EXAMINING THE USE OF FBSAPP AND VIRTUAL STRATEGY-BASED COACHING

WITH A FAMILY OF A YOUNG CHILD WITH ASD AND ADHD

by

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EXAMINING THE USE OF FBSAPP AND VIRTUAL STRATEGY-BASED

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Challenging behavior (CB) is a concern for many parents, especially as CB can have negative impacts on child development. It is critical for parents to receive supports to help address their child's CB. The FBSApp is a mobile application designed to teach parents specific strategies to use to prevent and respond to their child's CB. In addition to the FBSApp, this study used virtual strategy-based coaching that involved Behavior Skills Training (BST) on the target strategies and weekly coaching sessions. This study analyzed the effects of the FBSApp and virtual strategy-based coaching on parent use of target strategies and child behavior, using a multiple baseline across behaviors, single case design. Results indicated that the FBSApp and virtual strategy-based coaching was effective in increasing parent use of target strategies. Target strategy usage maintained when coaching was faded. Results were inconclusive on if parent strategy usage decreased child CB or increased the replacement behavior. More research is needed to determine the effect on child behavior. The parent rated the FBSApp and virtual strategy-based coaching highly, indicating that the intervention was socially valid.

INTRODUCTION

Challenging behavior (CB) is a leading concern for many parents with young children and often leads to strain on parent-child relationships (Doubet & Ostrosky, 2015). CB also negatively affects a child's development, leading to negative outcomes, including increased expulsion rates and decreased quality of education (Frey et al., 2015; Meek et al., 2020). Not only does CB impact school-age outcomes, but CB can also prevent meaningful participation in home and community activities (Lucyshyn et al., 2007). Early intervention for CB is critical to promote parent-child relationships, improve school outcomes, and allow access to home and community activities.

The Division of Early Childhood (DEC) stresses the importance of involving the family during child assessment and intervention, as family involvement leads to greater success (2014). There are also positive outcomes when support is provided to families in natural environments such as their home (Fixsen et al., 2005). Parental instruction on CB and how to address it could possibly reduce parental stress (Fettig et al., 2015).

The FBSApp is a mobile application designed to provide parental instruction on understanding CB as a form of communication and learning how to take antecedent-behavior-consequence (ABC) data on their child's CB (Barton, 2022). The App then generates an individualized behavior support plan (BSP). A randomized control trial (RCT) indicated that while effective in improving caregiver behavior and decreasing CB, some caregivers may benefit from professional coaching when using the FBSApp (Barton et al., in review). Additionally, a single-case study indicated that the coaching must provide individualized supports (Barton et al., in press).

This study aims to evaluate an individualized and collaborative coaching support approach. The following research questions are addressed: (a) Does the use of the FBSApp and virtual strategy-based coaching increase parents' use of target intervention strategies?; (b) Does the parents' use of target intervention strategies decrease the child's challenging behavior and increase replacement behaviors?; (c) Does the parents' use of target intervention strategies maintain after coaching is faded?; (d) How does the caregiver report the feasibility, usability, and effectiveness of the intervention package?

METHOD

Participants

One family, a mother, father, and son, participated. Participants were recruited via social media and distribution of flyers to local educational service providers after obtaining approval from the institutional review board. The family contacted research personnel to express interest in participation. They were then screened via Zoom for the following inclusion criteria: (a) child between 2 and 6 years of age, (b) child engages in challenging behavior that occurs at least 3 times a week based on parent report (c) child has a diagnosed disability or scores at-risk on the Ages and Stages Questionnaire: Social Emotional, 2nd edition (ASQ:SE-2; Squires et al., 2016), and (d) the family primarily speaks English at home. At the start of the study, Finn was a 4-year-old, white male who was diagnosed with autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD). He lived at home with his mother, dad, and 7-year-old sister. His mother, Carrie, was 41-year-old, white female and served as the primary caregiver in this study. Carrie stayed at home with Finn during the day while older sister was at school. Finn attended speech therapy once a week and an art class once a week. The parents reported the

primary CB was elopement from mealtimes and tantrums that involved crying, screaming, and property destruction.

Implementers

The primary implementer and first author, a White, 23-year-old female, was enrolled in a master's degree program in early childhood special education and applied behavior analysis. She served as the coach and conducted all training and coaching sessions, as well as served as the primary coder. The second author, a White, 29-year-old female enrolled in a doctoral program in special education, collected procedural fidelity data during all training and coaching sessions and served as a secondary coach. Two secondary coders were trained on data collection. One student, a White, 25-year-old female, was a second-year master's student in early childhood special education and applied behavior analysis. The second student, a White, 22-year-old female, was a first-year master's student in child studies and applied behavior analysis.

Setting

All training and coaching sessions were conducted via Zoom teleconferencing platform. The family was at their home during all sessions, including observation sessions and trainings. The parents chose to target the mealtime routine. This routine never occurred without CB and was valued by the family. Carrie expressed concern that Finn was waking up hungry in the middle of the night due to difficulty getting him to focus on eating during mealtime and his selective eating preferences. Mealtime occurred in the family's home at their dining table in the kitchen. Dad and sister were often present during meals, and the maternal grandfather was also sporadically present at mealtime throughout the study.

Materials

The caregivers used their personal iPad to attend training and coaching sessions as well as to record mealtime routines. The recordings were then uploaded to a secure online hard drive. The coach used Microsoft Excel to collect data from each video immediately. Microsoft PowerPoint was used to create training and coaching presentations for training the caregiver in the target strategies. Zoom teleconferencing platform was used to conduct and record all training and coaching sessions. The caregivers and coaches used their personal smartphones to download and use the FBSApp.

Family Behavior Support application (FBSApp)

The FBSApp is an app designed to support caregivers in addressing their child's CB. The app guides caregivers through the process of collecting and logging ABC data to hypothesize the function of the child's behavior and generate an individualized BSP. The BSP is comprised of function-based intervention strategies for caregivers to use to help prevent, replace, and respond to their child's CB. The BSP includes access to videos and infographics with more information about how to use the strategies. The FBSApp allows caregivers to collaborate with professionals (e.g., behavior analysts, child's therapists) directly within the app, allowing for additional support. Data can be continually documented within the app as well, allowing for progress to be tracked and communicated across parties.

