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I, Wallace M Larkin, hereby submit this original work as part of the requirements for the degree of Doctor of Philosophy in School Psychology.

It is entitled:

Using Trial-Based Functional Analysis to Design Effective Interventions for Students Diagnosed with Autism Spectrum Disorder

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Running head: TRIAL-BASED FUNCTIONAL ANALYSIS

Using Trial-Based Functional Analysis to Design Effective Interventions for Students Diagnosed
with Autism Spectrum Disorder

by

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A dissertation submitted in partial fulfillment of the

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TRIAL-BASED FUNCTIONAL ANALYSIS

An Abstract of

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Functional behavior assessments and function-based interventions are effective methods for addressing the challenging behaviors of children; however, traditional functional analysis has limitations that impact usability in applied settings. Trial-based functional analysis addresses concerns relating to the length of time, level of expertise required, and the contrived nature of functional analyses conducted in analogue settings. The current study expanded on previous research by assessing the function of challenging behaviors for three early childhood education students with autism spectrum disorder through trial-based functional analyses within an educational setting. The study also evaluated the outcomes of corresponding individualized function-based interventions for the students, all of which resulted in decreases in problem behaviors and increases in classroom engagement. Implications for practice include the feasibility of using trial-based FA to inform intervention design within applied settings.

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Introduction and Literature Review

Challenging behaviors are a common problem in early childhood special education settings (Campbell, 1995; Eisenhower, Baker, & Blacher, 2005) and are likely to persist over time (Green, O'Reilly, Itchon, & Sigafoos, 2005). Early intervention for young children with challenging behaviors is critical for the prevention of long-term negative effects on the development of social and academic skills (LaRocque, Brown, & Johnson, 2001). Functional behavior assessment (FBA), and interventions based on the identified function of behavior are considered to be best practice for serving children that have behavioral concerns (Arndorfer & Miltenberger, 1993; Conroy, Davis, Fox, & Brown, 2002; DEC, 2007; Dunlap & Fox, 2011; Gresham, Watson, & Skinner 2001, LaRocque et al., 2001).

Functional Behavior Assessment and Functional Analysis

FBAs are tools used to determine the function of behaviors through the identification of the environmental conditions preceding the behaviors (antecedents) and the contingencies maintaining them (consequences) (Carr & Durand, 1985; Davis, 1998; Iwata, Pace, Cowdery, & Miltenberger, 1994; Mace, Lalli, & Pinter-Lalli, 1991; Steege & Watson, 2009). FBA includes three increasing intensity assessment procedures: indirect, direct descriptive, and functional analysis (FA; Conroy, 2002; Cooper, Heron, & Heward, 2007). Indirect assessment involves records review, rating scales, and interviews for the purpose of generating a functional hypothesis (Gresham et al., 2001; Neilson & McEvoy, 2004). Direct descriptive assessment includes the addition of direct observation of the target behavior and relevant environmental variables, which further describe the behavior and potential relationships between the behavior and the associated antecedents and consequences (Gresham et al., 2001; Neilson & McEvoy,

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2004). Information gathered through indirect and direct descriptive FBAs is used to generate a functional hypothesis, or summary statement postulating the antecedent conditions and current reinforcement maintaining the behavior (Sugai, Lewis-Palmer, & Hagan, 1998). An FA can then be used to confirm the functional hypothesis generated by indirect and direct descriptive assessment. As the most intense approach, FA is an experimental method for reliably determining the function of behavior through the systematic presentation and manipulation of different antecedents and consequences for the target behavior (Cipani & Schock, 2011).

The seminal FA procedure described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) involves the delivery of potentially reinforcing consequences (e.g., escape from demands, access to attention, access to tangibles) contingent on the display of the problem behavior during separate test conditions. Conditions assessing escape from demands would set up a contingency where the client would be provided with a break from demands upon the display of the target behavior. Conditions assessing access to tangibles would set up a contingency where the client would be provided with access to a preferred object or activity upon the display of the target behavior. Conditions assessing access to attention would set up a contingency where the client is provided social attention (often in the form of a reprimand) based on display of the target behavior (Iwata et al., 1994).

Levels of engagement in the problem behavior during each replicated condition are then analyzed to determine which reinforcer(s) are most powerful in the maintenance of that behavior. FA involves direct manipulation of antecedents and consequences and traditional FA uses several sessions, each up to 30 min long, for each condition (Steege & Watson, 2009). FA has been used to identify the contingencies maintaining problem behavior for adults and children,

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with and without developmental disabilities (Derby et al., 1992; Gardner, Spencer, Boelter, Dubard, & Jennett, 2012; Hanley et al., 2003).

Ecological Validity of Functional Analysis

Although FA is supported by a wealth of empirical research, and has been used successful in school settings (Mueller, Nkosi, & Hine, 2011), there are several issues that limit the use of FAs in applied settings. One commonly cited reason for not using a traditional FA is the extensive amount of time required to complete it. On average, a traditional FA takes about six and a half hrs to conduct (Iwata et al., 1994; Tincano et al., 1999). Additional limitations of the use of FAs in applied settings include the expertise and training required for procedural integrity (Iwata et al., 2000) and the ethical concerns related to evoking problem behavior in students (Smith & Churchill, 2002). Perhaps most importantly, traditional FAs are limited by the analogue conditions under which the analysis typically occurs (Carr, Yarbrough, & Langdon, 1997). Analogue conditions used for traditional FA are often conducted in separate, highly controlled environments, which are contrived and may not accurately represent the environment in which the behavior naturally occurs (Lang, O'Reilly, & Machalicek, 2008).

In response to concerns about the influence of contrived settings in traditional FA, researchers have recognized the need to address the concept of ecological validity in FA. Ecological validity refers to the extent to which assessment conditions approximate real life settings (Arndorfer & Miltenberger, 1993; Hanley, Iwata, & McCord, 2003). However, this has been the focus of only a few studies (Carr et al., 1997; Conroy & Fox, 1996; Harding, Wacker, Berg, Baretto, & Ringdahl, 2005; Matson & Minshawi, 2007; Ringdahl & Sellers, 2000; Watson, Ray, Turner & Logan, 1999).

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Conroy and Fox (1996) evaluated the social and ecological validity of analog FA compared to directly observed antecedents and consequences in the classroom. The FAs were conducted on four male students from self-contained classrooms, with ages ranging from 5 to 12 years, with both developmental disabilities and challenging behaviors. The challenging behaviors targeted were self-injury, stereotypy, and noncompliance. The authors found that results from the analog FA were consistent with the results from the classroom FA for only one of the four children assessed, indicating a need for more ecologically valid FA procedures (Conroy & Fox, 1996).

In an effort to increase the ecological validity of FAs conducted in school settings, Watson et al. (1999) trained a classroom teacher to implement a FA in the classroom setting for a 10-year-old male special education student with intellectual disability and severe self-injurious behaviors. The authors hypothesized that using the student's teacher to conduct the FA would better account for the natural influence the teacher would have on the student's behavior (Watson et al., 1999). Results indicated the teacher was able to implement the assessment conditions and intervention procedures with high levels of adherence, suggesting that training teachers as FA administrators can be an effective and viable option for increasing the ecological validity of FAs (Watson et al., 1999).

While ecological validity was not the explicit focus, several studies have specifically examined the influence of idiosyncratic setting characteristics on the results of FAs (Carr et al., 1997; Harding et al., 2005; Matson & Minshawi, 2007; Ringdahl & Sellers, 2000). Carr et al., (1997) used naturalistic antecedent-behavior-consequence (ABC) observational data to determine possible idiosyncratic environmental variables associated with the target behaviors of three students, ages 10-20 years, diagnosed with autism, and displaying dangerous or disruptive

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behaviors (Carr et al., 1994). The researchers compared results from a general FA procedure and FA procedures that incorporated the idiosyncratic variables identified in the naturalistic observations related to the display of the target behaviors (Carr et al., 1997). Results of this comparison indicated that the presence or absence of these variables significantly affected the outcomes of the FAs for each student (Carr et al., 1997). These results signify the necessity of taking into consideration the environmental context in which the target behavior occurs when conducting FAs.

Ringdahl and Sellers (2000) compared FAs using caregivers as therapists versus FAs conducted by clinical staff for three students, ages 5-13 years, with intellectual or developmental disability and severe self-injurious or aggressive behavior. Across all students, results indicated that rates of target behavior during assessment were higher when the caregiver was conducting the analysis (Ringdahl & Sellers, 2000). This suggests that FA administrators can function to elicit the target behavior differentially and should be taken into consideration when administering and analyzing the results of a FA (Ringdahl & Sellers, 2000).

Harding et al. (2005) examined the influence of different physical locations on the results of a FA for two children, ages 1 and 5 years, with multiple disorders and developmental disabilities. Initially results from FAs conducted in the children's homes were undifferentiated. In an effort to clarify these results, antecedent analyses were conducted for each child by extending the "free play" condition from the initial analyses across different locations within their homes (e.g., bedroom, living room) within the home. These locations were based on the results of the initial analysis, natural observations, and interviews with the family and were analyzed to find the setting with the lowest rates of target behavior to represent a true control condition (Harding et al., 2005). The FA was then conducted in the setting with the lowest rate of

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problem behavior during control, which was determined to be on the couch next to his/her parent for both children. Results from this second analysis indicated that the target behaviors for both children were socially maintained, in contrast to the original analysis, which found them to be undifferentiated, thus providing more direction in treatment approach than the results from the preliminary analysis (Harding et al., 2005).

FAs conducted across natural settings allow researchers to examine the function of the target behavior within the target setting and may provide more relevant information for intervention planning (Lang et al., 2008/2009). Accounting for the idiosyncratic aspects of the environment in which the behaviors typically occur may be especially important when target behaviors are multiply controlled (Day, Horner, & O'Neil, 1994). Studies evaluating the effects of contrived settings, as well as other limitations of traditional FAs on results and usability, have led researchers and practitioners to investigate alternative procedures.

