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A RETROSPECTIVE WITHIN-SESSION ANALYSIS OF INTERVIEW INFORMED SYNTHESIZED CONTINGENCY ANALYSES FOR THE PURPOSES OF QUALITY IMPROVEMENT WITHIN A UNIVERSITY-BASED CLINIC

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SYNTHESIZED CONTINGENCY ANALYSES FOR THE PURPOSES OF QUALITY
IMPROVEMENT WITHIN A UNIVERSITY-BASED CLINIC

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in the
College of Education
at the University of Kentucky

By

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Lexington, Kentucky

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2022

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ABSTRACT OF THESIS

A RETROSPECTIVE WITHIN-SESSION ANALYSIS OF INTERVIEW INFORMED SYNTHESIZED CONTINGENCY ANALYSES FOR THE PURPOSES OF QUALITY IMPROVEMENT WITHIN A UNIVERSITY-BASED CLINIC

Functional analysis (FA) is a tool practitioners can utilize to identify the function of challenging behavior. An interview informed contingency analysis (IISCA) is a variation of a FA. In an effort to improve patient care within a university-based clinic, a within-session analysis of the first test condition of an IISCA was conducted to determine if a shorter assessment yield results similar to the full IISCA. An alternating treatments design was used to evaluate differentiated rates of challenging behavior across conditions for eleven client cases at the university-based clinic. A single test session was enough to determine the function of challenging behavior and the first test condition produced similar results to the whole IISCA for some of the cases reviewed.

KEYWORDS: Functional-analysis, interview informed synthesized contingency analysis, challenging behavior, single test session

Amy Wolfe

04/19/2022

Date

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INTRODUCTION

A functional analysis (FA) is an assessment process used to determine controlling factors over aberrant behavior by manipulating the environmental conditions that evoke behavior (Jessel et al., 2019). As described by Hanley (2012), this process generally started with a functional assessment, which includes both indirect assessment in which the behavior was not observed and descriptive assessment in which the behavior was directly observed. The information from both the indirect and descriptive assessments inform the experimental FA. According to Hanley and colleagues (2014), “These sorts of analyses are important, in that they permit a function-based treatment technology to emerge while influential variables (e.g., the importance of extinction) are isolated, thus resulting in a precise behavior-change technology” (p. 31). Conducting a FA increases the effectiveness and accuracy of an individualized treatment for challenging behavior (Hanley, 2012).

Several variations of the FA process have been developed over the years. Much of this work is based on findings by Iwata et al. (1982/1994). In this seminal work, Iwata and colleagues (1982/1994) described four standard experimental conditions that were randomly alternated to detect differences in the occurrence of the target challenging behavior. These standard conditions were (a) an attention condition designed to identify if positive reinforcement in the form of accessing attention maintained the behavior, (b) an escape condition designed to identify if the behavior was being maintained by negative reinforcement in the form of the removal of an unpleasant environmental factor maintained the behavior, (c) an alone condition designed to identify if behavior was maintained by automatic reinforcement, in which engaging in the behavior itself produces

the reinforcer, (d) and a toy play condition, which allowed for experimental evaluation and the point of comparison for the three previous test conditions (Iwata et al., 1982/1994). The FA assessment lengths ranged from 4-11 days and individuals were exposed to this assessment for 24-53 15 min sessions.

Although there are data to support an analog FA, some report reservations of use in practice. The extended exposure to assessments dedicated to evoking challenging behavior can potentially cause trauma responses depending on an individual's trauma history. The American Psychological Association (n.d), defines trauma as "an emotional response to a terrible event like an accident, rape, or natural disaster. Longer term reactions include unpredictable emotions, flashbacks, strained relationships, and even physical symptoms." There is limited research that has defined what a trauma informed framework looks like in practice, however there are conversations in the field about it. For example, Hanley (2021) indicated that "ABA has the potential to inflict trauma, and it has the potential to alleviate trauma." Overall, there is a push in the field to have a more compassionate approach to ABA and err on the side of caution with current practices that may evoke trauma responses.

Another reservation reported of the use of analogue FA in practice is that it can be time consuming (Hanley, 2012). Throughout the years many efforts have been made to increase the efficiency of a FA to help reduce time between the assessment and implementation of treatment (Saini et al., 2020). A study by Wallace and Iwata (1999) investigated the degree to which shorter session exposure could yield similar results when compared to longer sessions by re-evaluating 46 functional analyses. Results of this study demonstrated that reducing session time to 10 min, and even 5 min, could yield similar

results as the full session length of 15 min (Wallace & Iwata, 1999). Although Wallace and Iwata (1999) investigated the reduction of session time while still maintaining efficacy during FA, other approaches to increase efficiency have been made. With the interview informed synthesized contingency analysis (IISCA) presented in Hanley et al. (2014) length of sessions could be reduced to 5 min, and the number of sessions were limited to 5 unless further data were necessary to demonstrate a control of effect. This meaning that an analysis could be completed in 25 min, and time efficiency will have increased.

A more recent change in FA methodology was in the form of an IISCA that aimed to increase efficiency of FA while still maintaining its scientific rigor (Hanley et al., 2014). The IISCA consisted of an open-ended functional assessment interview used to hypothesize function(s) of behavior and identify environmental factors that could be manipulated to evoke the behavior during a FA (Hanley et al., 2014). This interview consists of a series of open-ended questions pertaining to what happened before and after the behavior occurred and under what circumstances behavior is likely to occur. According to Hanley (2012), an open-ended interview allows behavior analysts to identify regular, as well as distinctive, variables that may have evoked or maintained an individual's challenging behavior. The result of this interview was a hypothesized function that was used to help design an individualized test and control condition for the IISCA. The IISCA consisted of a single test condition in which reinforcers were provided contingent on the presence of the challenging behavior and a control condition in which the individual had free access to the same reinforcers throughout the entire condition non-contingently (Jessel et al., 2020b). During the FA, the control and test conditions were

alternated, always starting with the control condition. Each condition typically lasted 5 min, resulting in a full assessment of 20-25 min. This differed from the model demonstrated by Iwata et al. (1982/1994) which consisted of three separate test conditions that were replicated multiple times, making the IISCA a more efficient and concise assessment in determining the function of challenging behavior.