Response Definitions and Measurement Systems

Caregiver Behaviors

The five primary dependent variables were a) the parent's use of the target universal strategy, b) the parent's use of the target prevent strategy, c) the parent's use of the target teach

strategy, and d) the parent's use of the target new response strategy. These categories of strategies are defined by the FBSApp and generated based on the hypothesized function of CB with the exception of universal strategies, which are the same for all functions of CB. The universal strategies described in the App are beneficial for children and families regardless of the hypothesized function of behavior (e.g., positive descriptive feedback, visual schedules). One specific strategy from each category was targeted, and the primary caregiver gave input into which strategy she wanted to target. Data were recorded for both caregivers when present, but the mother was considered the primary caregiver for the purpose of the study. See Appendix A for a copy of the coding manual.

Universal. We collected data on the rate of positive descriptive feedback (PDF) as the targeted universal strategy. PDF was defined as the caregiver providing the child with positive feedback describing a behavior in which the child engaged. PDF must include a) positive language, and 2) a description of the child's behavior by labeling the behavior with a noun or verb. Examples included, "You did it! You cleaned up," and "Thanks for sitting in your seat." Non-examples included, "Great job," and "You're doing great." PDF cannot co-occur with CB and 5 s must elapse between the offset of the previous statement before the start of a new statement to be coded. Timed event recording was used to mark the onset of each strategy.

Prevent. For the prevent strategy, we collected data on the rate of the caregiver's use of a First-Then system. For an instance to be coded, the parent had to state the required behavior/activity occurring first and/or the subsequent reinforcer while using the words "first" and/or "then." Following the initial introduction of the First-Then visual, gestures (e.g., pointing to the visual), verbal reminders (e.g., "First chicken, then ice cream"), and/or environmental adjustments (e.g., sliding the First-Then visual into Finn's field of view) were counted as

instances of the strategy. For a new instance to start 5 s had to elapse from the offset of the previous instance. Prevent usage could not co-occur with CB. Timed event recording was used to mark the onset of each strategy.

Teach. To capture caregiver use of strategies to teach the child a replacement behavior, we measured the rate of trials. The teach trials involved the primary caregiver giving a verbal statement that motivated the child to use the targeted replacement behavior. A teach trial began with a vocal presentation of an establishing statement, which increased the value of a reinforcer and/or indicated that a reinforcer was available (e.g., "If you want me to sit with you, you can use your card."). A new onset of a teach strategy required a 5 s latency from the offset of a previous teach statement. Teach strategies can co-occur with CB. Timed event recording was used to mark the onset of each strategy.

New Response. For each instance of CB, we marked the occurrence or non-occurrence of a new response strategy. The targeted new response strategy was a combination of giving a verbal reminder, defined as the caregiver giving a brief statement of an appropriate behavior, and minimizing all attention, defined as the caregiver providing minimal attention for 10 s. The use of a verbal reminder was added after 3 sessions because mom described her struggles with minimizing attention and a desire to redirect Finn to a more appropriate behavior. The verbal reminder had to occur within 5 s of the CB, and minimizing attention had to begin within 5 s of the CB or immediately following the verbal reminder.

Child Behaviors

Child behaviors were recorded as secondary dependent variables. These included CB and use of replacement behaviors. See Appendix A for a copy of the coding manual.

Challenging Behavior (CB). We collected data on the frequency and/or duration of CB, which was broadly defined as behavior that interferes with the child's meaningful engagement in their environment or social interactions (Smith & Fox, 2003). Challenging behavior was categorized into three relevant categories of behaviors: a) elopement, b) property destruction, and c) screaming/yelling. These behaviors were chosen as the caregivers identified them as their main concerns during mealtime. Elopement was defined as being greater than an arm's distance from his food without parental permission. This included standing on the table, laying on the seat, and leaving the table/kitchen area. Elopement was recorded as duration, recording both the onset and offset (i.e., the child returning to the table, which was defined as the child returning to his seat or within an arm's distance of his plate for at least 3 s). Property destruction and screaming/yelling were recorded as frequencies (see Appendix A for definitions). For a new instance of CB to start, 3 s must elapse from the offset of the previous instance. Timed event recording was used.

Replacement Behavior. Replacement behavior was broadly defined as the child vocally requesting, signing, or using card exchange to request for help or for a caregiver to sit with him. It was coded as prompted if he did it within 10 s of a teach trial. It was coded as spontaneous if it occurred outside of 10 s of a teach trial. Timed event recording was used to mark the onset of each strategy.

Interobserver Agreement

Interobserver agreement (IOA) was calculated for 42.85% of all sessions. The coach was the primary coder and coded all variables for all observations. Two secondary coders were trained by reviewing the operational definitions and the codebook with the primary coder,

coding an example video together with the primary coder, and independently coding three

practice videos until 80% agreement was achieved for each variable. If IOA fell below 80%

agreement, the coders were retrained following the procedures used for initial training but with

different practice videos until they reach 80% agreement again. Sessions coded for IOA were

selected via a random number generator, and IOA was calculated using the point-by-point

method (with a 3 s agreement window) by dividing all agreements by agreements plus

disagreements and multiplying by 100 (Ledford et al., 2018).

Experimental Design

A single case, concurrent multiple baseline across behaviors design was used (sessions;

Gast et al., 2018). This design was chosen because it is appropriate to use for non-reversible

behaviors and allows for minimal time in baseline and for continued progress monitoring (Gast

et al., 2018). There are several common threats to internal validity in multiple baseline designs

including history, maturation, and multitreatment interference, which will be detected through

visual analysis. Hawthorne effect is also possible, and it will be detected by inconsistencies

between behaviors and expectations for behaviors. An immediate change with caregiver behavior

is expected, but a delayed change is expected for child behavior since it is dependent on

caregiver behavior. As behavioral covariation is possible, the chosen target strategies are

independent but functionally similar to mitigate this threat. Visual analysis of level, trend,

variability/stability, overlap between conditions, consistency of data within and across

conditions, immediacy of change with the introduction of the intervention, and differentiation

between interventions will used to make experimental decisions and to identify behavior change

and functional relations.

