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OVERCOMING CHALLENGES IN THE ASSESSMENT AND TREATMENT OF PROBLEM
BEHAVIOR IN ADULTS WITH AUTISM

by

JULIA A. IANNACCONE

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the
requirements for the degree of Doctor of Philosophy, The City University of New York.

2020

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Autism

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This manuscript has been read and accepted for the Graduate Faculty in Psychology in
satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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THE CITY UNIVERSITY OF NEW YORK

ABSTRACT

Overcoming Challenges in the Assessment and Treatment of Problem Behavior in Adults with Autism

by

Julia A. Iannaccone

Advisor: Emily Jones

Problematic behaviors, such as self-injurious behavior or aggression, demonstrated by adults with autism spectrum disorder (ASD), create many significant life complications, some life-threatening. Applied Behavior Analysis (ABA) is established as an evidence-based approach to treat problem behavior for children with ASD and shows promise as an effective treatment for adults, yet little research has been conducted within the adult population. Assessment and treatment of problem behavior with adults is often challenging due to funding limitations, increased severity and complexity of problem behavior, and underqualified staff. The purpose of the present study was to overcome these challenges by (1) identifying a functional assessment method that is effective, efficient, and socially valid, (2) evaluating the efficacy of treatment involving reinforcer parameter manipulation in functional communication training without extinction (extinction not often being feasible with adults due to increased severity of problem behavior), and (3) evaluating a novel efficient approach to effectively train staff to ensure correct treatment implementation. Results of the current study demonstrated an effective and efficient assessment and treatment option for adults with ASD and the need for ABA services through adulthood. The successful treatment of problem behavior for these adults with ASD has broad impacts such as improvement in quality of life, safety, health, and community opportunities.

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Overcoming Challenges in the Assessment and Treatment of Problem Behavior in Adults with Autism

The increasing number of individuals diagnosed with autism spectrum disorder (ASD) approaching adulthood has been described as “a looming crisis of unprecedented magnitude” (Gerhardt & Lanier, 2011; p. 37). Evidence-based treatments using Applied Behavior Analysis (ABA) are well established in the literature for children with ASD. In contrast, little research has been conducted with adults diagnosed with the same disorder. In a systematic review on the assessment and treatment of ASD in adults, the proportion of research articles including participants with ASD over 21 years of age either remained low or decreased since the year 2000 (Iannaccone & Jones, in preparation). For example, from the year 2000 to 2008 in the *Journal of Applied Behavior Analysis*, 10% of articles including participants with ASD included participants over 21-years-old. In more recent years, from 2009 through 2017, this proportion decreased to just 5%.

A number of issues arise in treatment for adults and not often experienced, at least not to the same extent, by children (Gerhardt & Lainer, 2011; Manente, Maraventano, LaRue, Delmolino, & Sloan, 2010). The most commonly cited challenges are the increased severity and complexity of problematic behaviors, ill-prepared and underqualified staff members charged with meeting the needs of adult clients, and legislation and cost regarding assessment and treatment. To address these challenges, effective and efficient assessment and treatment options that minimize risks to adults with ASD, as well as the effective training of staff members responsible for implementing the treatment, are required.

Challenge 1: Legislation and Cost

Of the 27 evidence-based treatments identified by the National Professional Development Center on ASD, 23 are behavior analytic in nature (Wong, et al. 2014). Because of the cost of behavior analytic services, policies have changed in most states to ensure children have access to effective behavior analytic treatment. In fact, laws in all 50 of the United States ensure medical insurance covers ABA services for children with ASD. However, only 10 of those 50 states also have laws about insurance coverage for ABA treatment for adults with ASD. The picture is even bleaker considering that the funding for treatment for adults in those 10 states is often lower than that for children, making it inadequate to cover the cost of the services required.

The present poor funding leads to the need for assessment and treatment options that do not require considerable resources (e.g., time, money, expertise). For example, despite the literature questioning the effectiveness of descriptive assessments, such as ABC data collection, this method is often used to conduct a functional assessment of problem behavior by untrained professionals (e.g., Thompson & Iwata, 2007). Fortunately, a few effective functional assessment models exist, that may prove to be equally efficient, but more effective than ABC data collection, leading to better information to guide treatment selection. One such model that shows promise as an effective alternative is the trial-based functional analysis in which brief trials are conducted to empirically identify environmental variables potentially reinforcing problem behavior (Sigafoos & Sagers, 1995). A direct comparison of not only the results of ABC data collection and trial-based functional analysis, but also the time, cost, and social validity of these two assessment methods is needed to address the issue of efficient and effective assessment tools.

Challenge 2: Complexity and Severity

Compounding the challenge of limited funding is the increased difficulty in assessing and treating problem behavior of adults, as compared to children, due to increased complexity and severity. Several reasons have been suggested to be, at least in part, responsible for the increased complexity, and thus, resistance to treatment. A long reinforcement history for problem behavior, especially if intermittently delivered, results in behavior that is resistant to treatment. Problem behavior in adults is also often severe due to the increased size and strength of an adult compared to a child. Therefore, it is crucial to assess and treat problem behaviors of adults with safe, evidence-based practices.

A powerful tool that behavior analysts have in the assessment of problem behavior is the functional analysis, first demonstrated by Iwata and colleagues in 1982/1994, which involves the experimental manipulation of environmental stimuli to determine factors reinforcing problem behavior. Due to the nature of the assessment, standard functional analyses occasion problem behavior, thus requiring clinicians of adults to choose a modified functional analysis to minimize risk to adult clients and staff. One such functional analysis method is the trial-based functional analysis (Bloom, Iwata, Fritz, Roscoe, & Carreau, 2011). This assessment decreases the risk of prolonged exposure to conditions that may provoke problem behavior, a known risk of the traditional functional analysis, by terminating testing conditions after a single instance of problem behavior. Compounded by the aforementioned reasons related to the cost of assessment methods, the trial-based functional analysis shows promise as an effective and efficient tool to identify functions of problem behavior in adult clients.

The increased potential for serious injury in severe problem behavior must also inform treatment choices. For example, many treatment plans include extinction. Clinical

implementation of extinction with children has been criticized due to the characteristic “extinction burst” in which the individual engages in increased rates of problem behavior, and sometimes new problematic behaviors such as aggression, when reinforcement is initially withheld. Previous research suggests that the likelihood of an extinction burst and extinction-induced aggression, however, is lower when extinction is used with another reinforcement procedure (Lerman & Iwata, 1995; Lerman, Iwata, & Wallace, 1999). Nevertheless, an extinction burst, however unlikely, presents potential serious injury to the adult with ASD and the staff implementing the intervention. Furthermore, provided a safe environment is available to evaluate a treatment with extinction, it may not physically be possible to implement. In clinical work with adults displaying problem behavior, it is not uncommon to have a client who can physically overpower the therapist to gain access to the reinforcer. Especially in these cases, extinction is not a feasible treatment option.

Within the current literature, the ineffectiveness of common treatment components, such as functional communication, is noted when implemented *without* extinction (Hagopian, Fisher, Sullivan, Acquistio, & LeBlanc, 1998). Only a few articles exist that attempt to address the issues associated with treatments without extinction. For example, Athens and Vollmer (2010) used functional communication training (FCT) without extinction and found FCT to be the most effective when three parameters of reinforcement were manipulated (delay, duration, and quality) simultaneously. Whereas this study provides preliminary evidence for the possibility of treatment effects when functional communication is used without extinction, little research has been conducted after the publication of this article. Reinforcement parameter manipulation appears to be a promising tool when treating problem behavior without extinction, however, it remains unknown if, when implemented with adults, reinforcement parameter manipulation is an

effective tool in functional communication treatments without extinction, and furthermore if treatment effects will be sustained as the schedule of reinforcement is thinned and generalized.

Challenge 3: Qualified Staff

Once an effective treatment is identified, proper training of direct care staff is necessary. The best planned intervention will have limited long-term success if staff are not qualified to implement the intervention and do not do so with procedural integrity (St. Peter, Byrd, Pence, & Foreman, 2016; DiGennaro Reed, Reed, Baez, & Maguire, 2011). Regrettably, a widely used technique in the training of staff members, including at groups home and day rehabilitation centers, is verbal instruction, which, when implemented alone, is seldom an effective means of training (Jahr, 1998). Behavior Skills Training (BST) has been repeatedly shown to be an effective means of training staff, especially in the implementation of behavior analytic procedures (e.g., Lafasakis & Sturmey, 2007; Parsons, Rollyson, & Reid, 2012). BST consists of six essential steps: providing a rationale for the target skill being trained, a succinct written description, a detailed vocal description, demonstrating the target skill, and rehearsing, practicing, and providing feedback until mastery is demonstrated.

A practical concern when using BST is the time required for training (Parsons, Rollyson, & Reid, 2012). Two manipulations to the traditional method of BST have been found to both be effective and time saving. One manipulation is the inclusion of a video model instead of a live demonstration of the target skill (Lavie & Sturmey, 2002). Another recent development is the use of video critiques (Iannaccone, Urich, Hardesty, & Bowman, in preparation). Video critiques with feedback are used instead of role play sessions to practice the target skill in a standard amount of time, regardless of the number of trainees. In a video critique, the target skill is

implemented with 50% procedural integrity, and the trainees are required to identify the errors in procedural integrity and detail the correct response.

Another benefit of video models and video critiques is the ability of the trainer to give these tools to the supervisors of individuals implementing the behavioral intervention to easily train new staff once the behavioral specialist is no longer present. Further evidence is needed to demonstrate the effectiveness of video critiques as they have only been used to train a wide variety of behavioral procedures, and not the specific behavioral treatment of a single client. Furthermore, individual improvements as a result of BST with video critiques is unknown, as the preliminary study indicating its efficacy was conducted in a group design.