The IISCA, when conducted in its entirety has shown to be an effective format for determining the function of challenging behavior (Hanley et al., 2014; Jessel et al., 2016). However, recently researchers have investigated a new approach to IISCA that consisted of a within-session analysis of a single-test session, hereon referred to as a single-session IISCA (Jessel et al., 2016; Jessel et al., 2019; Jessel et al., 2020a; Jessel et al., 2020b). This new approach was aimed to further increase the efficiency of the IISCA (Jessel et al., 2016). If assessments were more efficient, it would mean less exposure to contingencies that intentionally try to evoke behavior. It would also mean less demonstrations of challenging behavior from the individual which would be ideal when the challenging behavior is dangerous to the individual or others, or when trying to reduce the likelihood of eliciting a trauma response. Overall, more efficient assessments, benefit both the client and the practitioner.

While the full IISCA itself could be conducted in an average of 25 min, a within-session analyses could reduce this time to 5 min, further increasing efficiency (Jessel et al., 2019). With the single-session IISCA, Jessel et al. (2020b) analyzed differential rates of challenging behavior across two conditions, reinforcer present interval (RPI) and reinforcer absent interval (RAI) of the first test session of the full IISCA This varied from the full IISCA which compared rates of challenging behavior across test and control

conditions. A study by Jessel et al., (2019) suggests that a demonstration of functional control over challenging behavior is possible with this differentiated responding in the quick alternation of RPIs and RAIs. The model presented by Jessel et al., (2019) suggested the entire functional assessment process (i.e., indirect interview, descriptive assessment, and functional analysis) could be completed in under an hour. This would benefit the patient by reducing billable costs for insurance or funding agencies.

As studies have demonstrated the effectiveness of the full IISCA (Hanley et al., 2014; Jessel, et al., 2016), research on a single-session IISCA is limited. Findings from Jessel et al., (2016) suggest functional control can be established in a single 5 min test condition about 80% of the time, which implied that a single-session IISCA could determine the function for some but not all behavior. Jessel et al., (2019) conducted another study to further investigate if results from the single-session IISCA could lead to effective function-based treatments of three children who exhibited severe challenging behavior. The results of this study demonstrated that the single-session IISCA can determine the function of challenging behavior resulting in effective function-based treatment (Jessel et al., 2019).

Studies have spoken to the efficacy and efficiency of the single-session IISCA for determining the function of challenging behavior and implementing effective treatment (Jessel et al., 2016; Jessel et al., 2019; Jessel et al., 2020a; Jessel et al., 2020b). In an effort to improve patient care at a university-based clinic that's mission is to help families with children engaging in severe behavior (Shepley et al., 2021), there is a need ensure assessments and services are safe, efficient, and empirical. Therefore, the purpose of this study was to reanalyze full IISCA data from former clients and conducted a within-

session analyses of the first test condition to see if there was an agreement between the full IISCA and its first test condition. If findings showed agreement, changes in the current university clinic model should be made by defaulting the current full IISCA assessment protocols to a single-session IISCA. This would reduce assessment time leading to quicker treatment implementation by answering the following questions: (1) Is a single test session enough to establish a functional relation between the presence of reinforcing stimuli and the rate of challenging behavior observed per second? (2) and if yes, does this within-session analysis of the first test condition yield similar results to the full IISCA conducted at the time of client admission?

METHOD

Clients and Clinical Setting

Clients. Clients for this study were children between the ages 2-16 who had or were at risk of having a disability and were referred to the university clinic for function-based assessment and treatment of severe behavior. All clients engaged in at least one severe behavior that concerned their guardian due to cause of harm or disruption of the family's routines. The clinic implemented a family-centered service provision model, which consisted of five appointments: an intake, the assessment, treatment recommendations and training, an initial follow-up, and a one-month follow-up (Shepley et al., 2021). A single target behavior was identified during the intake appointment with the client's guardian. After the intake interview, function of the target behavior was hypothesized based on information provided during the interview, and an IISCA was conducted to conclude the function of behavior. IISCAs were conducted by graduate students pursuing their master's degree in applied behavior analysis (ABA) under the supervision of a Board-Certified Behavior Analyst (BCBA) at the university. The university clinic has conducted IISCAs as the primary functional analysis since 2017. The cases pulled for review for this study spanned from the years 2017-2021 and the clients in this study had to have (a) participated in a full IISCA which consisted of a minimum of two control and two test sessions (n=27), (b) consented to the use of recorded videos (n=20), and (c) a video recording of the full IISCA on file for review (n=11). Therefore, a total of 11 cases were retrospectively reviewed for this investigation.

Instructional Setting and Arrangement

The full IISCAs were all conducted in the university clinic therapy room (approximately 3 m by 4 m). All IISCAs were conducted by student therapists or by a guardian. If a guardian was needed to implement the IISCA, they were trained by a student therapist and coached throughout the assessment using bug-in-ear technology. Although all IISCAs were conducted by student therapists or guardians, every IISCA was supervised by a BCBA who used the same bug-in-ear technology to coach and assist student therapists during implementation.

All video recordings were reviewed in the same clinic therapy room the full IISCAs were conducted in and IOA data were collected for 36% of the within-session analysis. The cases selected for collection of IOA were randomized using a list randomizer to help reduce selection bias. Procedural fidelity data were collected for the first test condition of the recorded IISCA for 100% of the reviewed cases. Case numbers were randomly assigned and did not reflect the order in which clients received services at the clinic and done in compliance with the data-use policy in place due to the study being for quality improvement purposes.

Materials and Equipment

Assessment reports from the original IISCA conducted during the client's admission were used to obtain operational definitions of the target behaviors, the hypothesized functions of the challenging behavior, and the graphed data of the full IISCAs. Additional materials included the secure hard drive with the recordings of the

IISCAs and Microsoft Excel for graphing data. Two different data sheets were used for this study: re-analysis coding with IOA, procedural fidelity sheet for the first test condition of the full IISCA, and the Countee iOS phone application. See Appendix A and B for sample data sheets.

Dependent Variables

For the full IISCA, rate of challenging behavior per minute (RPM) was measured across conditions. Data were counted during continuous 10-s intervals and were converted to a RPM for each interval (Hanley, 2014). This was measured by dividing the total count of occurrences of challenging behavior within a condition divided by the total duration in minutes of that condition as described by Jessel et al. (2020b). This was calculated for both control and test conditions. Challenging behaviors were defined as either dangerous behavior referred to as R1 behaviors in which the client could harm themselves or others (e.g., biting, hitting, or self-injury) and non-dangerous reliable precursor behaviors referred to as R2 behaviors (e.g., crying, screaming, or flopping). These challenging behaviors were determined during the intake and interview process that informed the IISCA and operational definitions for R1 behaviors and R2 behaviors were established prior to the implementation of the IISCA. These definitions were client specific and multiple topographies of challenging behavior were included in these definitions. Experimental control of challenging behavior was established when higher rates of challenging behavior were observed during test conditions compared to control conditions.