Coaching Procedures

Coaching procedures were designed as a companion to the FBSApp to be used by professionals supporting families. All materials developed and used by coaches were closely aligned with existing features and resources within the App (e.g., infographics, tutorial videos). Coaching included the following components: (a) virtual coaching meetings, (b) behavior skills training (BST; Miltenberger, 2012), and (c) observations. While systematic in nature, coaching procedures were flexible enough to allow for individualization, ensuring alignment with the family's needs and goals.

Pre-Baseline

Four meetings were conducted during pre-baseline (see Appendix B for a timeline). The first meeting was to gain consent. Once the family consented to participate in the study, an intake meeting was held using the intake protocol (Appendix C). This meeting lasted approximately 60 min and covered the coaching role and procedures. During the following meeting, the coach helped the caregiver install the App and provided instruction on CB as a form of communication and its possible functions. Finally, the coach provided BST training on ABC data collection with the caregiver. The coach also walked the caregiver through entering the first data point for ABC data. The family then collected ABC data within the FBSApp on their own. This data was used to determine the hypothesized function of the child's behavior and generated the behavior support plan (BSP). No training or coaching sessions on specific strategies occurred. The family was instructed to record three pre-baseline videos to practice video angles and audio settings.

Baseline Phase

During baseline, the coach reached out to the family to schedule a meeting to discuss the results of the BSP, including the hypothesized functions of behaviors and the different strategies. No training or coaching on specific strategies occurred. The family was instructed to record videos of their typical mealtime routine.

Intervention

The coach reached out to schedule a meeting to discuss the results of the BSP. Following this meeting, the coach reached out to schedule the first training session with the primary caregiver on Zoom. Training sessions were 30-45 min long with the primary caregiver and followed a Behavior Skills Training approach, which included instruction, modeling, video examples, roleplay, and feedback (Miltenberger, 2012). Training sessions were recorded and given to both caregivers. Training sessions were conducted for a specific strategy within the following categories: universal strategies (positive descriptive feedback), prevent strategies (First-Then), teach strategies (ask for attention), and new response strategies (verbal reminder + minimize attention). Coaching sessions occurred weekly with the primary caregiver until data stabilized at levels higher than baseline before moving on to the next strategy. Coaching sessions were approximately 30 min long and used video examples, supportive feedback, and corrective feedback when data indicated a decrease in the caregiver's use of the strategy. Coaching sessions were recorded and sent to both caregivers. See Appendix B for a timeline of sessions.

Fading and Maintenance

Maintenance for each strategy began at the onset of the next strategy. Data was collected and reviewed during coaching sessions, but no feedback was given on the strategies during maintenance. Once data collection was finished on the new response strategy, coaching sessions were faded to bi-weekly meetings.

Procedural Fidelity

Procedural Fidelity (BST) was calculated for 90.47% of all sessions across components

and conditions using a yes/no checklist and frequency tallies (see Appendix D). Data were

collected by the second author.

Social Validity

To examine the social validity of the procedures and outcomes, the caregivers were given

a pre-study and post-study questionnaire. The questionnaire contained the same questions for pre

and post intervention, with the addition of questions pertaining to the intervention for the post-

study questionnaire (see Appendix E).

RESULTS

Figure 1 depicts caregiver use of strategies across phases. A functional relation was

identified between the use of the FBSApp plus coaching and increases in the caregiver's use of

the target strategies, with three strong demonstrations of effect.

Caregiver Strategies

Universal

The rate of the primary caregiver's use of the universal strategy is shown in tier 1 of

Figure 1. The rate is stable at 0 during pre-baseline and baseline. After the onset of intervention,

there is an immediate increase in rate of universal strategy usage. The rate is high and variable

across intervention (*range* = 0.06-1.36). The low rate of strategy use in the last session can be attributed to dad's presence and high use of the universal strategy during the same mealtime session as mom. During maintenance, the rate of universal strategy use remained stable and low at levels higher than baseline (*range* = 0.0-0.41).

Prevent

The rate of the primary caregiver's use of the prevent strategy can be seen in tier 2 of Figure 1. The rate is stable at 0 during pre-baseline and baseline. After the onset of intervention, there is an immediate and significant increase in prevent strategy usage. The rate is high and variable across intervention with no overlap with baseline (*range* = 0.25-1.63). During maintenance, the rate is lower in level than intervention, stable between 0.05-0.47 with no overlap with baseline.

Teach

The rate of the primary caregiver's use of the teach strategy can be seen in tier 3 of Figure 1. The rate is stable at 0 during pre-baseline and baseline. After the onset of intervention, there is an immediate increase in level with no overlap with baseline (*range* = 0.07-0.67). The rate is at similar levels during maintenance with a decreasing trend (*range* = 0.00-0.35).

New Response

The frequency of the primary caregiver's use of the new response strategy can be seen in tier 4 of Figure 1. Gray circles represent opportunities for the parent to engage in the new response strategy (i.e., instances of challenging behavior). Black circles represent the parent's use of new response strategy. The rate is stable at 0 during pre-baseline and baseline. After the onset of intervention, new responses remained low with a high degree of overlap with baseline. After the modification (adding a verbal reminder of expected behavior), there is a slight increase

in the parent's use of the new response strategy. Data are low with a high degree of overlap with baseline with a range of 0-2. The rate during maintenance is consistent with the rate during intervention (0.05).

