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The Effects of a Brief Training Module on Improving the Design of the Interview-Informed Synthesized Contingency Analysis (IISCA)

Efeitos de um Módulo de Treinamento Rápido na Melhora do Delineamento da Análise de Contingência Sintetizada através de Entrevista (IISCA)

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Abstract: Children diagnosed with autism spectrum disorder (ASD) often exhibit problem behavior such as aggression (hitting others), self-injurious behavior (hitting oneself), and property destruction (breaking objects). A functional analysis is typically recommended to inform the function-based intervention and is conducted by a behavior analyst. Unfortunately, this training can often be extensive and costly. In this study, we trained three registered behavior technicians in conducting a specific functional analysis format termed the interview-informed synthesized contingency analysis (IISCA). The brief training module consisted of a 50-minutes long video that explained the whole functional assessment process starting with the open-ended interview and ending with conducting the IISCA. Following the video, the participants completed a mock interview and designed the IISCA to address the problem behavior expressed by the confederate. Results showed that our training module increased participant performance in less than 1-hr using an online video.

Keywords: Autism, functional analysis, problem behavior, training

Resumo: As crianças diagnosticadas com transtorno do espectro do autismo (TEA) geralmente exibem comportamentos-problema, como agressão (bater nos outros), comportamento auto lesivo (bater em si mesmo) e destruição de propriedade (quebrar objetos). Uma análise funcional é normalmente recomendada para informar a intervenção baseada em função e deve ser conduzida por um analista do comportamento treinado. Infelizmente, esse treinamento muitas vezes pode ser extenso e caro. Neste estudo, treinamos três analistas do comportamento em nível técnico, registrados pelo BACB® na condução de um formato específico de análise funcional denominado análise de contingência sintetizada informada por entrevista (IISCA). O breve módulo de treinamento consistiu em um vídeo de 50 minutos que explicou todo o processo de avaliação funcional, começando com a entrevista aberta e terminando com a realização da IISCA. Após o vídeo, os participantes completaram uma entrevista simulada e projetaram a IISCA para abordar o comportamento-problema expresso pelo confederado. Os resultados mostraram que nosso módulo de treinamento aumentou o desempenho dos participantes em menos de 1 hora usando um vídeo online.

Palavras-chave: Autismo, análise funcional, comportamento-problema, treinamento

Problem behavior such as aggression, self-injurious behavior (SIB), property destruction, and stereotypic behavior are very common among individuals with autism spectrum disorder (ASD) and other developmental disorders (Heyvaert et al., 2014, Matson & LoVullo, 2008; Murphy et al., 2009). These topographies of problem behavior are often associated with risks to both the individual and their immediate environment regarding their social, emotional, and/or physical well-being. In addition, problem behavior can also have significant impacts such as disruption of the learning process for the individual (Chadwick et al., 2000), exclusion from community-based services (Murphy, 2009), or even institutionalization (Carr & Durand 1985). Individuals who display these problem behaviors may not be able to participate in services that are offered by the community. (Borthwick-Duffy et al., 1987)

Functional assessment is the process of identifying the variables that affect problem behavior (Hanley et al., 2014) and it includes a combination of indirect assessments, descriptive assessments, and functional analysis (Hagopian et al., 2013). Whereas indirect assessments do not involve direct behavior observation, descriptive assessments involve observing and measuring problem behavior and help understand the context in which the behavior occurs. Functional analysis involves observing and measuring problem behavior in at least two different contexts; test and control conditions. The test condition includes the variables that are suspected to influence problem behavior and the control condition is defined by the absence of any contingent relations between problem behavior and reinforcement (Hanley, Iwata, & McCord, 2003).

Campbell (2003) reviewed the efficacy of behavioral interventions for problem behavior in individuals with ASD. They examined over a hundred articles representing individuals with autism. They evaluated participant, treatment, and experimental variables. Results showed that treatments were more effective in reducing the rates of problem behavior when they were based on a functional assessment, and a more important implication is that behavioral treatments were reported to be more effective in reducing the rates of problem behavior when the functional assessment process included a functional analysis.

