (range = 27.0% to 92.3%). When self-monitoring was added to the consequences, on-task behavior increased to an average of 99.6% (range = 96.7% to 100.0%).

Disruptive behavior. Isaac's disruptive behavior data are shown in Figure 4. During baseline, Isaac engaged in disruptive behavior an average of 1.81 times per min (range = 0.20 to 4.20). When self-monitoring was implemented, his disruptions reduced slightly to an average of 1.51 per min (range = 0.20 to 2.60). After the self-monitoring phase, the function-based intervention was added to self-monitoring, decreasing disruptions to 0.16 per min (range = 0.00 to 0.60). Withdrawing the function-based intervention resulted in an average of 2.48 disruptions per min (range = 0.60 to 4.20). When the function-based interventions were added a second time, the average disruptions decreased to 0.09 per min (range = 0.00 to 0.20). When function-based consequences condition began, disruptions increased to an average of 1.42 per min (range = 0.40 to 3.60). When self-monitoring was added to the consequences, disruptions decreased to an average of 0.13 per min (range = 0.00 to 0.60).

Compliance. Isaac's compliance data are shown in Figure 4. During baseline, Isaac was compliant on the average of 55.6% of opportunities (range = 0.0% to 100.0%). When self-monitoring was implemented, his compliance decreased to an average of 47.7% of opportunities (range = 0.0% to 100.0%). After the self-monitoring phase, the function-based intervention was added to self-monitoring, increasing compliance to 92.9% of opportunities (range = 50.0% to

100.0%). Withdrawing the function-based intervention resulted in compliance at an average of 49.4% of opportunities (range = 25.0% to 100.0%). When the function-based interventions were added a second time, the average compliance increased to 89.6% of opportunities (range = 33.3% to 100.0%). When function-based consequences condition began, compliance decreased to an average of 58.6% of opportunities (range = 0.0% to 100.0%). When self-monitoring was added to the consequences, compliance increased to 100.0% of opportunities (all sessions were at 100.0%).

Jeremiah

FBA interview. A structured interview was conducted with Teacher 2 in the classroom after school. The teacher was most concerned with Jeremiah's behavior during independent seat work and group projects. Teacher 2 described a chain of problem behavior that occurred when his peers tried to ignore him. She said that Jeremiah would engage in talking or noises "to distract others." If the peers ignored Jeremiah, he would say something that was slightly aggressive or meant to provoke a response from the peer. If peers did not respond, he would start over with another peer. Generally, the ordinary consequences for disruptive behavior included point loss from a token reward system, reprimands, or loss of other opportunities such as recess. The teacher was asked directly, "What do you think [Jeremiah] receives from these disruptions?" Her response was, "Attention from his friends." The teacher was 90% sure of this hypothesis.

FBA (ABC) observation. Two 30-min observations showed that the majority of Jeremiah's problem behaviors were allocated to talking to his peers or making noises. The majority of disruptions resulted in peer attention or peer verbal responses. Some teacher attention occurred in the form of reprimands, but this attention was infrequent.

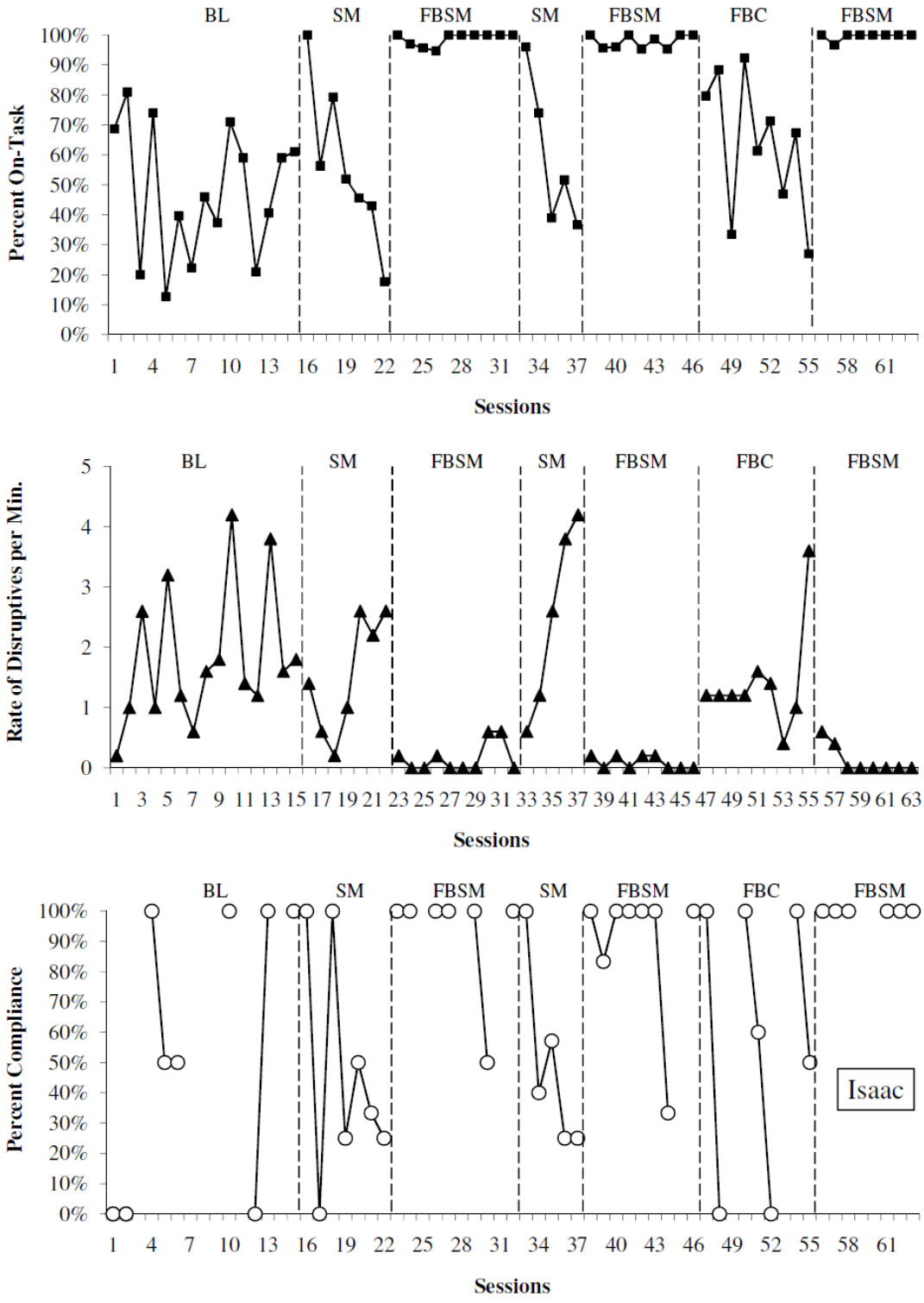

Figure 4. Isaac's data for baseline (BL), self-monitoring (SM), function-based self-management (FBSM), and function-based consequences (FBC). Missing lines on the compliance graph reflect sessions without opportunities for the child to respond.