Alternatives to Traditional Functional Analysis

Several alternatives to the traditional FA procedures have been evaluated to increase the feasibility of FA in applied settings (Lyndon, Healy, O'Reilly, & Lang, 2012; Northup et al., 1991, Sigafos & Sagers, 1995; Wacker et al., 1994). As an alternative to the extensive time required for the extended functional analysis, a brief functional analysis (BFA) can be used to identify the function of behaviors in less time (Northup et al., 1991). In a BFA, conditions are assessed and compared similarly as in a traditional FA, but for shorter periods of time, generally 5-10 min. The conditions are then replicated only a few times (i.e., 1-2) and the results of the conditions with the highest levels of observed target behaviors are confirmed with additional replication or a contingency reversal (Northup et al., 1991). Function-based interventions created based on the results of a BFA have been implemented to successfully reduce unwanted

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behaviors and increase desired alternative behaviors (Boyajian, DuPaul, Handler, Eckert, & McGoey, 2001; Cihak, 2007; Ishuin, 2009; Northup et al., 1991; Wilder, Chen, Atwell, Pritchard, & Weinstein, 2006).

Trial-based FA addresses some of the concerns relating to the level of expertise and training required to adequately implement a FA, as well as the possible effects of analogue settings on the results of FA. Sigafoos and Saggers (1995) described a discrete-trial approach to FA in which each condition is divided into discrete trials distributed throughout the school day and incorporated into existing routines that align with the conditions assessed. For example, the tangible condition was conducted during snack time, the escape condition was conducted during various academic tasks, and the attention condition was conducted when teacher attention was diverted.

The authors conducted a trial-based FA for two students, ages 10 and 12 years, diagnosed with autism and engaging in aggressive behavior. For the purposes of the analysis, aggressive behavior was defined as hitting, pushing, biting, scratching, pinching, pulling hair, grabbing others, or throwing objects (Sigafoos and Saggers, 1995). The trials were each divided into two parts, each lasting up to 1 min. The first part represented the test and the second represented the control. The test part for each trial was conducted similarly to a traditional FA, by creating a motivating operation for the target behavior (i.e., removing attention, restricting access to preferred items, presenting demands) and delivering the reinforcement contingent on the display of the target behavior. This test part lasted until the student engaged in the target behavior, or the 60 s had elapsed, at which point the control part would begin. The control part consisted of free access to the reinforcer being assessed for each condition (i.e., free access to attention, tangibles, or break from demands).

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Data collection consisted of simply indicating whether the target behavior occurred during the test and control parts of each trial. Four trials were conducted under each condition each day over the course of five days, for a total of 20 trials for each condition. Results were analyzed by comparing the percentage of trials in which the target behavior occurred across test and control parts for each condition. A high percentage of trials with target behaviors in the test part of a condition indicated that the function of the target behavior was maintained by that reinforcer (Sigafoos & Sagers, 1995). The authors found that the trial-based FA clearly identified the function of the students' aggressive behaviors as access to contingent adult attention for one student and access to preferred tangible items for the other student (Sigafoos & Sagers, 1995).

While this preliminary study was able to identify the function of the children's challenging behaviors, limitations included the methodology of presenting the test parts of each trial before the control, as this may result in carryover effects. Additionally, the authors did not implement or evaluate the effects of interventions targeting functionally related replacement behaviors for aggression. Therefore, there is a clear need for studies to evaluate methodological modifications to minimize carryover effects during trial-based FAs and to determine the effectiveness of function-based intervention based on the results of trial-based FAs.

The methodology applied by Sigafoos and Sagers (1995) was altered slightly by Bloom et al. (2011) for the trial-based FAs of 10 students, ages 6 to 18 years, diagnosed with autism, Down syndrome, hearing impairment, or speech and language delay. Target behaviors included aggression, self-injury, bizarre vocalizations, and/or inappropriate touching, with some level of intellectual disability. This study extended each part (i.e., test, control) of the trials to 2 min each and included an additional control part before each test part, resulting in a control-test-control

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trial for a total of 6 min (Bloom et al., 2011). The trial-based FAs were conducted and compared to standard FAs for each student.

The study found corresponding results across the trial-based FA and standard FA for six students, partial correspondence for one student, and correspondence with modifications for another. For two students, the results did not correspond across the traditional and trial-based FAs. Overall, the results indicated that trial-based FAs represent a viable option when standard FA's are not available or undesirable within the applied setting (Bloom et al., 2011). A possible limitation of this study is the use of graduate students as test administrators, as opposed to classroom teachers or therapists, who may be more strongly associated with the various reinforcers than the graduate students. Another possible limitation to the interpretation of results is the lack of any preference assessment for objects used in the test conditions of the trial-based FA, while a preference assessment was used during the standard FA for comparison. This indicates the need to evaluate the use of teachers or direct therapists in the role of test administrator for trial-based FAs, as well as incorporate the use of preference assessment to assess access to tangibles.

La Rue et al. (2010), also compared traditional FAs to trial-based FAs, using latency recording to measure the target variable for five individuals, ages 4 to 29 years, diagnosed with autism and intellectual disability. Participants were referred for aggression, self-injurious behavior, disruption, and stereotypy. Traditional FAs were conducted in separate therapy rooms and the trial-based FAs were conducted in the classroom. Data collection was conducted according to the Sigafoos and Sagers (1995) methodology, with the addition of latency recording until the first display of the target behavior (LaRue et al., 2010). Conditions assessed included attention, tangible, and demand, with a control for each test condition. There was

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complete correspondence between the traditional FAs and the trial-based FAs for four of the five participants and partial correspondence for the fifth. The authors suggested that these data revealed that there is strong support for the applied use of trial-based FAs for individuals with maladaptive behaviors (LaRue et al., 2010). Similarly to the studies by Sigafoos and Sagers (1995) and Bloom et al. (2011), this study did not use the results from the trial-based FAs to create function-based interventions, and thus it is not possible to evaluate the utility of trial-based FAs when creating interventions for students with challenging behaviors.

Kodak, Fisher, Paden, and Dickes (2013) modified the trial-based FA procedures by reducing the total number of trials for each condition from the initial 20 (Sigafoos & Sagers, 1995) to 10 and reduced the length of time for each test and control part from 1 min each (Sigafoos & Sagers, 1995) to 30 s each. Similarly to Bloom et al. (2011), this study conducted the control condition before the test condition to reduce carryover effects and did not evaluate the effectiveness of interventions based on the results of the trial-based FA. However, this study used typical classroom staff to conduct the analysis and was able to identify the function of the target behavior for each participant (Kodak et al., 2013).

Trial-based FA is associated with a number of advantages. First, trial-based FA maintains ecological validity by assessing the function of problem behaviors within the settings and activities in which they occur (Lyndon et al., 2012). Additionally, trial-based FA has been found to take considerably less time (LaRue et al., 2010) and less expertise and time required to train assessors than traditional FA because the procedures require only that observers record the occurrence and non-occurrence of the behavior during the conditions (Lambert, Bloom, & Irvin, 2012). Trial-based functional analysis uses a simpler form of data collection, marking the presence or absence of the target behavior within 1-2 min trials, allowing for one person to both

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administer the assessment and collect the data (Kodak et al., 2013). Additionally, trial-based FA lends itself to alternative forms of data collection, such as latency recording for the target behavior, which is recommended when behaviors are dangerous and there are concerns with eliciting and reinforcing these behaviors under the assessment conditions (Thomason-Sassi, Iwata, Neidert, & Roscoe, 2011).

Trial-based FAs present an attractive and viable option for assessing the function of challenging behaviors in applied settings such as schools and community-based clinics with limited time and resources for extensive assessment procedures (Bloom et al., 2011; Kodak et al., 2013; LaRue et al., 2010; Sigafos and Sagers, 1995). While there is established support for the reliability and validity of trial-based FAs in the assessment of challenging behavior, there is a need for additional research on the utilization of trial-based FAs to inform function-based interventions for students (Bloom et al., 2011; Kodak et al., 2013), particularly for young students with developmental disabilities in need of early intervention.

Corresponding Function-Based Interventions

FAs have been conducted in a variety of settings such as homes, schools, outpatient clinics, inpatient hospital units, institutions, and vocational programs (Cihak, Alberto, & Fredrick, 2007; Hanley, Iwata, & McCord, 2003; Harding, et al., 2005; Ringdahl & Sellers, 2000; Watson et al., 1999), and results have been used to design effective interventions for implementation within these settings (Ishuin, 2009; Lang et al., 2008/2009/2010). Additionally, results from BFAs conducted in natural, public settings have been confirmed with function-based interventions that decrease problem behavior and increase appropriate behavior when implemented within these settings (Cihak et al., 2007; Kodak, Grow, & Northup, 2004).

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Results from trial-based FAs conducted in the natural environment have been used to successfully implement corresponding function-based interventions. However, a review of trial-based FAs of challenging behavior by Rispoli et al. (2014) indicated that only four of the 13 articles reviewed incorporated a function-based intervention as a result of trial-based FA, the other 9 articles did include an intervention component.

Sigafoos and Meikle (1996) investigated the effects of functional communication training based on the results of a trial-based approach to the FA described by (Iwata et al., 1982). Participants included two 8-year-old boys diagnosed with autism, and frequently engaging in aggression, self-injury, disruption, and stereotyped movements. The analyses revealed that the behaviors were multiply maintained and a FCT intervention teaching the children to request access to reinforcement resulted in decreases in problem behaviors (Sigafoos & Meikle, 1996).

Schmidt et al. (2014) conducted a trial-based FA to determine the function of problem behaviors for three individuals with developmental disabilities, ages 9, 10, and 15 yrs. The individuals' problem behaviors included aggression, pica, self-injurious behavior, and elopement. The study took place in a residential treatment facility, within the children's classrooms, by trained behavior support member for the class or the primary investigator. The trial-based FA was conducted according to Sigafoos and Sagers (1995) with the test part of the trial occurring first and the control part occurring second. The authors were able to identify the function for each participant, and design and implement a functional communication training (FCT) intervention for each participant to access the reinforcement maintaining the problem behavior (Schmidt et al., 2014). This study measured both the target behaviors and communicative attempts during assessment and intervention.

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A similar study was conducted using a trial-based FA and corresponding FCT intervention for early intervention students (Lambert, Bloom, & Irvin, 2012). This study utilized the methodology described by Bloom et al., (2011), with some modifications. Lambert et al. (2012) conducted only 10 trials of each condition, as opposed to 20 trials for each condition (Bloom et al., 2011; Sigafoos & Sagers, 1995) and conducted one control before the test part of each trial. The FCT intervention resulted in significant reductions in the problem behavior and increases in communication (Lambert et al., 2012).

