Comparing the Results of and Evaluating Preferences for Functional Analyses and Concurrent Operant Analyses

Marrisa B. Allen

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COMPARING THE RESULTS OF AND EVALUATING PREFERENCES FOR FUNCTIONAL ANALYSES AND CONCURRENT OPERANT ANALYSES

by

Marissa B. Allen

A dissertation submitted to the Graduate College in partial fulfillment of the requirements for the degree of Doctor of Philosophy Psychology Western Michigan University December 2019

Doctoral Committee:

Stephanie Peterson, Ph.D., Chair
Wayne Fuqua, Ph.D.
Alan Poling, Ph.D.
Wendy Berg, M.A.
DEDICATION

This dissertation is dedicated to my grandmother, Allegra. You are the reason I went back to school and my number one inspiration.
ACKNOWLEDGEMENTS

I thank my advisor, Dr. Stephanie Peterson, for her guidance and support. I thank my committee members, Wendy Berg, Dr. Wayne Fuqua, and Dr. Alan Poling. I also thank Cara Cech for her help with data collection.

Marissa B. Allen
COMPARING THE RESULTS OF AND EVALUATING PREFERENCES FOR FUNCTIONAL ANALYSES AND CONCURRENT OPERANT ANALYSES

Marissa B. Allen, Ph.D.
Western Michigan University, 2019

It is recommended that a functional analysis (FA) be conducted before treating serious problem behaviors. However, it is not always feasible or desirable to do so. For example, the problem behavior may be too dangerous, or the setting may not allow procedures that evoke problem behavior. An alternative solution may be to identify reinforcers for adaptive behavior in order to develop a treatment plan to reduce problem behavior by increasing socially appropriate/adaptive behavior. Berg et al. (2007) evaluated whether the same social events identified as reinforcers for adaptive behavior by a concurrent operant (i.e., choice) analysis (COA) would be identical to those identified by a traditional FA. They found that the FA and COA did in fact identify the same social reinforcers for both problem and adaptive behavior for the majority of participants. These findings suggest that COAs could be an effective alternative when FAs are not feasible. Although Berg and colleagues provided anecdotal evidence that the COA identified effective treatments, no empirical data were presented on treatment effectiveness. The purpose of the current study was to replicate the study conducted by Berg et al. (Study 1) and extend it to evaluate children’s preferences for FA and COA methods (Study 2). A final purpose was to implement function-based treatments to evaluate the extent to which the FA and COA results accurately inform treatment (Study 3).
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INTRODUCTION

Functional analyses (FA) consist of systematically arranging different test conditions and comparing them to a control condition to determine the variables maintaining problem behavior. FA, first developed as a formal assessment technology by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) is the only current method that directly determines the function(s) of problem behavior (e.g., aggression, self-injury, and elopement). Identifying the variables that maintain problem behavior is important because doing so enables effective reduction in problem behavior through the application of function-based treatments. It also enables the identification of effective reinforcers for increasing socially appropriate adaptive behavior.

Unfortunately, it is not always feasible to carry out a FA in certain situations. For example, the problem behavior may be too severe or dangerous to repeatedly evoke during a FA. Other factors that may limit the extent to which FAs are utilized may include restrictions within the setting, resources, and/or caregiver preferences. For example, academic settings such as schools may not have the proper staff or resources to conduct FAs. If the behavior of concern is self-injurious in nature, caregivers may not want to evoke the behavior for risk of further injury. In these situations, an alternative form of assessment might be useful. One solution may be to evaluate and identify reinforcers for adaptive behavior. Doing so may allow the practitioner to develop a treatment plan that reduces problem behavior by increasing socially appropriate/adaptive behavior. For example, Grace, Thompson, and Fisher (1996) conducted a study with a participant who engaged in what was identified as “covert” self-injury. Covert self-injury, such as a cut or bruise, appears on the individual’s body, but rarely does the individual
engage in the behavior in the presence of others. Covert behaviors identified for the participant in Grace et al. consisted of skin and nail picking; head banging; self-biting; inserting objects into nose, ears, and eyes; and pulling on eyelids. Although the target behaviors were rarely observed, the resulting injuries (e.g., torn eye lids, bruising, and gashes requiring stitching) were frequently observed and demonstrated the severity and intensity of the behavior. A concurrent operant assessment (COA) was implemented as an alternative to a FA (since self-injury could not be directly observed) to evaluate the relative reinforcing value of medical and nonmedical attention (reported as the most commonly observed consequence of self-injury) by observing their effects on an alternative behavior, envelope stuffing. Results revealed elevated rates of envelope stuffing in both attention conditions with near zero rates of envelope stuffing occurring in the control condition (continuous attention). Based on findings from the COA, Grace and colleagues were able to successfully implement a treatment, which led to a drastic decrease in the percentage of new injuries observed during scheduled physical examinations. However, given that researchers were unable to measure problem behavior, it was not possible to directly compare the results of the COA to results of a FA to determine the extent to which results corresponded.

Another example is Piazza et al. (1997), who conducted FAs for three children who engaged in elopement, which put the children at risk of serious injury (e.g., running into traffic). Results identified a function of problem behavior for one participant but were difficult to interpret for the other participants. Concurrent operant assessments were subsequently conducted with the other two participants to clarify the reinforcers for elopement. Treatment was subsequently developed based on the results of the first participant’s FA results and the other participants’ reinforcer assessment results. Treatment resulted in a dramatic reduction in elopement for all three participants. Like Grace et al. (1996), Piazza et al. did not conduct a
reinforcer assessment with the first participant in order to determine the extent to which the same class of reinforcement identified during the FA matched the class of reinforcement identified during a COA.

Both Grace et al. (1996) and Piazza et al. (1997) discovered a significant implication for treatment of problem behavior when a FA is not possible or results are undifferentiated: Substitute behaviors may be measured during a concurrent operant assessment in lieu of evoking problem behavior, and results can be utilized to design an effective treatment for problem behavior. One limitation of both studies described above was that researchers were unable to make a comparison between assessment methods to determine if the same class of reinforcement-maintained problem behavior and adaptive behavior. This comparison would have enabled researchers to determine if it is necessary for the reinforcement-based treatment to match the function of problem behavior.