Functional analysis. During the interview, Teacher 2 identified peer attention as the most likely variable maintaining Jeremiah's behavior. Therefore, several experimental conditions were designed to rule out other possible sources of reinforcement for the disruptive behavior. First, an analysis of the grouping was conducted (see Figure 5). The teacher normally placed the students in tables of 3-5 students. In the grouping analysis, Isaac was removed from his group and placed at a table by himself. Disruptive behavior occurred at 1 or fewer disruptions per min under these conditions. When he was moved back to his normal table with peers present, Jeremiah's disruptions increased to more than 4 per min, which was similar to baseline.

The brief functional analysis was then conducted to test the effects of peer attention, no consequences, and escape. During the peer attention conditions, Jeremiah engaged in disruptive behaviors on the average of 3.33 per min (range 2.4 to 4.4). During the play (control) condition, Jeremiah engaged in disruptive behaviors on the average of 0.6 per min. During the escape condition, Jeremiah engaged in disruptive behaviors on the average of 0.4 per min. Given these results, peer attention was determined to be the function of Jeremiah's disruptive behavior.

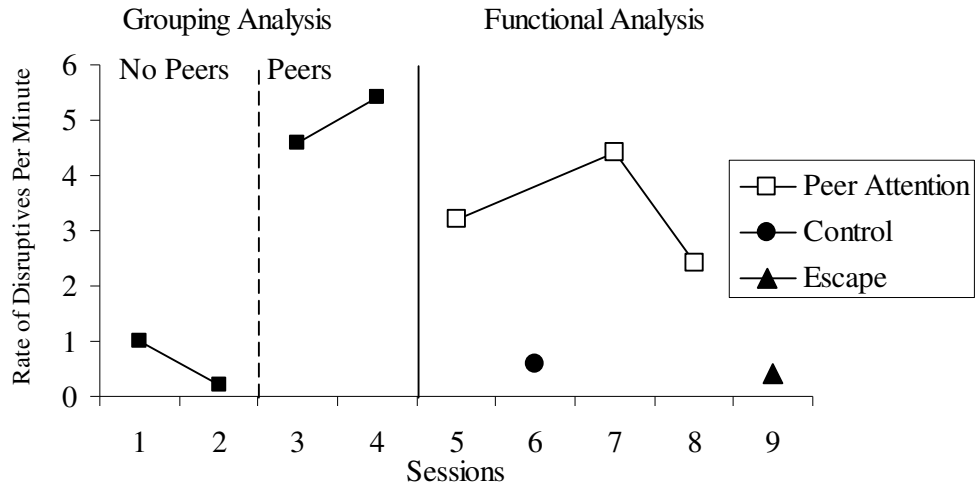

Figure 5. Functional analysis data for Jeremiah.

On-task behavior. Jeremiah's on-task behaviors are shown in Figure 6. During baseline, Jeremiah remained on-task an average of 32.9% of the time (range = 0.0% to 62.7%). When self-monitoring was implemented, his on-task behavior increased slightly to an average of 66.0% (range = 33.7% to 85.0%). After the self-monitoring phase, the function-based intervention was added to self-monitoring, increasing on-task behavior to 97.6% (range = 86.0% to 100.0%). Withdrawing the function-based intervention resulted in an average of 48.1% (range = 13.3% to 80.7%). When the function-based interventions were added a second time, the average on-task behavior increased to 99.1% (range = 94.7% to 100.0%). When the function-based consequences condition began, on-task behavior decreased to an average of 48.7% (range = 13.7% to 86.0%). When self-monitoring was added to the consequences, on-task behavior increased to an average of 97.8% (range = 85.0% to 100.0%).

Disruptive behavior. Jeremiah's disruptive behaviors are shown in Figure 6. During baseline, Jeremiah engaged in disruptive behavior an average of 4.72 times per min (range = 1.60 to 7.00). When self-monitoring was implemented, his disruptions reduced to an average of 2.36 per min (range = 1.00 to 4.80). After the self-monitoring phase, the function-based intervention was added to self-monitoring, decreasing disruptions to 0.17 per min (range = 0.00 to 0.60). Withdrawing the function-based intervention resulted in an average of 3.28 disruptions per min (range = 1.00 to 4.40). When the function-based interventions were added a second time, the average disruptions decreased to 0.43 per min (range = 0.00 to 1.00). When the function-based consequences condition began, disruptions increased to an average of 1.70 per min (range = 0.00 to 3.00). When self-monitoring was added, disruptions decreased to an average of 0.28 per min (range = 0.00 to 0.60).

Compliance. Jeremiah's compliance is shown on Figure 6. During baseline, Jeremiah was compliant on the average of 28.6% of opportunities (range = 0.0% to 100.0%). When self-monitoring was implemented, compliance increased to an average of 50.0% of opportunities (range = 0.0% to 100.0%). After the self-monitoring phase, the function-based intervention was added to self-monitoring increasing compliance to 100.0% of opportunities (all sessions were at 100.0%). Withdrawing the function-based intervention lowered compliance to an average of 25.0% of opportunities (range = 0.0% to 50.0%). When the function-based interventions were added a second time, the average compliance increased to 100.0% of opportunities (all sessions were at 100.0%). When the function-based consequences condition began, compliance decreased to an average of 6.7% of opportunities (range = 0.0% to 33.3%). When self-monitoring was added, compliance increased to 100.0% of opportunities (all sessions were at 100.0%).

Ben

FBA interview. A structured interview was conducted with Teacher 3 in a separate room away from the classroom while the students were in a different class. The teacher was concerned with Ben's behavior during the entire day, but specifically during math. Teacher 3 mentioned that if demands persisted, then Ben would progress from disruptions, verbal non-compliance, to threats, and eventually elopement. Generally, the ordinary consequences for disruptive behavior included point loss from a token reward system and removal of demands; frequently Ben was allowed to sleep in the room adjacent to his classroom. The teacher gave a 50% likelihood to the hypothesis that the majority of Ben's disruptions are maintained by escape from difficult or low preference assignments.