For the single-session IISCA, a within-session analysis was conducted of the first test condition of the full IISCA, and the dependent variable was the rate of challenging behavior per second (RPS) during reinforcer present intervals (RPIs) and reinforcer absent intervals (RAIs). The test condition of an IISCA always started with a RAI or the removal of known reinforcers (e.g., removal of toys or withdrawing attention) that were determined prior to assessment during the informed interview. For this study the onset of a RAI was recorded when a single component of reinforcement was restricted. For example, if reinforcement consisted of preferred adult attention and access to preferred toys, the second either attention was diverted, or the toys were restricted the RAI onset was recorded. The offset of RAIs were determined by the onset of the consequent RPIs. The start of RPI was contingent on the occurrence of challenging behavior that met the operational definition set a priori. The onset of a RPI was recorded when the implementer delivered the final component of reinforcement (i.e., the client had access to all of their reinforcers). For example, if reinforcement consisted of access to preferred adult attention and access to preferred games the onset of RPI began when both adult attention and the preferred game were provided to the client. Once the RPI started, the client had access to their reinforcers for 30-s regardless of any challenging behavior they may still be engaged in before another RAI condition started. This was repeated until the 5 or 10 min test condition was over. Experimental control of challenging behavior was established when a differentiated pattern of RPS were observed during RAIs compared to RPS observed during RPIs. The same operational definitions of challenging behavior for the full IISCA were used for the within-session analyses.

Duration data were collected on RPIs and RAIs with timestamps by the second. The 5 or 10 min test condition was segmented into 1 s intervals. Using the mobile application Countee, the investigator set a countdown timer for 300 or 600 s. The investigator started the timer the second the first RAI began in the first test condition of the full IISCA. Within Countee the investigator recorded the onset of RAIs and the onset of RPIs with timestamps, from which subsequent durations of each interval data were calculated. The occurrence of R1 and R2 behaviors were simultaneously recorded via Countee as a timestamp within the 300 or 600 s condition. Once the 5 or 10 min (300 or 600 s) test condition ended, the primary investigator transferred the data to an Excel spreadsheet (see Appendix A for reference) and calculated duration data for RAIs and RPIs as well as the RPS of all challenging behavior (R1 plus R2) within each condition. RPS data were calculated by dividing the number occurrences of R1 and R2 combined by the total number of seconds within that specific condition (RAI or RPI).

Experimental Design

An alternating treatments design (ATD) was used for this study. ATD is an efficient way to compare effects of two or more conditions (Cooper et al., 2020) and it allows the effect of two or more conditions on a single reversible behavior to be compared simultaneously (Wolery et al., 2018). ATD also help determine differentiation in patterns of challenging behavior between conditions through comparison of rates of challenging behavior in each condition. For the full IISCA, control and test conditions were alternated to observe effects on RPM of challenging behavior. For the within-

session analysis, RPI and RAI conditions were alternated to observe effects on RPS of challenging behavior.

Threats to internal validity for this study could not be controlled for by the investigator due to the retroactive nature of the study and the use of pre-existing data. However, ATD are more susceptible to some threats to internal validity than others, the first being procedural fidelity. Although, this was not controlled for in vivo, procedural fidelity data were reported for the original implementers of the IISCA for the first 5 min of the full IISCA. Although procedural fidelity could not be controlled for after the fact, all implementers were trained prior to running the IISCA through role play and reviewing of operational definitions as part of the university clinic procedures.

Another threat to internal validity that is more likely with an ATD is the Hawthorne Effect, which refers to the participants observed behavior not being representative of their behavior in their natural environment. Although this threat was hard to control for, therapists and BCBA's were aware that a milder form of the behavior was possible due to the novel environment and novel persons, and multiple actions were taken prior to assessment to help mitigate the chances of the Hawthorne Effect being a problem. The first was being sensitive to the client's precursor behaviors or R2 behaviors (e.g., crying, screaming, flopping). The second was having an indigenous person implement the IISCA (e.g., parent or guardian), or at the very least have them present in the room to increase likelihood of the occurrence of challenging behaviors.

The last threat to internal validity that was worth mentioning for an ATD was multi-treatment interference. Due to the rapid alternation of conditions carryover effects were more likely with this design. This was controlled for by the implementer

immediately delivering reinforcement contingent on challenging behavior and verbally narrating their actions (e.g., “Okay you can have it back” “Alright, we don’t have to do work”). Certain behaviors were more likely to carry over into the next condition because it took a few seconds to physically stop engaging in that challenging behavior.

General Procedure

The investigator reviewed the original assessment report of the full IISCA and reviewed the original graph for each case. The investigator then analyzed the RPM of challenging behavior between conditions. If there were higher RPM of challenging behavior in test conditions when compared to control conditions a functional relation was demonstrated. The investigator then reviewed the video of the first 5 min test condition of the full IISCA and graphed RPS of challenging behavior within RPIs and RAIs for the within-session analysis. The investigator then visually analyzed the graphed data and if RPS was higher in RAIs when compared to RPIs, a functional relation was demonstrated. After both graphs were analyzed and functional relations were either demonstrated or not, the investigator compared the two results to see if the within-session analysis yielded the same results as the conclusive full IISCA. There were four possible outcomes for the comparison: (a) both the full IISCA and the single-session IISCA demonstrated a functional relation (true positive), (b) the single-session IISCA did not demonstrate a functional relation but the full IISCA did (false negative), (c) the single-session IISCA did demonstrate a functional relation but the full IISCA did not (false positive), and (d) both the full IISCA and the single-session IISCA did not demonstrate a functional relation (true negative).

Procedures

Between-Session Analysis of IISCA

The assessment reports of each client as well as their video were all in the clinic's secure database. The investigator reviewed the assessment report of every client that received a full IISCA to (a) find the operational definitions of the target behaviors (clients had multiple topographies of behavior) used for data collection during the original full IISCA, (b) identified the hypothesized function that was assessed, (c) used the original graph of the full IISCA for visual analysis of RPM between conditions and compare it to the graph of the within-session analysis, and (d) report the IOA of the RPM that was collected at the time of the original implementation.