Bloom, Lambert, Dayton, and Samaha (2013) sought to implement function-based interventions based on the results of trial-based FAs for three preschool-aged boys with developmental disabilities. These interventions included differential reinforcement of an alternative behavior with extinction, and noncontingent reinforcement, which both led to reductions in problem behavior and increases in alternative behavior for all students (Bloom et al., 2013).

Sigafoos and Meikle (1996) and Schmidt et al. (2014) both utilized trial-by-trial method for data collection during assessment and intervention, where student responses to the removal of access to preferred items, attention, and the placement of demands were identified as either the problem behavior (e.g., tantrum) or an appropriate communicative response (e.g., “I want chips please”). While Bloom et al. (2013) and Lambert et al. (2012) used the trial-by-trial method for the functional analysis and observations of problem behavior as a rate per minute during intervention.

While these studies support the use of trial-based FAs to implement interventions, there is a need for additional research to further replicate these findings through the use of trial-based FA to create interventions to reduce problem behaviors and evaluate the outcomes of interventions in

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applied settings. Students with developmental disabilities, who engage in challenging behaviors, benefit from function-based interventions based on the results of FA. However, because of the documented limitations of using traditional FAs in applied settings such as school and community centers, alternative methods such as trial-based FA presents both a viable and effective option.

The present study sought to determine the results of a trial-based FA for early education students with developmental disabilities and challenging behaviors. It also evaluated the outcome of a corresponding function-based intervention for three of the four student participants. These results expanded the literature on the use of trial-based FA in applied settings and filled a gap in the literature evaluating the outcomes of interventions based on the results of trial-based FA conducted within applied settings. Specifically, the study addressed the following research questions:

- (a) Will trial-based FA procedures clearly identify the function of the challenging behaviors of preschool-aged children with autism spectrum disorder?
- (b) Will function-based interventions based on the information obtained from the trial-based FAs successfully reduce challenging behaviors and increase appropriate alternative behaviors?

The hypotheses were that the trial-based FA procedures would correctly identify the function of these challenging behaviors and function-based interventions based on the trial-based FA would effectively reduce the challenging behaviors and promote positive replacement behaviors.

Method

The study procedures for each student included an initial baseline phase to verify the target variables and determine the students' rate of engagement in the target variables under typical conditions. This was followed by a trial-based FA, in which the students were exposed to various conditions to assess their response to contingent access to attention, preferred items, and escape from demands. This was followed by another baseline, to confirm the students' rate of engagement in the target variables given the lapse in time required for the TBFA. Following this second baseline, the function-based interventions were implemented, then removed for a return to baseline phase, and re-implemented again.

Participants and Settings

Participants in this study included three early intervention students diagnosed with autism spectrum disorder, who exhibited challenging behaviors that interfered with their ability to participate in and benefit from instructional and/or social activities, and their primary teacher/therapist. Students were recruited based on teacher/primary therapist, parent, and/or agency referral for behavioral support. Student participation depended upon completed parent permission (Appendix A). Teacher/therapist participation was dependent upon completed adult consent (Appendix B).

Participants were recruited from a private center specializing in educational, social, communication, and behavioral programs for students with ASD. Students received early intervention services through a morning or afternoon class. Lenny, was 7 years old, Caucasian, and had attended the center for 7 months prior to the study. Lenny had limited verbal skills, and used an augmentative and alternative communication (AAC) device to communicate. Ben, was 4 years old, Caucasian, had attended the center for 7 months, had functional communication skills

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and did not use an AAC to communicate. Derrick was 5 years old, Black and Hispanic, had attended the center for 12 months, and used verbal language to communicate.

A fourth-year school psychology doctoral student, conducted this research in partial fulfillment of her dissertation requirement, oversaw all recruitment, consent, and permission procedures, conducted teacher interviews, and designed and oversaw assessment and intervention procedures. Graduate students from the school psychology program at the University of Cincinnati, along with agency staff members, assisted with data collection for assessment and intervention procedures.

Dependent Variables

Dependent variables included challenging or unwanted behaviors that interfered with the student's ability to appropriately participate in instructional and/or social activities during school, as described by the student's teachers/behavior therapists and/or parents. Target behaviors for assessment and intervention were selected based on the student's teacher or primary therapist's concerns and direct observations of the students' behavior across settings in which the student is most likely to display challenging behaviors. Information from these two sources was used to create a clear, operational definition of the target behavior(s) for each student participant through consultation and collaboration with the student's teachers.

For the first student, Lenny, disruptive behaviors were targeted for assessment and intervention. Disruptive behavior was defined as loud vocalizations, elopement (running out of designated area without permission both in the room and out of the room), pulling items off the wall, and throwing items on the floor. For the second student, Ben, elopement was targeted during assessment and intervention, and was defined as when Ben got out of his seat or assigned area, flopped to the floor, or ran away from his teacher. For the third student, Derrick, disruptive

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behavior was targeted for assessment and intervention. Disruptive behavior was defined as inappropriate vocalizations, yelling, and screaming, accompanied by aggressive arm and leg flinging.

Data Collection. During the trial-based FA, observers simply recorded if the target behavior occurred or not during the test and control parts of each of the 20 trials for each condition assessed using trial-by-trial data collection forms (Appendix C). The percent of test parts in which the target behavior occurred was determined (e.g., the target behavior occurred during the test part in five out of 20 trials; reported at 25%) and compared to the percent of control parts in which the target behavior occurred.

During baseline and intervention phases, data were collected for each student through direct observation using 15 s interval recording (Appendix D). Student engagement was collected using momentary interval recording, where engagement was noted as either occurring or not only at the beginning of the 15 s interval. Students' disruptive behavior and elopement (defined above) were assessed using 15 s partial interval recording, and were noted as occurring if the student displayed the behavior at any point during the interval. Rates of engagement, disruptive behavior, and elopement were determined by taking the number of intervals in which the behavior occurred, dividing by the total number of intervals observed, and multiplying by 100%.

Data collection training for graduate students and staff consisted of reviewing target behavior definitions and the trial-by-trial and interval recording data sheets as a group and individually. After the initial 30 min training, data collectors completed direct observations overlapping with the primary investigator (or another data collected with documented reliability with the primary investigator) using all data sheets. Once inter-observer agreement (IOA) of at

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least 90% is obtained between the data collector and the primary investigator, data collectors conducted observations independently.

Inter-Observer Agreement

Inter-observer agreement (IOA) for trial-based FA data was determined by comparing data from two trained reliability observers for 20% of the trials. IOA was calculated using total agreement of occurrence of the target behavior(s) by dividing the number of trials with agreement by the total number of trials and multiplying by 100%.

IOA for student outcomes during intervention was assessed by comparing data from two trained observers for an average of 22.72% of baseline and intervention observation sessions (range 21.43%-25%). Percent IOA was calculated by using total agreement of the occurrence or nonoccurrence of the problem behavior(s) during intervals. This was done by comparing the two observers data and dividing the number of intervals in which the observers agreed upon the occurrence and nonoccurrence of the target behavior(s) by the total number of intervals, and multiplying by 100%.

Research Design

Assessment and intervention results were analyzed using single-case designs. The results of the trial-based FA were analyzed using a multi-element design with pairwise comparisons of test-control for each condition assessed, similar to the methods described by Iwata, Duncan, Zarcone, Lerman, and Shore (1994). Multi-element designs compare the effect of multiple independent variables (or environmental conditions in the case of analyzing FA assessment data) on the dependent variable (or target behavior of the student) (Hains, 1991). The pairwise component directly compares rates of behavior from test conditions (demand, attention, tangible, alone) to a control (Iwata et al., 1994). For the trial-based FA, control conditions for each test

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condition consists of free access to the environmental variable (continuous attention, access to preferred item, with a lack of demands; Bloom et al., 2010; LaRue et al., 2010; Sigafoos & Sagers, 1995). Multi-element designs allow for the simultaneous evaluation of multiple conditions on one behavior, and are able to demonstrate experimental control more quickly than other designs (Hains, 1991). However, interaction or interference possibilities pose some limitations to the design. These limitations can be categorized as sequence effects, or when the order of conditions may influence results, and carryover effects, or when participation in one condition influences the results of another condition (Hains, 1991). These limitations are somewhat addressed through the addition of a pairwise comparison of test and control conditions (Iwata et al., 1994).

The results of the function-based intervention were analyzed using an ABAB withdrawal design where “A” represents baseline conditions without any additional interventions in place, and “B” represents conditions in which the function-based intervention is in place (O’Neill, McDonnell, Billingsley, & Jenson, 2011). One advantage of the ABAB withdrawal design is that it is relatively straightforward and easy to implement, while offering significant experimental control. Disadvantages include the possibility that the target behavior may not revert to baseline levels after intervention implementation, particularly when skills have been targeted and taught, the student may be unlikely to “unlearn” them in the withdrawal phase, and thus not demonstrate a functional relationship between the intervention and the target behavior. Additionally, there may be ethical issues or concerns relating to the withdrawal of an effective intervention (Byiers, Reichle, & Symons, 2011).

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Procedures

All assessment and intervention procedures were conducted in the students' classrooms, and other educational settings to which the student is exposed.

Staff training. Staff members were trained in trial-based FA procedures directly prior to the assessment of their student. Staff members were trained to implement the function-based interventions after the trial-based FA was complete, but prior to the implementation of the intervention.

Assessment training. Teachers were trained to conduct the trial-based FA procedures with at least 90% adherence during training. Training consisted of 30-min session including an overview of the procedures, modeling the procedures, and opportunities to practice with another adult behaving according to the target student.

Intervention training. The function-based interventions were drafted into individualized behavior plans outlining the steps of the intervention, which were reviewed with and modeled for the students' teachers. Graduate students provided feedback to the teacher based on an adherence checklist, until the teacher demonstrated at least 90% adherence.

Baselines. The first baseline condition was conducted prior to the administration of the trial-based FA in order to obtain target behaviors for each student. The trial-based FA required 4-10 days to complete, therefore, a second baseline phase was conducted after the trial-based FA to ascertain rates of the target behavior immediately prior to the intervention. A third baseline condition was conducted after the intervention was initially implemented, as a withdrawal, or return to baseline phase.