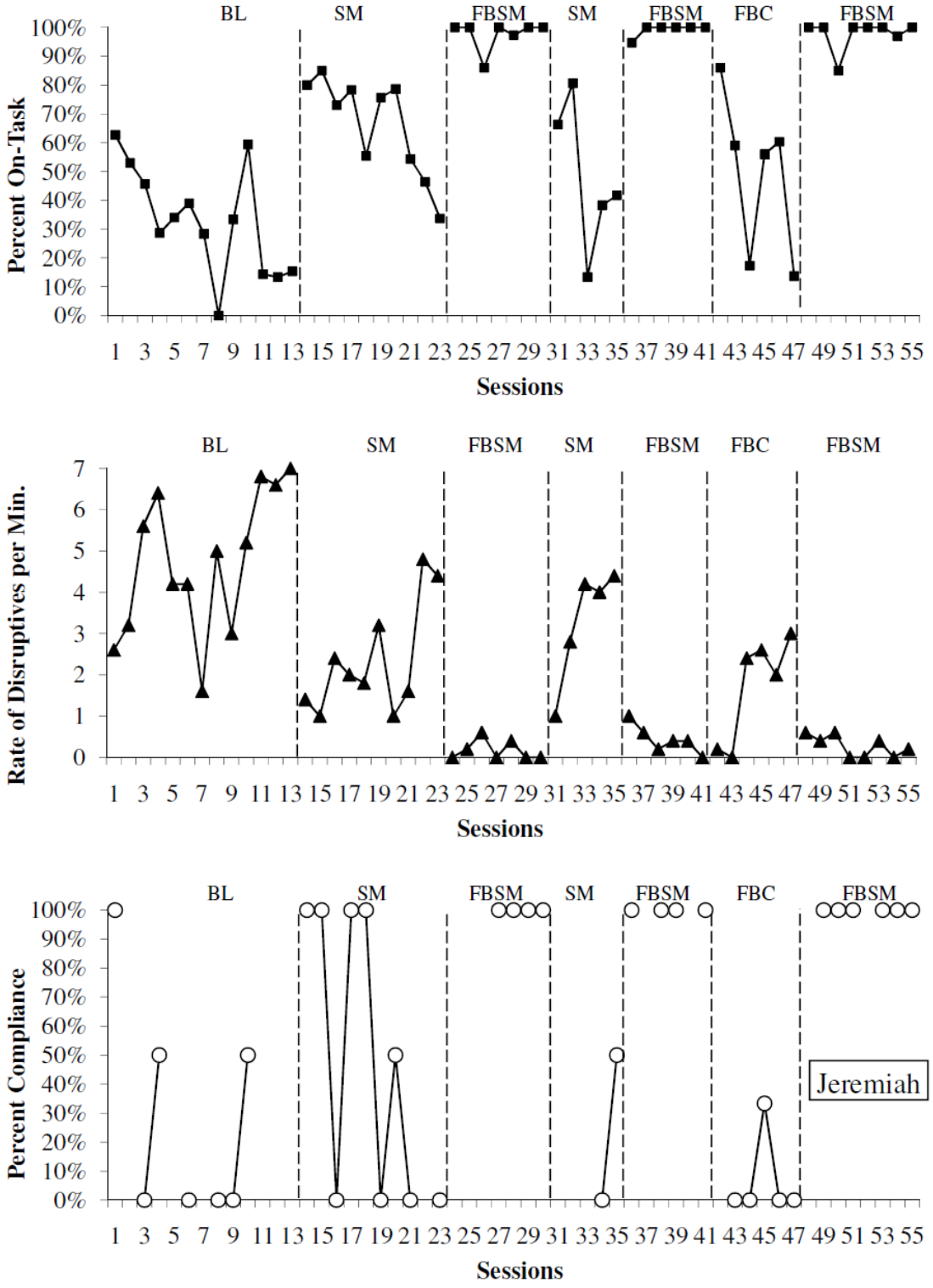

Figure 6. Jeremiah's data for baseline (BL), self-monitoring (SM), function-based self-management (FBSM), and function-based consequences (FBC). Missing lines on the compliance graph reflect sessions without opportunities for the child to respond.

FBA (ABC) observation. Three 30-min observations showed fairly stable results. When Ben was given a demand or request, he would generally not follow the request at the same rate as his peers. He would frequently remain off-task during the math assignments, and would occasionally engage in disruptions while he was off-task.

Functional analysis. Ben's functional analysis results are displayed in Figure 7. Functional analysis conditions were the same as for the other students, but for the protection of others and the child, the functional analysis only had 4 sessions (escape condition was conducted twice to replicate the finding). Between-session and within-session results are provided. During the first escape condition, Ben engaged in disruptive behaviors on the average of 5.2 per min (range = 0 to 9 per min). During the play (control) condition, Ben did not engage in disruptive behavior. During the attention condition, disruptive behaviors occurred on the average of 1.0 per min (range = 0 to 2 per min). During the final escape condition, Ben engaged in problem behavior on the average of 4.8 per min (range = 3 to 6 per min). Given these results, the functional analysis supported the interview and the observations.

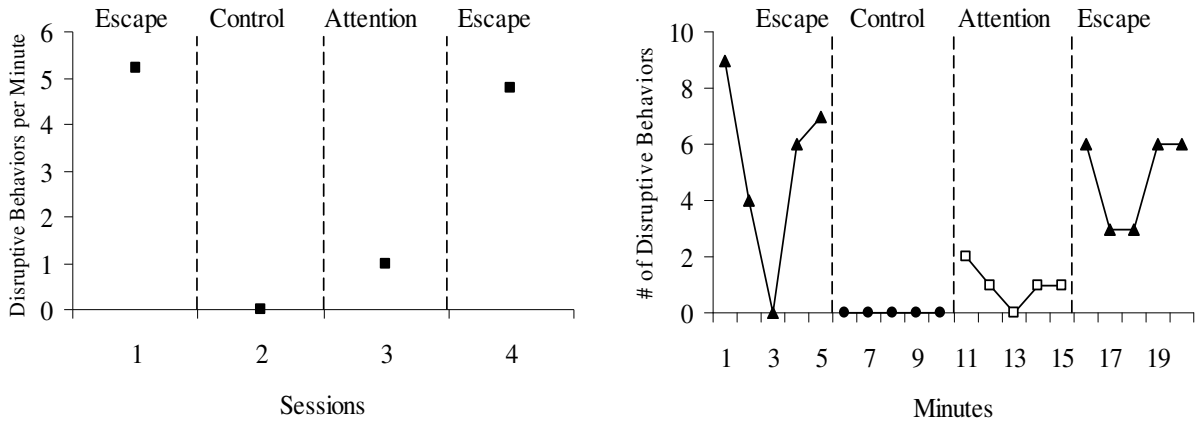

Figure 7. Functional analysis data for Ben. The left panel shows the rate of disruptive behaviors per session. The right panel shows the number of disruptive behaviors for each min during the 5-min sessions.

On-task behavior. Ben's on-task behaviors are shown in Figure 8. During baseline, Ben remained on-task an average of 30.6% of the time (range = 8.0% to 100.0%). When self-monitoring was implemented, his on-task behavior increased slightly to an average of 38.6% (range = 2.0% to 78.0%). After the self-monitoring phase, the function-based intervention was added to self-monitoring, increasing on-task behavior to 97.3% (range = 91.0% to 100.0%). Withdrawing the function-based intervention resulted in an average of 48.1% on-task (range = 23.0% to 64.7%). When the function-based interventions were added a second time, the average time on-task increased to 98.1% (range = 92.7% to 100.0%). When function-based consequences condition began, on-task behavior decreased to an average of 58.7% (range = 42.3 to 76.3%). When self-monitoring was added, on-task behavior increased to an average of 100.00% (range = 100.0% to 100.0%).