When the full IISCAs were conducted, each IISCA started with a 5 min control condition. During the control condition, the client had free access to identified reinforcers determined from the informed interview prior to assessment, and all challenging behaviors exhibited during this condition were ignored. After 5 min of control, a 5- or 10-min test condition started and access to reinforcer was withheld. Access to reinforcers during the test condition were contingent on the client exhibiting R1 or R2 challenging behavior. As soon as challenging behavior occurred the client had access to reinforcers again for a duration of 30 s before the implementor withheld reinforcement again. These steps repeated until the 5- or 10in-min test condition was over. These two conditions were alternated at least once more for a total of at least four intervals.

Within-Session Analysis

Using the same operational definitions as the full IISCA, the investigator reviewed recorded video footage of the first test condition of the full IISCA. Within the session, RAIs and RPIs were alternated contingent on the client exhibiting challenging behavior. The original implementer was alerted the test condition was beginning either by timer or bug-in-ear technology. For the purposes of this within-session analysis, the first test condition began at the start of the first onset of RAI or when the implementer removed a single component of the identified reinforcers (e.g., took away preferred toys, or removed their attention by stopping vocal communication and orienting their body away from the client) and the reinforcers would be delivered again contingent upon the client exhibiting R1 or R2 challenging behavior. The onset of RPI signaled the offset of the previous RAI and was reported when all components of identified reinforcement were delivered. RPIs lasted 30-s regardless of any challenging behavior exhibited by the client during this time. RAI and RPI conditions were alternated contingent on client behavior for a least 5 min and up to 10 min based on the reported session length of the first test condition described in the original assessment report. Within-session analysis data collection stopped after 5 min or 10 min regardless of if the original implementation continued.

Reliability and Fidelity

Interobserver Agreement

IOA data were collected for 36% of the cases reviewed in this study. The selection of which cases received IOA scores were randomized. The investigator entered the numbers one through eleven into a random number generator without replacement and selected four numbers. The four numbers selected referred to the three cases IOA data were collected for. The cases were randomized to reduce selection bias. Reliability data were collected on the percentage of agreement of the occurrence of challenging behavior as well as the percentage agreement of the onset of RAI and RPI. Both reliability measures were calculated using interval-by-interval IOA with time stamps. Two observers independently scored the occurrence of challenging behavior with timestamps to the second, as well as the onset of a RPI and RAI throughout the test condition. If the secondary observer scored an occurrence within +/-3 seconds of the primary observed scoring an occurrence it was marked as an agreement. If one observer scored an occurrence and the other observer did not score that occurrence within 3 seconds either before or after, it was marked as a disagreement. The percentage of agreements were calculated by dividing the number of agreements by the number of agreements plus disagreements multiplied by 100 (Cooper et al., 2020). The observer that collected reliability data was a BCBA-D trained a priori using a recording of an IISCA taken from an ABA graduate course used to teach IISCA procedures and was trained until reliability was at least 80% agreement prior to collecting data for this study.

The mean percentage IOA for challenging behavior during the within-session analysis was 92.22% agreement. IOA ranged from 80% - 100% agreement across four cases. The mean percentage IOA for the onset of RPI and RAI was 100% agreement.

Procedural Fidelity

Procedural fidelity data were collected on the original implementors of the full IISCA for all cases. The investigator reviewed the first test condition and scored the occurrence or non-occurrence of planned events in the protocol. The planned events scored were (a) did the implementer remove reinforcers or attempt to remove all reinforcers as described in the original assessment protocol based on the hypothesized function of behavior (b) did the implementer provide all reinforcers contingent on the client exhibiting challenging behavior within 3 s, (c) did the implementer remove reinforcers again once the client had access to them for the 30 s RPI, and (e) did the implementer ignore behavior that did not meet the operational definition established prior to the study or that fell within another same response class. The fidelity percentage was measured by dividing the number of the implementer's correct planned behaviors by the total number of planned behaviors multiplied by 100.

The mean procedural fidelity percentage for the first test condition of the full IISCA for all 11 cases was 83%. Procedural fidelity across all cases ranged from 66%-100%. For reliability results refer to Table 1.

Data Analysis

To answer the first research question, the investigator visually analyzed the graphed data. For visual analysis the investigator looked for (a) differentiation in patterns of challenging behavior across adjacent conditions (b) three or more demonstrations of effect for both the within-session and between-session analyses, and (b) determined the conclusiveness of each within-session and between-session based on the results of the visual analysis. Once the graphs were visually analyzed, to answer Research Question 2, the investigator compared the overall conclusiveness of each within-session to the between-session to see if they matched. If they matched, they agreed.

For each case both the between-session analysis of the full IISCA and the within-session analysis of the first test condition of the full IISCA were graphed and visually analyzed separately to determine if the results were conclusive or inconclusive. During the visual analysis the investigator looked for differentiated patterns of responding between conditions. For the between-session analysis differentiated patterns of responding across test and control conditions were reviewed and for the within-session differentiated patterns of responding across RPI and RAI conditions were reviewed. Criterion for determining overall conclusive results for the within- and between-session analysis can be found in Table 2. Inconclusive results were defined as two or less demonstrations of effect or having similar and undifferentiated rates of challenging behavior across conditions for between-session and within-session analyses.

After determining the overall result of each within-session and between-session analyses, results were compared for agreement. When the within-sessions were compared

to the between-sessions there were four possible outcomes (a) true positive, (b) true negative, (c) false negative, and (d) false positive. True positives and true negatives were considered agreements. False negatives and false positives were considered disagreements.

Table 1 *Reliability Results*

| Case | IOA Challenging Behavior | IOA RPI & RAI Duration | PF Percentage |
|------|--------------------------------|------------------------------|------------------|
| 1 | 100% Agreement | 100% Agreement | 100% |
| 2 | - | - | 66.66% |
| 3 | - | - | 84.6% |
| 4 | - | - | 94.11% |
| 5 | 100% Agreement | 100% Agreement | 75% |
| 6 | - | - | 82.35% |
| 7 | 88.88% Agreement | 100% Agreement | 72% |
| 8 | 80% Agreement | 100% Agreement | 66.66% |
| 9 | - | - | 90% |
| 10 | - | - | 86.66% |
| 11 | - | - | 100% |
| | Mean 92.22% | 100% | 83% |

Table 2 *Overall Conclusive Criterion*

| Within-Session | Between-Session |
|---|--|
| <ul style="list-style-type: none">• Higher rates of challenging behavior in RAIs compared to RPIs• At least 3 demonstrations of effect (A demonstration was considered any change in level from data point to data point in the desired direction) | <ul style="list-style-type: none">• Higher rates of challenging behavior in test condition compared to control• At least 3 demonstrations of effect (A demonstration was considered any change in level from data point to data point in the desired direction) |

RESULTS

The results of the conclusiveness of the within-session and between-session analyses for all 11 cases are presented in Table 3. Of the 11 cases reviewed, 63% (n=7) of the within-session analyses were conclusive, and 90% (n=10) of the between-session analyses were conclusive. To answer Research Question 1, “Can a single test session be reanalyzed to establish a functional relation between the presence of reinforcing stimuli and the rate of challenging behavior observed per second?” results demonstrated it could for 63% of reviewed cases.