<center>*Child Behaviors*</center>

Challenging Behavior

In Figure 2, the rate of CB per minute is depicted by the closed circles, and the percentage of each session spent in elopement is depicted by the grey bars. CB is high and variable during pre-baseline and baseline (*range* = 0.2-0.6). The percentage of time spent in elopement is variable but high (*range* = 5-20). At the onset of the universal intervention, CB immediately decreases and is variable with some overlap with baseline (*range* = 0.15-0.6). The percentage of time in elopement immediately decreases as well but is variable (*range* = 2-15). At the onset of the prevent strategy intervention, CB decreases to a lower but variable level with minimal overlap with baseline (*range* = 0.0-0.4). The percentage of session in elopement was at a low and stable level with minimal overlap with baseline (*range* = 2-10). At the start of the teach intervention, CB increased initially before decreasing to variable, moderate levels with minimal overlap with baseline (CB *range* = 0.55-0.9). The percentage of the session in elopement increased initially before decreasing to moderate levels (*range* = 2-30). At the onset of the new response intervention, CB was low and stable with minimal overlap with baseline (*range* = 0.05-0.2). Percentage of time in elopement was stable and low with no overlap with baseline (*range* = 0-5). CB and time in elopement remained low with no overlap with baseline during the maintenance session.

Replacement Behavior

<center>13</center>

Rate of replacement behavior can be seen in Figure 3. It remained at 0 through the prevent intervention. At the start of the teach intervention, when the replacement behavior was introduced, the rate of the replacement behavior use immediately increased to a high but variable level with minimal overlap with baseline (*range* = 0-0.45). Rate of replacement behavior continued to be high but variable through the new response intervention with minimal overlap with baseline (*range* = 0-0.25). The replacement behavior was not seen during the maintenance session.

Interobserver Agreement

IOA was collected for 42.85% of all sessions and results can be seen in Table 1. The average IOA for CB was 96%, and the average for replacement behavior was 100%. The average IOA for universal strategies was 96%. The average IOA for prevent strategies was 93%, and the average for teach strategies was 96%. The average IOA for new response strategies was 100%.

Procedural Fidelity

Procedural fidelity was collected for 100% of all pre-intervention sessions, 100% of all BST training sessions, and 71.42% of coaching sessions. Procedural fidelity was 100% for all sessions except for the BSP overview session during baseline, where the procedural fidelity was 96.3% (see Table 2).

Social Validity

The primary caregiver completed both pre- and post- questionnaires; results can be seen in Table 3. Confidence in using strategies to prevent CB, teaching communication in place of

CB, and responding to CB all increased from the pre- to post- questionnaire. The caregiver's reported increases in the child's communication from pre to post intervention. The frequency of CB and the impact on family life remained the same, along with the caregiver's relationship and satisfaction with the child. Overall, the satisfaction with the FBSApp and coaching was high, with appreciation for the variety of strategies available and the feedback giving on her use of the strategies.

DISCUSSION

Summary of Findings

The effects of FBSApp coaching on parent use of strategies was analyzed. A functional relation was present. There is a clear and consistent increase of caregiver strategy usage following BST trainings. A demonstration of effect is present for universal, prevent, and teach strategies, but there is no demonstration of effect for the new response strategy. This may be attributed to the low levels of CB, as the new response is contingent on CB. Maintenance was demonstrated for all strategies except for new response where only one maintenance session was conducted.

The child behavior was also analyzed to determine if parental use of strategy led to a decrease in CB and an increase in replacement behavior. The design of the intervention and variability in data preclude the determination of a functional relationship. Despite this, a decrease in CB is present, with a marked decrease in time spent in elopement. An increase in the replacement behavior is also seen after the onset of the teach tier of intervention. Mom's

feedback during training sessions also indicates that CB was perceived to decrease and that the use of replacement behavior was perceived to increase at mealtime.

The intervention package used, FBSApp and Zoom, is a socially and ecologically valid way to support families, that allows for flexibility and collaboration. The collaborative nature of the coaching procedures is a way to maximize caregiver buy-in and follow through and strengthen rapport between the coach and the family. The primary caregiver gave ideas to the coaches about what strategies she wanted to learn and which ones she thought her son would respond the best to. This allowed for stronger buy-in and follow through because, anecdotally, the caregiver felt a higher degree of ownership over the strategies. Another benefit of the intervention package is the ability to coach a family in their natural environment. The supports received in a natural environment is strongly tied to positive outcomes (Fixsen et al., 2005). The family was able to continue their normal mealtime routine in their home without the intrusion of coaches, and without making significant changes to the environment or schedule. The intervention package resulted in an immediate and significant increase in parent use of strategies that maintained after coaching component withdrawn. This intervention package has many benefits for families, providing them with a collaborative, flexible intervention that allows routines within the natural environment to be addressed.

Limitations and Implications

There are several limitations in this study. Firstly, the design does not allow for the determination of a functional relation between parental use of strategies and child CB and replacement behavior. Research is needed to help determine the relationship on coaching parent strategy usage and its impact on child behaviors. Secondly, the primary caregiver was a stay-at-

home mom, and the child did not attend pre-school or extended therapies. The effects of the FBSApp and coaching may not extend to working caregivers. Thirdly, the coaching and observations were limited to one routine, mealtime. This may limit the generalizability of the findings to other routines. Fourthly, maintenance data is limited, and no generalization data was collected. Anecdotally, the caregiver reported using the strategies across routines and throughout the day, but no data was collected. Finally, IOA was not coded continuously. One coder graduated in the middle of the study, which resulted in another coder being trained to code for the remainder of the study. As a result, intervention, and maintenance IOA was coded following the completion of coaching. More research is needed on how to support families across multiple routines and settings.

Conclusions

This study aimed to increase parent use of target strategies while also decreasing child CB and increasing child use of the replacement behavior. The results indicate that the intervention package increased the parent use of the target strategies in three of the four categories: universal, prevent, and teach. The study design did not allow for conclusions to be made about child behaviors. The parent highly rated the FBSApp as well as the training and coaching sessions, making the intervention socially valid.

Table 1

IOA Data

	PB	Baseline	Intervention	Maintenance	Average
Challenging Behavior	84 (83-84)	85 (77-95)	100	100	96
Universal	--	--	96 (87-100)	--	96
Prevent	--	--	93 (80-100)	100	93
Teach	--	--	96 (90-100)	--	96
New Response	--	--	100	--	100
Replacement Behavior	--	--	100	--	100

Note. Average across sessions with range in parentheses. PB= pre-baseline; IOA=interobserver agreement.