Purpose

The purpose of the present study was to provide an effective model for assessing and treating problem behavior in adults diagnosed with autism and overcome the aforementioned challenges specific to adults. This was achieved through two studies. Study 1 consisted of a functional assessment and functional communication treatment package for severe problem behavior in adults with ASD. The purpose of the pre-assessment in Study 1 was to compare the time, cost, social validity and consistency of results between two assessment methods: the commonly implemented descriptive assessment in the form of ABC data collection and the trial-based functional analysis. The purpose of the treatment evaluation in Study 1 was to assess the effectiveness and social validity of functional communication with reinforcement parameter manipulation (and *without* extinction) and treatment effects during schedule thinning and generalization. The purpose of Study 2 was to prepare staff to accurately implement the behavioral intervention of Study 1. This was accomplished by evaluating the efficacy of an

efficient modification of BST with video models and video critiques; the social validity of this method was also assessed.

Study 1: Effective and Efficient Assessment and Treatment of Problem Behavior

Method

Participants and Setting

Three individuals diagnosed with autism participated. Thomas was a 21-year-old male who engaged in aggressive behavior, John was a 22-year-old male who engaged in regurgitation/spitting, and Jack was a 22-year-old male who engaged in aggressive and self-injurious behavior. Thomas' primary form of communication was vocal language in the form of one to two word phrases, whereas John and Jack's primary form of communication was picture-aided (i.e., iPad communication applications or laminated picture cards). The severity of all participants' problem behaviors and skill deficits necessitated a 1:1 staff to client ratio of assistance.

All sessions took place on a farm where the participants worked. Direct care staff for the participants with autism participated to assist with ABC data collection, as well as to serve as the therapist in all sessions with the assistance of the first author, a Masters level Board Certified Behavior Analyst (BCBA) in her last year of doctoral training. In treatment evaluation sessions, assistance from the first author was no longer required after staff training (Study 2).

Materials

Materials for ABC data collection included coded data sheets, a clip board, and pencils. Data sheets were coded such that the staff member chose from an array of potential antecedents, problem behaviors, and consequences (i.e., there was no free operant responding). Coded data sheets were used in an effort to increase interpretability and comparability to results of the trial-based functional analysis. In the trial-based functional analysis and treatment evaluation,

materials for data collection included laptop computers with the data collection software BDataPro installed (Bullock, Fisher, & Hagopian, 2017). Relevant vocational tasks, toys, games, and edibles were used as necessary (e.g., demand or tangible conditions of functional analysis).

Procedures

Pre-Assessment. Clinically, a commonly used approach to functional assessment in group homes and day rehabilitation centers is descriptive assessment in the form of ABC data collection by direct care staff members. Because it is assumed by numerous facilities that ABC data collection is relatively straightforward, staff training to collect ABC data is not often conducted. In order to increase the accuracy and reliability of ABC data in the current study, staff members were trained to collect ABC data. This staff training was also conducted to demonstrate best practice of ABC data collection, increase the interpretability of data, and provide a fair comparison to results of the trial-based functional analysis. The first author used traditional BST to train staff. First, the first author told staff the rationale for data collection, then provided a succinct written description about how to collect the coded ABC data, as well as the operational definitions of the problem behaviors for individual clients. The first author then provided staff with a detailed vocal description of the coded ABC data collection sheet, and a model of how to collect ABC data. Lastly, staff practiced coded ABC data collection in role play trials with the first author. After training, staff collected ABC data during a predetermined time period (varied by participant schedule) each day for three weeks.

The first author, along with the direct care staff, conducted the trial-based functional analyses, as it is recommended that only qualified clinicians, such as BCBAs, conduct functional analyses due to safety and procedural integrity concerns. All participants were exposed to attention and demand trials. We added trial conditions if staff reported another potential function,

such as engaging in problem behavior to access an item, activity, or person or for automatic reinforcement. Conditions evaluated for Thomas were attention, demand, and access to activity choice in which problem behavior resulted in allowing Thomas to choose the next activity. Conditions evaluated for John were attention, demand, and ignore. Conditions evaluated for Jack were attention, demand, tangible, and attention from preferred staff in which problem behavior resulted in attention specifically from Jack's preferred staff member.

Each trial was divided into two segments lasting a maximum of 1 min each. The test segment always preceded the control segment. In the test segment, the occurrence of problem behavior resulted in the relevant contingency (attention, escape, activity choice, tangible item, or no social consequence) and in the control segment, the occurrence of problem behavior resulted in no consequence (no response cost for delivered reinforcers/stimuli). The occurrence of problem behavior ended any segment. That is, the occurrence of problem behavior in the test segment resulted in the delivery of the potential reinforcer for that condition (e.g., attention) and the start of the control segment; the participant then was given access to the potential reinforcer for the length of the control segment. A maximum of 20 trials took place in one day with at least 5 min between conditions.

Treatment Evaluation. Before baseline and treatment sessions, the first author conducted a preference assessment to identify high quality (HQ) and low quality (LQ) reinforcers for use during reinforcer parameter manipulation. A paired stimulus preference assessment of stimuli that could be delivered along with the functional reinforcer to increase or decrease the reinforcing value of the functional reinforcer was conducted (Fisher, Piazza, Bowman, Hagopian, Owens, & Slevin, 1992). The HQ reinforcers identified were fruit-flavored rolls, staff attention, and an iPad for Thomas, John, and Jack, respectively. Therefore, the combined HQ

reinforcers used in the treatment evaluation were activity choice with a fruit-flavored snack for Thomas, a break with staff attention for John, and preferred staff attention with an iPad for Jack. The LQ reinforcers identified were caregiver attention, bean bag toys, and a magazine for Thomas, John, and Jack, respectively. Thus, the combined LQ reinforcers used in the treatment evaluation were activity choice with caregiver attention for Thomas, a break with bean bag toys for John, and preferred staff attention with a magazine for Jack.

Figure 1 represents the progression through the treatment phases of Study 1. The shaping of a complex functional communication response was used in an effort to decrease the likelihood of resurgence, especially as the schedule of reinforcement was thinned (Ghaemmaghami, Hanley, Jessel, & Landa, 2018). In baseline sessions, problem behavior and any functional communication response (FCR) resulted in the immediate (no delay) delivery of the combined HQ reinforcer for 30 s. Baseline sessions lasted 5 min.

After baseline sessions, FCT was conducted. The FCR varied depending on the communication modality used by the participant. The FCR was a vocal response for Thomas and a picture exchange response for John and Jack. Three levels of complexity were used to train the FCRs, starting with the simple response (i.e., one-word phrase or touching the picture icon).

Before the first trial of FCT, to teach the FCR the therapist specified the contingency to the participant through verbal instruction and modeling, followed by a reinforced fully prompted trial. The first trial of FCT then began. Least-to-most prompting was used wherein if an independent FCR was not observed, a prompt was provided. The prompting hierarchy utilized in FCT depended on the modality of the FCR; a gesture to the FCR was used for John and Jack in the absence of independent responding and a partial echoic prompt was used for Thomas. If the FCR was not observed after this prompt, a full physical prompt was used for John and Jack and a

full echoic prompt was used for Thomas. Each FCT session consisted of 5 trials. To master the simple response, the participant was required to independently respond for at least 80% of trials without a decreasing trend for two consecutive sessions. During FCT trials of the simple response, baseline contingencies were implemented (immediate delivery of the combined HQ reinforcer for 30 s contingent on problem behavior or functional communication). These baseline contingencies were used in order to observe the initial effects of reinforcer parameter manipulation in the context of the treatment evaluation. FCT trials were conducted separately from the treatment evaluation sessions to ensure only mastered FCRs were included in the treatment evaluation data analysis. After the simple response was mastered, the treatment evaluation began.

In treatment evaluation sessions, FCRs resulted in the immediate (0s delay) delivery of the combined HQ reinforcer for 30 s and problem behavior resulted in the delayed delivery (10s unsignaled) of the combined LQ reinforcer for 15 s. All sessions lasted 5 min and no more than 10 sessions were conducted in a day. Low and sustained treatment effects were defined as three sessions below 80% reduction from baseline without an increasing trend.

Once low and sustained treatment effects were observed, the treatment evaluation was interrupted to return to FCT trials to teach the moderately complex response. Once mastered in FCT trials, the moderately complex response (i.e., two-word phrase for Thomas or picking up the picture icon for John and Jack) was used in the treatment evaluation, and the simple response was placed on extinction. After low and sustained treatment effects were observed, the treatment evaluation was interrupted again to return to FCT trials to teach the complex response (i.e., three-word phrase or handing over the picture icon). Once the complex response was mastered in FCT

trials, the complex response was used in the treatment evaluation (and the simple and moderately complex responses were placed on extinction).

After low and sustained treatment effects were observed with the complex FCR, schedule thinning took place using contingency-based progressive delays in the form of differential reinforcement of alternative behavior (DRA)-based schedule thinning (Ghaemmaghami, Hanley, & Jessel, 2016). That is, after the complex FCR was emitted, the therapist instructed the participant to complete a demand; after the participant complied with the instruction the combined HQ reinforcer was provided. The number of and complexity of demands was systematically faded to a terminal goal identified by the participants' clinical supervisor. Once novel staff were trained in Study 2, generalization sessions were conducted with novel staff to ensure generalization of reduced problem behavior to other staff working with the participant.

Dependent Measures and Interobserver Agreement

Efficacy. Problem behaviors were defined individually for each participant. Thomas' problem behavior was aggression defined as attempting to or successfully hitting, kicking, scratching, grabbing, biting, pinching, or forcefully leaning against another person. John's problem behavior was regurgitation/spitting defined as expelling saliva or previously ingested food from stomach or esophagus into or out of the mouth onto any surface or body part. Jack engaged in two problem behaviors: self-injurious behavior, which was defined as using the back of his wrist and/or hand to forcefully hit his head or using one open hand to forcefully hit his head, face, or any other body part, and aggression, which was defined as making forceful contact on any part of another person with a closed or open fist; kicking, biting, scratching, pinching, or pushing.