To answer Research Question 2, “does a within-session analysis of the first test condition yield similar results to the full IISCA conducted at the time of client admission?” results demonstrated a 72% agreement between both within- and between-session analyses.

Cases were distributed among the four agreement categories and are presented in Table 4. Of the 11 cases reviewed, seven were identified as being a true positive (Cases 3, 4, 5, 6, 7, 9, and 10) for a total of 63% of cases. All true positive cases are presented in Figure 1 and 2. One case (9%) reviewed was determined to be a true negative (Case 11), and is presented in Figure 3. Three were identified as being a false negative (Cases 1, 2, and 8) for a total of 27% of cases, presented in Figure 4. No cases were identified as a false positive.

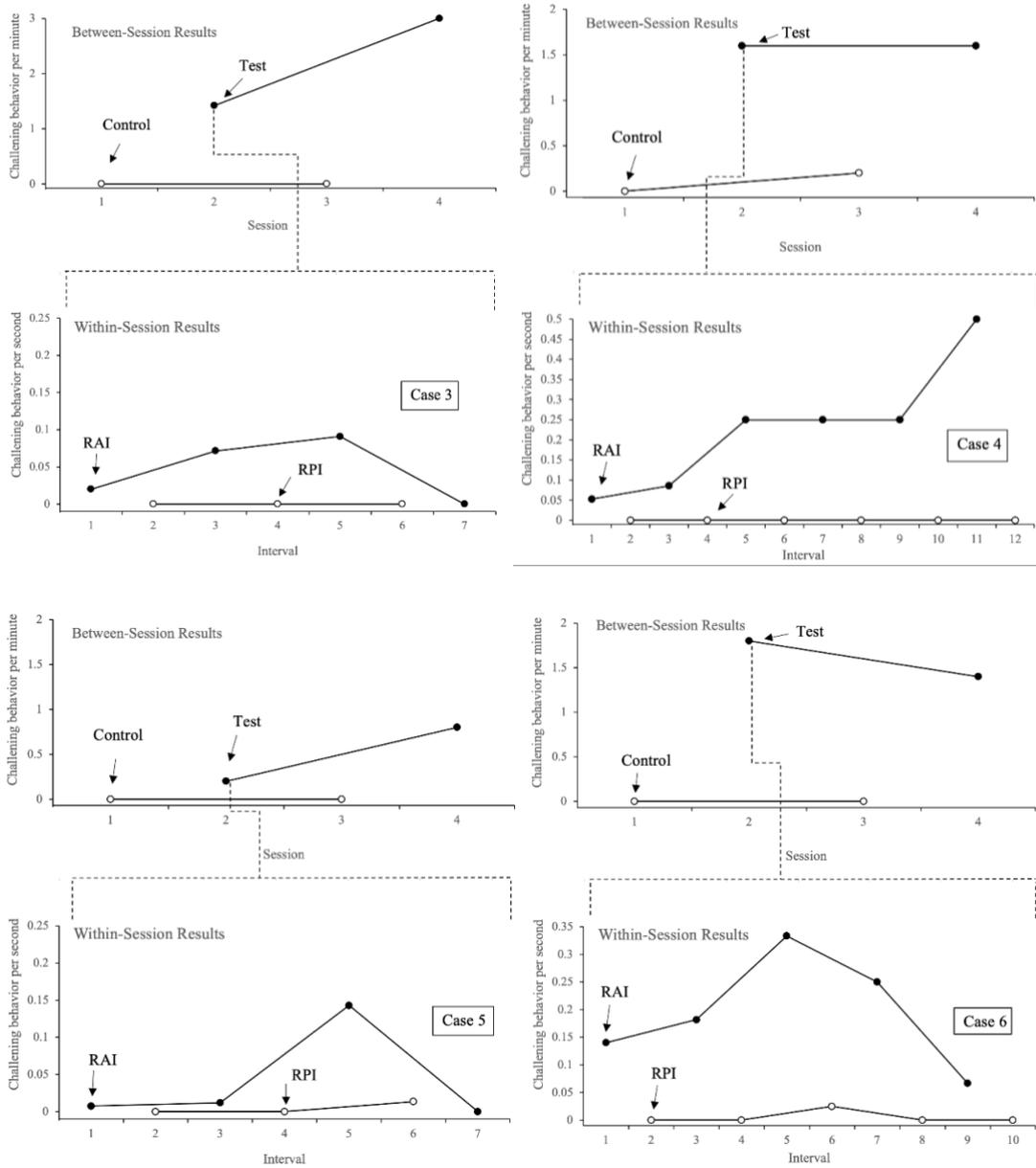
Table 3 *Conclusive and Inconclusive Results for Within- and Between-Session Analyses*
Between Session and Within-Session Analysis

| Case | Within-Session | Between Session | Comparison | Match |
|----------------|-----------------------|------------------------|-------------------|--------------|
| Results | | | | |
| 1 | Inconclusive | Conclusive | False Negative | - |
| 2 | Inconclusive | Conclusive | False Negative | - |
| 3 | Conclusive | Conclusive | True Positive | + |
| 4 | Conclusive | Conclusive | True Positive | + |
| 5 | Conclusive | Conclusive | True Positive | + |
| 6 | Conclusive | Conclusive | True Positive | + |
| 7 | Conclusive | Conclusive | True Positive | + |
| 8 | Inconclusive | Conclusive | False Negative | - |
| 9 | Conclusive | Conclusive | True Positive | + |
| 10 | Conclusive | Conclusive | True Positive | + |
| 11 | Inconclusive | Inconclusive | True Negative | + |
| Summary | 63% Conclusive | 90% Conclusive | 72% Agreement | |