Multiple systematic reviews have all supported the functional analysis as the benchmark for informing treatments of problem behavior (Beavers et al., 2013; Hanley et al., 2003; Melanson & Fahmie, 2023). More specifically, about 75% of functional analyses use a standard set of procedures (Melanson & Fahmie, 2023). The standard functional analysis was first demonstrated by Iwata et al. (1982/1994) and involved multiple test conditions isolating general classes of reinforcement (i.e., attention, escape, tangible, automatic) compared to a play control condition. Despite the fact that the standard functional analysis has been found to inform more effective treatment, it comes with a host of reported practical barriers (Oliver et al., 2015; Roscoe et al., 2015). For example, in a recent survey of over 200 behavior analysts, Roscoe et al. (2015) found that a majority of participants reported using just descriptive assessments or combination of descriptive assessments and indirect assessments. Less than half of the participants reported using functional analyses in practice even though they considered it to be one the most useful functional assessment methods. When respondents were asked to indicate the barriers to conducting functional analyses they reported a lack of time, resources, and trained staff.

Hanley et al. (2014) described a practical functional assessment (PFA) model that addresses most of the criticism about the standard functional analysis. It emphasizes the importance of an open-ended interview as a first step in order to identify the unique contingencies that may impact problem behavior. Individualized test and control conditions were then created as a result of the open-ended interview for each participant. The only difference between the test and control conditions was that the putative reinforcement contingency was present in the test condition and absent in the control condition (i.e., matched control). This specific functional analysis format of the PFA process has been referred to as the interview-informed synthesized contingency analysis or (IISCA; Jessel et al., 2016). While, the IISCA may reduce barriers to the practical utility of the functional analysis, concerns may still arise regarding professional and staff training to conduct this particular functional analysis format. Given the importance of the functional analysis model in determining the variables affecting

problem behavior and experimentally manipulating these variables in order to influence behavior, it is necessary for behavior analysts to be competent in conducting functional analyses such as the IISCA to assess problem behavior (BACB, 2014).

Trainings in conducting functional analyses have existed for several years in the field of applied behavior analysis (ABA), but the trainings have historically been conducted in-person (Iwata et al,. 2000; Wallace et al., 2014). With the advent of certain technological advances, video-modeling began to appear as a more cost efficient form of training practitioners to conduct functional analyses (Moore & Fisher, 2013). Some studies present training of parents to apply certain types of functional analyses via teleconference; however, this training did not imply parents implement the procedures without supervision. In fact, sessions could be carried out online with in-situ feedback while the practitioner watched live via video (Davis et al., 2022; Gerow, Radhakrishnan et al., 2020; Gerow, Hagan-Burke, et al., 2018; Gerow, Rivera et al., 2020).

Whelan et al. (2020) described a seminar-based approach to train practitioners on how to conduct the PFA. The authors trained behavior analytic practitioners to interview caregivers, design and then conduct an IISCA as a part of the PFA via a seminar that took 3 hrs to complete and included behavioral skills training (BST), didactic instruction with a PowerPoint presentation, and open discussion. The authors found that participants who attended the seminar demonstrated more component skills than those who were provided the same materials but did not attend the seminar in a randomized controlled design. In addition, following the mock interviews with confederates, a subgroup continued on to complete authentic PFAs for actual clients who exhibited problem behavior. Overall, their results showed that the seminar-based approach was an effective method for training practitioners to conduct the entire PFA process including the IISCA.

The goal of our research was to evaluate an online brief training that can be completed by clinicians and improve the design of the IISCA. Compared to the seminar Whelan et al. (2020) used to train their participants, our training module was designed to be completed in a single 1-hr sitting. Furthermore, our training module was intended to be more accessible because it was fully online, and the participants could complete it on their own schedule. Participants experienced mock interviews and were asked to design IISCAs before and after the online training subsequently.