Berg et al. (2007) addressed these two limitations by conducting a study to determine if the same social events would be identified as reinforcers for problem behavior (FA) and appropriate behavior (COA). The results suggested the COA did in fact identify the same social reinforcers for both problem and adaptive behavior for the majority of participants. These findings suggested COAs could be a robust assessment alternative when FAs are not feasible. Berg et al. noted that when the two assessment methods identified different classes of reinforcement, the treatment corresponding to the outcomes of the FA was more effective in reducing problem behavior. Despite this difference, for the majority of participants, COAs were an effective alternative to FAs. To date, there have been few, if any, studies that replicate the findings of Berg and colleagues. Further replications of this study would be useful to determine if COAs indeed align with FAs for the majority of individuals.
The studies described above illustrate the effectiveness of two different assessment procedures for evaluating functional reinforcers to develop effective behavioral treatment. Some might view FAs as more intrusive than COAs, because FA procedures are designed to evoke problem behavior, while COAs tend to evaluate appropriate or substitute behaviors. This may not be desirable to care providers, administrators, teachers, or even the child. Many of the children who participate in these assessments may not have the communication skills necessary for telling caregivers or evaluators what their assessment preferences are. Understanding client preferences for the procedures implemented for them is important because researchers and practitioners have an ethical responsibility to ensure they are implementing assessment procedures and treatments that are least intrusive, most effective, and preferred (Professional and Ethical Compliance Code for Behavior Analysts, 2.09). They also have a responsibility to obtain social validity measures from the individuals for whom they provide services (Hanley, 2010). More research is needed on client preferences for assessments and treatments.

One effective and direct approach to assessing treatment preference is via a discrete trial concurrent chains assessment (e.g., Hanley, Piazza, Fisher, Conrucci, & Maglieri 1997; Heal & Hanley, 2007). A discrete trial concurrent chains assessment (DTCCA) consists of presenting multiple treatment alternatives in a choice arrangement to the individual receiving the treatment (Hanley, Piazza, Fisher, & Maglieri, 2005). This type of assessment has been particularly useful for individuals who have limited communication skills. For example, in a study conducted by Hanley et al. (2005), when participants were given the opportunity to choose which treatment procedure they preferred, they reliably selected the most effective procedure in reducing problem behavior and maintaining appropriate behavior (i.e., FCT plus punishment). A study conducted by Heal, Hanley, and Layer (2009) conducted a DTCCA to evaluate participants’ preferences for
three different teaching strategies and had similar results. Teaching strategies differed in the amount of teacher directness, which consisted of discovery oriented, embedded, and/or direct instruction. When given the opportunity to choose which strategy was most preferred, five of the six participants chose the most effective (produced the highest number of correct responses, the least amount of time to teach mastery, and the highest posttest scores) strategy. A similar strategy might be useful in evaluating client preference for the assessment of their problem behavior.

The purpose of Study 1 was to first replicate the previous study conducted by Berg et al. (2007) in determining whether the same social events would be identified as reinforcers for problem behavior (FA) and appropriate behavior (COA). In order to extend Berg et al., during Study 2, participants’ preferences for the two assessment methods were evaluated (DTCCA) to determine if there was a preference for one assessment method over the other. During Study 3, participants received function-based treatments based on the results of performance during the FA/COA in order to evaluate the extent to which results of these assessments could be used to develop effective treatments.

GENERAL METHOD

Participants/Setting

Prior to the study, the researcher reviewed the details of the study with parents of possible participants and obtained informed consent for their child’s/children’s participation. This information included the following: The purpose of the study, participant inclusion and exclusion criteria, where the study took place, time commitment required, what the participant would be asked to do during sessions, what information would be measured, the risks, benefits, costs, compensation, who would have access to information in the study, and how confidentiality
would be ensured. This study was approved by the Human Subjects Institutional Review Board (HSIRB) at Western Michigan University.

The following inclusion criteria were required for participation in the study: Participants had the skills to attend to a model and participate in a COA. Participants had to have a history of problem behavior that interfered with their progress in learning functional skills. Specifically, problem behavior hypothesized to be maintained by socially mediated consequences was required. This was determined based on caregiver report, record review, and direct observation screening of participants by the researcher during their regularly scheduled therapy sessions with the agency from which they received services. Participants with problem behavior hypothesized or determined to be maintained by automatic reinforcement (i.e., behavior that is not maintained by socially mediated consequences) were excluded from the study, given that the study was not designed to address this function.

Three children with a diagnosis of autism and who displayed problem behavior that interfered with their quality of life and education participated in all three studies. Participant 1 was 6 years old and displayed vocal protest (crying/screaming) and aggression (biting, hitting, kicking). She spoke in two-to-three-word short phrases, which often required prompting and displayed difficulty with articulation of words. Participant 2 was 8 years old and displayed vocal protest (yelling) and property destruction (kicking/pushing over furniture). He spoke in complete sentences. Participant 3 was the brother of Participant 2. He was 3 years old and displayed vocal protest (crying/yelling) and flopping. He spoke in complete sentences and displayed difficulty with articulation of words. All three children had communication goals and required some degree of prompting with communication. Participants all demonstrated the ability to complete paired-choice preferences assessments, attend to model prompts, discriminate colors, and follow basic
rules and one-step instructions. Sessions were conducted by the researcher at a local autism center.

Prior to the study, a brief free-operant preference assessment was used in combination with interviews with staff to determine participant social reinforcer preferences. A free operant preference assessment (Roane, Vollmer, Ringdahl, and Marcus, 1998) was selected as opposed to a paired-choice or multiple stimulus without replacement preference assessment because all participants were reported to play with preferred toys in combinations. Assessing a hierarchy of preferred toys in a free-operant context enabled the researcher to capture this. Participant 1’s highly preferred tangibles included a string of beads plus little people and accessories. Her moderately preferred tangibles included little people and accessories minus the beads. Participant 2’s highly preferred tangibles included a train set, legos, and cars. His moderately preferred tangibles included cars only. Participant 3’s highly preferred tangibles included the iPad. Moderately preferred tangibles included little people and cause-and-effect toys that made music.

**Data Collection, Dependent Variables, Procedural Integrity, and Interobserver Agreement**

Data were collected by the researcher and a research assistant recruited from WMU. Data were collected via paper and pencil. Sessions were video recorded. Data were collected on problem behavior, engagement with stimuli, time allocation to each side of the room, assessment type choice selections, and independent functional communication. Table 1 summarizes the different dependent variables and measurements that took place during the study. The researcher provided training in data collection and procedure implementation for the research assistant using role-play with a script for each specific procedure prior to conducting in-situ sessions. Sessions were 5 min in duration with 5 min breaks between sessions. Although multiple sessions
were conducted per day, the total participation time did not exceed more than 1 hour; thus, participants were not required to participate in research for more than 1 hour per day, up to 4 days per week, depending on participant availability.