Table 4 *Case Results Distribution*

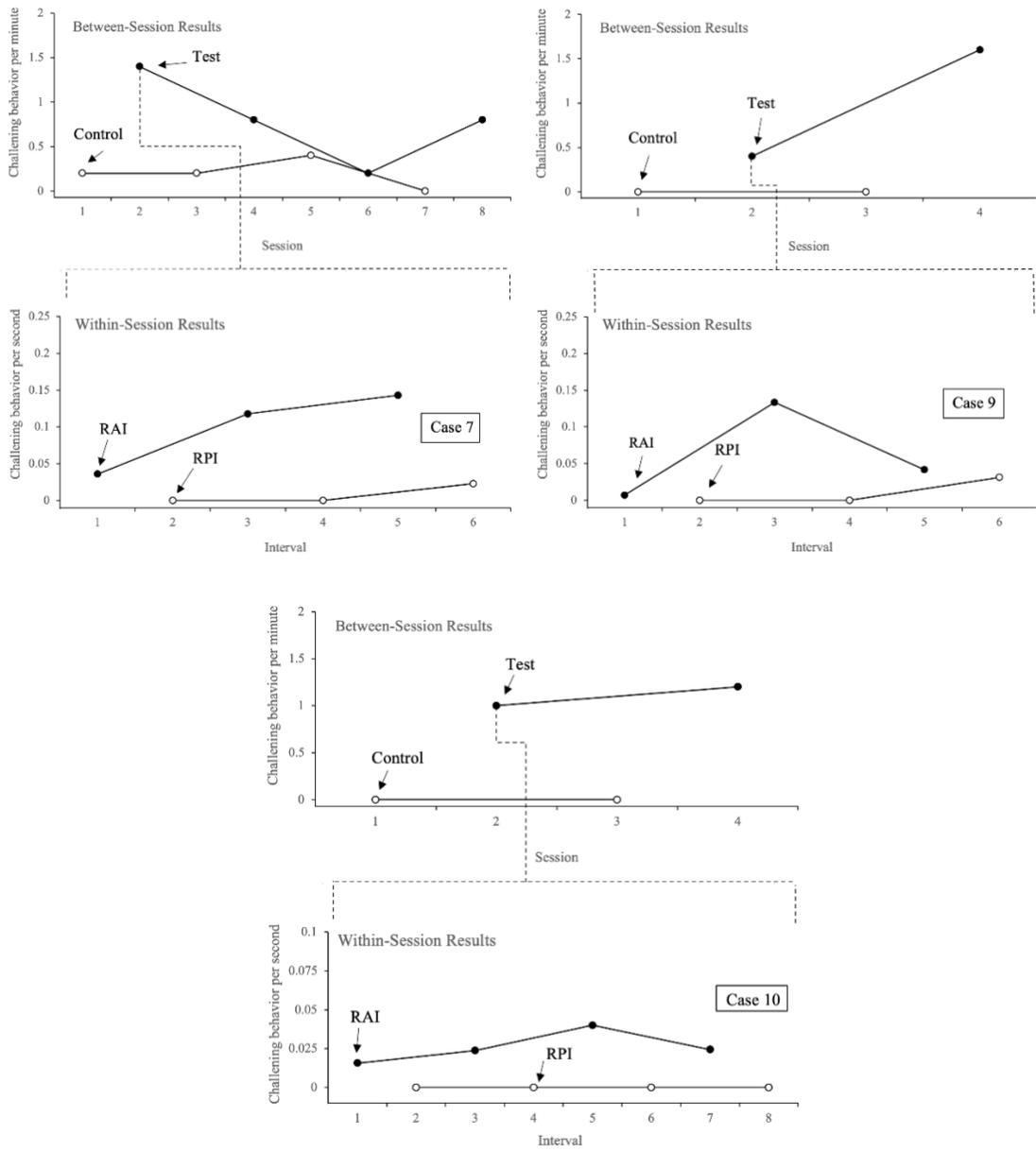
| | | Between-Session | |
|----------------|--------------|------------------------------------|-----------------------------------|
| | | Conclusive | Inconclusive |
| Within-Session | Conclusive | (True Positive) N=7 63% | (False Positive) N=0 0% |
| | Inconclusive | (False Negative) N=3 27% | (True Negative) N=1 9% |

Figure 1 True Positive- Part I: Conclusive Between- and Within-Session Assessments



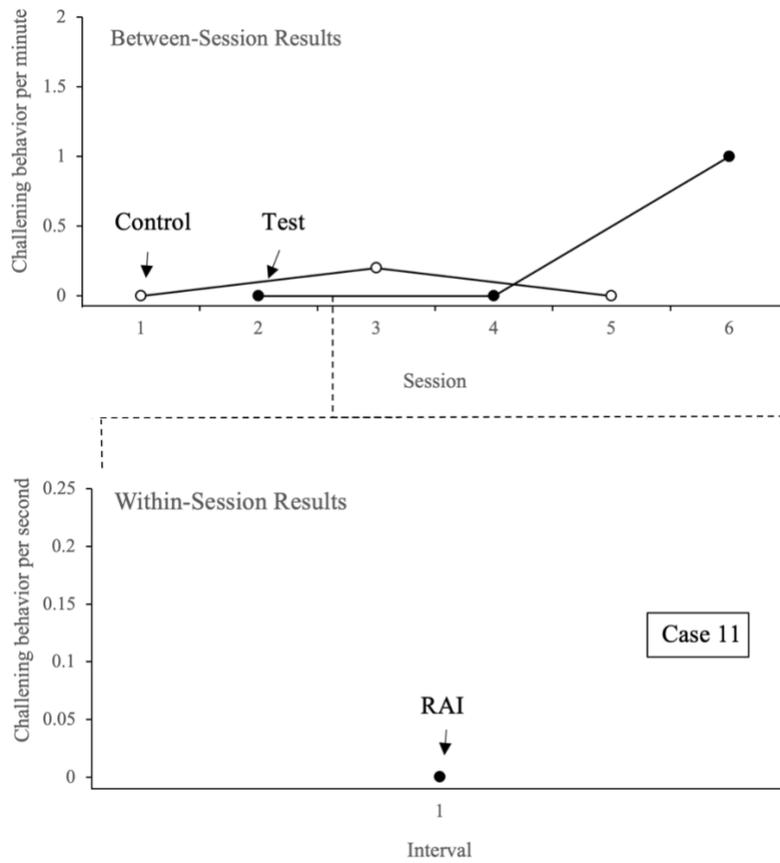
Note. A conclusive within-session analysis of reinforcement absent intervals (RAIs) and reinforcement present intervals (RPis) during the first test session (bottom panel) of a conclusive full interview informed synthesized contingency analyses (IISCA) (top panel) for Cases 3-6.