Method

Participants

The participants in this study were three students in an ABA master's program. Mia was a 24-year-old South Asian female. She had been working at an ABA agency as a registered behavior technician (RBT) and she was in her second year of the master's program during the completion of this study. Kay was a 33-year-old Jamaican black female. She was a licensed clinical social worker and she has been working as a social worker since 2014. She had been working at an ABA agency as an RBT and she was in her second year of the master's program during the completion of this study. Riley was a 30-year-old South Asian female. She had been working at an ABA agency as an RBT and she was in her second year of the master's program during the completion of this study. The interventionist recruited the participants using a flyer that was sent to ABA graduate students via email. The participants reached out to the interventionist via email to express their interest in participating in the study. They also expressed their concerns about not having enough training on conducting a functional analysis despite pursuing their higher education in ABA.

Setting & Materials

The interventionist met with the participants over Zoom. The participants and the interventionist were in their home offices away from any distractions. They all had access to a computer with internet. Before their participation in the study, the participants were sent three documents via email. They were sent a copy of the oral consent form. They were also sent an open-ended interview form that included questions the participants might use to ask during the mock interview with caregivers. The last form the interventionist sent the participants was the form for designing the IISCA.

Experimental Design

A multiple probe design (Horner & Baer, 1978) across participants was used to compare baseline and intervention results of participants using three different, randomized cases. Each participant experienced a number of baseline probes (one, two, or three) prior to the introduction of treatment. The probes were introduced in a staggered fashion and functional control was demonstrated when accurate performance in implementing the open-ended interview and designing the IISCA improved following training at different points in time for each participant.

Measurement

The interventionist collected data during the mock interview and once the participants designed the IISCA. The open-ended interview consisted of 22 questions and the interventionist recorded data on whether each participant asked the questions or not. If the participant asked the question, the interventionist coded it as "yes" and gave it a score of 1. If the participant did not ask the question, the interventionist coded it as "no" and gave it a score of 0. The interventionist calculated the percentage of questions asked by dividing the number of questions the participants asked by the total number of questions (i.e., 22). The interviews were video recorded and once the participants completed the interviews, they were sent the IISCA forms. The participants filled out the IISCA forms using their computers and emailed them to the interventionist upon completion.

Each participant's IISCA design was compared to one conducted by an expert (a BCBA-D with extensive experience designing, conducting, and interpreting IISCAs). The expert conducted open-ended interviews with caregivers as clinical work providing services for individuals who exhibited problem behavior. These interviews were video recorded for later review. Transcripts of these interviews were created reviewing the recordings. The expert designed the IISCAs using the information given by caregivers during open-ended interviews and the IISCAs were found to be effective in (a) identifying socially mediated functional relations and (b) informing a function-based treatment that decreased the rates of problem behaviors. These IISCAs were used as models for which to compare against participants' IISCA designs.

Participants' IISCA designs then were rated for correspondence between establishing operations, operational definitions of problem behavior, and reinforcement contingencies. Using the expert's IISCAs, the interventionist assigned either correct, partial, or incorrect to participants' answers. A correct answer was a complete match. For example, if the participant defined the same target problem behaviors as the expert, it was scored as a correct response. If the participant only included some of the target problem behaviors the interventionist scored the answer as partially correct. If any part of the participant's answer included an error of commission, (e.g. they said they would target self-injury whereas the problem behavior was aggression), the interventionist scored the answer as incorrect. The interventionist then calculated a total percentage correct score by assigning a numerical value to correct answer, partially correct answer, and incorrect answer. Correct answers were provided a value of 1, partially correct answers were provided a value of 0.5, and incorrect answers were provided a value of 0. The total percent correct score was calculated by adding the total component scores and dividing by the number of questions answered.

Interobserver Agreement

A secondary, independent observer collected data during at least 33% of the mock interview videos and IISCA forms to calculate interobserver agreement (IOA). The observer independently reviewed recorded mock interview sessions and coded whether the participant asked the question or not. The interventionist calculated the IOA by dividing number of agreements by the total number of agreements and disagreements and multiplying by 100. An agreement was considered both observers scoring that (a) a question was asked or not asked (from the mock interview) and (b) an answer was correct, partially correct, or incorrect (from the IISCA design). Any scores that did not match were considered a disagreement. The IOA for the mock interview and IISCA design was 96% (range, 92-100%) and 92% (range, 86-100%), respectively.