In the pre-assessment, results of each assessment method were determined by analyzing the ABC data and the percentage of trials with problem behavior during the functional analysis. For ABC data collection, staff selected a coded antecedent(s) and consequence(s) for each instance of problem behavior yielding a percentage of instances within each category of antecedent and consequence (e.g., attention, escape, tangible) with the highest percentages determining the hypothesized function(s).

In the trial-based functional analysis and treatment evaluation, data were collected on the relevant problem behaviors for each participant. In the functional analysis, trials were divided into two segments lasting a maximum of 1 min each; data were collected separately for the two segments and data were analyzed as the percentage of trial segments with problem behavior. The test segment(s) with problem behavior, followed by low rates of or no problem behavior in the control segment provided evidence of the function of problem behavior.

A second observer simultaneously and independent collect data for 50% of trial-based functional analysis sessions for Jack and 67% of sessions for Thomas and John. Trial-by-trial agreement was calculated by comparing the exact number of responses recorded in each trial; trials in which exact agreement was observed were scored as 1 and trials in which exact agreement was not observed were scored as 0. The mean of scores across trials was calculated and multiplied by 100%, resulting in the percent of exact agreement in that session. The average IOA in the trial-based functional analysis was 100% (range 100% - 100%) for Jack, and 90% (range 80% - 100%) for Thomas and John.

In the treatment evaluation, problem behavior was measured as a frequency and calculated as rate by dividing the frequency of problem behavior by the minute duration of the

session. Additionally, in treatment evaluation sessions, data were collected on functional communication responses. These data were also analyzed as responses per minute.

A second observer simultaneously and independent collected data for 41% of sessions for Thomas, 46% of sessions for John, and 44% of sessions for Jack in the treatment evaluation. Partial agreement was calculated by separating each session in 10-s bins and comparing each 10-s bin by dividing the smaller by the larger of the two numbers. The mean of each quotient from each 10-s bin was calculated and multiplied by 100%, resulting in the percent of partial agreement in that session. The average IOA in the treatment evaluation was 98.8% (range 87% - 100%), 98% (range 93.3% - 100%), and 95.7% (range 80% - 100%) for problem behaviors and 93.3% (range 83.3% - 100%), 95.3% (range 80% - 100%), and 98% (range 86.7% - 100%) for functional communication responses for Thomas, John, and Jack respectively.

Efficiency. In the pre-assessment, the cost and time to complete each assessment was calculated. The cost of a qualified clinician was calculated by multiplying the average hourly rate of Board Certified Behavior Analysts (BCBAs) in the New York metropolitan area by the number of hours (rounded up) required to train the staff in ABC data collection and conduct the trail-based functional analysis. We totaled the number of days and hours separately to complete ABC data training and collection as well as the trial-based functional analysis.

Social Validity. After each pre-assessment method and the treatment evaluation, a questionnaire was given to each participant's direct care staff and clinical supervisors to assess social validity (see Appendices A and B). The pre-assessment social validity questionnaire consisted of closed and open-ended questions related to overall satisfaction/cost of the assessment methods, ease/practicality of the procedures, and objective/subjective nature of the assessment methods. The questions on the treatment evaluation social validity questionnaire

were all closed-ended with a comments section at the end. Questions related to the significance of the goals, the appropriateness of the procedures, and the importance of the effects (Foster & Mash, 1999; Wolf, 1978); the category of appropriateness of the procedures was further broken down into practical appropriateness, social appropriateness, and effortful/disruptive appropriateness.

Experimental Design

In the trial-based functional analysis, experimental control was demonstrated through differentiated responding in the rapid succession of test and control segments. The effects of treatment for problem behavior with functional communication and reinforcer parameter manipulation was evaluated using a multiple baseline across participants design.

Results and Discussion

Pre-Assessment. Results of the pre-assessment for Thomas are depicted in Figure 2. During ABC data collection, the antecedent that preceded most instances of problem behavior was the presentation of a demand, followed by low caregiver attention. The consequence that occurred after most instances of problem behavior was the delivery of attention, followed by the delay or escape from a demand. These results suggest escape from demands and attention maintained Thomas' aggressive behavior. In the trial-based functional analysis, however, Thomas engaged in no problem behaviors in both demand and attention conditions. After discussion with Thomas' clinical supervisor and observation by the first author, it was suggested that Thomas may engage in aggressive behavior to choose the activity to be completed next in his routine. Therefore, trials were conducted with a test segment in which the caregiver chose the next activity; contingent on problem behavior, the control segment began in which Thomas was able to choose the next activity. Aggressive behavior was consistently observed in test segments

of the activity choice condition, and no instances of aggression were observed in control segments. Based on these results, it was concluded that Thomas engaged in problem behavior to choose activities to be completed.

Results of John's pre-assessment are presented in Figure 3. During ABC data collection, the antecedent that preceded most instances of problem behavior was the presentation of a demand, followed by low caregiver attention. In addition, the consequence that occurred after most instances of problem behavior was delay or escape from a demand, followed by the delivery of attention. These results suggest escape from demands and attention maintained John's problem behavior. During the trial-based functional analysis, John engaged in low and variable levels of problem behavior in ignore and attention conditions in both test and control segments. John also engaged in consistent instances of regurgitation/spitting in escape test segments and 0 instances of problem behavior in control segments. Based on these results, it was concluded that John engaged in problem behavior, at least in part, to escape demands and possibly to access automatic reinforcement. Due to the nature of the treatment evaluation, only John's escape function was treated in the treatment evaluation; clinical recommendations were provided to treat automatically maintained regurgitation/spitting.

Results of the pre-assessment for Jack are presented in Figure 4. During ABC data collection, the antecedent that preceded most instances of problem behavior was the presentation of a demand, followed by the removal or denied access of tangible items. The consequence that occurred after most instances of aggression or self-injury was the delivery of attention. These results suggest that Jack engaged in problem behavior to access caregiver attention, and possibly to escape demands and access tangible items. In the trial-based functional analysis, however, Jack engaged in 0 problem behaviors in escape, attention, and tangible conditions. After

discussion with Jack's clinical supervisor and staff, as well as observation by the first author, it was suggested that Jack may engage in problem behavior to specifically access the attention of his preferred staff member. Thus, an additional condition was conducted in which, during test segments, Jack's preferred staff member left the room and, contingent on self-injury or aggression, the control segment began, and the preferred staff member returned to the room to provide attention. Jack consistently engaged in problem behavior in the test segments of this condition and 0 problem behaviors in the control segment. Based on these results, it was concluded that Jack engaged in problem behavior to access the specific attention of his preferred staff member.

A summary of the results for all measures (efficiency, conclusions, and social validity) of the pre-assessment are depicted in Table 1. Because the trial-based functional analysis is a previously demonstrated effective experimental method of identifying the function of problem behavior (LaRue, Lenard, Weiss, Bamond, Palmieri, & Kelley, 2010) and because these results have been shown to lead to effective function-based treatment, the conclusions of the trial-based functional analysis were considered more accurate and results of ABC data collection are compared to these results. As depicted in the figures of each participant and the conclusions section of Table 1, the results of the ABC data collection only compared to the results of the trial-based functional analysis for one participant, John; discrepancies were found, however, in the identification of an automatic function for John. For Thomas and Jack, the ABC data collection identified escape from demands and attention functions when the trial-based functional analysis did not. For Jack, attention specifically from one person was found to maintain his problem behavior in the trial-based functional analysis. This necessary specification of attention was not identified in ABC data collection. ABC data collection, and not the trial-

based functional analysis, also identified a tangible function to Jack's problem behavior. ABC data collection did not indicate specific reinforcers for Thomas's and Jack problem behavior, which were found to be access to activity choice (Thomas) and preferred staff (Jack). The overly inflated influence of attention in ABC data collection has been previously noted as a risk (Thompson & Iwata, 2007).

Whereas a direct comparison to the well-established, standard functional analysis initially identified by Iwata and colleagues (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1992) was not conducted, the results of the trial-based functional analysis were considered true functions of problem behavior for two reasons. First, a direct comparison between the trial-based functional analysis and the standard functional analysis was previously conducted by LaRue and colleagues (2010); these researchers found similar functions after conducting each assessment method. These results demonstrated that the trial-based functional analysis is an empirically supported experimental method of identifying the function of problem behavior. Second, the results of the trial-based functional analysis informed the function-based treatment conducted in this study, which was found to be effective for all participants (results described shortly). If the functions identified in the trial-based functional analysis were not actual functions of the participants' problem behavior, it is not likely a corresponding function-based treatment would be effective. Therefore, the discrepancies identified between ABC data collection and the trial-based functional analyses may be considered errors on the part of ABC data collection and not the trial-based functional analysis.

Table 1 also shows a comparison of the time and one measure of cost between the two assessment methods. The cost of a qualified clinician (BCBA) was identical for one participant (John), but double for two participants (Thomas and Jack) for the trial-based functional analysis,

compared to ABC data collection. The time to complete the ABC data collection, however, was more than five times higher across days and twenty-five times higher across hours, as compared to the trial-based functional analysis.

Social validity responses for each method of the pre-assessment are presented in Table 2. On average, the supervisors (BCBAs) rated the trial-based functional analysis higher (more preferable) in general questions, in questions related to objectivity and effectiveness, and overall. ABC data collection, however, was rated higher by the supervisors in questions related to ease and practicality. Direct care staff, on average, rated the trial-based functional analysis higher only in questions related to objectivity, effectiveness, and overall. Direct care staff rated ABC data collection higher in general questions and the same mean score was observed for the two assessment methods in questions related to ease and practicality. On average, staff and supervisors each rated the assessment they were not responsible for conducting as higher in ease/practicality, perhaps due to the fact that they were not responsible for conducting that assessment. Typically, direct care staff are responsible for collecting ABC data and qualified clinicians (BCBAs) are responsible for conducting functional analyses. Because both direct care staff and clinical supervisors provided high scores for the trial-based functional analysis in the area of objectivity and effectiveness, the two assessment methods ultimately received similar overall social validity scores. Overall, social validity was comparable across the two methods, with slightly higher scores observed for the trial-based functional analysis compared to ABC data collection.