Table 2

PF Summary Data

	Pre-meetings	BST	Coaching
Pre-baseline	100	--	--
Baseline	96.3	--	100
Universal	--	100	100
Prevent	--	100	100
Teach	--	100	100
New Response	--	100	100
Maintenance	--	--	100

Note. Average across sessions with range in parentheses. PF= procedural fidelity.

Table 3

Pre- and Post- Questionnaire Results

Question	Pre-Questionnaire Answer	Post- Questionnaire Answer
What is your name?	Carrie	
What is your gender?	Female	
What is your age?	41	
What race/ethnicity do you identify as?	White or Caucasian	
What is the highest level of education you have completed?	Bachelor's degree	
What is your occupation?	Stay at home mom	
What is your child's name?	Finn	
What is your child's birthdate?	May 2018	
What is your child's gender?	Male	
What is your relationship to the child?	Mother	
Does your child have any siblings?	Yes, sister 6	
Do any other family members live in your household?	Yes	
Who else lives in the household?	Dad	
What languages do you speak with your child?	English	
Is your child currently enrolled full- or part-time in daycare, preschool, or another childcare setting?	No	
What is your child's diagnosis?	ASD, Speech-language delay	
What services does your child receive?	Speech, occupational, and physical therapy	
Has your child ever been hospitalized or experiences a significant illness or injury?	No	
Is there anything else about your child's	No	

developmental history that you'd like to share?		
How satisfied are you with your relationship with your child?	**X** Very satisfied Somewhat satisfied Neutral Unsatisfied Very unsatisfied	**X** Very satisfied Somewhat satisfied Neutral Unsatisfied Very unsatisfied
How often does your child engage in challenging behaviors?	About once per month About once per week A few times per week Daily **X** Multiple times per day	About once per month About once per week A few times per week Daily **X** Multiple times per day
To what extent does this behavior negatively impact you and your family's life?	**X** Significant impact Some impact A little impact No impact	**X** Significant impact Some impact A little impact No impact
How confident do you feel using strategies to prevent your child's challenging behavior?	Very confident **X** Somewhat confident Not very confident Not confident at all	**X** Very confident Somewhat confident Not very confident Not confident at all
How confident do you feel teaching your child to use their words instead of challenging behavior?	Very confident **X** Somewhat confident Not very confident Not confident at all	**X** Very confident Somewhat confident Not very confident Not confident at all
To what extent do you feel your child communicates their wants and needs in an appropriate way?	All the time Often **X** Sometimes Not very often Never	All the time **X** Often Sometimes Not very often Never
How confident do you feel in responding to your child's challenging behaviors?	Very confident Somewhat confident **X** Not very confident Not confident at all	**X** Very confident Somewhat confident Not very confident Not confident at all
How satisfied are you with the FBSApp?		Very satisfied **X** Pretty satisfied Satisfied Not too satisfied Not satisfied at all
How satisfied are you with the coaching you've received?		**X** Very satisfied Pretty satisfied Satisfied Not too satisfied Not satisfied at all
How satisfied are you with your experience in this study?		**X** Very satisfied Pretty satisfied

		Satisfied Not too satisfied Not satisfied at all
What was the most useful aspect of participating in this study?		The feedback for how I am using techniques and it being more relevant to real life since it was real time at home.
What was the most useful component of the app?		Having access to strategies.
What was the least useful aspect of participating in this study?		Nothing I can think of that wasn't useful.
How likely are you to use the FBSApp in the future?		Very likely **X** I might use it I probably won't I definitely won't
How likely are you to recommend the FBSApp to other families?		**X** Very likely Pretty likely I might I probably won't I definitely won't
What changes, if any, would you make to the app or procedures?		More user friendly interface for the app.
Is there anything else you'd like for us to know?		This has been one of the most rewarding and beneficial things we have done with our son. Useful not only to him, but for our whole family. The feedback, encouragement, and meaningful engagement from the team was invaluable. Very sweet, positive, caring ladies. Not something easy to come by in our typical therapeutic setting. We appreciate the time and dedication they put into the study. Great work!

Figure 1

Primary caregiver's use of target strategies
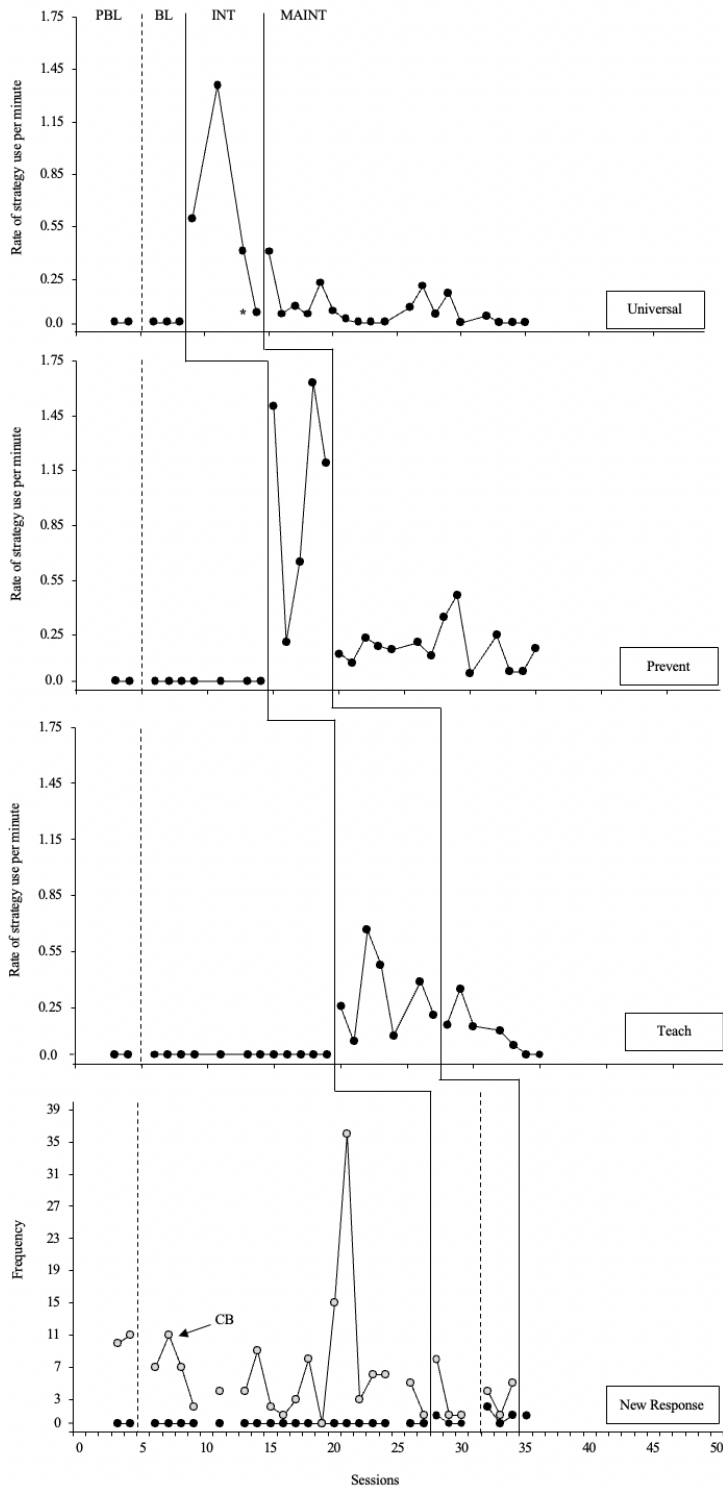
Note. *Both caregivers present, where combined rate of strategy is high; PBL=pre-baseline; BL=baseline; INT=intervention; Maint.=maintenance; CB=challenging behavior.