Disruptive behavior. Ben's disruptive behavior is shown in Figure 8. During baseline, Ben engaged in disruptive behavior an average of 1.27 times per min (range = 0.00 to 4.00). When self-monitoring was implemented, his disruptions increased to an average of 1.63 per min (range = 0.00 to 4.20). After the self-monitoring phase, the function-based intervention was added to self-monitoring, decreasing disruptions to 0.13 per min (range = 0.00 to 0.40). Withdrawing the function-based intervention resulted in an average of 0.93 per min (range = 0.40 to 1.40). When the function-based interventions were added a second time, the average disruptions decreased to 0.12 per min (range = 0.00 to 0.40). When the function-based consequences condition began, disruptions increased to an average of 1.13 per min (range = 0.40 to 1.80). When self-monitoring was added, disruptions decreased to an average of 0.15 per min (range = 0.00 to 0.40).

Compliance. Ben's compliance is shown on Figure 8. During baseline, Ben was compliant on the average of 75.0% of opportunities (range = 50.0% to 100.0%). When self-monitoring was implemented, compliance decreased to an average of 28.6% of opportunities (range = 0.0% to 100.0%). After the self-monitoring phase, the function-based intervention was added to self-monitoring, increasing compliance to 100.0% of opportunities (all sessions were at 100.0%). Withdrawing the function-based intervention resulted in a compliance average of 50.0% of opportunities (a single session was at 50.0%). When the function-based interventions were added a second time, the average compliance increased to 100.0% of opportunities (all sessions were at 100.0%). When the function-based consequences condition began, compliance decreased to an average of 37.5% of opportunities (range = 0.0% to 75.0%). When self-monitoring was added to the consequences, compliance increased to 80.6% of opportunities (range = 67.7% to 100.0%).

Teacher Behaviors

Table 5 displays the means and ranges of teacher behaviors during the various conditions. In general, teachers praised more and reprimanded less during the various intervention phases. However this effect was not consistent across teachers and phases. For instance, Teacher 1 praised Isaac's behavior during the SM-1 phase on the average of 1.29 times per session and 0.20 times per session during the SM-2 session. Teachers provided additional opportunities to respond during the intervention phases, but as with praise and reprimands, this effect was not consistent across phases or teachers.

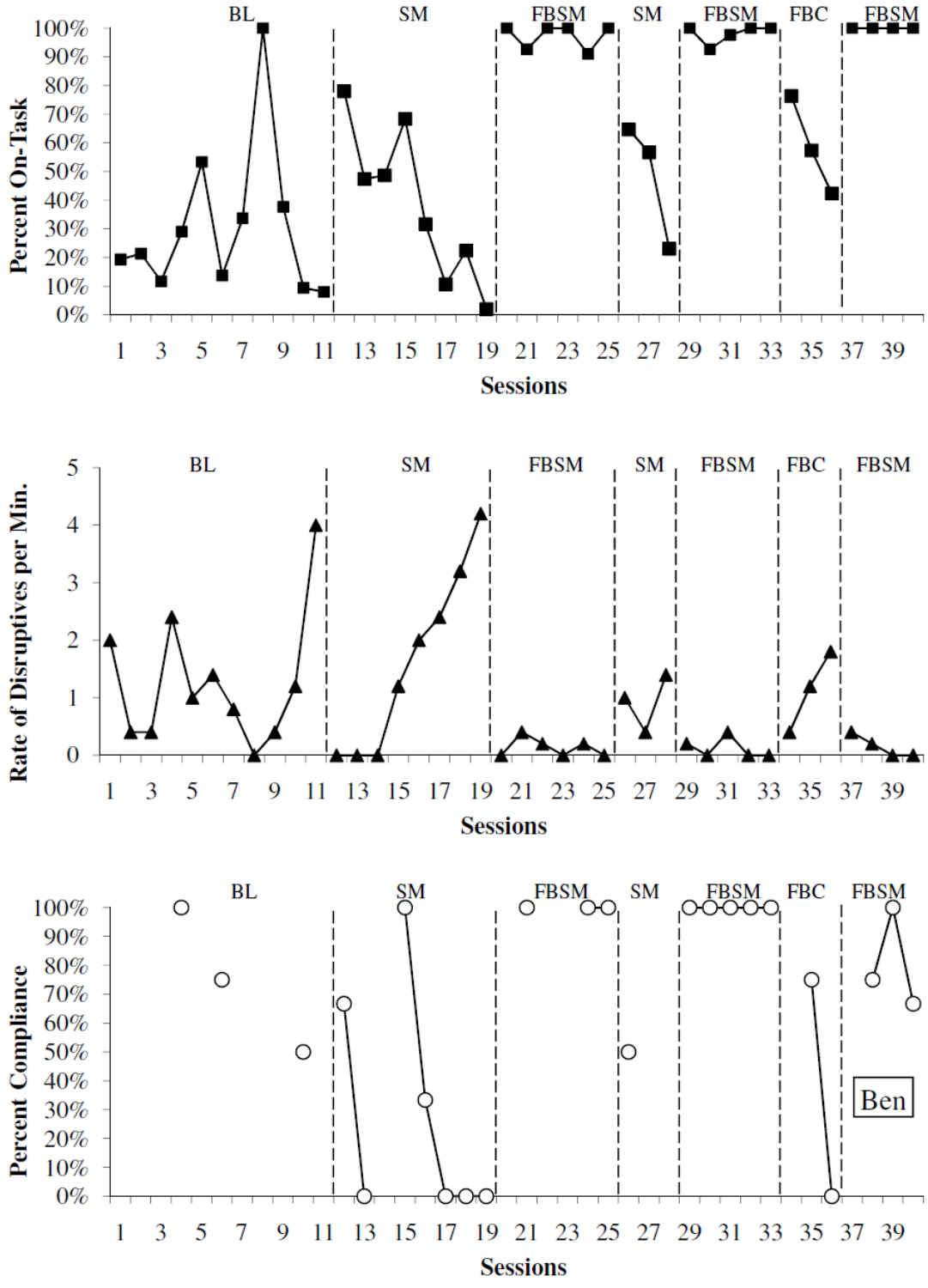

Figure 8. Ben's data for baseline (BL), self-monitoring (SM), function-based self-management (FBSM), and function-based consequences (FBC). Missing lines on the compliance graph reflect sessions without opportunities for the child to respond.