Figure 2 True Positive- Part II: Conclusive Between- and Within-Session Assessments



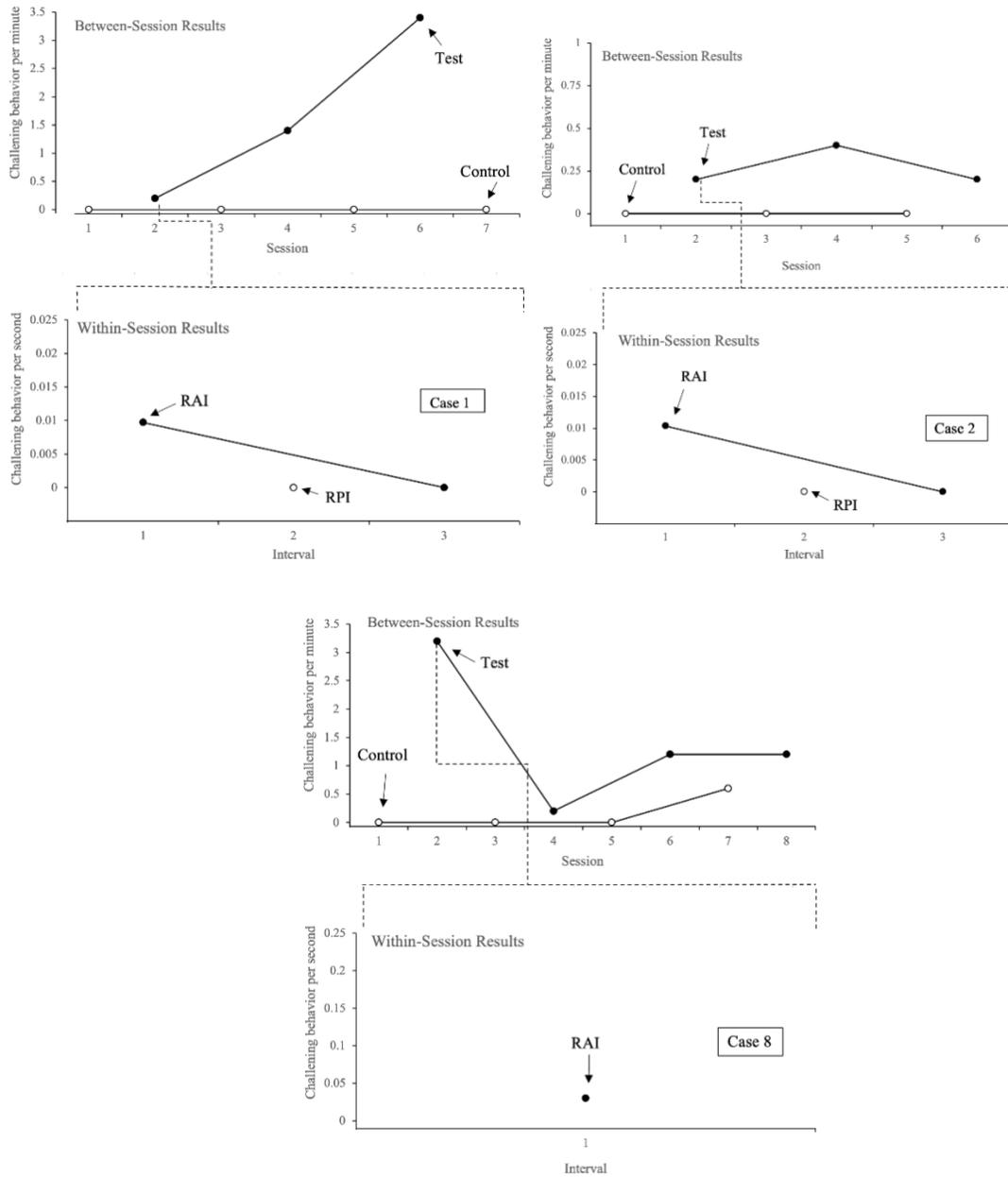
Note. A conclusive within-session analysis of RAIs and RPIs during the first test session (bottom panel) of a conclusive full IISCA (top panel) for Case 7, 9, & 10.

Figure 3 *True Negative: Inconclusive Between- and Within-Session Assessments*



Note. An inconclusive within-session analysis of RAIs and RPIs during the first test session (bottom panel) of an inconclusive full IISCA (top panel) for Case 11.

Figure 4 *False Negative: Inconclusive Within-Session and Conclusive Between-Session Assessments*



Note. An inconclusive within-session analysis of RAIs and RPIs during the first test session (bottom panel) of a conclusive full IISCA (top panel) for Cases 1, 2, & 8.

DISCUSSION

The university-based clinic currently follows the brief family-centered 5-appointment model described in Shepley et al. (2021) and “was developed to supplement a medical model for service-provision for families in rural communities.” This model had been in place since fall 2019, and student therapists have been trained to conduct function-based assessments and treatments based on this model. In an effort to improve the quality of service for families and increase efficiency in the assessment appointment of the current model, this study conducted a retrospective within-session analysis of eleven IISCAs to evaluate if a shortened assessment could produce results similar to the longer assessment.

Currently the clinic conducts full IISCAs or brief functional analysis (BFA) which is a shortened assessment methodology from the traditional extended FAs conducted when time constraints are a concern (Wacker et al., 2004), to identify the function of challenging behavior demonstrated by their clients. The assessment appointment guides treatment recommendations after a function has been identified. The current FAs conducted using the current clinic model accounts for 20+ min of the allotted 1.5 hours for the assessment appointment. With the current service model student therapists, under the supervision of a BCBA, currently conduct these assessments. The training process for a student therapist to conduct a FA is extensive. Before a student therapist can conduct a FA, they need to first demonstrate their competency through detailed written protocols, role playing assessments, practicing data collection, and writing operational definitions. Once competency has been demonstrated, therapists are

allowed to conduct a FA with real clients with live coaching. The current student therapist training focuses on conducting full IISCAs.

This retrospective review was conducted to evaluate if a shorter single-session IISCA could result in a functional relation and if it could yield similar results to a multi-session full IISCA. Of the eleven within-session analysis seven (63%) demonstrated a functional relation and eight (72%) yielded a match to the full IISCA. Upon further investigation, all cases not in agreement were IISCAs that were conducted prior to the clinic restructure pre-fall 2019. During this restructure, the clinic model was manualized so that all assessment and treatment trainings and competencies of student therapists were consistent across days and supervisors. Since the clinic restructure all cases reviewed were identified as a true match, either a true positive or negative. These results suggest that a single test condition is enough to establish a functional relation and under the current service-provision model yield the same results as a full IISCA in a quarter of the time.