During these baseline conditions, data were obtained by direct observation, using interval recordings of the student's target behaviors. No interventions outside of the student's typical

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supports were in place in order to determine current levels of target behaviors prior to assessment and intervention implementation. However, typical supports within the classroom were comprehensive, and included the use of visual schedules, class-wide positive behavior supports, and individual token boards for correct responses during work sessions. To establish that individual student behavioral concerns were not due to a lack of classroom support, each classroom was assessed using a 28 item observation form outlining evidence-based practices for classrooms with students with autism spectrum disorder. Results of the observations indicated that both classes exhibited a high degree of evidence-based practices across the areas of physical organization, visual schedules, behavioral supports, instructional considerations, and communication. Both the first and second class demonstrated 83.93% of the items on the observation checklist (Appendix E).

Indirect functional behavior assessment. Prior to the trial-based FA, a structured interview using the Functional Assessment Checklist for Teachers and Staff (FACTS; Appendix F) (March et al., 2000) was conducted with the student's teacher/therapist. This interview was used in the determination of clear and operational definitions of the target behaviors and to determine when these behaviors were most likely to occur. These results were used to guide decisions regarding which conditions were assessed in trial-based FA and during what daily activities they should be assessed.

Preference assessment. In order to determine preferred tangible items for the condition assessing access to tangibles, a brief natural preference assessment was completed daily before the tangible conditions began. Aligning with the daily procedures conducted at the school to assess student preference for reinforcement, prior to the start of the tangible conditions students indicated what they wanted either verbally or through the use of a Picture Exchange

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Communication System (PECs). The therapist approached the child (providing them with the PECS board of known reinforcers if needed) and said “what do you want”? The student then selected an item (verbally or from the board) that they wanted that day. This item was then used for the tangible condition trials for that day. Each day the child was asked to indicate what they wanted for use in this condition.

Trial-based FA. The trial-based FA procedures were based on those described by Sigafoos and Sagers (1995) and Bloom et al. (2011). Similarly to Sigafoos and Sagers (1995), each trial consisted of two parts, each lasting up to 60 s, with 20 trials conducted for each condition, assessed over the course of four to 10 school days. Each trial lasted up to 2 min, and depending on the number of conditions assessed, there was a maximum of 32 min of assessment each day, with a maximum of 2 hrs 40 min of assessment across 4 to 10 days. Test and control parts for each trial were conducted according to Bloom et al. (2011) with the control session occurring first and the test session occurring second, so as to limit carryover effects.

Test conditions were chosen based on the hypothesized function of the behavior obtained from the structured teacher interview, and were attempted each day, with four trials (each consisting of one test and one control) for each condition. Attention and demand conditions were assessed for each student. Tangible conditions and ignore/alone conditions were assessed only if access to tangibles or automatic reinforcement were respectively hypothesized to maintain the problem behavior.

The test conditions were conducted within the student’s naturally occurring classroom activities, aligning the test conditions based on the results of the teacher/therapist interview. For example, the results of the interview with Lenny’s teacher suggested that he was likely to engage in disruptive behavior during one on one instruction, during which is naturally presented

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with many instructional demands, thus the demand condition trials for Lenny were conducted during group instruction. All test conditions were embedded throughout the student's daily activities using typical activities from the students' routines as antecedents, and delivering different consequences to the students' behaviors according to the function being assessed (attention, escape, access to tangible items, and automatic reinforcement). Staff members trained as behavior therapists conducted all assessment and intervention procedures, as well as collected data for the target behavior during assessment.

Attention. The teacher initiated this condition during a time when he/she was interacting with the child one-on-one. The control part will consisted of the teacher delivering constant attention to the child for 60 s, regardless of the display of target behaviors. The test session then began with the teacher saying "I will play with you in a little bit", or "I will help you in a little bit" if appropriate, then the teacher turned away from the child to read a magazine, complete paperwork, or talk to another adult. The teacher remained near the child, while not engaging with the child for up to 60 s. If the child engaged in the target behavior during the 60 s, the administrator would turn to face the child and deliver attention (e.g., "Please don't do that", or "tell me what you want"). After the first display of target behavior, the trial ended.

Tangible. The trials for this condition were conducted during an activity where the child was likely to encounter preferred items, such as free play or snack. A tangible item was selected based on the brief, daily preference assessments conducted immediately before the tangible condition was assessed in order to find a highly preferred tangible item. During the control portion of a tangible trial, the student was provided continuous access to the preferred item for 60 seconds, and displays of the target behavior resulted in no consequences for child. During the test portion of the trial, the teacher sat next to the student with a preferred edible or non-edible

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item in sight but out of reach. The teacher then told the child “You can have this in a minute”, marking the beginning of the trial period. If at any point during the 60 s the child engaged in the target behavior, the teacher provided the child with access to the item for the remainder of the trial period.

Demand. This trial occurred during typical, regularly scheduled activities in which demands were placed on the child. During the control portion, no demands were placed but the teacher remained close to the child. During the test portion of the trial, relevant and challenging tasks were presented. If the student didn’t immediately engage, the teacher verbally and/or physically prompted the child to engage in the task every 10 s. If the child displayed the target behavior at any point during the test session, the administrator removed the task materials and provided no further demands for the test period.

Alone. This trial was conducted only if the behavior was suspected of being automatically reinforced, or self-stimulatory. These trials consisted of identical control and test sessions, where the child was not provided leisure or task materials or attention from others. The student was allowed to walk around but if they interacted with a toy or another person the trial was considered failed and repeated at a later time. For a more in-depth description of the trial-based FA procedures please see Bloom et al., 2011.

Function-based intervention. Based on the results of the trial-based FA, a, individualized, function-based intervention was be designed and implemented for each student. The interventions were designed to reduce the students’ display of the problem behaviors and increase engagement in more appropriate behaviors. The basis for these interventions consisted of placing access to the identified reinforcer based on the display of the target behavior on extinction and access to the identified reinforcer contingent on the display of alternative,

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appropriate behaviors. These interventions were individualized and tailored to the needs and functions of each student's target behavior as follows. Additionally, an individualized scripted story with pictures explaining the expectations and contingencies of the intervention was created for each student to review daily.

The functions of Lenny's disruptive behaviors were access to adult attention and escape from demands, and his intervention consisted of multiple components. Before each one-on-one work activity, the teacher provided pre-correction in the form of a verbal reminder of the expected behavior with visual prompts. To address Lenny's disruptive behavior, a 90 s momentary fixed interval differential reinforcement of other behavior (DRO) was implemented through which he accessed specific verbal praise (e.g. "Nice job! I love the way you're working!"), and access to a break with the teacher (the teacher would remove the work, and sing a preferred song with Lenny for about 1 min) contingent upon appropriate behavior. The teacher was provided with a MotivAider time keeper, which emitted an inaudible buzz every 90 s. If, at that moment (momentary), Lenny was behaving appropriately, he was provided with access to reinforcement. If, at that moment, he was engaged in the target behavior, he was not provided access to reinforcement. The teacher provided no verbal or physical attention and turned her face away, until Lenny displayed a calm body and quiet voice, at which point she returned to normal interaction, and waited until the next interval to provide access to a special break if he continued to refrain from disruptive behavior.

Ben's inappropriate behaviors were maintained by access to tangibles. His function-based intervention provided access to preferred tangible items contingent on staying in his seat (differential reinforcement of alternate behavior), using a fixed-interval 1-minute token board. During group instruction and individual work sessions, Ben was shown a choice board with

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pictorial representations of various preferred items (Dinosaur book, cookies etc.) and asked what he wanted to work for. Once he had selected an item, the teacher verbally reminded him how the token board worked, e.g. “OK, you are working for the dinosaur, you need 1,2,3 stars for Dinosaur, remember, staying in your seat earns you stars for Dinosaurs”. Ben’s teacher then set a MotivAider for 1 min. When the MotivAider went off, if Ben had stayed in his seat the entire 1 min, he was given a star to place on his token board, coupled with specific verbal praise. Once he earned 3 stars, he was provided brief access to a previously chosen preferred item.

If Ben eloped during group instruction or circle time, his teacher very quickly reminded him of the conditions for reinforcement, e.g. “Remember, you need to stay in your seat to earn stars for Dinosaur”. If he continued to elope, his teacher stopped the MotivAider, physically prompted Ben back to his seat, but provided no facial or verbal reactions. Once Ben was back in his seat, his teacher informed him she was restarting the timer, and reminded him that he needed to stay in his seat in order to earn his chosen reward.

The function of Derrick’s inappropriate behavior was access to tangibles. His function-based intervention had multiple components. During group instruction and circle time, his teacher implemented a fixed momentary 30 s DRO through which he earned access to tangibles. Derrick was asked what he wanted to work for, and the tangible, usually edible item was presented visually. Every 30 s a MotivAider went off, and if at that moment, Derrick was not engaging in disruptive behaviors, he received access to the edible reinforce, paired with specific verbal praise. If, at that moment, he was engaged in disruptive behavior, he was given a verbal reminder that he needed a calm body and quiet voice to get M&Ms, but was provided no additional verbal or physical interaction.

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Withdrawal. Function-based intervention procedures were withdrawn. Students received the typical supports provided by the center.

Function-based intervention. After four data points without intervention, the function-based intervention procedures for each participant were reinstated.

Data Analysis

Individual graphs were used to display the results of the FAs to determine the function of the target behavior(s) and the effectiveness of the function-based intervention. Data from the trial-based FA were analyzed using a pairwise comparison of the percentage of trials in which the target behaviors occurred across test and control parts of each condition. Data from the function-based interventions were analyzed by visually comparing level and trend of disruptive behaviors and engagement across baseline, intervention, and withdrawal conditions.

Adherence

Adherence to the FA and intervention procedures was assessed using a checklist containing the critical elements of the trial based FA and function-based intervention (Appendix G). The number of steps observed divided by the total number of steps on the checklists, multiplied by 100 was used to obtain a percentage for adherence. Adherence was assessed for 20% of the assessment trials for each student, with a total of 40 out of 200 trials observed. Adherence to the function-based interventions was assessed for an average of 28% of intervention sessions observed (range 25%-30.77%).

Treatment Acceptability

Social validity was maintained throughout the assessment and intervention procedures through collaboration and input from the student's teacher/therapist, parents, and agency supervisors. Additionally, the Treatment Acceptability Rating Form- Revised (TARF-R)

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was used to evaluate teacher acceptability of the intervention procedures and a modified version was used for the assessment procedures (Langthorne & McGill, 2011) at the completion of the study (Appendix H) completed by the student's teacher/therapist.