Table 5

Teacher Behaviors

			BL	SM-1	FBSM-1	SM-2	FBSM-2	FBC	FBSM-3
Teacher 1	Praise	Mean	0.53	1.29	1.1	0.2	1.11	0.56	0.88
		Range	0 - 3	0 - 3	0 - 4	0 - 1	0 - 4	0 - 1	0 - 2
	Reprimand	Mean	0.4	0.14	0.1	0.2	0	0.33	0.25
		Range	0 - 2	0 - 1	0 - 1	0 - 1	0 - 0	0 - 1	0 - 2
	OTR	Mean	1	2.71	1.1	4.2	3.22	1.67	2.25
		Range	0 - 4	1- 4	0 - 4	1 - 7	0 - 6	0 - 5	0 - 5
Teacher 2	Praise	Mean	0.15	0.2	0.14	0	0.17	0.5	0
		Range	0 - 1	0 - 1	0 - 1	0 - 0	0 - 1	0 - 2	0 - 0
	Reprimand	Mean	2.08	2	0.57	2.6	0.5	0.17	0.63
		Range	0 - 5	0 - 5	0 - 2	1 - 4	0 - 2	0 - 1	0 - 3
	OTR	Mean	0.85	1.3	1	1.4	0.67	2.33	1
		Range	0 - 2	0 - 4	0 - 3	0 - 6	0 - 1	0 - 4	0 - 2
Teacher 3	Praise	Mean	0.09	0	0.17	0	0	0	0
		Range	0 - 1	0 - 0	0 - 1	0 - 0	0 - 0	0 - 0	0 - 0
	Reprimand	Mean	0.73	0.88	0	1	0.4	0	0
		Range	0 - 4	0 - 4	0 - 0	0 - 2	0 - 1	0 - 0	0 - 0
	OTR	Mean	0.82	2	0.83	0.67	2.4	1.67	2
		Range	0 - 4	0 - 3	0 - 3	0 - 2	1 - 4	0 - 4	0 - 4

Overall Study Effects

Overall effects of the study are displayed in Tables 6 and 7. All students' data were summarized using means and standard deviations across all phases and sessions (see Table 6). These numbers were used to calculate effect sizes on student behaviors (i.e., on-task, disruptive,

and compliance) using Cohen's *d*, as displayed in Table 7. The study demonstrated large effects at increasing on-task and compliant behavior and reducing disruptive behavior (Cohen's categorization for effect size are small = 0.1 to 0.23, medium = 0.24 to 0.36, and large = 0.36 and greater).

Table 6

Pooled Means and Standard Deviations for Baseline (BL), Self-Monitoring (SM), Function-Based Self-Management (FBSM), and Function-Based Consequences (FBC)

		BL	SM	FBSM	FBC
On-task	Mean	41.39%	54.75%	98.31%	59.11%
	SD	21.11%	26.64%	3.38%	23.09%
Disruptive per min	Mean	2.63	2.07	0.18	1.47
	SD	2.03	1.43	0.23	0.97
Compliance	Mean	48.68%	42.92%	95.83%	37.02%
	SD	42.88%	39.55%	13.47%	42.65%
Praise per min	Mean	0.28	0.32	0.49	0.44
	SD	0.65	0.74	0.95	0.62
Reprimand per min	Mean	1.05	1.18	0.27	0.22
	SD	1.52	1.49	0.65	0.43
OTR per min	Mean	0.90	2.05	1.62	1.89
	SD	1.21	1.77	0.95	1.53

Implementer Satisfaction

Results from the TARF-R are displayed in Tables 8 and 9. Overall, each teacher found the treatments acceptable for her student. Some responses showed some degree of discrepancy among the three teachers (e.g., items 12 and 13), but the majority of the time the teachers agreed within 1 or 2 points of each other on the 7-point scale. One discrepancy between the special

Table 7

Effect Sizes for Self Monitoring (SM) and Function-Based Self-Management (FBSM)

	SM	FBSM
On-task	0.56	2.29
Disruptive[a]	-0.32	-1.85
Compliance	-0.14	1.79

Note. [a]Targeted for reduction.

education teacher (Teacher 1) and the general education teachers existed for the effectiveness questions. On items 7 and 12, the special education teacher expressed the highest level of acceptability (7), while the general education teachers ranked the items in the middle range (4). Two additional discrepancies that emerged among special education and general education teachers were in willingness to implement the intervention and likeability of the intervention (items 14 and 15), with the special education teacher ranking the intervention with a 7 and both general education teachers ranking a 5.

Social Validity

Results from the social validity questionnaire are displayed on Tables 10 and 11. There were a few discrepancies among the three teachers. On item 5, for example, Teacher 2 was less likely to use a self-management intervention than the other two teachers. Overall, each teacher considered the goals, acceptability, and effectiveness of the interventions to be socially valid.

Table 8

Item-by-Item Responses to the TARF-R

Question	Teacher 1	Teacher 2	Teacher 3	Average
1. How clear is your understanding of the suggested procedures?	7	5	6	6
2. How acceptable do your find the strategies to be regarding your concerns about the identified student?	7	6	5	6
3. How willing are you to implement the suggested protocol as it was described?	7	7	7	7
4. Given the student's behavior issues, how reasonable do you find the suggested procedures?	7	6	5	6
5. How costly will it be to implement these strategies?	1	1	2	1.3
6. To what extent do you think there might be disadvantages in following the procedures suggested in	3	4	2	3
7. How likely are the suggested procedures to make a permanent improvement in the student's behavior?	7	4	4	5
8. Given the student's problem behavior and the suggested time to implement the suggested procedures, how reasonable do you find the time requirements to be?	7	5	6	6
9. How confident are you that the suggested procedures will be effective?	6	4	5	5
10. Compared to other students in the classroom, how serious is this student's problem behavior?	7	5	7	6.3
11. How disruptive will it be to your classroom to implement the suggested procedures?	2	2	2	2
12. How effective are these procedures likely to be for your student?	7	4	4	5
13. How affordable are these procedures?	7	1	7	5
14. How much do you like the proposed procedures?	7	5	5	5.7
15. How willing will others in your classroom be to help implement the procedures?	7	5	5	5.7
16. To what extent are undesirable side effects likely to result from these procedures?	2	5	4	3.7
17. How much discomfort is your student likely to experience as a result of these procedures?	2	2	1	1.7
18. How severe are this student's behavior problems?	7	5	6	6
19. How willing would you be to change your classroom routine to implement these procedures	7	6	7	6.7
20. How well will carrying out these procedures fit into your classroom routine?	7	6	6	6.3

Table 9

Responses Within the Various Domains of the TARF-R

Domain	Teacher 1	Teacher 2	Teacher 3	Totals
Willingness	7.00	6.00	6.00	6.3
Acceptable and reasonable	7.00	5.50	5.50	6.0
Fit with classroom	4.50	4.00	4.00	4.2
Affordable	4.00	1.00	4.50	3.2
Effectiveness	6.67	4.00	4.33	5.0
Like of intervention	7.00	5.00	5.00	5.7
Understanding	7.00	5.00	6.00	6.0
Disadvantages	2.33	3.67	2.33	2.8
Seriousness of behavior	7.00	5.00	6.50	6.2

Table 10

Item-by-Item Responses to the Social Validity Questionnaire

	Teacher 1	Teacher 2	Teacher 3	Average
1. How important is it to increase the target student's academic engagement in your classroom?	7	7	7	7.0
2. How important is it for your target student to learn to manage his own behavior?	6	7	7	6.7
3. How important is it to reduce your target student's disruptive behavior in your classroom?	7	7	7	7.0
4. How much effort is required to implement the self-management intervention compared to other interventions?	5	5	3	4.3
5. If you are faced with a similar problem in the future, would you use a self-management intervention similar to this one?	7	4	6	5.7
6. Given the student's behavior problems, how well did this intervention address the student's overall problems during the intervention?	7	5	5	5.7
7. Compared to baseline, how effective do you rate the self-management intervention?	7	5	6	6.0
8. Compared to self-monitoring only, how effective is the self-management intervention?	6	4	6	5.3
9. Compared to positive consequences only, how effective is the self-management intervention?	7	5	6	6.0