Based on the results of the pre-assessment of the current study, it is possible that facilities continue to utilize direct assessments in the form of ABC data collection, due to its ease of implementation/practicality and lower cost. Because of the cost of training for ABC data

collection, however, the cost of both methods was somewhat comparable. In addition, the time to complete the trial-based functional analysis was significantly shorter than the time to complete ABC data collection, and would remain shorter even if ABC data were collected for one week.

Several limitations of this pre-assessment are important to note. First, the type of ABC data collection used was structured data collection in which staff selected from pre-made options for antecedents, behaviors, and consequences. While there was a section for comments, it is possible that the specific functions for Thomas and Jack were not identified in the ABC data collection due to the nature of structured ABC data collection. Future research can explore these potential differences in structured and narrative ABC data collection. Second, it is important to note that the dependent measures for efficiency are not an exhaustive list of measures. There are many other factors that contribute to the cost of assessment methods including, but not limited to, the cost of materials, the cost of injuries (to staff and the client), and the cost of transportation if the client is required to attend a clinic. Because analyzing these and more measures of efficiency were beyond the scope of the current study, future research should further evaluate the time and cost-efficiency of these assessment methods.

Trial-based functional analysis represents one appropriate method to efficiently and effectively assess problem behavior. Future research can directly compare the trial-based functional analysis with other functional analysis methods such as the latency-based functional analysis and the practical functional analysis (Thomason-Sassi, Iwata, Neidert, & Roscoe, 2011; Hanley, Jin, Vanselow, & Hanratty, 2014, respectively) to address issues of practicality, safety, cost, and time. In addition, preliminary evidence suggests functional analyses of precursors, in which the occurrence of the severe problem behavior is not necessary to obtain results, may be a

promising alternative that could be especially useful in cases of very severe problem behavior (Smith & Churchill, 2002).

Treatment Evaluation. Results of the treatment evaluation are depicted in Figure 5. High rates of problem behavior occurred in baseline for Jack ($M = 1.42$, range 0.67 – 1.8 responses per minute; RPM) and Thomas ($M = 1.36$, range 1 – 1.6 RPM), and moderately high rates of problem behavior occurred for John in baseline ($M = 0.3$, range 0.2 – 0.4 RPM). A rapid and sustained reduction in problem behavior was observed once treatment was initiated for Jack ($M = 0.02$, range 0 – 0.22 RPM), John ($M = 0.02$, range 0 – 0.22 RPM), and Thomas ($M = 0.02$, range 0 – 0.22 RPM). Sustained high rates of functional communication responses also occurred in treatment sessions for Jack ($M = 1.49$, range 1.2 – 1.6 RPM), John ($M = 0.6$, range 0.6 – 0.6 RPM), and Thomas ($M = 1.42$, range 0.6 – 1.6 RPM). During schedule thinning, a slight increase in problem behavior was observed for all participants, however, a sustained reduction was observed at the terminal goal of schedule thinning for Jack ($M = 0.1$, range 0 – 0.8 RPM), John ($M = 0.13$, range 0 – 0.6 RPM), and Thomas ($M = 0.13$, range 0 – 0.6 RPM). Treatment effects generalized to other staff members without any problem behavior for Jack and Thomas, however, John showed a slight increase in problem behavior before reduced rates of problem behavior ($M = 0.08$, range 0 – 0.2 RPM).

Results of the social validity questionnaire of the treatment evaluation are depicted in Table 3. On average, supervisors rated the treatment highly in all areas of social validity: significance of the goal, practical, social, and effortful/disruptive appropriateness of the procedures, and importance of the effects. Direct care staff responded similarly highly.

The results of the treatment evaluation suggest FCT with reinforcer parameter manipulation is an effective treatment method when extinction is not a practical option and

demonstrate to clinicians working with adults with ASD and severe problem behavior that behavior analytic procedures can be effective and tailored to client-specific difficulties. The results of Study 1 are consistent with and expand the literature on reinforcer parameter manipulation with children (Athens & Vollmer, 2010) by applying these procedures with adults displaying severe problem behavior. This treatment was also associated with high social validity ratings across direct care staff and clinical supervisors. The results in schedule thinning are especially important because the participants could have accessed the functional reinforcer more immediately if they engaged in problem behavior as the schedule of reinforcement for functional communication responses became thinner. Due to this finding, it is possible that either the quality or duration of access to the reinforcer, or both, more heavily influenced the allocation of responding between problem behavior and functional communication responding. Future research is required to further evaluate the individual benefits of each reinforcer parameter (i.e., quality, duration, and immediacy).

Future research may also explore the effectiveness of reinforcer parameter manipulation as an initial procedure in a treatment evaluation, to decrease the likelihood of an extinction burst, before subsequently introducing extinction. Whereas the social validity of functional communication with reinforcer parameter manipulation was high, the procedure was more complicated than typical functional communication with extinction procedures. The parameters of the reinforcer could be systematically manipulated until problem behavior results in no reinforcement (i.e., extinction). This systematic manipulation could be time consuming, but may ultimately be more valuable, as problem behavior would no longer be reinforced. This may be easier to implement than reinforcer parameter manipulation because of the resulting single reinforcer with set parameters.

In addition, future research could evaluate the efficacy of not providing any items in combination with the functional reinforcer contingent on problem behavior. Low preferred items were presented with the functional reinforcer in the low quality manipulation of the reinforcer in the present study in an effort to increase the saliency of the contingency. It is possible, however, that the absence of additional stimuli more substantially and/or immediately decreases problem behavior.

Study 2: Effective and Efficient Group BST using Video Critiques

Method

Participants and Setting

Participants included the staff members of the individuals who participated in Study 1. Thomas' staff member, Barry, began implementing treatment with Thomas in generalization sessions. John's staff member, Sophie, began implementing treatment with John in the first treatment session of the evaluation. Jack's staff member (non-preferred), Teddy, began implementing treatment with Jack in the first treatment session of the evaluation. Teddy also served as the therapist in generalization sessions for John. Jack's clinical supervisor, a BCBA, participated in the training and served as the therapist in Jack's generalization sessions. The setting of the training was the same farm where Study 1 took place.

Materials

Materials for data collection included data sheets, a clip board, and pencils. Whiteboards as well as dry erase markers were needed for response cards. The primary author created videos with three video models as well as three video critiques for each participant. The video models were 5 min in duration. One confederate acted as the client who engaged in 16 criteria for behavior plan implementation (e.g., engaging in problem behavior or the FCR) and the other

confederate acted as the staff member who implemented the behavior plan with 100% procedural integrity. The video critiques were also 5 min and were identical to the video model with the exception of only 50% procedural integrity. Errors in procedural integrity were made contingent on problem behavior or functional communication responses and consisted of the inaccurate (or absence of the) delivery of specific reinforcer parameters (i.e., quality, delay, or duration was implemented incorrectly).

Experimental Design

The effects of the modified BST with video models and critiques procedure was evaluated using a multiple baseline across participants design.

Procedures

Pre- and Post-Training. The first author handed each staff member written procedural instructions for the behavior plan and provided staff time to read the instructions. She briefly answered any questions prior to the start of each session. She then acted as the adult with ASD in individually conducted 5 min role play sessions. These role play sessions were conducted to measure staff's ability to implement the procedure.

Training. The group training, which included as many trainees as individuals expected to work with each participant, lasted 1.5 hours and was led by the first author. Trainings began with providing the rationale for implementing these procedures, a succinct written description, and a detailed vocal description of the intervention procedures; this part of the training lasted 45 min. Throughout this initial training, response cards were used to ensure active participation and learning (Hardesty, McIvor, Wagner, Hagopian, & Bowman, 2014). Response cards allow trainers to track trainee knowledge and provide staff with feedback. To use the response cards, the first author posed questions, and staff wrote their answers on their response cards

(whiteboards) and held up their cards towards the researcher/trainer. The second part of the training consisted of multiple exemplars of the video models and video critiques; this part of the training lasted 45 min. Response cards were used during the video critiques in order to practice and receive feedback. Staff were instructed to raise their hands when they observed a mistake (incorrect implementation of the behavior plan). The video was paused when at least one staff member raised a hand; if no staff raised a hand within 5 s of a mistake, the video was paused. Each time the video was paused, staff wrote down which component of the behavior plan was implemented incorrectly and what the staff actor should have done. Feedback was then provided, and the correct answers were discussed.

Generalization. In-vivo sessions in which the staff implemented the behavior plan with the client were conducted to ensure generalization of accurate behavior plan implementation. Client problem behavior during these sessions are reported in Study 1 as the first three sessions of treatment sessions for Teddy and Sophie, and the three generalization sessions for Barry.

Dependent Measures and Interobserver Agreement

Efficacy. The efficacy of the training procedure was measured in staff percent correct implementation of the behavior plan in role play and generalization sessions. One-minute interval data were collected on the frequency of the criteria for implementation of each treatment component separately, and correct or incorrect implementation of the relevant treatment component was recorded. The total correct implementation of all components and minute intervals was divided by the total criteria for implementation and multiplied by 100% to produce the percent correct implementation.

A second observer simultaneously and independently collected data for 40%, 42%, and 33.3% of sessions for Barry, Sophie, and Teddy respectively. Total agreement was calculated by

dividing the smaller by the larger of the two resulting percent correct implementations of each session. This quotient was calculated and multiplied by 100%. The average IOA in staff training was 92% (range 80% - 100%), 93.5% (range 80% - 100%), and 93.7% (range 80.7% - 100%).

Social Validity. After the completion of training, a questionnaire was given to each participant (staff member) as well as supervisors to assess social validity. The questionnaire consisted of closed-ended questions regarding the major characteristics of social validity mentioned in Study 1 (Wolf, 1978; Appendix C) with more questions related to the importance of the effect, as the social validity of the effectiveness of the training was of high interest.