Results

The average rate of engagement in target behaviors during baseline observations was 30.78% for Lenny, 29.04% for Ben, and 26.11% for Derrick. Inter-observer during the trial-based FA trials across the three students was 96.19% agreement (range 91.69%-100%). Average IOA across baseline and intervention observation sessions was 98.24% (range 96.87%-99.67%). Adherence was found to be 100% for all of the trial-based FA and intervention observations.

Figures 1-3 present the results for Lenny, Ben, and Derrick, respectively. The top panels of each figure include the results from the trial-based FA and the bottom panels include intervention results. Data from the trial-based FAs were analyzed using a pairwise comparison of the percentage of trial parts in which the target behaviors occurred across test and control parts of each condition. Rate of responding during control as compared to test parts of each condition was used to indicate function and visual analysis was used to evaluate intervention effects.

Lenny's trial-based FA analyzed engagement in problem behaviors across test and control parts of attention, demand, and automatic condition, a tangible condition was not assessed, as indirect assessment results did not indicate that Lenny's problem behavior often occurred before gaining access to tangible items. Lenny's problem behavior occurred across all test and control parts of each condition assessed, indicating that his behavior was sensitive to all three types of reinforcement. However, data from the trial-based FA revealed that Lenny's problem behaviors occurred at a significantly higher rate during the test parts, as compared to the control parts, for both the attention and demand conditions (Figure 1). Lenny engaged in

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problem behaviors during 80% the test parts of attention trials, as compared to 30% of the control parts of attention trials; and Lenny engaged in problem behaviors during 90% of the test parts of demand trials as compared to 30% of control parts of demands trials. Escape from demands and access to adult attention were identified as the multiple functions of Lenny's behavior, and were selected as reinforcers for his differential reinforcement of other behavior intervention.

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Figure 1. Trial-based functional analysis and intervention results for Lenny.

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Intervention data for Lenny (Figure 1) revealed that during baseline, disruptive behavior ($M = 30.78$, $SD = 22.42$) and engagement ($M = 37.65$, $SD = 9.64$) were occurring at approximately the same rate, with more variability apparent in disruptive behavior. During the first intervention phase, there was a clear reduction in the level of disruptive behavior ($M = 5.18$, $SD = 5.03$), along with a decreasing trend and decreased variability. During the first intervention phase, there was an immediate increase in the level of engagement ($M = 60.69$, $SD = 18.82$), although there remained a significant amount of variability. During the withdrawal phase, there was an immediate, modest increase in the level of disruptive behavior ($M = 14.63$, $SD = 10.38$), with a clear decreasing trend, along with an immediate decrease in engagement ($M = 48.17$, $SD = 26.57$), with an increasing trend back to intervention levels. When intervention was re-implemented, disruptive behavior ($M = 3.47$, $SD = 5.37$) decreased in level, with initial variability, eventually leveling off at near zero levels. There was no initial change in the level of engagement ($M = 67.29$, $SD = 16.68$) during re-implementation of the intervention; however, there was a clear increasing trend in the rate of engagement.

Figure 2 represents the results of the trial-based FA and intervention for Ben. During the trial-based FA, Ben's behaviors occurred at a significantly higher rate in the test part as compared to the control part of the tangible condition. Ben engaged in elopement during 79% of the test parts of the tangible trials, as compared to only 4% of the control parts of the tangible trials. An automatic condition was not accessed as the nature of Ben's target behavior, elopement, never occurred in the absence of adults. Thus, access to preferred tangible items was identified as the function of Ben's elopement, and was selected as the reinforcer in his differential reinforcement of alternate behavior (e.g. staying in his seat).

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Figure 2. Trial-based functional analysis and intervention results for Ben.

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Intervention data for Ben (Figure 2) revealed that during the initial baseline phases, elopement ($M = 29.04$, $SD = 11.16$) and engagement ($M = 29.51$, $SD = 14.69$) occurred at approximately the same rate, with considerable variability and no discernable trend. Once the intervention was implemented, there was an immediate decrease in the level of elopement ($M = 18.63$, $SD = 10.51$), with significant variability. During the initial intervention, engagement ($M = 55.15$, $SD = 15.64$) immediately increased in level, again with significant variability, and a slight decreasing trend. During the withdrawal condition for Ben, elopement ($M = 30.47$, $SD = 21.72$) initially decreased in level but quickly experienced a sharp increase in trend to well above initial baseline and intervention levels. During this phase, engagement ($M = 26.67$, $SD = 7.10$) initially did not change, however, a clear decreasing trend was apparent. When intervention was re-implemented, elopement ($M = 8.2$, $SD = 10.26$) immediately decreased in level, with a decreasing trend stabilizing at near zero levels, while engagement ($M = 39.58$, $SD = 14.19$) increased slightly in level, with a variable increasing trend.

Figure 3 represents the results of the trial-based FA and intervention for Derrick. Derrick engaged in significantly higher rates of problem behavior during the test part of the tangible condition, and had the lowest rate of responding during the control part of the tangible condition. Derrick engaged in problem behavior during 85% of the test parts of the tangible trials, as compared to only 5% of the control parts of the tangible trials. Access to preferred tangible items was identified as the function for intervention planning, and was selected as the reinforcer in his differential reinforcement of other (non-disruptive) behavior.

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Figure 3. Trial-based functional analysis and intervention results for Derrick.

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Intervention data for Derrick (Figure 3) revealed that during baseline, disruptive behavior ($M = 26.11$, $SD = 14.61$) and engagement ($M = 26.11$, $SD = 14.61$) occurred at approximately the same rate, with more variability in disruptive behavior than in engagement. During the initial intervention phase, disruptive behavior ($M = 9.32$, $SD = 6.45$) immediately dropped in level, with a relatively stable decreasing trend to near zero, while engagement ($M = 25.38$, $SD = 10.10$) decreased slightly initially, but then increased with a variable upward trend. During the withdrawal, there was an immediate increase in the level of disruptive behavior ($M = 26.94$, $SD = 12.47$), with a variable slightly increasing trend. Engagement ($M = 28.37$, $SD = 12.80$) initially decreased slightly, with a variable slightly decreasing trend. Once intervention was re-implemented, disruptive behavior significantly decreased in level, stabilizing around near zero levels. Engagement ($M = 38.39$, $SD = 11.84$) during the re-implementation of the intervention immediately increased in level, with a variable increasing trend.

Treatment acceptability. The results of the social validity questionnaire assessing teacher acceptability for the trial-based functional analysis procedures are displayed below in table 1. All three teachers responded with agreement (i.e. a 4 or 5) that the assessment procedures were acceptable, and strongly agreed (i.e. 5) that they would be willing to have the functional analysis procedures used again, and overall had a positive reaction to the assessment. All three teachers agreed that it would be acceptable to use this assessment without the child's consent, and that it would be an acceptable assessment for people who cannot choose assessments for themselves. All three teachers responded with agreement that they liked the procedures, and believed them to be effective in identifying the cause of the child's behaviors. Two of the three teachers reported they neither agreed nor disagreed (i.e. a score of 3) if their student experienced discomfort during the assessment procedures, while one teacher strongly

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disagreed (i.e. a score of 1) that her student experienced discomfort during the procedures. Two teachers agreed that the assessment procedures would result in permanent improvements in the child's behavior, while one teacher neither agreed nor disagreed with that statement.

Table 1

<i>Assessment Acceptability Ratings</i>			
Item	Question	Mean	Range
1	I find this approach to be an acceptable way of assessing the child's challenging behavior	4.67	4-5
2	I would be willing for this procedure to be used again to asses the child's challenging behavior	5.00	5-5
3	I believe it would be acceptable to use this assessment without the child's consent	4.67	4-5
4	I like the procedures used in this assessment	4.33	4-5
5	I believe this assessment is likely to be effective in identifying the factors that cause the child's challenging behavior	4.67	4-5
6	I believe the child experienced discomfort during the assessment	2.33	1-3
7	I believe the assessment is likely to result in permanent improvements in the child's challenging behavior	4.00	3-5
8	I believe it would be acceptable to use this assessment with people who cannot choose assessments for themselves	4.33	4-5
9	Overall I had a positive reaction to this assessment	5.00	5-5

Note. All items scored 1 (*strongly disagree*) to 5 (*strongly agree*).

The results from the social validity questionnaire assessing teacher acceptability of the intervention procedures are presented in table 2 below. Eight of the 20 items rated were inversely scored, with lower ratings converted to high ratings, all others were scored with low ratings indicating low levels of acceptability and high ratings indicating high levels of acceptability. Total ratings have a potential range of 20-140, with higher scores indicating overall higher ratings of treatment acceptability. All three teachers rated the interventions very highly, with an average acceptability rating of 120.

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Table 2

<i>Treatment Acceptability Rating Form-Revised Results</i>			
Variable	Teacher 1	Teacher 2	Teacher 3
Overall score	125	128	107

Note. All items scored 1 (*indicating low acceptability*) to 7 (*high acceptability*).

Discussion

The study aimed (a) to evaluate whether trial-based FA procedures are an effective method to clearly identify the function of the challenging behaviors of preschool-aged children with ASD and (b) to determine if function-based interventions based on the information obtained from the trial-based FAs significantly reduce challenging behaviors and increase appropriate alternative behaviors. Although students exhibited target behaviors across most conditions of the trial-based FA, one or multiple functions of behavior were identified for each participant. These functions were used to develop interventions that led to improvements in student behavior. For Lenny and Derrick, function-based intervention plans resulted in a decrease and stabilization of disruptive behavior, and an increase in engagement during both intervention phases. There was also a significant decrease in Ben's elopement behavior during the second intervention phase.

For the first student, Lenny, the functions of his disruptive behavior were determined to be both escape from demands and access to teacher attention. His individualized intervention was based on providing escape from demands and access to attention during the absence of disruptive behavior (referred to positively as a "calm body and quiet mouth" to the student) on a 1 min fixed interval momentary schedule of reinforcement, while escape and attention were withheld when he engaged in disruptive behavior. This resulted in a decrease and stabilization of

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disruptive behavior, and an increase in engagement during both intervention phases, with the most significant results seen towards the end of the second intervention phase.