Table 1
Dependent Variables and Measurement

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Problem Behavior</th>
<th>Engagement with Stimuli</th>
<th>Time Allocation</th>
<th>Independent Functional Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>definition</td>
<td>P1: vocal protest, aggression P2: vocal protest, property destruction P3: vocal protest, flopping</td>
<td>touching toys or work materials or facing or touching the researcher</td>
<td>time allocated w/ choice activities</td>
<td>P1: “IPAD” P2: “More time please” P3: “More time please”</td>
</tr>
<tr>
<td>measurement system</td>
<td>10-s partial interval converted to number of intervals</td>
<td>10-s partial interval converted to number of intervals</td>
<td>10-s partial interval converted to number of intervals</td>
<td>trials converted to percentage of opportunities</td>
</tr>
<tr>
<td>procedure measured</td>
<td>FA, COA, DTCCA, Treatment</td>
<td>COA</td>
<td>COA</td>
<td>Treatment</td>
</tr>
</tbody>
</table>

Color stimuli referred to as signals (colored posters and a corresponding colored shirt the researcher wore) corresponding to FA test (yellow), FA control (red), COA test (green), COA control (white), and treatment (blue), were present during respective sessions. The signals were used to form a conditional relation between a specific color and type of condition during each session. The colored stimuli were intended to signal to the participant which condition was in effect, which was crucial for the DTCCA. Prior to FA, COA, and treatment sessions, the
participant was presented with an array of two different colored cards on the outside of the door to the session room and instructed to touch the card representing the condition they would experience. The card selection was presented the same prior to DTCCA sessions except participants were instructed, “Pick the one you want to do” instead of being instructed to select a specific color.

Problem behavior was measured during the FA, COA, DTCC, and treatment sessions. Problem behavior was defined individually for each participant. Problem behavior was recorded using a 10 s partial interval measurement system and converted into number of intervals with problem behavior.

Engagement with stimuli was measured during the COA to measure the degree to which participants were engaged with available activities on each side of the room as opposed to allocating time to one side or both sides and not engaging with activities. Engagement was defined as the participant touching toys or work materials with his or her hand or facing or engaging with the researcher appropriately. A 10 s partial interval measurement system was used and converted into number of intervals of engagement with stimuli.

Time allocation to the different choice areas was measured during the COA. Time allocated to each choice area was recorded by marking on which side of the midpoint (marked with tape) of the room the participant’s body is for each interval using a using a 10 s partial interval measurement system and converted into number of intervals of time allocation. Although rare, participants were occasionally observed to stand on and engage with both sides of the room during one 10 s interval. Both intervals were scored as time spent on each side of the room, engaged (procedure modification to Berg et al., 2007).

During the DTCCA, the participant made choice selections regarding which assessment
condition he or she preferred to experience. Choice selections were defined as the participant touching or stating the color of a card in an array of two different color cards within 5 s of an instruction to make a choice. Choice selections were measured using an event recording procedure. The frequency of each selection was recorded and presented as cumulative initial link selections.

Independent functional communication was measured during treatment. Independent functional communication was defined as the participant vocally engaging in a specified response alternative to problem behavior within 3 s of the statement, “My turn.”.

Interobserver (IOA) agreement was measured a minimum of 25% (range, 25% to 31%) of the sessions across all assessments and treatments. For interval data, an agreement was defined as two independent observers recording the same topography of target behavior in a given 10 s interval (FA, COA, and treatment) or trial (DTCCA); a point-by-point agreement method. For event recording procedures, agreement was determined by dividing the number of agreements of occurrence of the behavior by the number of agreements plus disagreements of the occurrence of the behavior and multiplied by 100%.

Procedural integrity was measured a minimum of 25% (range, 25% to 31%) of the sessions during all three assessments and treatment. Integrity data were recorded on the accuracy with which the researcher delivered instructions and consequences for problem behavior (FA only and treatment only) and alternative selections (COA and DTCCA only). Integrity was determined by dividing the number of correct responses the researcher displays by the number of incorrect researcher responses plus correct responses and multiplied by 100%.

Procedural integrity and IOA were collected for 31% of assessment and treatment (studies 1-3) sessions with an average of 97% IOA (range, 83% to 100%) and 97% integrity.
(range, 86% to 100%) for Participant 1 across studies 1-3. Integrity and IOA were collected for 30% of assessment and treatment sessions (studies 1-3) with an average of 98% IOA (range, 86% to 100%) and 98% integrity (range, 90% to 100%) for Participant 2 across studies 1-3. Integrity and IOA were collected for 24% of assessment and treatment sessions (Studies 1-3) with an average of 98% IOA (range, 73% to 100%) and 97% integrity (range, 90% to 100%) for Participant 3 across studies 1-3.

**Experimental Design**

During Study 1, participants experienced FA and COA sessions in a quasi-random order (i.e., multielement design; Ulman & Sulzer-Azarof, 1975). For example, the first session could have been a COA session followed by another COA session and then a FA session. The order of sessions was quasi-random with no more than three sessions in a row of the same condition conducted. This was done to prevent order of session effects from influencing the results of the study. Since there were ten total COA & FA conditions being compared (see Table 2), each social reinforcer was tested separately in a pairwise design to avoid carryover effects across conditions. Each COA-FA comparison analysis was immediately followed by a corresponding DTCCA to assess child preference for the matched COA-FA conditions (Study 2). For example, immediately after participants completed the escape COA-FA they received the escape DTCCA. During the DTCCA in Study 2, participants were presented with a choice between matched COA and FA conditions and asked to choose the option they preferred (concurrent-chains arrangement design; Rachlin & Green, 1972). After completing the DTCCA, participants completed treatment in Study 3. For two of the three participants, treatment was presented in a reversal design (Sidman, 1960), in which participants received baseline conditions and treatment conditions in the following sequence: BAB reversal design with treatment first, then reversed to a baseline
probe, then reversed back to treatment to complete participation in the study.

Table 2  
*Types of Social Reinforcement Tested, FA Antecedent, and Consequence Conditions and COA Alternatives*