General Procedure

Riley participated in one baseline mock interview, whereas Mia participated in two and Kay participated in three. Prior to training, participants conducted a mock interview and completed the form for designing the IISCA. The interviews were video recorded for data collection purposes. After conducting the mock interview, the participants had access to the training module. The training module included questions that popped up along the way and participants had to answer the questions in order to finish watching the module. This was not video or audio recorded. Participants were able to watch the video according to their availability and schedule. After watching the video and answering the questions, the participants were interviewed by the interventionist again and completed the identical form for designing the functional analysis. The interviews were video recorded for data collection purposes. All participation was held online over zoom. The research personnel did not engage in face-to-face, in-person human subjects research activity (for recruitment, consenting, data collection, and any other activity).

Baseline

During baseline, the interventionist conducted mock interviews with the participants. The interventionist acted as a confederate and used real interviews with actual caregivers. The sessions began with the following intro:

> Today, you will be presented with a caregiver, which would be me, experiencing problem behavior with her child and you will be interviewing her in order to understand the problem behavior better. Open-ended functional assessment interview involves some questions you may choose to use to ask the parent in order to get information regarding the problem behavior. You may not use the document at all if you choose to do so. Feel free to create your own questions or comments. You can use whatever you think will help for you to understand the problem behavior better. After you're done with the interview, you will use the form for designing the IISCA, and design an interview-informed synthesized contingency analysis, which is a type of functional analysis.

The interviews took place via zoom and lasted an average of 20 min each (range from 12-30 minutes). The participants were free to use the open-ended interview questions or any other questions they might ask the caregiver. Answers provided by the interventionist were based off of transcriptions of actual interviews. The interventionist did not take data on additional questions asked. If participants asked an additional question which the interventionist did not have the answer to (for example if the participant asked if the child has an IEP in place at school), the interventionist did not answer the question. The interview ended once they stopped asking questions and informed the interventionist that was all the information they needed.

Training

During training, the interventionist used a training module to teach the participants how to conduct an IISCA. The interventionist used EdPuzzle platform to upload the video and enrolled the participants in a class and assigned the module. The module was approximately 50 min long and described the whole functional assessment process starting with the open-ended interview and ending with conducting the IISCA and why each step was important and what type of information individuals would gain. The module also included a quiz that had 11 questions and participants needed to answer each question in order to move forward. Questions were multiple choice and each question had written feedback the participant could see once they answered the question. Before participants start conducting open-ended interviews post-training, the interventionist gave them the option to go through the questions and provide feedback if they scored 90% or above on the quiz. If the participants scored under 90%, the interventionist met them over Zoom and went through the questions and provided feedback and answered any questions they had related to the module. These sessions were also recorded. Kay and Riley scored less than 90% on the quiz so the interventionist met them and went over the questions and answered all other questions they had. Even though Mia scored over 90% on the quiz,

she asked to meet with the interventionist and was interested in going over the questions.

Post-training Evaluation

As part of the post-training evaluation, the interventionist conducted additional mock interviews with the participants. The interventionist started the interviews using the identical intro that was used in baseline. The process was similar to pre-training but the interventionist used different interviews transcripts.

Results

Figure 1 displays the percentage of questions each participant asked during the mock open-ended interviews across baseline and post training sessions. In baseline, Riley asked 50% of questions presented in the open-ended interview. Post-training, she asked an average of 84.8% of the questions presented (range from 72.7-100%). In baseline, Mia asked an average of 93.1% of the questions presented (range from 86.3-100%). Post-training, she asked 100% of the questions. In baseline, Kay asked an average of 80.2% of the questions presented (range from 63.6-95.4%). Post-training, she asked 100% of the questions. Overall, participants tended to use the open-ended interview to ask questions; however, more questions were included after they completed the training.