Results and Discussion

Results of the staff training are depicted in Figure 6. Low percent correct implementation of the treatment procedure was observed prior to training for Sophie (M = 53.3% range 53.3% – 53.3%) and Barry (M = 25.6%, range 6.7% – 40%), and a decreasing trend was observed for Teddy (M = 67.1%, range 55.6% – 83.3%). A rapid and sustained increase in percentage correct implementation was observed post-training for Teddy (M = 100%, range 100% – 100%) and Sophie (M = 100%, range 100% – 100%). Barry’s post-training data showed an increasing trend ending with sustained high percent correct implementation (M = 80%, range 80% – 100%). Sustained high rates of percent correct implementation maintained throughout generalization for Teddy (M = 100%, range 100% – 100%), Sophie (M = 100%, range 100% – 100%), and Barry (M = 100%, range 100% – 100%).

Results of the social validity questionnaire of the staff training are depicted in Table 4. On average, supervisors rated the training procedure highly in all areas of social validity: significance of the goal, practical, social, and effortful/disruptive appropriateness of the

procedures, and importance of the effects. Direct care staff reported higher scores overall, compared to supervisors, and in all areas with the exception of the significance of the goals.

Without proper training, behavior plans are not implemented with procedural integrity, and without procedural integrity, efficacy of the intervention fails (St. Peter Pipkin, Vollmer, & Sloman, 2010). At group homes and day rehabilitation programs, it is not uncommon for staff training to consist of one meeting with all staff members to discuss new behavior plans or changes to existing plans. Whereas traditional BST has been proven to be an effective method of training behavioral treatments, it is difficult to be completed in one large group meeting in this standard amount of time. The present study demonstrated an effective model used to train staff in a group format in a single 1.5 hr training session. These results suggest that group homes and day rehabilitation centers do not need to dedicate more time to training to achieve better implementation of behavior plans. Rather, changing the approach to training may be effective. Additionally, at the conclusion of the training, providing supervisors with the training tools (video models and critiques) may maintain procedural integrity of new staff members and increase the likelihood treatment effects maintain for the adults with ASD.

A limitation of Study 2 was the experimental comparison; the modified BST using video aides was compared to no training. Future research should directly compare this modified BST to traditional BST using role play practice and even other modifications to BST that may further improve the efficiency of training. Because the present method was effective at training groups in a time efficient manner, trainers could use this procedure to train large groups of new staff members and even begin to tailor the training to individual staff performance. For example, if future research demonstrates that role play practice is more effective than video critiques, then trainees with low progress scores after group training can then experience role play practice

sessions, as opposed to using significantly more time to conducted role play sessions with all trainees. In addition, future research should evaluate the effectiveness of pyramidal training using video aided BST, especially considering that the video aides can be given to trainers and used for as long as the treatment is used. An additional limitation of this training study was the level of experience previously had by the participants. All participants of the training had previous experience implementing ABA procedures. Future research should explore the effectiveness of the training procedure with staff novel to the field of ABA.

General Discussion

The present study demonstrated an effective and efficient model for assessing and treating severe problem behavior tailored to adult specific challenges. Results contribute to a limited body of research demonstrating the efficacy of Applied Behavior Analytic interventions for adults with ASD. Whereas it may be a logical assumption that the same technologies used to treat behavioral deficits in children with ASD are appropriate and effective in the treatment of behavior deficits in adults with ASD, the specific challenges encountered in treating this older population may not be as obvious. The results of the current study, however, provide preliminary evidence that, with careful consideration of adult-specific challenges, our science of behavior analysis can be effective to better the lives of these older individuals.

Legislation and cost present significant challenges to effective assessment and treatment. The results of the current study provide useful information to clinicians working with adults with ASD and to clinicians hesitant to work with this populations for reasons related to the present challenges. The current legislation and resulting limited funding leads to several larger issues. First, because of the limited funding provided to adults with ASD, many behavior analytic clinicians currently working with adults with ASD are given a large caseload. Second, many

individuals charged with meeting the needs of adult clients with ASD are not expected to have the same level of knowledge, qualifications, or certifications/licenses as those of children. As a result, the ideal scenario for an adult client would require the adult agency to contract a qualified individual. In the case of a qualified clinician having a large caseload, and thus limited time, and in the case of the agency contracting a qualified clinician, and thus using limited funds, using efficient methods without sacrificing effectiveness is crucial.

The pre-assessment in Study 1 suggested that, whereas ABC data collection was associated with lower cost, the trial-based functional analysis was effective in identifying functions of problem behavior and was more time-efficient. This analysis demonstrates to clinicians and agencies the possibility and benefits of conducting time-efficient experimental functional analyses, such as trial-based functional analyses. Challenges related to costs for services suggest the need for future examination of outcomes associated with each assessment approach in terms of costs related to other relevant services such as psychiatric appointments.

The time efficiency of the trial-based functional analysis is related to both the challenge of limited resources and to the challenge of severe and complex problem behavior often seen in adults with ASD. Assessment methods that do not require prolonged exposure to procedures that evoke and reinforce problem behavior are especially crucial. It is not uncommon for an adult client to be larger and stronger than their clinician, and especially in these cases, it is not safe to contrive situations that may evoke behaviors that put the client and clinician at risk. The trial-based functional analysis used in Study 1 greatly limited the exposure to contingencies that may evoke dangerous behaviors. In addition, the first instance of problem behavior that met the operational definitions used, regardless of intensity, was reinforced. Although there were no data collected on the intensity of problem behavior, it was anecdotally noted by the researcher and

staff assisting in the completion of this study that the intensity of aggressive and self-injurious behavior observed in the pre-assessment were not of the high intensity associated with bursts of problem behavior that were known to occur under natural conditions. No injuries were sustained by the client or clinicians throughout the completion of this study, however, concerns about the severity of problem behavior suggest that future research should compare other effects associated with both assessment tools such as injuries sustained by clients and caregivers and medication changes (in cases in which medical restraint is being used or considered).

The choice of treatment approach in Study 1 also related to the challenge of severe and complex problem behavior in adult clients. A sustained reduction of problem behavior was observed for all clients in the treatment evaluation of Study 1 exploring functional communication training with reinforcer parameter manipulation, as opposed to extinction. No initial increase in problem behavior was observed for any participant, as may occur in treatments extinction. This study demonstrated the effectiveness of a tool that can be used when extinction is not a practical or safe option. These results also demonstrate that treatments typically used for children with ASD can also be used and tailored to adult-specific challenges. Future research could explore other behavioral treatments that involve extinction, replacing extinction with reinforcer parameter manipulation instead.

With regard to the challenge surrounding staff qualifications, Study 2 demonstrated an efficient and effective method to train direct care staff members to implement a behavior analytic treatment with procedural integrity. It is important to note that due to the adult-specific challenges, the resulting effective function-based treatment was procedurally more complicated than a typical treatment using extinction. This fact increased the need for an effective training tool. As previously mentioned, the qualifications required for adult service providers are not as

strict as qualifications required to work with children. As a result, more care needs to be taken in the training of staff members to ensure effective behavioral treatments are implemented with procedural integrity. The present study provides clinicians and agencies with a tool that can be used to effectively and efficiently achieve this goal. For a clinician with a large caseload and little time and for an agency without a qualified clinician on staff and little funds, having an efficient method to effectively train staff to implement a behavior plan is a valuable tool.

In sum, the present study contributes to a limited evidence base for behavior analytic interventions for adults with ASD. Despite several articles urging the field to explore effective treatments for adults with ASD, no increase in such research has been observed (e.g., Gerhardt & Lanier, 2011). Adults with ASD have the right to effective, evidence-based treatment, just as children with ASD do, and should have the resources necessary to receive these services.

Table 1
Summary of Results for the Pre-Assessment of Study 1

| | Thomas | | John | | Jack | |
|-------------------------|--------------------|-----------------|--------------------|--------------------|------------------------------|-----------------|
| | ABC Data | Trial-Based FA | ABC Data | Trial-Based FA | ABC Data | Trial-Based FA |
| <i>Efficiency</i> | | | | | | |
| Cost of BCBA | 45.80 | 91.60 | 45.80 | 45.80 | 45.8 | 91.60 |
| Time to Complete (hrs) | 60 | 1.17 | 22.5 | 0.83 | 60 | 1.3 |
| Time to Complete (days) | 15 | 3 | 15 | 2 | 15 | 3 |
| <i>Conclusions</i> | | | | | | |
| Function Identified | Escape & Attention | Activity Choice | Escape & Attention | Escape & Automatic | Escape, Attention & Tangible | Preferred Staff |
| <i>Social Validity</i> | | | | | | |
| Supervisors (BCBAs) | 5.6 | 5.7 | 5.6 | 5.7 | 5.6 | 5.7 |
| Direct Care Staff | 5.7 | 6.4 | 3.9 | 4.1 | 5.2 | 4.0 |

Note. Efficiency of each assessment method for each participant as measured by cost of BCBA (in dollars), time to complete the assessment (in hours), and time to complete the assessment (in days); conclusions of each method described as the function identified to maintain problem behavior; social validity of each methods expressed as the mean response on a 1-7 scale (1 indicating poor social validity and 7 indicating high social validity).

Table 2
Social Validity Results for the Pre-Assessment of Study 1

| | General | | Ease/ Practicality | | Objectivity/ Effectiveness | | Overall | |
|--------------------|----------------|------------|-------------------------------|------------|---------------------------------------|------------|----------------|------------|
| | ABC | TBFA | ABC | TBFA | ABC | TBFA | ABC | TBFA |
| Supervisors | 5.8 | 5.9 | 6.2 | 4.7 | 4.7 | 6.5 | 5.6 | 5.7 |
| BCBA 1 | 5.8 | 6.0 | 6.7 | 5.7 | 5.0 | 6.3 | 5.8 | 6.0 |
| BCBA 2 | 5.8 | 5.8 | 5.7 | 3.7 | 4.3 | 6.7 | 5.3 | 5.4 |
| Direct Care | 6 | 5.4 | 4.7 | 4.7 | 4 | 5.5 | 5.1 | 5.2 |
| DC 1 | 7 | 6.5 | 6.0 | 5.7 | 1.3 | 7.0 | 5.0 | 6.4 |
| DC 2 | 6.8 | 6.5 | 6.0 | 5.7 | 6.3 | 6.7 | 6.4 | 6.3 |
| DC 3 | 4.0 | 4.3 | 3.3 | 3.7 | 4.3 | 4.3 | 3.9 | 4.1 |
| DC 4 | 6.0 | 4.3 | 5.3 | 3.7 | 4.0 | 4.0 | 5.2 | 4.0 |

Note. Numbers in each cell correspond to the average agreeability with statements regarding each assessment method scaled 1 (greatly disagree) to 7 (greatly agree).