Figure 2

Rate of challenging behavior and duration of session in elopement
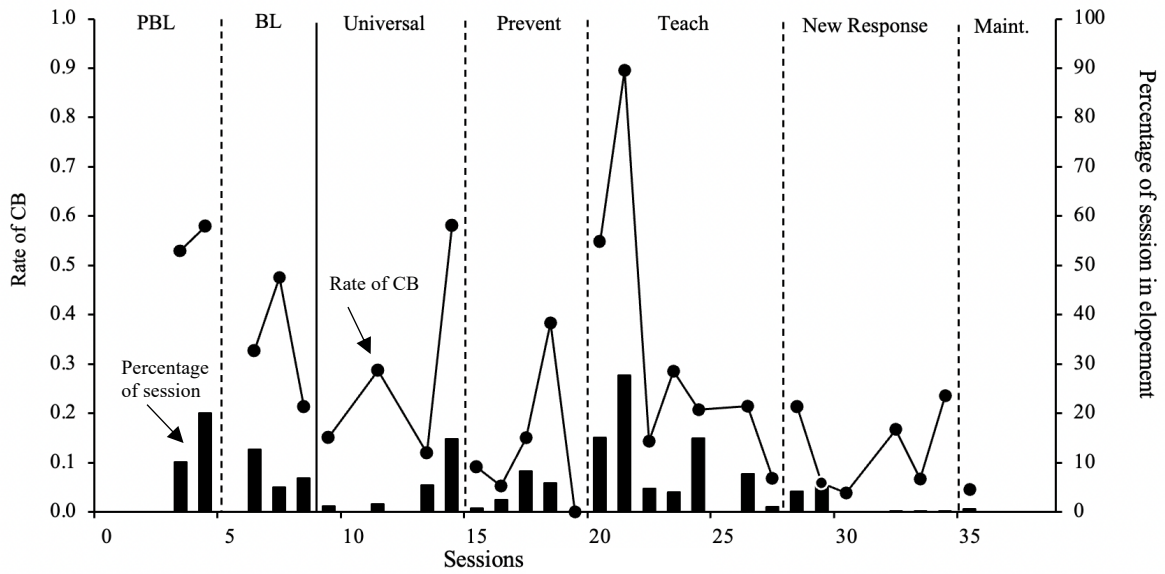
Note. CB=challenging behavior; BL=baseline; Maint.=maintenance.

Figure 3

Rate of replacement behavior

Note. RB=replacement behavior; BL=baseline; Maint.=maintenance.

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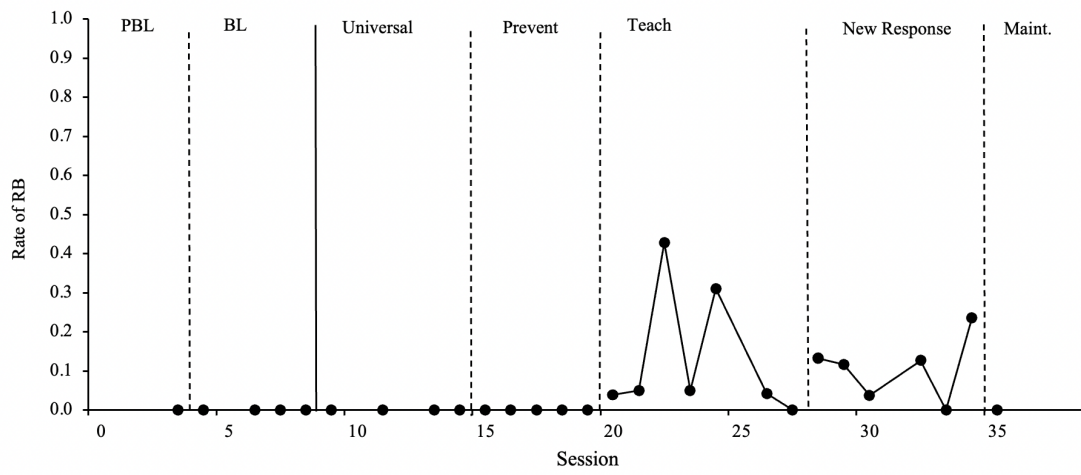
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APPENDIX A
Coding Manual
General Guideline

1. Begin coding when the video starts. End coding when the video ends. Code any behaviors that occur concurrent with the timer signaling the end of a session.
2. If CB is already occurring when universal strategy is emitted or occurs simultaneously, code the CB but NOT the universal strategy.
3. CB can occur with prevent strategies, teach strategies, and new response.