For the second student, Ben, the function of his elopement was determined to be access to tangibles. His individualized intervention was based on providing him with access to preferred tangible items based on the absence of elopement (referred to positively as a staying in his seat to the student), while access to non-academic items was withheld when Ben eloped. Reinforcement was provided through tokens given on a 1 min fixed whole interval schedule of reinforcement for staying in his seat, with access to the tangible item provided after three stars were accumulated, or after 3 min of staying in his seat. Although there was no visible decrease or stabilization of Ben's elopement during the first intervention phase, there was a significant decrease during the second intervention phase, with stable, low levels of elopement towards the end of the phase. Additionally, engagement increased during both intervention phases, compared to baseline and withdrawal phases.

For the third student, Derrick, the function of his disruptive behavior was determined to be access to tangibles. His individualized intervention was based on providing him with access to preferred tangible items based on the absence of disruptive behavior (referred to positively as having a "calm body, and quiet voice") on a 1 min fixed momentary interval schedule, while access edible items was withheld when Derrick engaged in disruptive behavior. This resulted in a decrease and stabilization of Derrick's disruptive behavior and an increase in engagement during both of the intervention phases, compared to baseline and withdrawal phases.

Best practice strongly supports the use of function-based interventions to address these behavior concerns (Arndorfer & Miltenberger, 1993; Conroy, Davis, Fox, & Brown, 2002; DEC, 2007; Dunlap & Fox, 2011; Gresham, Watson, & Skinner 2001, LaRocque et al., 2001).

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Acknowledgment of the importance of examining and utilizing function as it relates to student behavior, coupled with a consensus that early intervention for behavioral concerns is critical (LaRocque, Brown, & Johnson, 2001), indicate a need to investigate strategies to increase and improve the use of FBAs and functional-based behavioral interventions in schools.

While FBAs include a spectrum of less intensive to more intensive procedures, functional FA, represents the most reliable way to determine the function of behavior (Cipani & Schock, 2011). However, there are several factors that limit the usability of FA within applied settings such as schools. These factors include time, expertise, training, ethical concerns, and setting concerns related to artificial, or analogue, settings (Carr et al., 1997; Iwata et al., 1994; 2000; Smith & Churchill, 2002; Tincano et al., 1999). Trial-based FA provides an alternative that may suite application in school settings, as it addresses several of these issues. The current study used trial-based FAs within the classroom, throughout typical school activities. Additionally, classroom staff members were trained to conduct the functional analysis procedures, and implement function-based interventions with a high degree of adherence. The current study utilized two adults for the trial-based FA procedures; however, this was solely for the purposes of collecting IOA and adherence data. The classroom staff member conducted the assessment, and collected the primary trial-by-trial data, which is easier to collect than other data collection forms such as interval recording. Thus, for assessments conducted within applied settings for non-research purposes, the additional adult would not be necessary. These results indicate that when a functional analysis is deemed necessary within a school setting, trial-based FA may offer a viable option considering the often limited time, expertise, staff, and training available within these settings.

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The results of this study support the use of trial-based FAs within school settings, as the analyses were able to identify a function for the challenging behaviors of all students assessed. These results aligned with previous studies supporting the effectiveness and efficiency of trial-based FAs conducted in schools by classroom staff to identify the function of challenging behaviors in students (Bloom et al., 2011; Kodak et al., 2013; LaRue et al., 2010, Rispoli et al., 2013; Siagfoos & Sagers, 1995). Additionally, the current study extends this research by providing evidence that function-based interventions can then be implemented based on the results of trial-based FAs to effectively improve student behavior. Only a few previous studies have used trial-based FA results to design and implement interventions (Rispoli et al., 2013).

These results indicate that when a functional analysis is deemed necessary within a school setting, trial-based FA may offer a good option considering the limited time, expertise, and training available within these settings. The current study utilized two adults for the trial-based FA procedures; however, this was solely for the purposes of collecting IOA and adherence data. The classroom staff member conducted the assessment, and collected the primary trial-by-trial data, which is easier to collect than other data collection forms, such as interval recording. Thus, for assessments conducted within applied settings for non-research purposes, the additional adult would not be necessary.

The current study also supports the use of trial-based FA results to design function-based interventions as the interventions significantly reduced students' challenging behaviors, and increased classroom engagement. While many previous studies have utilized trial-based FAs to determine the function of a student's behavior, only a few have used these results to design and implement interventions to address these behaviors (Bloom et al., 2013; Lambert et al., 2012; Schmidt et al., 2014; Sigafos and Sagers, 1996). In the current study, classroom staff

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implemented all intervention procedures, with support and feedback from graduate students with extensive training in behavior management.

The results of the current study should be interpreted in light of limitations. In all functional analyses there is a risk of reactivity, which is when the assessment conditions themselves increase or decrease the display of behaviors. However, in the trial-based FA procedures, assessment conditions are embedded in typical routines that elicit behaviors, thus attempting to minimize this influence. Another limitation is the time constraints related to conducting research within the parameters of the school year, which provided the greatest barrier to data collection. Standards for single-case designs state that a four-stage design should include at least five data points for each stage (Kratochwill et al., 2013). Five or more data points were collected for the initial baseline and all intervention phases; however, only four data points were collected during the withdrawal phase. Additionally, there was considerable variability in baseline data and initial intervention phases. Stability in data became more apparent by the end of the second intervention phases.

Another limitation to the study relates data collection. Graduate students collected data evaluating intervention outcomes. Modifying data collection to make it feasible and reliable for the classroom staff to collect would improve implications for practice. Future studies on the use of trial-based FA with corresponding function-based interventions might focus on promoting usability and independence in behavior data collection during intervention.

When evaluating the effects of the intervention on student outcomes, it's important to recognize that the function-based interventions were implemented within the context of a classroom with existing class-wide and individual supports. The positive impact on the student may not be due solely on the function-based intervention, but rather due to the intervention

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“package” provided through the cumulative supports provided to the student. For example, Lenny’s intervention “package” included not only the function-based DRO for disruptive behavior, but also a token board for correct and independent responses, as well as pre-correction and specific verbal praise for overall appropriate behavior. Any additional supports in place prior to the function-based intervention were documented, and baseline data reflect student behavior with these supports in place. However, it is possible that the positive outcomes were due to this “package” of supports, which included the function-based DRO, but may not have been due solely to the DRO. A function-based intervention alone may not have been sufficient for positive outcomes, but rather the interventions packaged along with class-wide and individual positive behavior supports maximized effectiveness.

The present study used trial-based FA, conducted by classroom staff within the classroom setting, to determine the function of three students’ challenging behaviors. Results were then used to design and implement a function-based intervention, which resulted in a significant decrease in challenging behavior as well as an increase in appropriate engagement. These results support the use of trial-based FA, and function-based interventions to identify and address the behavioral concerns of early childhood students diagnosed with ASD whose challenging behaviors negatively impact their ability to be successful in the classroom environment.

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Appendices

Appendix A. Parent/Agency Permission

Parent Permission for Child's Participation in Research
University of Cincinnati
Department: School Psychology
Principal Investigator: Wallace Larkin, M.Ed.
Faculty Advisor: Renee Hawkins, Ph.D.

Title of Study: Using Trial-Based Functional Analysis to Design Effective Interventions for Students Diagnosed with Autism Spectrum Disorder

Introduction:

You are being asked to allow your child to take part in a research study. Please read this paper carefully and ask questions about anything that you do not understand.

Who is doing this research study?

The person in charge of this research study is Wallace Larkin, M.Ed. of the University of Cincinnati (UC) Department of School Psychology. She is being guided in this research by Renee Hawkins, Ph.D. There may be other people on the research team helping at different times during the study.

What is the purpose of this research study?

The purpose of this research study is to examine the results from behavior assessments done in the child's classroom to help design interventions for challenging behaviors.

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Who will be in this research study?

About 3-5 children will take part in this study. Your child may be in this study if

- Your child attends the Cincinnati Center for Autism.
- Your child was referred by his/her teacher for challenging behaviors such as aggression, property destruction, elopement, screaming, crying and non-compliance.

What if you or your child is an employee where the research study is done?

Taking part in this research study is not part of your job. Refusing to be in the study will not affect your job. You will not be offered any special work-related benefits if your child takes part in this study.

What will your child be asked to do in this research study, and how long will it take?

Your child will be asked to complete tasks your child does during his/her average school day. Depending on your child's reaction, the researcher may be able to figure out why your child has challenging behaviors at school.

- It will take about 2-3 weeks.
- The research will take place at your child's school.
- Your child will be asked to do various typical school activities (i.e. color, build a tower with block, work on a puzzle etc.).
- The researchers will observe your child to see if he/she has any challenging behaviors, and if he/she is participating in the activity during that time.
- Each trial will last up to 2 minutes
- 12-16 trials will be completed per day
- Observations will occur over the course of 2-3 weeks
- The observations will take place in your child's typical school settings

Are there any risks to being in this research study?

The risk is not expected to be more than your child would have in daily life.

Are there any benefits from being in this research study?

Because of being in this research your child might benefit from the results of the behavioral assessment because the results will be used to create an effective intervention plan for your child, and may guide teacher interactions with your child to improve learning outcomes by decreasing your child's challenging behaviors.

What will your child get because of being in this research study?

Your child will not be paid to take part in this study.

Does your child have choices about taking part in this research study?

If you do not want your child to take part in this research study he or she will receive the same services he or she already gets.

How will your child's research information be kept confidential?

Information about you will be kept private by:

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- Using a study ID number instead of the participant's name on the observation forms.
- Keeping the master list of names and study ID numbers in a separate location from the research forms
- Limiting access to research data to the research team
- Not including the participant's name on the typed transcript
- Keeping research data on a password-protected computer
- Keeping signed consent and permission forms will be kept separately locked in the supervising faculty's office.
- Data used for research purposes will be kept in a locked file at the University of Cincinnati and will be shredded 3 years after completion of the study.

Your child's information will be kept in a locked file at the University of Cincinnati for 3 years. After that it will be shredded by the co-PI.

1. The University of Cincinnati
  - a. This is usually in a locked cabinet in the faculty researcher advisor, Renee Hawkins' campus office.
  - b. Signed consent documents and master lists of participant names and ID numbers will be stored in a separate locked file.
2. The data will be kept for 3 years after the completion of the study.
3. After 3 years, all research files will be shredded including consent documents and master lists of participant names and ID numbers.
4. The data from this research study may be published; but you will not be identified by name.