The left panels of Figure 2 display the number of correct, partial, and incorrect answers after the participants designed the IISCAs. In baseline, Riley had 2 correct answers, 1 partial answer, and 4 incorrect answers. Post-training, she had an average of 3.6 correct (range from 3-5) answers, 2.3 partial (range from 2-3) answers, and 1 incorrect (range from 0-2) answer. In baseline, Mia had an average of 2.5 correct (range from 2-3) answers, 1 partial answer, and 3.5 incorrect (range from 3-4) answers. Post-training, she had an average of 6 correct answers and 1 partial answer. She had no incorrect answers. In baseline, Kay had an average of 2.3 correct (range from 1-4) answers, 1.6 partial (range from 1-2) answers, and 3 incorrect (range from 2-4) answers. Post-training, she had an average of 4.3 correct (range from 4-5) answers, 2 partial answers, and 0.6 incorrect (range from 0-2) answers.

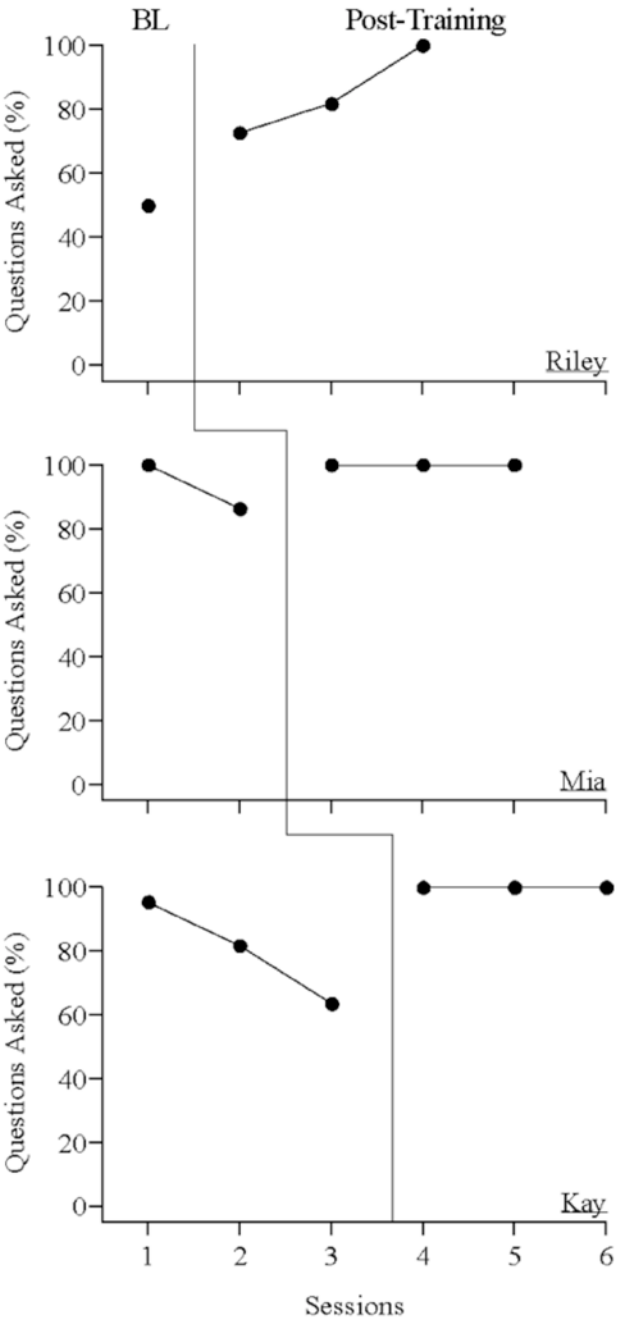

Figure 1. Percentage of Questions Asked during Interview

The right panels of Figure 2 display the participants' overall performance as a percentage correct in designing the IISCA. During baseline, the percentage of correct answers for Riley was 36% and following training improved to 69% (range, 57-86%). Mia's design of the IISCA was initially 43% (range, 36-50%) during baseline interviews. After