<table>
<thead>
<tr>
<th>Condition</th>
<th>FA Antecedents</th>
<th>Consequences</th>
<th>Berg et al. Alternatives</th>
<th>COA Alternative 1</th>
<th>COA Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>free play</td>
<td>0 demands</td>
<td>0</td>
<td>attention w/ toys vs.</td>
<td>0 demands</td>
<td>0 demands</td>
</tr>
<tr>
<td></td>
<td>+ attention</td>
<td></td>
<td>alone at table</td>
<td>+ attention</td>
<td>0 attention</td>
</tr>
<tr>
<td></td>
<td>+ highly</td>
<td></td>
<td></td>
<td>+ highly</td>
<td>0 toys</td>
</tr>
<tr>
<td></td>
<td>preferred toys</td>
<td></td>
<td></td>
<td>preferred toys</td>
<td></td>
</tr>
<tr>
<td>escape</td>
<td>+ demands</td>
<td>0 demands</td>
<td>demands and attention</td>
<td>+ demands</td>
<td>0 demands</td>
</tr>
<tr>
<td></td>
<td>+ attention</td>
<td>0 attention</td>
<td>vs. alone with no toys</td>
<td>+ attention</td>
<td>0 attention</td>
</tr>
<tr>
<td></td>
<td>0 toys</td>
<td>0 toys</td>
<td></td>
<td>0 toys</td>
<td>0 toys</td>
</tr>
<tr>
<td>attention</td>
<td>0 demands</td>
<td>0 demands</td>
<td>alone w/toys vs.</td>
<td>0 demands</td>
<td>0 demands</td>
</tr>
<tr>
<td></td>
<td>0 attention</td>
<td></td>
<td>attention w/toys vs.</td>
<td>0 attention</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+ moderately</td>
<td></td>
<td>(not from Berg et al.)</td>
<td>+ moderately</td>
<td></td>
</tr>
<tr>
<td></td>
<td>preferred toys</td>
<td></td>
<td></td>
<td>preferred toys</td>
<td></td>
</tr>
<tr>
<td>tangible</td>
<td>0 demands</td>
<td>0 demands</td>
<td>attention vs. alone w/toys</td>
<td>0 demands</td>
<td>0 demands</td>
</tr>
<tr>
<td></td>
<td>+ attention</td>
<td>0 attention</td>
<td></td>
<td>0 attention</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 toys</td>
<td>+ highly</td>
<td></td>
<td>0 toys</td>
<td></td>
</tr>
<tr>
<td></td>
<td>preferred toys</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>escape-to-tangible</td>
<td>+ demands</td>
<td>0 demands</td>
<td>demands and attention v.</td>
<td>+ demands</td>
<td>0 demands</td>
</tr>
<tr>
<td>(not from Berg et</td>
<td>+ attention</td>
<td>0 attention</td>
<td>alone w/toys</td>
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<td>0 attention</td>
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<td>al.)</td>
<td></td>
<td>+ highly</td>
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<tr>
<td></td>
<td></td>
<td>preferred toys</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12
The purpose of using this type of reversal design was to end the study with the participant in the treatment phase demonstrating several successful sessions. For the third participant (Participant 2), only treatment and no reversals were conducted. This was because Participant 2’s ABA services ended before the study could be completed.

STUDY 1: FA-COA COMPARISON

Procedures

*Functional Analysis (FA)*. Functional analyses (FA) (Iwata et al., 1982/1994) were conducted to test for attention and escape functions of problem behavior. Additionally, escape to tangible and tangible functions of problem behavior were also tested in order to approximate other functional contingencies maintaining problem behavior in the natural environment, replicate (Berg et al., 2007), and determine whether problem behavior was maintained by these functions. Prior to sessions, the participant and researcher stood outside the closed session door with two color cards attached. The participant was then instructed, “Pick [color representing corresponding condition],” and they entered the session room after the participant touched or stated the specified color.

A control condition (free play) was implemented to provide a comparison with test conditions. Demands and learning materials used during the analyses were individualized for participants based on interviews with staff, record review, and direct observation. It should be noted that in escape/escape-tangible conditions, participants were presented with demands to complete learning activities that were already in their repertoire.

During the attention condition, the researcher sat across the table from the participant appearing to be engaged with reading materials, diverting attention from the participant. The researcher issued 30 s of attention in the form of statements of concern (e.g., “Oh no, please
don’t do that. It will be okay.”) or other forms of attention typically delivered after problem behavior (e.g., intermittently touching the participant on the shoulder, saying, “stop it”, etc.) contingent on problem behavior. The participant also had free access to moderately preferred toys throughout the session. The researcher did not otherwise interact with the participant during this condition.

During the escape condition, the researcher presented a series of work tasks already in the participant’s repertoire approximating the instructional set-up/tasks received in the natural environment. Work tasks during escape were identified by staff that had historically evoked problem behavior. Failure to initiate a work task within 3 s of an instruction resulted in the researcher re-stating the demand and using least-to-most three-step prompting to assist the participant in completing the task. The researcher restated the demand immediately prior to delivering a prompt in the error correction sequence. During the first prompt, the researcher restated the demand, then gesture to the materials. During the second prompt, the researcher restated the demand, then modeled completing the task. During the third prompt the researcher restated the demand, then provided hand-over-hand assistance with completing the task. If problem behavior occurred, the researcher immediately removed the task materials and turned away from the participant for 30 s. After 30 s has elapsed, the researcher presented the participant with another work task.

The escape-to-tangible condition was identical to the escape condition, except the participant received access to highly preferred toys instead of an empty table.

During the tangible condition, the participant received 30 s of access to highly preferred toys at the start of the session. The researcher was seated across the participant at the table. After 30 s elapsed, the researcher said, “My turn,” and attempted to remove the toys or block view
access from the participant. Problem behavior resulted in the researcher returning the toys to the participant. The researcher subsequently continued to remove toys every 30 s. Contingent on problem behavior, the researcher provided the toys to the participant. This process was repeated for the duration of the session.

During the free play condition, the participant had access to highly preferred toys, and no demands were placed on the participant. The researcher provided attention at least every 30 s in the form of a brief statement related to activities with which the participant was engaging and also delivered attention contingent on the participant’s initiation of interacting with the researcher. Problem behavior resulted in no programmed consequences.

FA sessions were conducted with each participant until a functional relation was identified between a specific class of reinforcement consequences and the target behavior.

*Concurrent Operant Assessment (COA).* A COA based on the procedures described by Berg et al. (2007) was conducted to identify participants’ preferences among the same activities (1) access to attention from an adult such as conversation 2) escape from non-preferred instructional activities, 3) access to preferred toys or electronics, and 4) escape from non-preferred instructional activities in order to access preferred toys or electronics evaluated during the FA. Prior to sessions, the participant and researcher stood outside the closed session door with two different colored cards attached. The participant was then instructed, “Pick [color representing corresponding condition],” and they entered the session room after the participant touched or stated the specified color.

Participants were not required to engage in problem behavior before receiving access to preferred activities. When presented with a choice between two activities, participants were simply be required to walk up to whichever activity they preferred and engage in that activity.
Participants were able to engage with each activity as many times as they preferred during the timed session. Problem behavior (although rarely observed) resulted in no programmed consequences, meaning the participant continued to have free access to preferred activities and the researcher did not change how she interacted with the participant. Two tables were placed 1 to 1.5 m apart at one end of the room. Materials associated with one activity (e.g., instructional materials) were placed on one table, and materials associated with the other another alternative activity (e.g., toys) were placed on the other table. At the start of the session, the researcher provided a brief demonstration of the activity associated with each table and informed participants they could choose the activity they wanted and go back and forth between activities. The participant then walked up to whichever table they chose and engaged in the activities presented at that table. The choices between the two activities were repeated verbally to the participant every 90 s for the duration of the 5 min session in order to remind participants of the activities associated with each table. The researcher said, “If you go to this table (while pointing to a specified table), you will be able to do this,” while gesturing to the respective stimuli. The participant was allowed to cross back and forth between the two areas at any time within the session but was not allowed to take materials to the other area. Although this rarely happened, the researcher prompted participants to place those materials in their respective place on the designated table.