Child Behavior

- **Replacement Behavior**
  o Code a unique mand occurrence each time child uses a mand with 3s between previous mand.
  o RB cannot occur simultaneously with CB. Code CB instead.
- **Challenging Behavior**
  o Code any of the following behaviors as CB: elopement, property destruction, and screaming/yelling.
  o **Code a unique CB occurrence each time a CB occurs AND is separated by the previous CB by at least 3 s, if it is the SAME topography.** If two CBs of different topographies (Physical aggression and elopement) occur simultaneously, code as two behaviors. Mark each behavior at its onset.
- **Return**
  o Code when child has most of his body on the gray chair and is facing his plate, or if no chair is present, when he is within an arms distance to his plate.
  o He must return for at least 3 s for a return to be coded.

Caregiver Strategies

1. First mark the *onset* of the caregiver strategy.
2. Must be 3 s between offset of strategy and start of new use, except for prevent which is 10 s. ***Only when same strategy. If other strategy no latency requirement.**
3. Universal strategy cannot co-occur with CB. The other caregiver strategies can co-occur with CB.

Child Behavior			
Behavior	**Definition**	**Example**	**Non-example**
Replacement Behavior	Child requests a break from the table using his voice or sign language. OR Child asks for help using his voice, card, or sign language. This includes asking mom to do specific things. OR Child asks for his mom to come over. *3 s between* *Cannot co-occur with CB.* **Prompted RB:** Within 10 s from mom using the teach strategy **Spontaneous RB:** After 10 s from mom using the teach strategy	Child uses the sign to ask for help. Child uses his voice to ask for a break. Child asks mom to fix his water.	Throws help card. Holds card in hand, flip it over, but doesn't give it to parent.
	Reinforced: Caregiver acknowledges RB with 10 s of the mand	Verbal statement: "Okay," "one second" -Can be onscreen or offscreen. Physical: coming over, fixing water	Off screen and no verbal statement
Challenging Behavior (CB)	**Elopement (duration):** When E is more than an arm's distance between him and his food without permission (within 20 s) for at least 1 s. A vocal utterance, such as 'all done', 'go' or 'bye-bye' may occur	Child runs out of the room. Child stands up on bench. Child lays down on bench. Child holds on to edge of table and hops.	He drops a utensil, chart, etc., on the floor and picks it up He is asked by a parent to get something that requires him to leave the table. He **asks** to go to the bathroom.

	simultaneously but is not necessary to code an occurrence.	Child has fork with a bite in his hand but is not within reach of his plate. He leaves table and then says he needs to go potty (needs permission) Knees are resting on table and head back on chair. Sitting on arm of chair facing away from food He gets out of his chair because it's wiggly and then mom comes to fix it	He requests permission to take a break and leave the table. Mom takes away plate and then he leaves. Mom says he can be done. Sitting on arm of chair facing toward food Knees up alone=not CB Mom tells him to get up from his seat and then he gets up He finishes all chicken and then gets up
	Property Destruction: Throwing, pushing, ripping, or stomping on objects at the dinner table. Include instances where contextually inappropriate, forceful contact is made between EK (or an object controlled by him) and another object	Throwing toys, iPad Stepping on toys, iPad Throwing shoe at table Pushing placemat, plate, silverware, glass off of table. Ripping napkin Throwing any object to the ground.	Setting placemat, silverware, plate down forcefully while setting the table.

		Hits table with hand/fist Kicks chair over	
	Screaming or yelling: Vocal output that is notably louder than typical conversational level indicated by (A) increasing volume during statement, or (B) louder than previous statement, or (C) louder than the following statement. If the volume of the statement in question is the same as the previous or following statement, code as CB if either of those statements are marked as CB. Do not code output communicating excitement (e.g., "Woohoo") or play schemes (look for engagement with toys). Look for secondary indicators of aggression, such as directed towards another person (e.g., eye gaze), interrupting another person's communication attempt, the person the child is addressing is within view of the child (i.e., not distant enough to warrant yelling)	Child is told it is bedtime and loudly emits a piercing wail. Mom is talking and child "ROARS" looking at mom and interrupting mom's statement. "STOP" to Mom	Child is playing "Dinosaur" and stomps around the room loudly roaring. Child whining Child is playing with a spinner and babbles loudly. Child yells to get mom's attention when she's in another room. Falls/slips and then shouts/screams because startled. Is excited and shouts.
Return	Code when E puts his knees into the gray chair, or if no chair is present, when he is within an arms distance to his plate.	Comes back and sits down in his seat. Sits on the chair arm with his legs in the middle.	Comes back within frame but does not come to table. Sits on the chair arm facing away from the center.

	Need to be there for 3 s otherwise continue elopement.	Kneels into chair.	Is there for less than 3 s

Caregiver Strategy			
Strategy	**Definition**	**Example**	**Non-example**
Universal	Positive Descriptive Feedback Caregiver provides the child with positive feedback describing a behavior the child engaged in. Must include ALL: 1. Positive language (e.g., "yay", "you did it", "nice", "good", "way to go", "like a big girl", "thank you") 2. Description of child's behavior by labeling the behavior with a noun or verb (e.g., cleaned up) "Great that is your arm!" "Right leg, awesome" "There ya go, you helped mom" "Put on pants" child puts on pants "Pants on, nice." *Cannot co-occur with CB*	"You did it! You cleaned up!" "High five, you finished"	"Great job" "You did great"
Prevent	First-Then+ Initial introduction must include ALL: 1. State the activity/behavior that needs to be completed AND the reinforcer OR *potential* reinforcer (does NOT need to be in sequential order) 2. Second item/activity that comes after must be a potentially preferred item/activity (does NOT need to be vocally stated; can be paired with secondary indicator of gesture or physical presence) 3. The word "first" AND/OR "then." Does not need both, but explicitly needs at least one of these words to order the events. Subsequent references to First-Then can include verbal reminders, gestures (e.g., point at the visual or tap the visual), or physical proximity (e.g., setting the visual next to him). Verbal	Place board in front of E Hand him a piece/token "First eat" "You're working for iPad."	Leaving reinforcer ambiguous: "First take a bite and then we'll see."