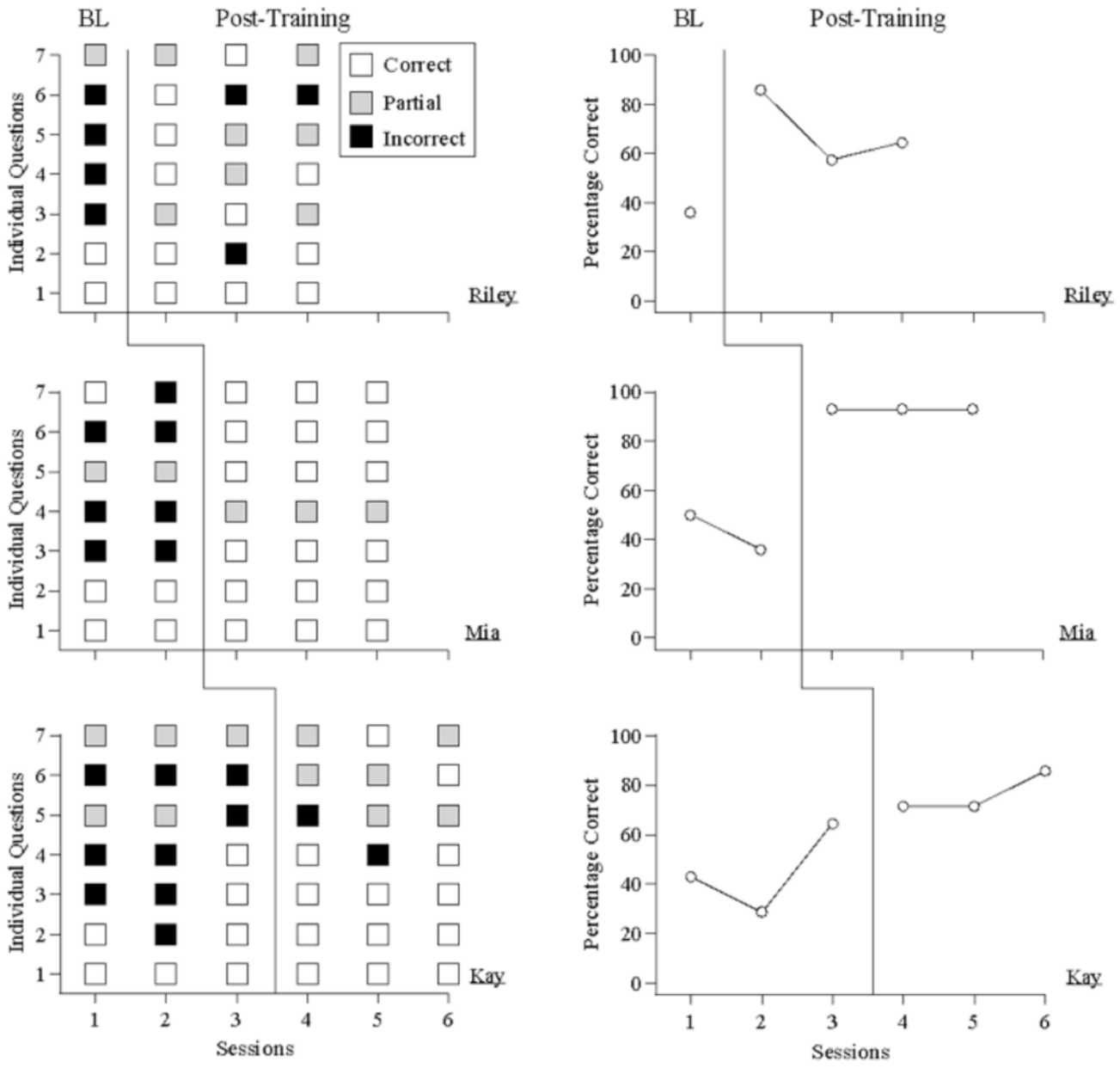

Figure 2. Individual and Aggregate Accuracy following Training

the training was introduced, Mia was consistently designing an IISCA with 93% accuracy. Finally, Kay was performing at 45% (range from 29-64%) prior to training and 76% (range, 71-86%) following training.