Limitations

There were some limitations to this retrospective review. First, a limited number of cases were available for review. When this study was first conceptualized it was anticipated that twenty-two cases would be reviewed. Once the achieved files were reviewed, videos were available for eleven of the cases due to human error (e.g., not saved properly or incorrectly labeled), assessments were conducted in a room with no video, or technological issues. More cases for review would suggest stronger evidence if they yielded similar results. Second, IOA data of the between-session analysis were not

re-assessed. IOA was not re-assessed because reliability data were collected at the time of the assessment based on clinic protocols. Third, when recoding the within-session analysis new behaviors that were established to be a part of the same response class later in the assessment and were later added to the operational definition. Due to the additions to the original operation definition throughout the in-vivo assessment, the rates of challenging behavior were not an exact match when recoded. When recoding, the primary investigator included all behaviors within the same response class when collecting data and scored them from the beginning of the assessment. Recoding the full IISCA might yield different results in terms of conclusiveness of the between-session analyses if reassessed using new operational definitions which included all topographies of behavior identified as part of the same response class as the original R1 and R2 challenging behaviors.

Quality Improvement of Future Clinical Practice

The exact match of results of both the within- and between-session analyses since the clinic adopted its service-provision model suggests that a single-session IISCA would be enough to successfully identify a function to inform treatments. Based on these results, the author suggests that the clinic review its current assessment appointment protocol and modify its default assessment from a full IISCA to a single-session IISCA.

Single-session IISCAs adopted into practice would lead to a shorter amount of time in FA, which could lead to less cost to families or funding agencies. From a patient care perspective this would be more cost effective. At this current time, the billable rate is \$125 per hour. The average time spent on assessments, including but not limited to the

interview, administering assessment, interpreting data, and discussing findings is 4.25 hours (\$531.25). According to Fisher and Kornack, 2019, Current Procedural Terminology Codes (CPT) are issued, copyrighted, and maintained by the American Medical Association (AMA). Billing code, CPT 97151, appointments are billable in 15 min increments. If a single-session IISCA were conducted a client would only be billed for one 15 min increment (\$31.25) instead of the average three billed for a full IISCA (\$93.75).

This would also leave more time available to conduct additional assessments with other professionals if a clinic had an interdisciplinary team. According to Shepley et al., (2021), utilizing a clinic-based provision model for assessing and treating severe behavior can be effective if multiple teams of professionals are involved. A shortened assessment time could mean more room for related services to conduct their own discipline specific assessments within the same appointment leading to less costs and more services provided within a single visit. This is integral when the families being serviced come from rural areas and commute long distances to receive services. The purpose of the implementation of the family-centered clinic service provision model is to make services for the treatment of severe behavior more accessible to rural communities and revisions to the current model could lead to greater access to related services.

Shorter FAs also means the child would have less exposure to uncomfortable or aversive contingencies and would align with a trauma-informed framework. According to Rajaraman et al. (2022), behavior analysts should actively avoid programming features that might occasion a trauma response. During FA procedures, reinforcers are withheld in test conditions which could be triggering and traumatic to some individuals based on

their learning histories. Based on the results of this study and potential benefits to implementing single-session IISCAs in lieu of a full IISCA, assessment appointments could be more efficient and equally as effective, overall improving patient care.

Considerations

When adopting single-session IISCAs into practice there are a few matters to take into consideration. First, training staff to graph and visually analyze data at the time of assessment which is not part of current clinic procedures during the assessment appointment. It is going to take time to get therapists proficient and reliable before applying it to practice. Second, the potential feasibility of in the moment analysis of data by therapists using resources available at the clinic could pose to be a problem.

Conclusion

A retrospective review was conducted to evaluate if a shorter single-session IISCA could result in a functional relation and yield similar results to a full IISCA. Results demonstrated that after the clinic adopted its current clinic model the first test condition of the full IISCA was an exact match to the full IISCA. This suggests that a single-session IISCA could be adopted into practice and effectively determine the function of challenging behavior and inform treatment.

APPENDICES

Appendix A

A Section of the Re-Analysis Coding Data Sheet with IOA

| Time | Primary | Reliability | IOA of RPI Onset/Offset | IOA of Challenging BX | | Duration of Condition | Count of Bx | RPS |
|------|---------|-------------|-------------------------|-----------------------|--|-----------------------|-------------|---------|
| 0:01 | | | | | | | | #DIV/0! |
| 0:02 | | | | | | | | #DIV/0! |
| 0:03 | | | | | | | | #DIV/0! |
| 0:04 | | | | | | | | #DIV/0! |
| 0:05 | | | | | | | | #DIV/0! |
| 0:06 | | | | | | | | #DIV/0! |
| 0:07 | | | | | | | | #DIV/0! |
| 0:08 | | | | | | | | #DIV/0! |
| 0:09 | | | | | | | | #DIV/0! |
| 0:10 | | | | | | | | #DIV/0! |
| 0:11 | | | | | | | | #DIV/0! |
| 0:12 | | | | | | | | #DIV/0! |
| 0:13 | | | | | | | | #DIV/0! |
| 0:14 | | | | | | | | #DIV/0! |
| 0:15 | | | | | | | | #DIV/0! |
| 0:16 | | | | | | | | #DIV/0! |
| 0:17 | | | | | | | | #DIV/0! |
| 0:18 | | | | | | | | #DIV/0! |

RPI Duration IOA (free operant event recording with time stamps based on onsets & offsets of RPI)

Onset/Offset Time Stamp: Within 3 s

of agreements within 3 s time stamp window/# of agreements + disagreements
x 100

Challenging Behavior IOA (free operant timed event recording)

Time Stamp: Within 3 s

of agreements within 3 s time stamp window/# of agreements + disagreements
x 100

Appendix B

Full IISCA Procedural Fidelity Data Sheet

| Target Implementer Behaviors | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
| The implementer removed reinforcers as planned. | | | | | |
| The implementer provided reinforcers contingent on the participant exhibiting problem behavior within 3-s. | | | | | |
| The implementer removed reinforcers again once the client had access to them. | | | | | |
| The implementer ignore behavior that did not meet the operational definition established prior to the study or that fell within the same response class. | | | | | |

Possible Responses: + = occurrence; - = non-occurrence; N/A = no opportunity for the behavior to occur

| Procedural Fidelity | |
|---|--|
| # of implementer behaviors observed | |
| # of implementer behaviors planned | |
| PF percentage: # of implementer behaviors observed/# of implementer behaviors planned x 100 | |

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