Table 11

Responses Within the Domains on the Social Validity Questionnaire

Domain	Isaac	Jeremiah	Ben	Average
Goals	6.7	7.0	7.0	6.9
Acceptability	6.3	4.7	4.7	5.2
Effectiveness	6.7	4.7	6.0	5.8

Discussion

The purpose of the present study was to implement function-based self-management interventions for three children with E/BD. A secondary purpose was to analyze the intervention components by implementing self-monitoring and rewards separately and together. Findings from this study indicated that the purposes were accomplished in several ways. First, the function-based self-management intervention resulted in large decreases in problem behavior and large increases in on-task behavior during the sessions for all three participants. Second, intervention components were implemented separately and together, and neither component (i.e., self-monitoring of on-task behavior and contingent reward for on-task behavior) maintained the same levels of appropriate behaviors as the combined self-management intervention.

Functional Behavior Assessment to Design Intervention

In regards to Research Question 1, functional behavior assessment (FBA) and analysis provided information for creating the intervention for the three children in the study. A unique feature of the present study was the use of functional analysis in the classroom to confirm hypotheses generated through interview and observation. This study is unique in this sense because, of the studies reviewed, only one (Kamps et al., 2006) conducted a functional analysis in the classroom. The majority of studies that included functional analyses were conducted in clinics or other tightly-controlled settings. Some used experimental approaches to identify the conditions that influence problem behavior (i.e., Grandy & Peck, 1997), but the variables that influenced problem behavior were not manipulated in typical functional analysis conditions.

FBA was useful for determining function and designing interventions in general education settings because when function was determined, appropriate behaviors could be targeted for change behaviors that would provide the same reinforcers that the problem behaviors

had. This effect has been demonstrated many times in the research literature as noted in the review, so this intervention contributes to that particular literature base.

Student Outcomes with Function-Based Intervention

In regards to Research Question 2, the present study demonstrated that functional behavioral assessment is useful for creating behavioral interventions that include self-management procedures. The combination of self-management (i.e., self-monitoring) with offering the same consequences that had maintained problem behaviors for appropriate, on-task behaviors was effective. All student participants showed large gains in on-task behavior with the combined intervention when compared to baseline, self-monitoring, and consequences alone.

This study supported the effects of the combination of self-monitoring and consequences related to the function of the problem behavior found by other authors. Kamps and colleagues (2006) used self-monitoring with golf counters for the children to record responses during academic activities, and they found similar reductions in disruptive behaviors and increases in on-task behaviors. Frea and Hughes (1997) demonstrated that recording alternative communication behaviors led to a reduction in problem behaviors. In a comparison study, Ingram et al. (2005) utilized self-evaluation of on-task behavior and demonstrated reductions in overall intervals of problem behavior, similar to the present study. One difference between Ingram and colleagues and the other studies mentioned is the lack of reporting of alternative behaviors. While the findings in the present study were similar to Kern and colleagues (2001) in reducing disruptive behaviors, participants in her study recorded problem and appropriate behaviors. The Kern study is somewhat unique in that regard, because the previous studies along with the present study focused on recording only replacement behaviors.

Self-monitoring of on-task behavior in the present study was conducted because teachers were more interested in monitoring on-task behavior than disruptive behavior. Each teacher was asked casually in the FBA interview or prior to the intervention study which behaviors were most meaningful to her. They each indicated behaviors that were in the on-task response class, which the students were then asked to monitor.

The present study demonstrated differences between the intervention components and the function-based self-management treatment package. This study adds to the research evidence that consequences can and should be added to self-monitoring interventions. In addition, providing rewards without the self-monitoring was not an effective way to maintain on-task behaviors. While self-monitoring initially increased on-task behavior and decreased disruptive behavior for all participants, both behaviors returned to baseline levels within several sessions. Adding function-based consequences to self-monitoring and creating a treatment package increased on-task behavior and reduced disruptive behavior for all participants. These effects were replicated across two additional phases and all three participants. When the self-monitoring component was withdrawn, the levels returned to levels similar to baseline and self-monitoring alone.

The present study adds evidence that self-management interventions are effective when combined with multiple components. Kern et al. (1995) found a similar outcome with rewards alone or rewards combined with a discussion regarding inappropriate peer interactions. In Kern et al. (1995), rewards were provided if the children's appropriate peer interactions occurred at least 70% of the opportunities. Similar to the present study, Kern and colleagues found that the rewards were not salient enough to increase appropriate interactions. The intervention in both studies required the self-management component.

Fidelity of Intervention

In regards to Research Question 3, teachers successfully implemented the intervention without major problems. Fidelity remained high during the function-based intervention. The main reason that fidelity was low during the self-monitoring-alone and the consequences-only phases was that the same fidelity form was used throughout the study. Therefore, even if the teacher provided the self-monitoring form correctly during the self-monitoring phase, she still did not give a consequence which meant that fidelity waned throughout the phase.

Other teacher behaviors (i.e., attention and opportunities to respond) remained generally stable across all teachers and phases. These teacher behaviors were not expected to change, especially since the teachers were not told to modify praise, reprimand, or rates of opportunities to respond. The purpose for measuring praise, reprimands, and opportunities to respond was to investigate the extent to which they changed during the interventions. One unfortunate finding through this measurement was that in spite of her student's positive behavior change, Teacher 2 continued to reprimand the student at similar rates throughout the study.

Overall Findings

Results from this study demonstrated that function-based self-management interventions were effective in improving student outcomes socially valid and acceptable for practitioners. Kern et al. (2001) noted how these interventions were generally simple to implement, especially given the results that were produced. The findings from the present study were similar, in that teachers could implement these interventions in their classes with limited researcher assistance. Though similar to other studies, the present study extended Kern and colleagues (2001) by implementing the intervention in a public school setting, and in two cases in general education classes with more than 20 children.

The present study extended the work of others in several ways. First, the study adds to the literature demonstrating the use of functional analysis methods in classroom settings. The present study utilized a functional analysis approach to test the hypotheses of behavioral function obtained through interviews and observations in the classroom where the problem behaviors most frequently occurred. Hanley et al. (2003) found that 31.4% of all functional analysis research was conducted in school settings. However within the school settings, far fewer examples exist where functional analyses were conducted in the classroom (Solnick & Ardoin, 2010).

Second, the present study removed consequences and self-monitoring separately, with the purpose of demonstrating how the two intervention components interact. To date, no other studies in the function-based self-management literature have completed this component analysis. The findings demonstrate that self-monitoring, goal setting, and consequences should be used together in a treatment package. Interpretation of the function-based consequences condition should be done with caution. Results were likely influenced by how the consequences were delivered. While the teacher delivered consequences every 5 min during the both the function-based self-management and function-based consequences condition, it could be that results were different due to the fact that the criteria for earning the tickets during the function-based consequence condition was based on the teacher's evaluation versus the student's evaluation. Although it was not designed this way, the teachers gave the students a ticket after each session, even though the experimenter's observations portray students who were frequently off task, which meant that student off-task or disruptive behaviors could have been shaped when rewarded.