Agents of the University of Cincinnati may inspect study records for audit or quality assurance purposes.

The identity of participants and information about them will be kept confidential, unless the authorities have to be notified about abuse or immediate harm that may come to the participant or others.

What are your and your child's legal rights in this research study?

Nothing in this consent form waives any legal rights you may have. This consent form also does not release the investigator, the institution, or its agents from liability for negligence.

What if you or your child has questions about this research study?

If you have any questions or concerns about this research study, you should contact Wallace Larkin at 513-207-8247 or larkinwm@mail.uc.edu

Or, you may contact Renee Hawkins at 513-556-3342 or renee.hawkins@uc.edu.

The UC Institutional Review Board reviews all research projects that involve human participants to be sure the rights and welfare of participants are protected.

TRIAL-BASED FUNCTIONAL ANALYSIS

If you have questions about your child's rights as a participant or complaints about the study, you may contact the UC IRB at (513) 558-5259. Or, you may call the UC Research Compliance Hotline at (800) 889-1547, or write to the IRB, 300 University Hall, ML 0567, 51 Goodman Drive, Cincinnati, OH 45221-0567, or email the IRB office at irb@ucmail.uc.edu.

Does your child HAVE to take part in this research study?

No one has to be in this research study. Refusing to take part will NOT cause any penalty or loss of benefits that you or your child would otherwise have.

You may give your permission and then change your mind and take your child out of this study at any time. To take your child out of the study, you should tell Wallace Larkin at 513-207-8247

Your child will be asked if he or she wants to take part in this research study. Even if you say yes, your child may still say no.

Agreement:

I have read this information and have received answers to any questions I asked. I give my permission for my child to participate in this research study. I will receive a copy of this signed and dated Parent Permission form to keep.

You Child's Name (please print) _____

Your Child's Date of Birth _____ (Month / Day / Year)

Parent/Legal Guardian's Signature _____ Date _____

Agency Supervisor's Signature _____ Date _____

___ Oral presentation of the Parent Permission was given to the parent, who was not able to read the written Parent Permission. By signing, I certify that the oral presentation was consistent with this written document.

_____
Impartial Witness Signature (oral presentation only) Date _____

Signature of Person Obtaining Permission _____ Date _____

Appendix B. Adult Consent

Adult Consent Form for Research
University of Cincinnati
Department: School Psychology
Principal Investigator: Wallace Larkin, M.Ed.
Faculty Advisor: Renee Hawkins, Ph.D.

Title of Study: Using Trial-Based Functional Analysis to Design Effective Interventions for Students Diagnosed with Autism Spectrum Disorder

Introduction:

You are being asked to take part in a research study. Please read this paper carefully and ask questions about anything that you do not understand.

Who is doing this research study?

The person in charge of this research study is Wallace Larkin, M.Ed. of the University of Cincinnati (UC) Department of School Psychology. She is being guided in this research by Renee Hawkins, Ph.D. There may be other people on the research team helping at different times during the study.

What is the purpose of this research study?

The purpose of this research study is to examine the results from behavior assessment done in the school setting to design interventions for challenging behaviors.

Who will be in this research study?

Between 3 and 5 students will take part in this study. Between 3 and 5 teachers will take part in this study. You may be in this study if

- You are a teacher/therapist working with a preschool student who has been

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identified with a developmental or behavioral disability, or is at-risk for developmental and behavioral disabilities

- You referred a student for challenging behaviors such as aggression, property destruction, elopement, screaming, crying and non-compliance.

What if you are an employee where the research study is done?

Taking part in this research study is not part of your job. Refusing to be in the study will not affect your job. You will not be offered any special work-related benefits if you take part in this study.

What will you be asked to do in this research study, and how long will it take?

You will be asked to complete an in person interview about a student. It will take about 20-60 minutes. You will be trained to conduct the behavioral assessment and behavioral intervention for the student. The research will take place in your classroom.

Are there any risks to being in this research study?

The risk is not expected to be more than you would have in daily life.

Are there any benefits from being in this research study?

Because of being in this research you might benefit from the behavioral assessment and intervention plan for your student, as this may improve student outcomes by decreasing the student's challenging behaviors.

What will you get because of being in this research study?

You will not be paid to take part in this study.

Do you have choices about taking part in this research study?

If you do not wish to take part in this research study, you will still receive support for you students through with school wide services.

How will your research information be kept confidential?

Information about you will be kept private by:

- Using a study ID number instead of the participant's name on the observation forms.
- Keeping the master list of names and study ID numbers in a separate location from the research forms
- Limiting access to research data to the research team
- Not including the participant's name on the typed transcript
- Keeping research data on a password-protected computer
- Keeping signed consent and permission forms will be kept separately locked in the supervising faculty's office.
- Data used for research purposes will be kept in a locked file at the University of Cincinnati and will be shredded 3 years after completion of the study.

Your information will be kept in a locked file at the University of Cincinnati for 3 years.

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After that it will be shredded by the co-PI.

5. The University of Cincinnati
  - a. This is usually in a locked cabinet in the faculty researcher advisor, Renee Hawkins' campus office.
  - b. Signed consent documents and master lists of participant names and ID numbers will be stored in a separate locked file.
6. The data will be kept for 3 years after the completion of the study.
7. After 3 years, all research files will be shredded including consent documents and master lists of participant names and ID numbers.
8. The data from this research study may be published; but you will not be identified by name.

Agents of the University of Cincinnati may inspect study records for audit or quality assurance purposes.

Your identity and information will be kept confidential unless the authorities have to be notified about abuse or immediate harm that may come to you or others.

What are your legal rights in this research study?

Nothing in this consent form waives any legal rights you may have. This consent form also does not release the investigator, the institution, or its agents from liability for negligence.

What if you have questions about this research study?

If you have any questions or concerns about this research study, you should contact Wallace Larkin at 513-207-8247 or larkinwm@mail.uc.edu

Or, you may contact Renee Hawkins at 513-556-3342 or renee.hawkins@uc.edu.

The UC Institutional Review Board reviews all research projects that involve human participants to be sure the rights and welfare of participants are protected.

If you have questions about your rights as a participant or complaints about the study, you may contact the UC IRB at (513) 558-5259. Or, you may call the UC Research Compliance Hotline at (800) 889-1547, or write to the IRB, 300 University Hall, ML 0567, 51 Goodman Drive, Cincinnati, OH 45221-0567, or email the IRB office at irb@ucmail.uc.edu.

Do you HAVE to take part in this research study?

No one has to be in this research study. Refusing to take part will NOT cause any penalty or loss of benefits that you would otherwise have.

You may start and then change your mind and stop at any time. To stop being in the study, you should tell Wallace Larkin at 513-207-8247.

Agreement:

I have read this information and have received answers to any questions I asked. I give my consent to participate in this research study. I will receive a copy of this signed and dated

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consent form to keep.

Participant Name (please print) _____

Participant Signature _____ Date _____

Signature of Person Obtaining Consent _____ Date _____

Appendix C. Trial-By-Trial Data Sheet

Trial-Based Functional Analysis Data Sheet

Participant: _____		
Date: _____		
Condition: Attention Escape Tangible Automatic		
Trial	Control	Test
1	Y N	Y N
2	Y N	Y N
3	Y N	Y N
4	Y N	Y N

Participant: _____		
Date: _____		
Condition: Attention Escape Tangible Automatic		
Trial	Control	Test
1	Y N	Y N
2	Y N	Y N
3	Y N	Y N
4	Y N	Y N

Participant: _____		
Date: _____		
Condition: Attention Escape Tangible Automatic		
Trial	Control	Test
1	Y N	Y N
2	Y N	Y N

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3	Y	N	Y	N
4	Y	N	Y	N

Participant: _____		
Date: _____		
Conditions: Attention Escape Tangible Automatic		
Trial	Control	Test
1	Y N	Y N
2	Y N	Y N
3	Y N	Y N
4	Y N	Y N

Appendix D. Time Sampling Observation Code

Child: _____	(subject number only)
Date: _____	Researcher: _____
Start Time: _____	End Time: _____
Condition: _____	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Engagement																
Disruptive																
Dangerous																

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Engagement																
Disruptive																
Dangerous																

	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	Total
Engagement																
Disruptive																
Dangerous																

	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	Total
Engagement																
Disruptive																
Dangerous																

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Total engagement: _____

Total disruptive: _____

Total dangerous: _____

Total IOA (if applicable): _____

Appendix E. Evidence-Based Practices Classroom Checklist

Evidence-Based Practices in the Classroom

✓ Those items observed

<u>Environmental</u>	
Physical organization	
1. classroom spaces are visually defined by visual and physical arrangements (e.g. furniture arrangements, labels)	
2. Classroom areas include identifiable spaces for various instructional configurations (check v any of the following observed)	
a. Independent work	
b. Large group	
c. Small group	
d. One on one instruction	
e. Other:	
3. Materials that are accessible in the classroom have an identifiable instructional purpose	
Visual Schedules	
1. Overall classroom schedule is posted and easy to read (clear where every student and every staff member should be at any given time)	
2. Consider the following if an overall schedule is posted, if not complete as "N/O"	
a. Students are receiving instruction (in academic, functional, social, or communication skills) that	

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correspond to the schedules	
3. Consider the following only if multiple staff member are assigned to the classroom, otherwise complete as "N/A"	
a. Staff schedules posted (may be embedded in master classroom schedule)	
b. Adults are assigned areas as posted in the schedule (or teacher can articulate valid reason for change)	
4. Specifically consider students with autism and other complex learning needs when completing the following.	
a. Every student has an individualized visual schedule (text-based, picture-based, object) that the student can manipulate (i.e. physically access)	
b. Students schedules are designed for use across activities and environments	
c. Systematic prompting is used to teach students to use visual schedule	
Behavior Supports	
1. Classroom rules and/or expectations presented visually (e.g text based, pictures)	
5. Use of reinforcement is observed across classroom activities	
6. Staff is observed offering choices	
7. Consider the following if staff is observed offering choices, if not complete as N/O.	
a. Staff honors student choices as requested	
8. Transitions between tasks and activities occur quickly and with minimal disruption	
9. Individualized transitions supports (wait chairs, transition area) are available to students as they move between activities or environments	
Instructional Considerations	
1. Indicate with a v check the type(s) of instructions observed in the classroom during the observation	
a. Independent work	
b. Whole group	
c. Small group	
d. Individualized instruction with adult or peer	
e. Other (please describe):	
2. Goals of instructional activities are clearly identifiable to observer without explanation	
3. Activity schedules or work systems are used to communicate expectations during instructional activities	
4. Individualized work systems (IWS) are used for independent work tasks in order to communicate answers to four questions – What work? How much work? How do I know when I'm finished? What do I do next?	