Table 3
Social Validity Results for the Treatment Evaluation of Study 1

| | Goal | Practical | Social | Effort^a | Effect | Overall |
|--------------------|-------------|------------------|---------------|---------------------------|---------------|----------------|
| | N=3 | N=3 | N=3 | N=3 | N=3 | N=15 |
| Supervisors | 6 | 6 | 6.2 | 6.2 | 5.9 | 6 |
| BCBA 1 | 5.7 | 6 | 6 | 6 | 6 | 5.9 |
| BCBA 2 | 6.3 | 6 | 6.3 | 6.3 | 5.7 | 6.1 |
| Direct Care | 6.1 | 6.3 | 6.3 | 5 | 6.1 | 6 |
| DC 1 | 7 | 6.7 | 7 | 4.7 | 6.7 | 6.4 |
| DC 2 | 4 | 7 | 7 | 6 | 7 | 6.2 |
| DC 3 | 7 | 7 | 7 | 6.3 | 6.7 | 6.8 |
| DC 4 | 5.3 | 5.7 | 4.7 | 4.7 | 5 | 5.1 |
| DC 5 | 7 | 5 | 5.7 | 3.3 | 5.3 | 5.3 |

Note. Numbers in each cell correspond to the average agreeability with statements regarding the treatment evaluation scaled 1 (greatly disagree) to 7 (greatly agree) in each of the following categories: significance of the goal, practical appropriateness of the procedure, social appropriateness of the procedure, effortful/disruptive appropriateness of the procedure, and importance of effect.

^aItems in the category of effortful/disruptive appropriateness of procedure were reverse coded, such that high scores indicate the procedure is NOT effortful/disruptive and low scores indicate the procedure is effortful/disruptive.

Table 4
Social Validity Results for Study 2

| | Goal | Practical | Social | Effort^a | Effect | Overall |
|--------------------|-------------|------------------|---------------|---------------------------|---------------|----------------|
| | N=2 | N=2 | N=2 | N=2 | N=4 | N=12 |
| Supervisors | 6.8 | 6 | 6.5 | 5.5 | 6.4 | 6.3 |
| BCBA 1 | 6.5 | 6 | 6.5 | 4.5 | 6.8 | 6.2 |
| BCBA 2 | 7 | 6 | 6.5 | 6.5 | 6 | 6.3 |
| Direct Care | 6.3 | 7 | 7 | 6.6 | 6.7 | 6.6 |
| DC 1 | 7 | 7 | 7 | 5.5 | 6.8 | 6.7 |
| DC 2 | 4 | 7 | 7 | 7 | 7 | 5.9 |
| DC 3 | 7 | 7 | 7 | 7 | 6.3 | 6.8 |
| DC 4 | 7 | 7 | 7 | 7 | 6.5 | 6.8 |

Note. Numbers in each cell correspond to the average agreeability with statements regarding the training procedure scaled 1 (greatly disagree) to 7 (greatly agree) in each of the following categories: significance of the goal; practical, social, and effortful/disruptive appropriateness of the procedure; and importance of effect.

^aItems in the category of effortful/disruptive appropriateness of procedure were reverse coded, such that high scores indicate the procedure is NOT effortful/disruptive and low scores indicate the procedure is effortful/disruptive.

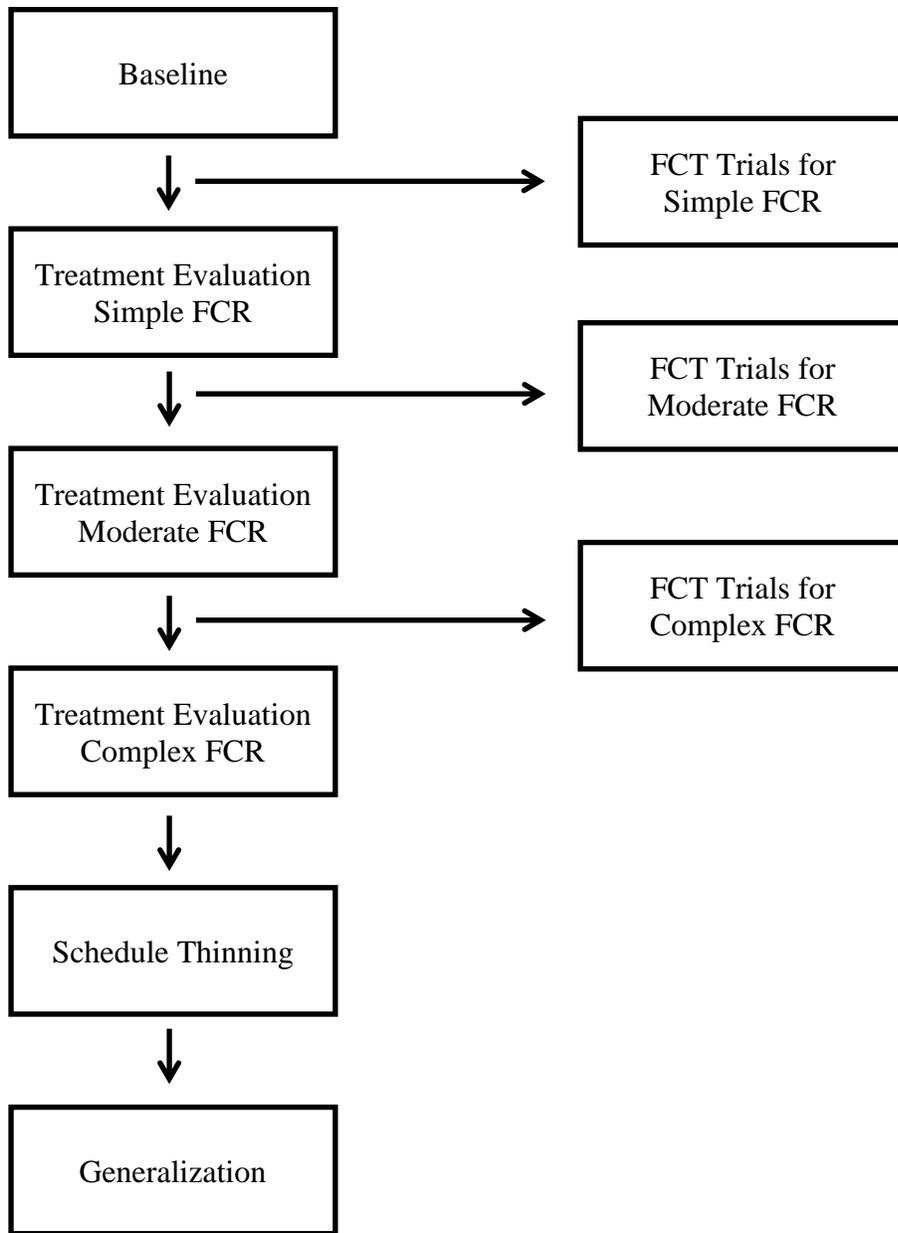


Figure 1. Participant progression through functional communication training and treatment evaluation sessions of Study 1.

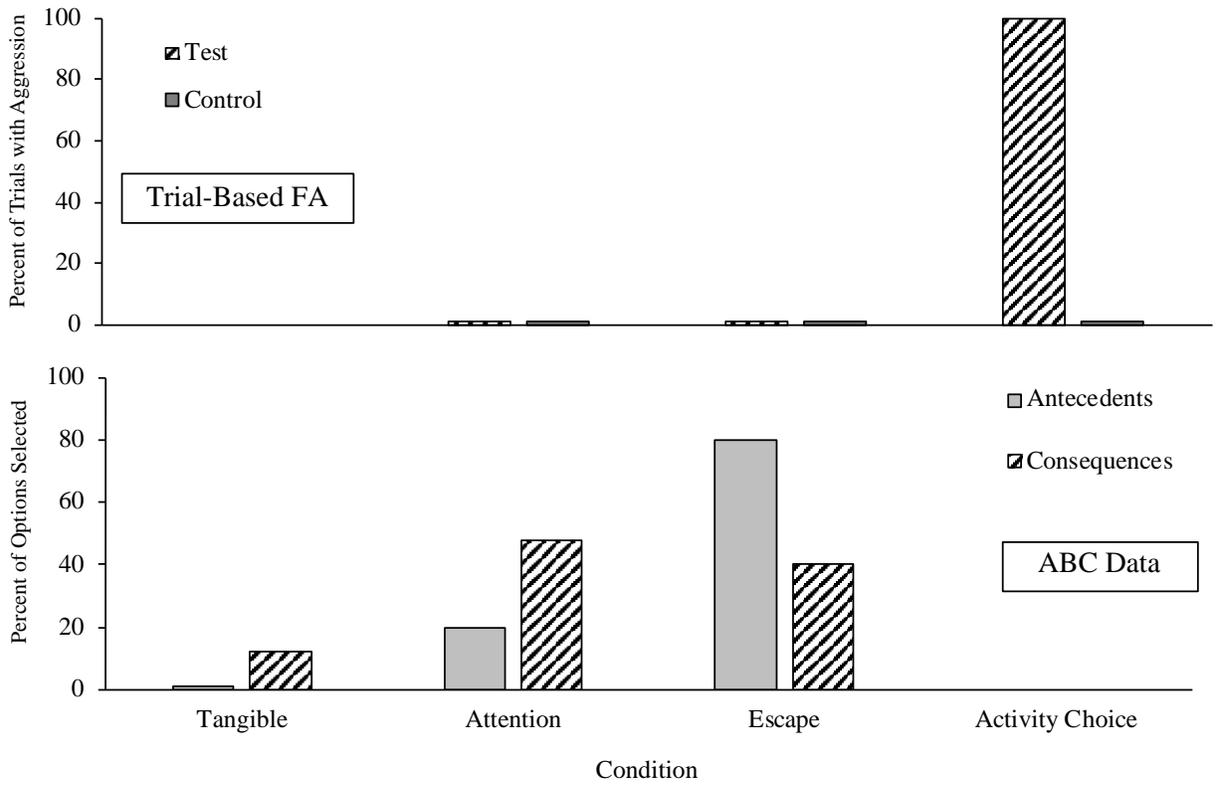


Figure 2. Results of the trial-based functional analysis and ABC data collection for Thomas.