Third, the present study demonstrated that with few training sessions, children with severe E/BD can monitor and evaluate their own behavior and show gains in appropriate, on-task behavior. The majority of the studies involved typically developing children who engage in problem behaviors and would be considered "at-risk" in most school settings. The present study drew participants from a more restrictive environment for children with E/BD and used a simple intervention for teaching self-management and on-task skills. In addition, this study demonstrated that teachers can use these interventions in their classrooms with little help from researchers or behavioral consultants.

Accurate self-monitoring is an important component of self-management interventions. Some of the most prominent examples of these interventions (e.g., Rhode et al., 1983) regarded accuracy as a necessary component to self-management interventions. In the present case, accurate self-monitoring did not have a separate contingency from the targeted behaviors. This aspect of the present study was similar to Tiger et al. (2010). In the current study, accuracy remained at 100% levels during the function-based self-management conditions, but varied greatly during the self-monitoring-only condition. Accuracy was a result of the combined self-management interventions in the present study, rather than on-task behavior being a result of accuracy. This occurred because the contingencies were explicitly imposed on on-task behavior and goal setting. Based on observations during the self-monitoring-alone conditions, the timer would prompt the children back to task, and the children would write a "1" even when they were prompted back to task, resulting in an inaccurate response.

The data from the present study support several conceptual explanations for self-monitoring effects (Rachlin, 1974; Nelson & Hayes, 1981). The timer and self-monitoring sheet serve as cues for the overriding environmental contingencies (i.e., the positive consequences for

reaching the goal that was set). The evidence for this conclusion is that when there were no consequences for reaching the goal or self-monitoring during the self-monitoring-only condition, the child's behavior changed initially but returned to baseline levels. Yet, when the consequences for reaching the goal were added to the self-monitoring conditions, the on-task behavior remained above 90% across all participants, and disruptive behaviors remained low for all participants. When self-monitoring was removed, consequences failed to maintain behavior at levels achieved during function-based self-management conditions. There are many reasons that consequences, as in the consequences used in the present study, can be ineffective for a given behavior.

Limitations

There were several limitations to the present study. A primary limitation is the small number of participants, only three students. In addition, the functional analyses were brief. The reason for selecting a brief assessment was to support the findings of the descriptive and observational functional assessments. For example, the interview with Jeremiah's teacher indicated that peer attention was the primary variable maintaining problem behavior. Thus, only peer attention was tested against escape and play conditions for Jeremiah. Additionally, the constraints of the school environment prohibited prolonged assessment, and concerns from the teachers in the study that problem behaviors might be increased made it less preferable to conduct a complete functional analysis. Nonetheless, some research on brief functional analyses has shown that accurate results are achieved about two-thirds of the time (Kahng & Iwata, 1999).

During the consequence-only condition the teachers determined whether the child had been on-task for the majority of the session. Other research (i.e., Tiger et al., 2009) compared therapist-administered consequences by having the therapist monitor the self-injury using the

same materials as the participant. A potential limitation to the present study was that the way the teacher monitored the children's behaviors was not determined on timer intervals in the way that the self-monitoring phase was. A phase that compared teacher-monitored to child-monitored behaviors would have reduced the likelihood that poor student responding was a function of longer intervals without cues or reinforcers.

Another limitation was that the function of behavior was escape for two of the participants, and peer attention for the other and thus the study did not test a function-based self-management intervention for adult attention-related behaviors.

It is possible that the order in which the intervention components occurred produced the effects demonstrated in this study. It could be that function-based consequences improved behavior without self-monitoring had they been tested immediately after baseline, but since the function-based intervention included consequences; a dependence upon cues and points could have been created, especially since the tickets would have been novel after baseline. It is also possible that the order in which the reversals occurred produced the effects demonstrated in this study. While others (Rhode et al., 1983) have demonstrated strong effects on generalization and maintenance of behaviors across settings and time using self-management procedures, generalization was outside of the scope of the present study. Even so, generalization is extremely important for the demonstration of a technology of behavior (Stokes & Baer, 1977).

Future Research

Future research should address the use of functional analysis in the classroom. Additional research is needed in this regard, particularly in identifying target behaviors and possible environmental variables, and in dealing with the noisiness and limitations of the natural environment. While self-management programs are effective at improving generalization,

function-based interventions that combine self-management procedures have rarely demonstrated generalization. Future research should look at the effects of function-based self-management interventions on generalization of appropriate behavior to additional situations, settings, times of day, and so on. Given that the overarching goal of self-management interventions is to increase individuals' ability to manage the contingencies that influence their behavior, future research should address the extent to which elementary-aged children with E/BD can identify the contingencies that prompt and reinforce their own behavior, and can use this information to create self-management programs for themselves.

Conclusion

Children with emotional and behavioral disorders (E/BD) are a small part of the total school population, but they have specific social, emotional, academic, and behavioral needs. Self-management interventions have been used by school to respond to these for many years. To guide intervention, functional behavior assessment is a useful method of identifying the contexts that prompt and motivate problem behavior in schools.

The present study demonstrated an effective intervention by combining self-management with function-based interventions. Doing so, this study has extended the available research on both self-management and function-based interventions in schools. The available research was extended in several ways. First, the function-based intervention was added to self-monitoring and demonstrated a strong effect. Second, when self-monitoring was removed, on-task and disruptive behaviors reached baseline levels. The interpretation of these results is that self-monitoring alone did not maintain a strong effect. Moreover, rewards delivered at 5-min intervals were not enough to maintain the effect produced by combining self-monitoring with function-based interventions.

Practitioners can potentially benefit from the approach to self-management provided in this study. By conducting FBA prior to implementing self-management, teachers, school psychologists, and other school personnel can enhance the effects of their intervention by linking assessment to the replacement behaviors chosen to increase, the selected consequences, and the procedures. Teachers and school personnel can benefit from utilizing the approach presented in this study in response to the contingencies that they face. Most of all, children with E/BD can benefit from interventions like the one presented here by developing new skills and becoming better self-managers.

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APPENDIX A: SELF-MANAGEMENT FIDELITY

Date: _____

Time: _____

Student: _____

[ ] Student provided self-monitoring sheet

[ ] Student sets a goal for self-monitoring

[ ] Teacher delivered break cards or praise:

Time 1: _____

Time 2: _____

Time 3: _____

Time 4: _____

[ ] Student reached goal

[Yes] [NO] [N/A] Teacher delivered break card or praise at end of session contingent on meeting goal

Student Accuracy:
Y=Accurate
N=Inaccurate

Timer 1: _____

Timer 2: _____

Timer 3: _____

Timer 4: _____

Timer 5: _____

Timer 6: _____

Timer 7: _____

Timer 8: _____

Timer 9: _____

Timer 10: _____

APPENDIX B: TREATMENT ACCEPTABILITY RATING FORM-REVISED

TREATMENT ACCEPTABILITY RATING FORM (TARP-R)
By Thomas Reimers and David Wacker (1988)
Modified by Silvestri (2003) and Van Norman (2004)

DIRECTIONS:

1. Please read the following intervention description.

This intervention targeted the following behaviors:

Disruptive behavior (talk-outs, talking to peers when not appropriate, or making noises)

On-task (working on assigned task, listening and sitting quietly during lecture, and following directions)

We conducted a functional behavioral assessment (FBA) using interviews, observation, and experimental analysis. We determined that your student's behavior was maintained by escape from demands.