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5. Check v if IWS are observed in classroom but are not applicable to observed instruction (i.e. independent work activities not observed)	
6. Environmental supports are embedded in classroom instruction (check v any of the following that were observed during instructional activities)	
a. Token economy	
b. First/Then instructions	
c. Graphic organizers	
d. Templates	
e. Visual directions	
f. Choice template (e.g. written text, picture icons)	
g. Video models	
h. Other (please describe):	
7. Systematic instruction includes gaining attention, direction (prompting), student response, and feedback – either error correction or reinforcement	
8. Classroom activities include direct instruction in building independence	
a. Functional independence	
b. Academic independence	
9. All staff actively participate w/students in learning or in classroom-related activities (e.g. preparing materials)	
10. Staff are observed collecting data on student performance	
11. Conversation among staff limited to discussion directly related to curriculum, instruction, and classroom activities	
Communication	
1. Expressive communication systems (i.e. assistive technology) are utilized in the classroom to support students with communication differences.	
2. Staff members do not speak on behalf of students and instead prompt students to use expressive communication	
3. Communication instruction is embedded throughout classroom activities	
4. Direct instruction in social interaction is embedded throughout classroom activities	
5. All students have opportunities to communicate with both peers and adults	
a. Adults	
b. Peers	

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Appendix F. Functional Assessment Checklist for Teachers and Staff (FACTS- Part A)

Functional Assessment Checklist for Teachers and Staff (FACTS-Part A)

Student/ Grade: _____ Date: _____
Interviewer: _____ Respondent(s): _____

Student Profile: Please identify at least three strengths or contributions the student brings to school.

_____
_____

Problem Behavior(s): Identify problem behaviors

☐ Tardy	☐ Fight/physical Aggression	☐ Disruptive	☐ Theft
☐ Unresponsive	☐ Inappropriate Language	☐ Insubordination	☐ Vandalism
☐ Withdrawn	☐ Verbal Harassment	☐ Work not done	☐ Other _____
	☐ Verbally Inappropriate	☐ Self-injury	

Describe problem behavior: _____

Identifying Routines: Where, When and With Whom Problem Behaviors are Most Likely.

Schedule (Times)	Activity	Likelihood of Problem Behavior	Specific Problem Behavior
		Low 1 2 3 4 5 High 6	
		1 2 3 4 5 6	

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		1	2	3	4	5	6	
		1	2	3	4	5	6	
		1	2	3	4	5	6	
		1	2	3	4	5	6	
		1	2	3	4	5	6	
		1	2	3	4	5	6	
		1	2	3	4	5	6	
		1	2	3	4	5	6	
		1	2	3	4	5	6	

Select 1-3 Routines for further assessment: Select routines based on (a) similarity of activities (conditions) with ratings of 4, 5 or 6 and (b) similarity of problem behavior(s). Complete the FACTS-Part B for each routine identified.

Functional Assessment Checklist for Teachers & Staff (FACTS-Part B)

Student/ Grade: _____

Date: _____

Interviewer: _____

Respondent(s): _____

Routine/Activities/Context: Which routine(only one) from the FACTS-Part A is assessed?

Routine/Activities/Context	Problem Behavior(s)

Provide more detail about the problem behavior(s):

What does the problem behavior(s) look like?

How often does the problem behavior(s) occur?

How long does the problem behavior(s) last when it does occur?

What is the intensity/level of danger of the problem behavior(s)?

What are the events that predict when the problem behavior(s) will occur? (Predictors)

Related Issues (setting events)	Environmental Features
☐ illness Other: _____ ☐ drug use _____ ☐ negative social _____ ☐ conflict at home _____ ☐ academic failure _____	☐ reprimand/correction ☐ structured activity ☐ physical demands ☐ unstructured time ☐ socially isolated ☐ tasks too boring ☐ with peers ☐ activity too long

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	___ Other _____ ___ tasks too difficult

What consequences appear most likely to maintain the problem behavior(s)?

Things that are Obtained	Things Avoided or Escaped From
___ adult attention Other: _____ ___ peer attention _____ ___ preferred activity _____ ___ money/things _____	___ hard tasks Other: _____ ___ reprimands _____ ___ peer negatives _____ ___ physical effort _____ ___ adult attention _____

SUMMARY OF BEHAVIOR

Identify the summary that will be used to build a plan of behavior support.

Setting Events & Predictors	Problem Behavior(s)	Maintaining Consequence(s)

How confident are you that the Summary of Behavior is accurate?

Not very confident						Very Confident
1	2	3	4	5	6	

What current efforts have been used to control the problem behavior?

Strategies for preventing problem behavior	Strategies for responding to problem behavior
___ schedule change Other: _____ ___ seating change _____ ___ curriculum change _____	___ reprimand Other: _____ ___ office referral _____ ___ detention _____

Appendix G. Trial-Based Functional Analysis Adherence Checklist

Date_____

Researcher_____

Child Participant_____

Adult Participant_____

Conditions assessed for adherence_____

Attention

Control:

- Provide 60 seconds of constant attention regardless of child behavior

Test:

- Say “I will play with you/help you in a little bit”
- Remove attention by engaging in other activity e.g working on paperwork or talking to another adult
- If child engages in problem behavior
  - Provide attention e.g “please don’t do that” or “what do you want?”
  - End trial

Demand

Control:

- Place no demands but remain close to child

Test:

- Present relevant and challenging task
- Verbally and/or physically prompt child to engage in task ~ every 10 s
- If the child engages in problem behavior

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- Remove task
- End trial

Tangible

Control:

- Provide continuous access to preferred item

Test:

- Place preferred item in sight but out of reach
- Say “you can have this in a minute”
- If child engages in problem behavior
  - Provide access to preferred item for remainder of trial
  - End Trial

Automatic Reinforcement

Control:

- Provide no demands, attention, or access to activities or toys
- Child can walk around but if they access a person or toy, cancel trial

Test:

- Provide no demands, attention, or access to activities or toys
- Child can walk around but if they access a person or toy, cancel trial

Appendix H. Social Validity Questionnaires

Assessment Acceptability Form (modified TARF-R)

For each please mark with the corresponding number to indicate

1. (Strongly disagree)
2. (Somewhat disagree)
3. (Neither agree nor disagree)
4. (Somewhat agree)
5. (Strongly agree)

1. I find this approach to be an acceptable way of assessing the child’s challenging behavior
2. I would be willing for this procedure to be used again to assess the child’s challenging behavior
3. I believe it would be acceptable to use this assessment without the child’s consent
4. I like the procedures used in this assessment
5. I believe this assessment is likely to be effective in identifying the factors that cause the child’s challenging behavior
6. I believe the child experienced discomfort during the assessment
7. I believe the assessment is likely to result in permanent improvements in the child’s challenging behavior
8. I believe it would be acceptable to use this assessment with people who cannot choose assessments for themselves
9. Overall I had a positive reaction to this assessment

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Treatment Acceptability Rating Form- Revised

Please complete the items listed below by placing a check mark on the line under the question that best indicates how you feel about the student's intervention.

1. How clear is your understanding of this treatment?

___ Not at all clear ___ ___ Neutral ___ ___ ___ Very clear

2. How acceptable do you find the treatment to be regarding your concerns about your child?

___ Not at all acceptable ___ ___ Neutral ___ ___ ___ Very acceptable

3. How willing are you to *carry out* this treatment?

___ Not at all willing ___ ___ Neutral ___ ___ ___ Very willing

4. Given your child's behavioral problems, how reasonable do you find the treatment to be?

___ Not at all reasonable ___ ___ Neutral ___ ___ ___ Very reasonable

5. How costly will it be to carry out this treatment?

___ Not at all costly ___ ___ Neutral ___ ___ ___ Very costly

6. To what extent do you think there might be disadvantages in following this treatment?

___ None are likely ___ ___ Neutral ___ ___ ___ Many are likely

7. How likely is this treatment to make permanent improvements in your child's behavior?

___ Unlikely ___ ___ Neutral ___ ___ ___ Very likely

8. How much time will be needed each day for you to *carry out* this treatment?

___ Little time will be needed ___ ___ Neutral ___ ___ ___ much time will be needed

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

___ Not at all confident ___ ___ Neutral ___ ___ ___ Very confident

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10. Compared to other children with behavioral difficulties, how serious are your child's problems?

___ Not at all serious ___ ___ ___ Neutral ___ ___ ___ Very serious

11. How disruptive will it be to the classroom (in general) to carry out this treatment?

___ Not at all disruptive ___ ___ ___ Neutral ___ ___ ___ Very disruptive

12. How effective is this treatment likely to be for your child?

___ Not at all effective ___ ___ ___ Neutral ___ ___ ___ Very effective

13. How affordable is this treatment for your classroom?

___ Not at all affordable ___ ___ ___ Neutral ___ ___ ___ Very affordable

14. How much do you like the procedures in the proposed treatment?

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

15. How willing will other teachers be to help you carry out this treatment?

___ Not at all willing ___ ___ ___ Neutral ___ ___ ___ Very willing

16. To what extent are undesirable side-effects likely to result from this treatment?

___ No side effects are likely ___ ___ ___ Neutral ___ ___ ___ Many side effects are likely

17. How much discomfort is your child likely to experience during the course of this treatment?

___ No discomfort at all ___ ___ ___ Neutral ___ ___ ___ Very much discomfort

18. How severe are your child's behavioral difficulties?

___ Not at all severe ___ ___ ___ Neutral ___ ___ ___ Very severe

19. How willing would you be to change your class routine to *carry* out this treatment?

___ Not at all willing ___ ___ ___ Neutral ___ ___ ___ Willing

20. How well will carrying out this treatment fit into the class routine?

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___ Not at all ___ ___ ___ Neutral ___ ___ ___ Well

21. To what degree are your child's behavioral problems of concern to you?

___ No concern ___ ___ ___ Neutral ___ ___ ___ Great concern