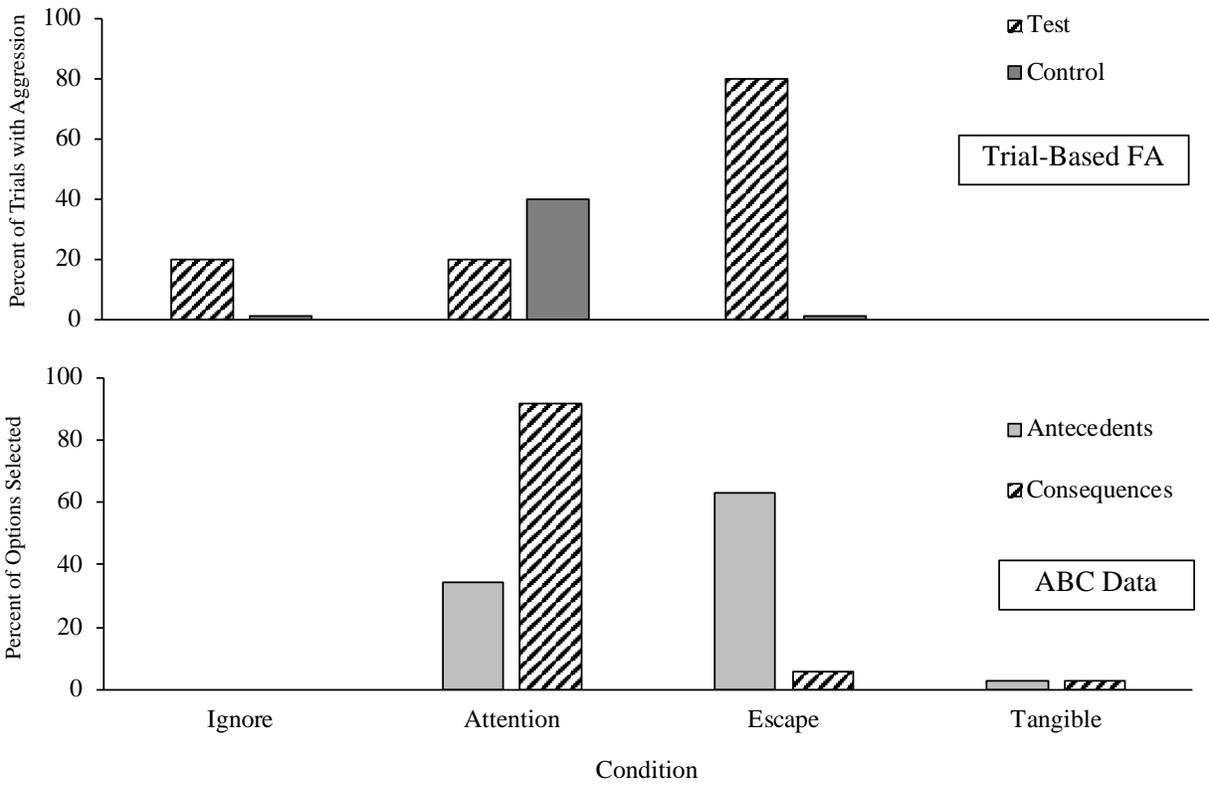


Figure 3. Results of the trial-based functional analysis and ABC data collection for John.

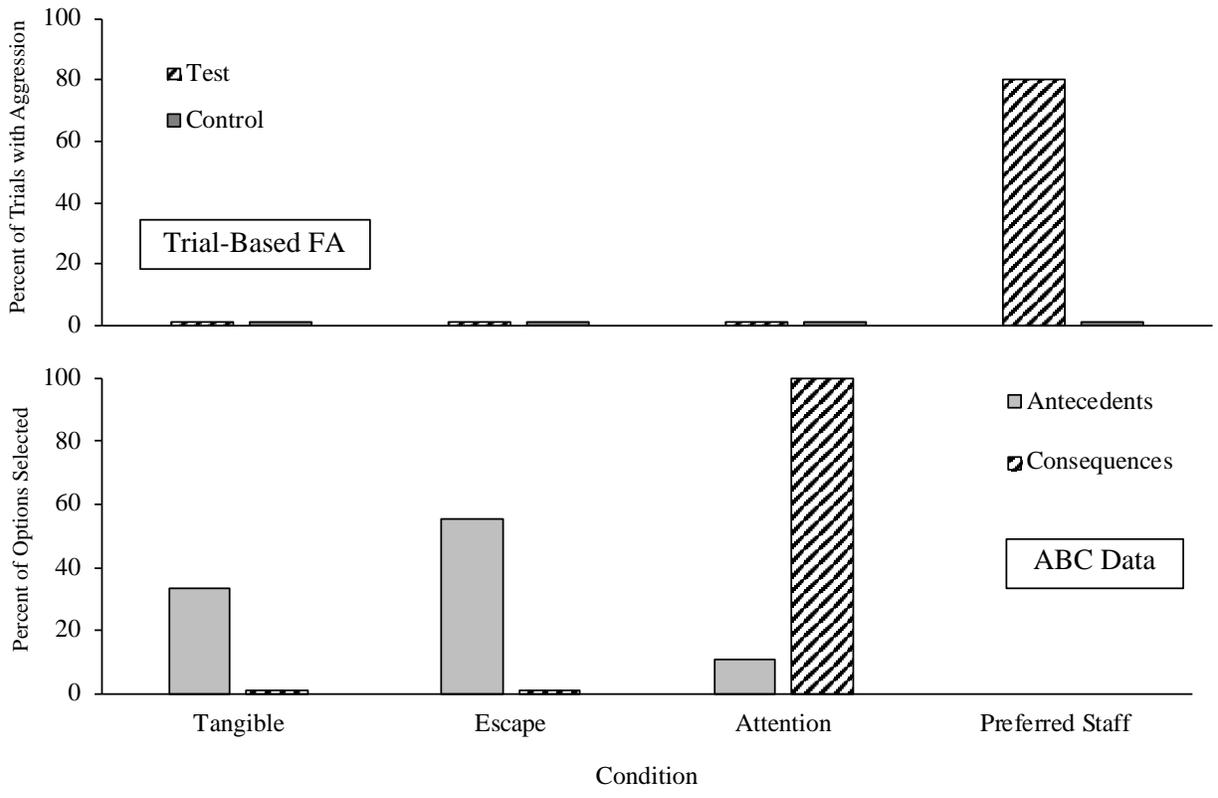


Figure 4. Results of the trial-based functional analysis and ABC data collection for Jack.

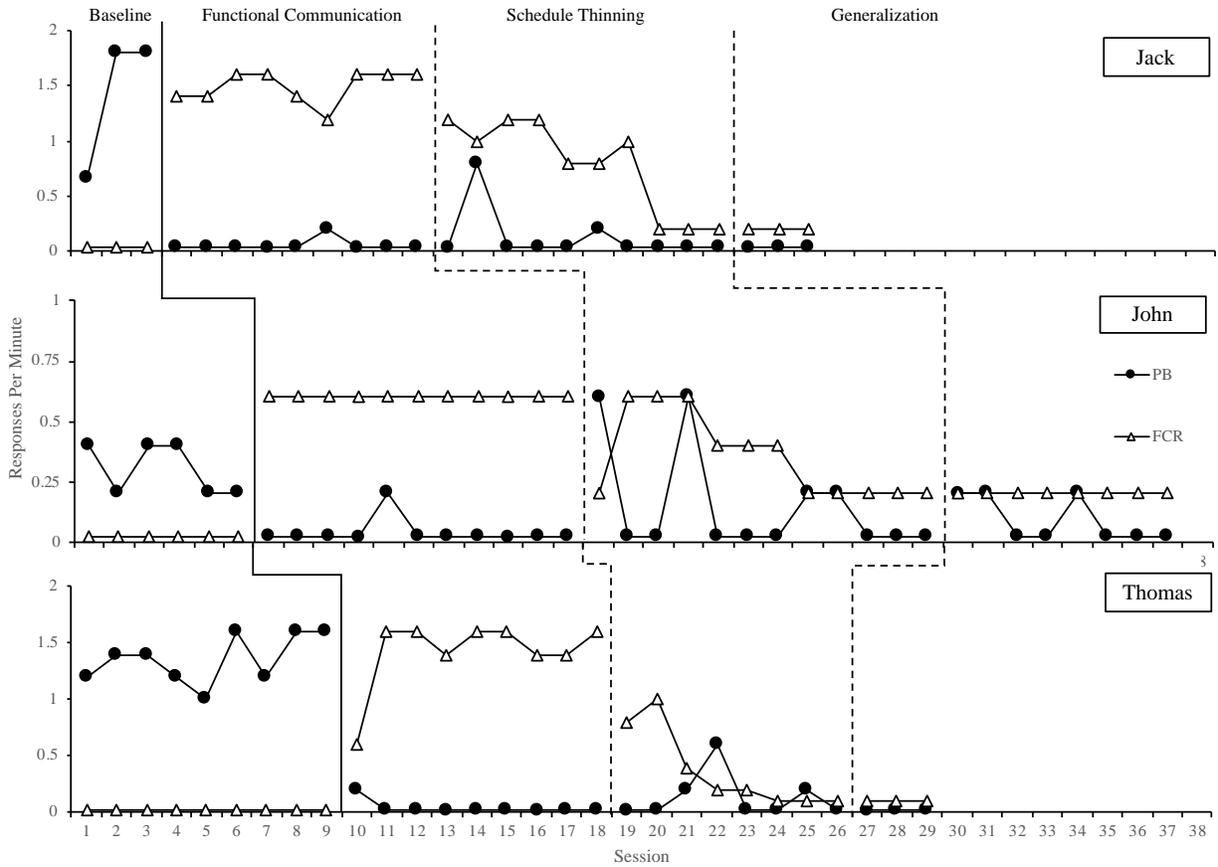


Figure 5. Results of the treatment evaluation of Study 1; responses per minute of problem behavior and functional communication responses in baseline, functional communication, schedule thinning, and generalization.