During the control choice condition, the participant selected between engaging in moderately preferred toys with the researcher (attention and toys) and sitting alone with no toys or attention (alone). During the attention with toys alternative, the participant had continuous access to highly preferred toys and the researcher provided attention at least every 30 s in the form of a brief statement related to activities with which the participant was engaged and also
delivered attention contingent on the participant’s initiation of interacting with the researcher. During the alone alternative, the participant had continuous access to an empty table without toys or the researcher present at the table.

During the tangible choice condition, the participant selected between talking with the researcher (attention) and playing with highly preferred toys alone (alone with toys). During the attention alternative, the researcher was seated at the table facing the participant with no other materials present. The researcher delivered attention in the form of neutral statements (e.g., “I like the way you are sitting with nice hands,” “It is nice outside today,” “You are wearing a cool shirt.”). During the alone with toys alternative, the participant had continuous access to highly preferred toys at the table without the researcher present at the table.

During the escape condition, the participant selected between working with the researcher (demands) and sitting alone with no toys or attention (alone). During the demands alternative, the researcher delivered continuous work tasks to the participant identical to the tasks used during the FA. Completion of a work task resulted in a brief praise statement (e.g., “Great job” or “Way to go”) and the presentation of a new work task.

During the escape-to-tangible condition, the participant selected between demands and sitting alone with highly preferred toys. During the demands alternative, the researcher delivered demands in an identical fashion as during the FA demand condition, except that problem behavior resulted in no programmed consequences. During the alone with toys alternative, the participant had continuous access to highly preferred toys at the table without the researcher present at the table.

Sessions were repeated in a counterbalanced fashion until a pattern of selection emerged. Results from the COA were then compared to FA results to determine the extent to which they
corresponded and contrasted as well as to what extent they matched treatment outcomes. Results from the FA were used to develop function-based treatments to eliminate problem behavior for participants.

**Results**

Results for the FAs and COAs are presented in Figures 1 through 3. Table 3 provides the percentage of problem behavior and engagement across total time intervals for participants.

Table 3
**Percentage of Problem Behavior and Engagement That Occurred out of Total Time Intervals Across All COA Conditions During Study 2 per Participant**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Percentage of Problem Behavior Across all COA Conditions During Study 2</th>
<th>Percentage of Engagement Across all COA Conditions During Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>0.0038% (3 intervals) out of 780 total time intervals across 26 sessions</td>
<td>99% (772 intervals) out of 780 total time intervals across 26 sessions</td>
</tr>
<tr>
<td>Participant 2</td>
<td>0.004% (3 intervals) out of 750 total time intervals across 25 sessions</td>
<td>100% (750 intervals) out of 750 total time intervals across 25 sessions</td>
</tr>
<tr>
<td>Participant 3</td>
<td>0% (0 intervals) out of 720 total time intervals across 24 sessions</td>
<td>99% (713 intervals) out of 720 total time intervals across 24 sessions</td>
</tr>
</tbody>
</table>

Participants all had nearly 100% activity engagement and nearly 0% problem behavior across all COA conditions. The pairwise FAs and COAs for each putative function are presented together, with the FA results shown in the top panel and the results for the matched COA analysis presented in the bottom panel. For the FAs, the dependent variable was problem behavior in the test and control conditions. For the COAs, the dependent variable was time allocation to each side of the room. Because problem behavior rarely occurred in any of the COA conditions, problem behavior is not displayed for these analyses. Also, COA control data is not displayed because participants allocated nearly all of their time to the free-play side of the room,
suggesting strong experimental control. Results are available from the experimenter, if desired. Also, data were collected on engagement during the COA to determine if the participants actually engaged with the materials or experimenter when the participant allocated time to that side of the room. All participants engaged with the materials or experimenter nearly 100% of the time when they allocated time to any given side of the room. These data are not displayed on the graphs because they are not informative and made the graphs more difficult to read.

Figure 1 displays the results of the FA (top panels) and respective COA (bottom panels) analyses for Participant 1. The tangible/free play pairwise FA yielded elevated problem behavior in the test condition and no problem behavior in the control condition, indicating a tangible function for problem behavior. During the COA that compared tangibles alone versus attention with no tangibles, Participant 1 allocated the vast majority of her time to the tangibles side of the room, also indicating a tangible function for alternative behavior (i.e., time allocation). The escape-to-tangible/free play pairwise FA yielded elevated problem behavior in the test condition. No problem behavior was observed in the control condition, indicating an escape-to-tangible function. During the COA that compared no demands (escape) and tangibles to demands, Participant 1 allocated all of her time to the escape/tangible side of the room, also indicating escape-to-tangible as a function. The attention/free play pairwise FA produced almost no problem behavior in the test condition and no problem behavior in the control condition, indicating that attention was not a function problem behavior. During the COA that compared moderately preferred toys alone versus moderately preferred toys with attention, Participant 1 allocated the majority of her time to the side of the room with moderately preferred toys and no attention, also suggesting attention was not a function.
Figure 1. The figure illustrates the results of the FA (top panels) and COA (bottom panels) for Participant 1.

The escape/free play pairwise comparison FA resulted in no problem behavior in any condition, suggesting escape was not a function for problem behavior. During the COA that compared
demands with an adult to sitting alone with no toys, attention or demands, Participant 1 allocated the majority of her time to the side of the room with demands, also suggesting escape was not a function. Based on the functional analysis, it was determined that problem behavior was maintained primarily by access to tangible items. Although problem behavior occurred in the escape-to-tangible condition, it did not occur in the escape condition. Therefore, any problem behavior that occurred in escape-to-tangible was likely maintained by the tangibles, and not escape. The COA assessment produced similar results, given that the participant allocated her time to the side of the room with highly preferred toys when they were available. In this case, the two analyses appeared to match in terms of their outcomes.

Figure 2 displays the results of the FA (top panels) and respective COA (bottom panels) analyses for Participant 2. The escape-to-tangible/free play pairwise comparison FA yielded elevated problem behavior in the test condition and no problem behavior was observed in the control condition, indicating an escape-to-tangible function. During the COA that compared no demands (escape) and tangibles to demands, Participant 2 allocated all of his time to the escape-to-tangible side of the room, also indicating an escape-to-tangible function. No time was allocated to the demands side of the room. Both analyses appeared to have matching outcomes. The tangible/free play pairwise comparison FA resulted in elevated problem behavior in the test condition and no problem behavior was observed in the control condition, indicating a tangible function. During the tangible COA condition, the participant allocated all time to the tangible side of the room, and no time was allocated to the attention side of the room, indicating a tangible function.
Figure 2. The figure illustrates the results of the FA (top panels) and COA (bottom panels) for Participant 2.
The attention/free play pairwise comparison FA resulted in no problem behavior across during test and control sessions. The attention COA condition yielded the majority of time allocation and engagement to the moderately preferred toys side of the room, suggesting attention was not a function. Both analyses matched in indicating attention was not a function. The escape/free play pairwise comparison FA resulted in elevated problem behavior in the test condition and no problem behavior was observed in the control condition, indicating an escape function. The escape COA resulted in the majority of time allocation to the escape side of the room, also indicating escape as a function. Both analyses appeared to match in terms of their outcomes.