Discussion

The purpose of this study was to improve performance in conducting the open-ended interview of the PFA and designing the IISCA using a brief and efficient training module. In general, all participants used the open-ended interview questions effectively once the intervention was introduced. They asked more questions within the open-ended

interview and used the information to design their IISCAs. In addition, following the training using the online, video module, the participants were able to more accurately design the IISCA.

After receiving the training, the participants demonstrated the ability to gather information using the open-ended interview regarding the topographies surrounding the problem behavior and relevant EOs and reinforcers that influence problem behavior. Even though they asked a majority of questions within the open-ended interview in baseline, we only saw improvement in conducting the IISCA after the video intervention was introduced. Therefore, it seems the training was more relevant in improving performance in comparison to simply asking the questions. That is to say, just because an individual is able to ask all the questions from the open-ended interview, it does not infer that they will be able to appropriately design a subsequent IISCA based on that information obtained. Mia showed improvement as she moved from a downward trend in the baseline to near 100% accuracy across three sessions following the introduction of training. Kay continued to make some errors following training; however, this was greatly reduced from her baseline performance. Although we were only able to compare Riley's post-training performance to a single baseline session, there was no overlap and accuracy was consistently higher.

Across the three participants, accuracy in designing the IISCA was 79% following the brief training. Although this was a substantial improvement in initial baseline performance, those who completed the more extensive, 3-hr training from the Whelan et al. (2020) study had a higher percentage accuracy of a mean of 87%. Of course, between groups comparisons are difficult to make with such a small participant pool but there are several factors that we can interpret to potentially influence these differences.

First, we made the whole process entirely online and participants were allowed to complete the training on their own without the supervision of the interventionist. Therefore, participants may have been less attentive to the material. This is evident in the fact that two out of the three participants scored less than 90% on the quiz questions presented throughout the video. Even though online trainings are efficient and cost-effective, there are some studies that suggest that they are not as effective as live training methods. For example, Geiger et al. (2018) compared the efficiency of Behavioral Skills Training (BST), a live training method, to Computer-based instruction (CBI) to train undergraduate students to conduct discrete-trial teaching. Participants were randomly assigned to groups and received either one of the training methods. Results showed that even though both methods were effective at training participants to implement discrete-trial teaching, BST was slightly more effective. Future researchers may want to consider evaluating if these differences are socially impactful. For example, our participants' performance may have been improved with a more intensive training package but it is possible that they would still be able to design an IISCA that identifies a socially mediated function and informs the effective treatment of problem behavior. That is, the percentage correct mastery criterion corresponding to sufficient clinical skills is currently unknown.

Second, we only had one training component (i.e., online video), whereas the training module that Whelan et al. (2020) used included a comprehensive package with multiple components (e.g., BST, didactic instructions, video examples, discussion). The reduction in training components was by design to improve the efficiency of the training process; however, it potentially could have come at the expense of efficacy in improving performance. Future researchers may want to consider conducting component analyses of the training packages to determine what training components are necessary for maintaining high levels of accuracy. That being said, many studies have found BST to be an integral training component, often effective on its own (e.g., Rios et al., 2020; Sarokoff & Sturmey, 2004; Shayne & Miltenberger, 2013). For example, Rios et al. used BST to train seven Board Certified Behavior Analysts (BCBAs) and three social workers on conducting functional analyses through telehealth. The training involved all steps of BST (written instructions, video modelling, rehearsal, and feedback) being provided to each participant remotely with the average training period requiring 50 min. Performance improved to above 90% for most participants without the need of supplemental teaching strategies.

A third reason for the relatively low performance is that most research on training individuals to conduct and interpret functional analyses includes professionals who have master's degree or BCBAs (Moore & Fisher, 2013, Rios et al., 2020, Lloveras et al., 2021). That is to say, the limited participant pool of professionals following formal education may results in somewhat skewed data set that indicates higher performance. However, many individuals should be receiving some level of training in conducting functional analysis during their graduate coursework, such as the participants in the current study. Thus, it is difficult to interpret their comparable performance when there aren't many similar studies. Future researchers may want to consider including more students as research participants and incorporating the training into a typical classroom setting. Doing so could result in a more cost-effective model than taking the time to train professionals after they have been hired.

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