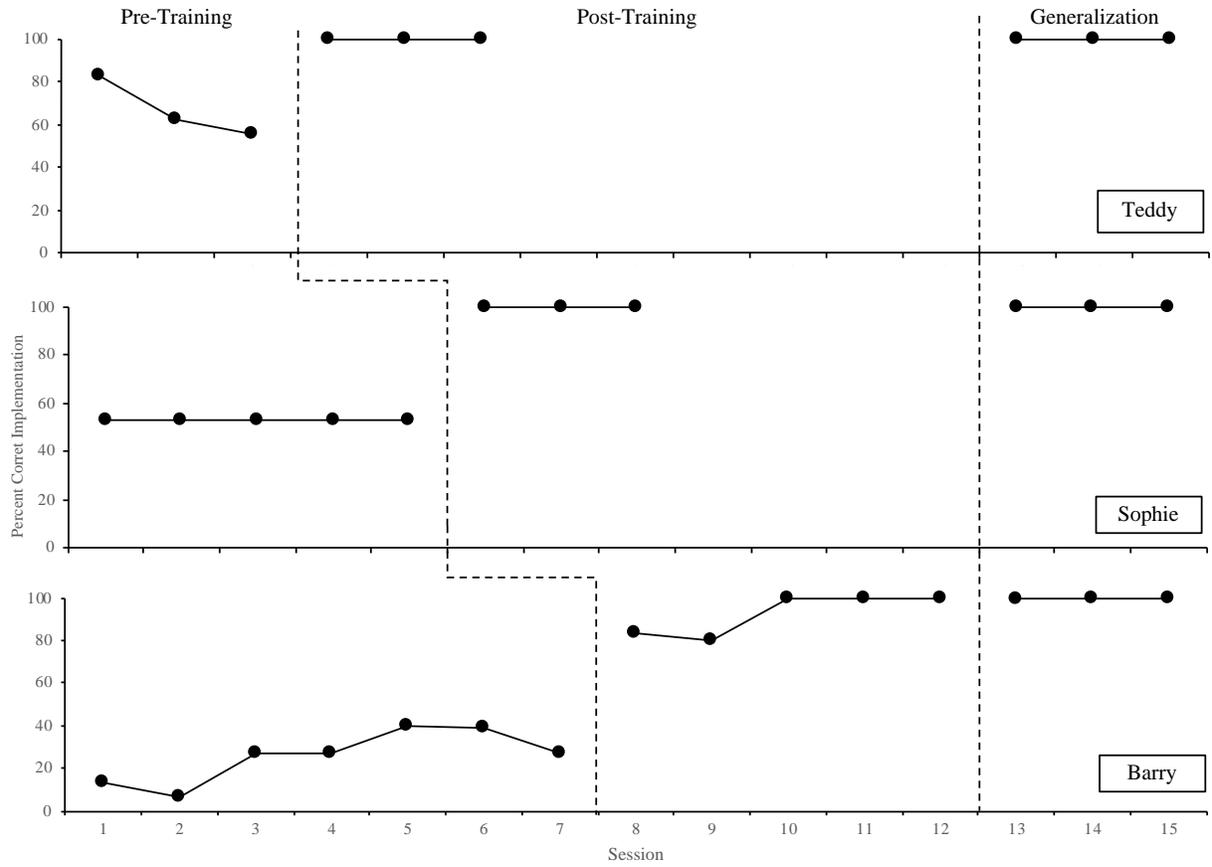


Figure 6. Percent correct implementation of the relevant treatment of problem behavior before training, after training, and in generalization sessions across staff members.

APPENDIX A

Name of Person Completing Questionnaire: _____

Name of Client: _____

Relation to Client: _____

Please rate your agreement with the following statements regarding *ABC Data Collection* as a method to assess problem behavior. Please use the following scale:

| | | | | | | |
|-------------------|----------|-------------------|----------------------------|----------------|-------|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |

1. ABC Data is easy to collect.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. ABC Data is feasible & practical to collect in the present setting.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

3. Including the cost to train staff to collect ABC Data, I feel that ABC Data is a cost-efficient method to assess problem behavior.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

4. ABC Data is an effective way to identify the cause of problem behavior.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

5. I would use ABC Data again to assess problem behavior of other clients.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

6. ABC Data Collection objectively identifies the cause of problem behavior.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

7. ABC Data Collection is a subjective assessment method.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

8. ABC Data Collection causes disruption to the group home/day rehabilitation center.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

9. In order to collect ABC data, a high level of direct care staff training is required.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

10. The client benefited from ABC Data Collection.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

Please rate your agreement with the following statements regarding *Trial-Based Functional Analysis* as a method to assess problem behavior. Please use the following scale:

| | | | | | | |
|-------------------|----------|-------------------|----------------------------|----------------|-------|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |

1. Trial-Based Functional Analyses are easy to conduct.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. Trial-Based Functional Analyses are feasible & practical to conduct in the present setting.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

3. I feel that Trial-Based Functional Analyses are a cost-efficient method to asses problem behavior.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

4. Trial-Based Functional Analyses are an effective way to identify the cause of problem behavior.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

5. I would use Trial-Based Functional Analyses to assess problem behavior of other clients.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

6. Trial-Based Functional Analyses objectively identify the cause of problem behavior.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

7. Trial-Based Functional Analysis is a subjective assessment method.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

8. Trial-Based Functional Analyses cause disruption to the group home/ day rehabilitation center.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

9. In order to conduct the Trial-Based Functional Analyses, a high level of direct care staff training is required. (Note, direct care staff do not directly conduct Trial-Based Functional Analyses)

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

10. The client benefited from Trial-Based Functional Analysis.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Please answer the following questions in the space provided about *ABC Data Collection and Trial-Based Functional Analyses*.

1. Which procedure would you rather use in an attempt to identify the cause of problem behavior in your client? Why?

2. Do you have any significant concerns about either procedure? If so, what concerns?

3. Which procedure do you think was more feasible and practical in the present location? Why?

4. Which procedure do you think more objectively identified the cause of problem behavior?

5. Which procedure do you think more effectively identifies the cause of problem behavior, and thus, better informs treatment selection?

6. Did any procedure cause disruption to the current setting? If yes, how so?

7. Is there anything else you feel should be mentioned about either procedure?

APPENDIX B

Name of Person Completing Questionnaire: _____

Name of Client: _____

Relation to Client: _____

Please rate your agreement with the following statements regarding Functional Communication with Varied Reinforcement. Please use the following scale:

| | | | | | | |
|-------------------|----------|-------------------|----------------------------|----------------|-------|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |

1. The set goal of decreasing the client's problem behavior was important to the client's life.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. The client's problem behavior was limiting the client's ability to attend a typical day setting (e.g., day rehabilitation program, work, community outings).

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

3. The client's problem behavior negatively impacted the lives of those close to the client (e.g., family, friends).

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

4. Functional communication with varied reinforcement is easy to implement.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

5. Functional communication with varied reinforcement is feasible/ practical.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

6. Functional communication with varied reinforcement is socially appropriate.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

7. I would recommend functional communication with varied reinforcement to someone else with problem behavior.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

8. I am confident in my/my staff's ability to implement functional communication with varied reinforcement.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

9. The effort to implement functional communication with varied reinforcement is worth the effects for the client.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

10. I am satisfied with the client's level of problem behavior with functional communication with varied reinforcement.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

11. Functional communication with varied reinforcement effectively achieved the goal of decreasing the client's problem behavior.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

12. Functional communication with varied reinforcement positively impacted the client's life.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

13. I will continue to use functional communication with varied reinforcement with my client.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

14. Functional communication with varied reinforcement disrupts the group home/day rehabilitation center.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

15. Functional communication with varied reinforcement requires a high level of staff training to implement accurately.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

Is there anything else you feel should be mentioned about functional communication with varied reinforcement?

APPENDIX C

Name of Person Completing Questionnaire: _____

Name of Client: _____

Relation to Client: _____

Please rate your agreement with the following statement regarding the training technique used today. Please use the following scale:

| | | | | | | |
|----------------------|----------|----------------------|----------------------------------|-------------------|-------|-------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |

1. The set goal to train staff to accurately implement the client's behavior plan was important.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. The inability of staff to accurately implement the client's behavior plan would negatively impact the client.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

3. The training procedure made learning the behavior plan easy.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

4. The training procedure was feasible/practical.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

5. The training procedure was appropriate.

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

6. I would recommend this training procedure to train other behavior plans.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

7. I am confident in my/ my staff's ability to implement the client's behavior plan after this training.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

8. The time required for the training was worth the effects.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

9. I am satisfied with the training procedure.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

10. The training procedure effectively trained staff to implement the client's behavior plan accurately.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

11. This training procedure disrupted the group home/ day rehabilitation center.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

12. I/my staff would not be able to implement the behavior plan as accurately without the training.

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

Is there anything else you feel should be mentioned about today's training?

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