Figure 3 displays the results of the FA (top panels) and respective COA (bottom panels) analyses for Participant 3. The tangible/free play FA resulted in elevated problem behavior in the test condition and no problem behavior was observed in the control condition, indicating a tangible function. The tangible COA test condition resulted in all time allocation to the tangible side of the room and none to the attention side of the room, also indicating tangible as a function. Both analyses matched in identifying the same social functions/reinforcers. The attention/free play pairwise FA resulted in no problem behavior in test or control sessions, indicating attention was not a function. The attention COA resulted in all time allocation to the attention plus moderately preferred toys side of the room. No intervals of time were allocated to the moderately preferred toys only side of the room, indicating attention was a function. In this case, the two analyses differed in terms of their outcomes. The escape/free-play pairwise FA resulted in no problem behavior in test or control sessions, indicating escape was not a function. The escape COA resulted in the majority of time allocation to the demands side of the room and less time was allocated to the empty table side of the room, indicating escape was not a function. Both analyses appeared to match in identifying escape was not a function.
Figure 3. The figure illustrates the results of the FA (top panels) and COA (bottom panels) for Participant 3.
The escape-to-tangible/free play pairwise FA resulted in elevated problem behavior in the test condition and problem behavior was observed in the control condition, indicating an escape-to-tangible function. The escape-to-tangible COA test condition resulted in all of time allocation to the escape-to-tangible side of the room, and time was allocated to the demands side of the room, indicating escape-to-tangible as a function. Both analyses matched in their outcomes.

**STUDY 2: DISCRETE TRIAL CONCURRENT CHAIN ASSESSMENT (DTCCA) PROCEDURES**

Now that the participants each had a history with both the FA and COA assessment procedures, a discrete trial concurrent chain assessment (DTCCA) based on the general procedures described by Hanley et al. (1997) was conducted to identify their preferences for FA test conditions and corresponding COA conditions. Table 4 shows the FA and COA condition choices that were presented to participants. These conditions, when selected by the participants, were implemented in exactly the same manner as described above. Trials started with the researcher and participant standing at the closed door to the session room, which had two color cards attached to it. The researcher instructed the participant, "Pick the one you want to do," and waited for the participant to make a selection. Touching or stating the color of one card within 5 s of the instruction completed the initial link in the DTCCA. After this initial link, the participants experienced the condition they selected for 5 min. For example, if the participant touched the green card representing the COA test condition, the participant then experienced that condition in the terminal link, which completed the trial. Selecting the COA resulted in different activities on both sides of the room being available at all times during the 5 min session (identical to the same COA conditions in Study 1). Trials were then repeated until a pattern of preference emerged. Any problem behaviors observed at any point while experiencing choice selections resulted in the programmed consequences associated with that condition. For example,
if the participant selected an FA test condition for tangibles, any problem behavior that occurred during the trial was resulted in access to tangibles.

Table 4

*Choices between FA and Respective COA Conditions in a DTCCA Arrangement*

<table>
<thead>
<tr>
<th>Initial Link (select the corresponding FA or COA condition when presented with a choice)</th>
<th>FA or COA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>FA condition</td>
</tr>
<tr>
<td>escape</td>
<td>antecedents + consequences for PB</td>
</tr>
<tr>
<td>attention</td>
<td>antecedents + consequences for PB</td>
</tr>
<tr>
<td>tangible</td>
<td>antecedents + consequences for PB</td>
</tr>
<tr>
<td>escape-to-tangible</td>
<td>antecedents + consequences for PB</td>
</tr>
</tbody>
</table>

**Results**

Figures 4 through 6 show the results of the DTCCA for each participant. Each figure has four panels, one for each DTCCA comparison. The dependent variable was which condition the
participants selected in the initial link. Data are presented as the cumulative number of selections for each type of analysis (FA or COA). Figure 4 displays the results of the DTCCA for Participant 1.

Figure 4. The figure illustrates the results of the tangible (top left), escape-to-tangible (top right), attention (bottom left), and escape (bottom right) DTCCA for Participant 1.

During the tangible DTCCA (upper-left panel), Participant 1 selected the COA tangible condition every time. During the escape-to-tangible DTCCA (upper-right panel), the participant initially showed indifference between the conditions but eventually selected the COA condition on every trial for the last three trials. During the attention DTCCA (lower-left panel), the participant initially selected the COA condition on the first trial, but never selected it again. Instead, the participant always chose the FA-attention condition. During the escape DTCCA
(lower-right panel), the participant showed indifference between the COA and FA conditions for the first two trials but then chose the COA condition for all remaining trials. In summary, this participant generally preferred the COA analyses. However, this participant preferred the FA attention condition (sitting alone with moderately-preferred toys) to the COA attention condition.

Figure 5 displays the results of the DTCCA for Participant 2.

![Graphs](image-url)

**Figure 5.** The figure illustrates the results of the escape-to-tangible (top left), tangible (top right), attention (bottom left), and escape (bottom right) DTCCA for Participant 2.

During the escape-to-tangible DTCCA (upper-left panel), Participant 2 initially showed indifference then eventually selected the COA during the last three trials. During the tangible DTCCA (upper-right panel), the Participant initially showed indifference then eventually selected the COA tangible condition during the last four trials. During the attention DTCCA (lower-left panel), the participant initially showed indifference, then eventually selected the FA condition during the last three trials. During the escape DTCCA (lower-right panel), the
participant demonstrated a preference for the COA condition with a cumulative frequency of three selections and zero selections for the FA escape condition. In summary, this participant generally preferred the COA analyses. However, this participant preferred the FA attention condition (sitting alone with moderately-preferred toys) to the COA attention condition.

Figure 6 displays the results of the DTCCA for Participant 3.

Figure 6. The figure illustrates the results of the tangible (top left), attention (top right), escape (bottom left), and escape-to-tangible (bottom right) DTCCA for Participant 3.

During the tangible DTCCA (upper-left panel), Participant 3 initially showed indifference between conditions but eventually showed an overall preference for the COA condition with a cumulative frequency of nine selections over six selections for the FA condition. During the attention DTCCA (upper-right panel), the participant initially showed indifference but eventually selected the COA condition during the last three trials. During the escape DTCCA (lower left panel), the participant preferred initially showed indifference but eventually selected the FA condition with cumulative for the last three trials. During the escape-to-tangible DTCCA (lower-
right panel), the participant initially showed indifference but eventually selected the FA condition for the last three trials. In summary, the participant had mixed preferences for COA and FA conditions. He preferred the COA condition whenever his FA (escape-to-tangible and tangible) from Study 1 resulted in elevated problem behavior. He preferred the FA condition whenever his FA (attention and escape) from Study 1 resulted in zero problem behavior.