After he was taught to self-monitor using a timer, a self-monitoring sheet, and to set a goal accordingly, we implemented the ticket (either for break time or peer time) intervention. The break ticket intervention included providing tickets for on-task behavior and for reaching the goal. These tickets could be turned in for 1 minute of break time. Breaks or peer time could take place after the self-monitoring session or when the student chose to use them.

2. Answer the questions on the following pages regarding this intervention.

3. Thank you very much for your time.

1. How clear is your understanding of the suggested procedures?

Not at all clear			Neutral			Very clear

2. How acceptable do your find the strategies to be regarding your concerns about the identified student?

Not at all acceptable			Neutral			Very acceptable

3. How willing are you to implement the suggested protocol as it was described?

Not at all willing			Neutral			Very willing

4. Given the student's behavior issues, how reasonable do you find the suggested procedures?

Not at all reasonable			Neutral			Very reasonable

5. How costly will it be to implement these strategies?

Not at all costly			Neutral			Very costly

6. To what extent do you think there might be disadvantages in following the procedures suggested in this protocol?

No disadvantages at all			Neutral			Very many disadvantages

7. How likely are the suggested procedures to make a permanent improvement in the student's behavior?

Not at all likely			Neutral			Very likely

8. Given the student's problem behavior and the suggested time to implement the suggested procedures, how how reasonable do you find the time requirements to be?

Not at all reasonable			Neutral			Very reasonable

9. How confident are you that the suggested procedures will be effective?

Not at all confident			Neutral			Very confident

10. Compared to other students in the classroom, how serious is this student's problem behavior?

Not at all serious			Neutral			Very serious

11. How disruptive will it be to your classroom to implement the suggested procedures?

Not at all disruptive			Neutral			Very disruptive

12. How effective are these procedures likely to be for your student?

___ ___ ___ ___ ___ ___ ___

Not at all effective — Neutral — Very effective

13. How affordable are these procedures?

___ ___ ___ ___ ___ ___ ___

Not at all affordable — Neutral — Very affordable

14. How much do you like the proposed procedures?

___ ___ ___ ___ ___ ___ ___

Do not like them at all — Neutral — Like them very much

15. How willing will others in your classroom be to help implement the procedures?

___ ___ ___ ___ ___ ___ ___

Not at all willing — Neutral — Very willing

16. To what extent are undesirable side effects likely to result from these procedures?

___ ___ ___ ___ ___ ___ ___

Not at all likely — Neutral — Very willing

17. How much discomfort is your student likely to experience as a result of these procedures?

___ ___ ___ ___ ___ ___ ___

No discomfort at all — Neutral — Very much discomfort

18. How severe are this student's behavior problems?

___ ___ ___ ___ ___ ___ ___

Not severe at all — Neutral — Very severe

19. How willing would you be to change your classroom routine to implement these procedures

___ ___ ___ ___ ___ ___ ___

Not at all willing — Neutral — Very willing

20. How well will carrying out these procedures fit into your classroom routine?

___ ___ ___ ___ ___ ___ ___

Not at all well — Neutral — Very well

THANK YOU FOR YOUR TIME
Please return the completed form to Blake Hansen

APPENDIX C: SOCIAL VALIDITY QUESTIONNAIRE

1. How important is it to increase active student engagement in your classroom?

___	___	___	___	___	___	___
Not Important			Somewhat Important			Very Important

2. How important is it for children to learn to manage their own behavior?

___	___	___	___	___	___	___
Not Important			Somewhat Important			Very Important

3. How important is is to reduce disruptive behavior in your classroom?

___	___	___	___	___	___	___
Not Important			Somewhat Important			Very Important

4. How much effort is required to implement the self-management intervention?

___	___	___	___	___	___	___
No effort			Some effort			Very much effort

5. Will you use a self-management intervention similar to this one in the future?

___	___	___	___	___	___	___
Unlikely			Somewhat likely			Very likely

6. Given the student's behavior problems, how well did this intervention address the student's overall problems?

___	___	___	___	___	___	___
Not at all			Somewhat			Very well

7. Compared to baseline, how effective do you rate the self-management intervention?

___	___	___	___	___	___	___
Not at all effective			Somewhat effective			Very effective

8. Compared to self-monitoring only, how effective is the self-management intervention?

___	___	___	___	___	___	___
Not at all effective			Somewhat effective			Very effective

9. Compared to positive consequences only, how effective is the self-management intervention?

___	___	___	___	___	___	___
Not at all effective			Somewhat effective			Very effective

APPENDIX D: EXAMPLE ABC FORM

Time	Antecedent	Behavior	Consequence
0:30	Peer walks into room	Disruptive – talks to peer	Peer responded (peer attention)
1:30	Teacher reprimands target	Argues back	Teacher attention (argument)
2:15	Teacher explaining assignment	Off task	Escape from demand
2:25		Pushed paper away and said: “Too hard”	Escape demand
4:00	Independent work time	Student off task, staring out door	Avoid task

APPENDIX E: FUNCTIONAL ANALYSIS PROTOCOL

Adapted from Skinner, Veerkamp, Kamps, & Andra (2009).

Conduct a minimum of 2 sessions each in the order presented here.

I. Teacher attention. 5 minutes.

A. Sit student around peers who will not pay attention to him or her.

B. Remind class to ignore others' inappropriate behavior.

C. Give attention to the student only when he engages in the problem behavior.

D. Provide minor reprimands (i.e., don't do that, stop doing that, etc.).

E. Remind any students who give attention to student to ignore others' inappropriate behavior.

II. Escape. 5 minutes.

A. Sit with student and have several assignments ready that he/she does not prefer.

B. Ask him to complete the task.

C. Praise him when he completes a problem and prompt him when he gets off task for 5 seconds.

D. When he/she engages in a target behavior, remove the task and walk away for 30 seconds. Say: "I think you need a break."

E. Do not pay attention to the student during the 30 second break.

F. After 30 seconds, prompt him/her to work.

G. If the student engages in a target behavior at any time during the break, restart the 30 seconds.

H. Experimenters will cue the teacher at the end of the 30 seconds.

III. Play. 5 minutes.

A. Teacher and several peers will sit with student and play a game.

B. The student does not have to play if he/she does not want to.

C. Give attention every 30 seconds for appropriate behavior. Do not give attention to inappropriate behavior, and wait 5 seconds to give attention to appropriate behavior following any instance of misbehavior.

D. Do not make any demands.

E. Do not give any breaks if the target behavior occurs.