STUDY 3: TREATMENT USING DIFFERENTIAL REINFORCEMENT OF ALTERNATIVE BEHAVIOR (DRA) PROCEDURES

A DRA (Deitz & Repp, 1983), function-based treatment was implemented with participants to evaluate whether an effective treatment to reduce problem behavior could be derived from COA results. Treatment consisted of functional communication training (Carr & Durand, 1985), in which a communicative replacement response was taught. This response produced the type of reinforcement (e.g., tangible, attention, escape, etc.) based on the results of the COA, and problem behavior was placed on extinction (i.e., the reinforcer identified in the COA was withheld contingent upon problem behavior). Prior to each session, participants were presented with two different colored cards attached to the closed door of the session room and instructed, “Pick blue.” The blue card was meant to signal treatment was in effect (as opposed to one of the assessment conditions described above). After participants touched the blue card, they entered the session room. The researcher provided participants with a rule (e.g., “When I say, ‘my turn’ you can say, ‘more time please’”). Then, the researcher practiced this with the participant one time. After this practice trial, the session began. Every 30 s the researcher conducted a trial in which she provided an opportunity for the participant to engage in functional communication and receive 30 s access to the identified reinforcer. Participant 1’s treatment was designed based on the results of her FAs and corresponding COAs. The escape-to-tangible and tangible FAs yielded positive functions, but no function was identified in escape FA. Therefore,
treatment specifically was built off the tangible FA and included the tangible FA test condition as baseline in order to capture the most likely contexts maintaining problem behavior. During treatment, the participant was given 30 s access to reinforcement, then the researcher interrupted play to say, “My turn” and toys were immediately provided contingent on engaging in functional communication. It should be noted that this participant was observed to lose interest in the toys identified a highly preferred at the beginning of study 1. Subsequently, interviews with staff and a free-operant preference assessment prior to session four of Study 3 identified the iPad as highly preferred. The remaining sessions used the iPad as the highly preferred social reinforcer.

Participant 3’s treatment was designed based on the results of his FAs and corresponding COAs. Similar to participant 1, the escape-to-tangible and tangible FAs yielded positive functions, but no function was identified in escape FA. Therefore, treatment specifically was built off the tangible FA and included the tangible FA test condition as baseline in order to capture the most likely contexts maintaining problem behavior. Treatment for Participant 2 was designed based on the results of his FAs and corresponding COAs. The escape-to-tangible, tangible, and escape FAs all yielded positive functions. Therefore, treatment specifically was built off the escape-to-tangible FA in order to capture the most likely contexts maintaining problem behavior. During treatment, the participant was given 30 s access to reinforcement, then the researcher interrupted play to say, “My turn” and presented the participant with work materials. A break to access toys was immediately provided contingent on engaging in functional communication.

After the participant demonstrated independent mands and decreased problem behavior, the DRA treatment was removed, and a contingency reversal was implemented. For each participant, this contingency reversal consisted of providing the reinforcer for problem behavior and withholding it for mands. Essentially, this condition was identical to the test condition(s) of
the FA that demonstrated a function of problem behavior. For example, if access to attention was determined to be the function of problem behavior for a participant, then the attention condition of the FA served as the baseline condition with which to compare performance during DRA. In this example, DRA would have consisted of the delivery of attention for 30 s.

Results of the study were shared with staff and caregivers in order for participants to continue receiving function-based treatments after the study was completed.

Results

Figure 7 displays the results of treatment for participants 1 (top panel), 2 (middle panel), and 3 (bottom panel). Participant 1 engaged in problem behavior for three total intervals and independent functional communication for three total intervals during the first treatment phase. She met criteria of two or fewer instances of problem behavior and three consecutive sessions with 100% independent functional communication responses of opportunities at session nine of baseline. Upon a reversal back to baseline probe, the participant’s problem behavior increased to a total of ten intervals and independent functional communication continued to occur for 100% of opportunities. It appeared a chain had formed in that the participant would initially engage in the communication response and then immediately go into problem behavior when it was ineffective. A reversal back to treatment showed independent functional communication initially occurring at 80% with two occurrences of problem behavior (session eleven). Subsequently the participant successfully completed the study with 100% independent functional communication and zero problem behavior for the remaining three sessions.
Figure 7. The figure illustrates the results of treatment for Participant 1 (top panel), 2 (middle panel), and 3 (bottom panel).
Participant 2 only experienced the first phase of treatment due to his ABA services ending. He completed treatment with consecutive sessions of 100% independent functional communication and zero problem behavior.

Participant 3 engaged in problem behavior for zero intervals and 100% independent functional communication for the last three intervals during the first treatment phase. Upon a reversal back to baseline probe, the participant’s problem behavior increased to a total of ten intervals and independent functional communication dropped to 40% of opportunities. A reversal back to treatment showed a successful completion of treatment with independent functional communication immediately increase to 100% and zero occurrences of problem behavior for three consecutive sessions.

GENERAL DISCUSSION

Table 5 summarizes the results of studies 1-3. During Study 1, the FA and COA assessments matched in almost every case across participants. When there was a function identified by the FA, there was also a function identified for the COA every time. These results replicated findings previous research (e.g., Grace, Thompson, & Fisher, 1996; Piazza et al., 1997; Berg et al., 2007), indicating COAs could be a viable alternative when FAs are not possible or feasible. Additionally, when there was no function identified by the FA, COA results also matched most of the time. There were a total of five analyses across participants where no function was identified by the FA. The corresponding COA comparison test conditions also indicated that the reinforcers tested did not maintain time allocation, with one exception. In one case (Participant 3), the participant allocated time to the side of the room with attention, indicating attention was a reinforcer. In this case, the COA yielded a false positive for attention. This instance of inconsistency with identifying the same social reinforcer/function for FA and
COA could be conceptualized as a false positive in the COA; meaning we should not assume that problem behavior is maintained by social reinforcers when children show preferences for those reinforcers.

Table 5

*Summary of Performance across Participants for Study 1, 2, and 3 (data are highlighted for Participant 3, the only instance where the FA and COA did not correspond)*

<table>
<thead>
<tr>
<th></th>
<th>FA: Elevated Problem Behavior</th>
<th>COA: Majority of Time Allocation</th>
<th>Matching Results?</th>
<th>DTCCA: Analysis Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participant 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tangible</td>
<td>Yes</td>
<td>tangible</td>
<td>Yes</td>
<td>COA</td>
</tr>
<tr>
<td>attention</td>
<td>No</td>
<td>tangible</td>
<td>Yes</td>
<td>FA</td>
</tr>
<tr>
<td>escape</td>
<td>No</td>
<td>demands</td>
<td>Yes</td>
<td>COA</td>
</tr>
<tr>
<td>escape-to-tangible</td>
<td>Yes</td>
<td>escape-to-tangible</td>
<td>Yes</td>
<td>COA</td>
</tr>
<tr>
<td><strong>Participant 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tangible</td>
<td>Yes</td>
<td>tangible</td>
<td>Yes</td>
<td>COA</td>
</tr>
<tr>
<td>attention</td>
<td>No</td>
<td>tangible</td>
<td>Yes</td>
<td>FA</td>
</tr>
<tr>
<td>escape</td>
<td>Yes</td>
<td>escape</td>
<td>Yes</td>
<td>COA</td>
</tr>
<tr>
<td>escape-to-tangible</td>
<td>Yes</td>
<td>escape-to-tangible</td>
<td>Yes</td>
<td>COA</td>
</tr>
<tr>
<td><strong>Participant 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tangible</td>
<td>Yes</td>
<td>tangible</td>
<td>Yes</td>
<td>COA</td>
</tr>
<tr>
<td>attention</td>
<td>No</td>
<td>attention + moderately preferred tangible</td>
<td>No</td>
<td>COA</td>
</tr>
<tr>
<td>escape</td>
<td>No</td>
<td>escape</td>
<td>No</td>
<td>FA</td>
</tr>
<tr>
<td>escape-to-tangible</td>
<td>Yes</td>
<td>escape-to-tangible</td>
<td>Yes</td>
<td>FA</td>
</tr>
</tbody>
</table>
If this is considered when designing a treatment, this may not necessarily be problematic because additional reinforcers would be provided for appropriate responding. It would be more problematic if participants in the current study showed elevated problem behavior in a FA test condition and the COA did not identify the same social reinforcer. This would indicate the COA is not a reliable alternative when the FA is not feasible and should not be utilized to attempt to design function-based treatment to reduce problem behavior. However, this was not the case in the current study.

During Study 2, participants had an overall preference for COA test conditions over FA test conditions, with the COA eight times across all participants and the FA four times across participants. Interestingly, the COA was preferred over FA conditions that had elevated problem behavior in the previous analysis for six of the eight times COA was preferred, suggesting perhaps participants preferred the COA alternative because it did not evoke problem behavior. When the FA condition was selected as more preferred, this was when the FA condition did not evoke problem behavior in the previous analysis. The data in this study indicated that participants demonstrated more of a preference for the COA when the FA evoked problem behavior in the test condition. In contrast, participants demonstrated more of a preference for the FA over the COA when the FA did not evoke problem behavior in the test condition. Other studies have demonstrated the DTCCA as a reliable direct measure of social validity (e.g., Hanley, Piazza, Fisher, Contrucci, & Maglieri 1997; Heal & Hanley, 2007; Hanley, Piazza, Fisher, & Maglieri, 2005). It could be a limitation that the current study did not include a control condition as a third option during the DTCCA. This would have enabled researchers to determine the extent to which preferences for test conditions compared to preferences for a neutral condition that did not contain preferred social reinforcers. Future studies could evaluate
including an experimental control measure. For example, if participants do not select the control condition as preferred but select one or both test conditions as preferred, then it can be concluded that their selections were a direct measure of preference as opposed to random selection. A question for future research is, do individuals prefer to experience assessment conditions in which they do not have to engage in problem behavior in order to access reinforcement? The results of this study suggest they may. Possibly no other studies have directly evaluated this question. Future studies should consider using direct measures of social validity, such as the DTCCA methods, to determine individual preferences for different assessment conditions. It is our ethical responsibility to evaluate individuals’ preferences (Professional and Ethical Compliance Code for Behavior Analysts, 2.09).

Treatment for all participants was based on matched results of the FA and COA. Specifically, treatment for Participant 1 consisted of FCT for tangible and, for Participant 2, treatment consisted of FCT for escape-to-tangible. Treatment for Participant 3 consisted of FCT for tangible. Participant 3’s escape and attention FA and COA did not match. In this case, the FAs did not have a positive function but the participant preferred escape and attention during the COA. During Study 3, treatment was successful for all three participants in eliminating problem behavior and increasing independent functional communication, replicating findings from Berg et al. (2007). It would have been interesting to have also implemented treatment that was identified by the COA. This would have been FCT for other functions identified by the COA, such as attention and escape to determine whether these treatments were necessary for effective reduction of problem behavior. Berg et al. demonstrated that for one participant in their study whose FA and COA did not match, the treatment based on the FA was more successful in the reduction of problem behavior than treatment based on the results of the COA. Future research
should possibly evaluate a treatment based on COA results whenever FA results are negative. A possible limitation of the current study was treatment was brief and reinforcement schedule-thinning was not included due to time restraints and it was beyond the scope of the study’s purpose. Future research should evaluate treatments that include these components in conjunction with the analyses utilized to design treatment.

The results of Study 1 indicate the COA is a reliable alternative to the FA for all participants. The COA could be a safe and accurate procedure for individuals with a history of behavior too potentially harmful to be evoked during a FA. It may also be useful in safely informing the design of treatments for individuals with a history of covert harmful behavior, such as self-injury. During Study 2, the COA was selected by all participants as more preferred over the FA. The majority of analyses resulted in the COA being selected as more preferred when the FA during the previous analyses resulted in elevated problem behavior, suggesting participants may prefer to access social reinforcers without first engaging in problem behavior. This context of preference should be carefully considered when selecting assessments that are feasible, safe, and effective. During Study 3, treatment based on the matching results of the FA & COA resulted in elimination of problem behavior and increase in independent functional communication for all participants. These results further support the COA as a viable alternative method for identifying social reinforcers that can be used in a treatment context.
REFERENCES


http://doi.org/10.1901/jaba.1985.18-111


APPENDIX

HSIRB APPROVAL
Date: April 26, 2018

To: Stephanie Peterson, Principal Investigator
   Marissa Allen, Student Investigator for dissertation
   Student Investigators: Michal Fantetti, Kelsey Rothermel

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 18-01-36

This letter will confirm that your research project titled “Evaluating the Efficacy of and Preferences for Functional Analyses and Concurrent Operant Assessments” has been approved under the full category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may only be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., you must request a post approval change to enroll subjects beyond the number stated in your application under “Number of subjects you want to complete the study.”) Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: February 20, 2019

Office of the Vice President for Research
Research Compliance Office
1901 W. Michigan Ave., Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293 FAX: (269) 387-8276
WEBSITE: wmich.edu/research/compliance/hsirb
CAMPUS SITE: 251 W. Walwood Hall