	reminders must include a reference to the expected behavior OR a reference to the potential reinforcer. Following: can be any piece *10 s between first and then for them to be coded as two* *Can co-occur with CB*		
Teach	First mark the onset of the caregiver vocal establishing statement OR discriminative stimulus according to function (reminder a new onset is indicated by a 5s latency from the offset of the caregiver's previous statement) a. Statement provides one of the following: i. Clear task direction ii. Suggestive question iii. Potential access to/retention of reinforcer iv. Potential removal of an aversive stimulus Caregiver statement motivates child to bid/ask for attention. 1. Caregiver states the replacement behavior child needs to use to access attention. 2. Caregiver mentions presence as if to say "I am available." 3. Caregiver verbally states the removal of attention. Statement may include an activity that that does not involve the child's presence (e.g., "I'm going to make lunches for a bit") and requires a secondary	"I'm going to fold laundry" and leaves room. "You can ask for help if you need it."	Mom wondering where the help card is/trying to find it. "Now where is the help card?"

	indicator of removal of verbal attention or physical presence. Secondary indicators include: (1) caregiver leaving the area the child is in, (2) items needed for the activity/action are in an area the child is not in. • Non-example: caregiver says, "I need to wash dishes" and remains in the room talking to child while child continues to play in the same room. • Non-example: caregiver and child are playing together. Caregiver says, "I'm going to build this truck." Non example: Compliance with the prompt to receive attention (e.g., "Hold my hand"). *Can co-occur with CB*		
New Response	Caregiver provides minimal attention (10 s) to the child without referencing the child's challenging behaviors. Attention must be limited to maintaining safety or brief verbal statements. Caregiver gives a brief, verbal reminder of the appropriate behavior the child can engage in. Must be: 1. Positively stated 2. Not paired with negative attention or punishment	Giving a verbal reminder for safety, but no other attention for the rest of the 10 s.	If off screen and no verbal can't code. If verbal reminder can code

	Verbal reminder: Onset within 5 s of the CB *Minimize attention: Onset within 5 s of CB or* *immediately following verbal reminder*		

APPENDIX B
Timeline of Meetings

Week	Meeting Type	Topic
1	Pre-intervention	Consent
2	Pre-intervention	Intake
3	Pre-intervention	App Intro
4	Pre-intervention	ABC data
5	Pre-intervention	BSP Overview
6	BST Training	Universal
7	Coaching	Universal
9	BST Training	Prevent
10	Coaching	Prevent
11	BST Training	Teach
12	Coaching	Teach
13	Coaching	Teach
14	Coaching	Teach
15	BST Training	New Response
16	Coaching	New Response
17	Fading	Fading

APPENDIX C
Intake Checklist

Family #: _____   Date: Researcher:

1. Child Age:
2. Diagnosis:
3. Tell me a little bit about your child's challenging behaviors and when they occur." Some examples might be screaming, crying, tantrums, noncompliance, throwing things, hitting, biting…

Behavior:

Frequency:

Duration:

Routine:

Time of day:

Person:

4. Which behavior and routine would you like to target as primary? This could be the behavior that is most consistent, or most concerning to you. This will be the behavior and the routine that we target for the purposes of data collection for this study, so this will be when we come to observe."

5. Meal time: how often sitting down to eat, how long can he sit down?

6. Is there anything else you'd like for us to know about your child's behavior?

7. Communication preferences: how often do you want to meet? Zoom vs phone call?

APPENDIX D
Introductory Meeting Fidelity

Date of Training: **Implementer:**
Family ID: **Data Collector:**

Behavior	Correct Implementation?	
Introduction		
Coach greets family and briefly reviews agenda	Y	N
Coach briefly explains their role in the study	Y	N
FBSApp Installation		
Coach confirms family has *installed the app* **or** walks them through the process if not	Y	N
Coach confirms family has *created an account* **or** walks them through the process if not	Y	N
Coach confirms family has *added the researchers and coach as a professional* **or** walks them through the process if not	Y	N
Child Information		
Coach asks family to enter basic child information on app	Y	N
Coach asks family to enter child's communication on app **and** explains that challenging behavior may be a form of communication for some children	Y	N
Coach asks family to enter child preferences on app	Y	N
Universal Supports page		
Coach briefly explains general purpose and functionality of universal support strategies	Y	N
Coach describes logistics of universal supports page (including logging into the app once per day over next four days)	Y	N
Review Next Steps		
Coach sends pre-study questionnaire and asks family to complete before next meeting	Y	N
Coach reminds family about recording and uploading pre-baseline videos	Y	N
Coach asks and answers any questions the family has **or** makes a plan to follow-up regarding any questions not answered	Y	N
Coach tells family that she will reach out to schedule the next meeting (ABC/BSP meeting)	Y	N
Total:		0
Percentage Correct (Total Y / Total Y + N)		

ABC Data Training

Date of Training: **Implementer:**
Family ID: **Data Collector:**

Introduction		
Coach greets family and briefly reviews agenda	Y	N
Coach checks in with the family about how things have been going, including answering any questions or trouble-shooting any tech/routine issues	Y	N
ABC		
Coach introduces ABC video	Y	N
Coach plays the ABC video and checks for understanding	Y	N
Coach reiterates information presented on video using the infographic	Y	N
Coach explains how ABC data collection relates to the function of challenging behavior (and how this is used by the app)	Y	N
Coach uses reflective questions to help caregiver identify antecedents and consequences in pre-baseline video	Y	N
Coach supports caregiver in entering one instance of ABC data	Y	N
Review Next Steps		
Coach instructs caregiver to enter one instances of ABC data per day over the next 3-4 days (including reviewing potential prompts [e.g., alarm on phone])	Y	N
Coach prepares caregiver for hypothesis statement	Y	N
Coach reminds caregiver about recording and uploading pre-baseline videos	Y	N
Coach asks and answers any questions the family has **<u>or</u>** makes a plan to follow-up regarding any questions not answered	Y	N
Coach makes a plan with caregiver to schedule the next meeting (BSP meeting)	Y	N
Total:		
Percentage Correct (Total Y / Total Y + N)		

BSP Overview Meeting Procedural Fidelity				
Date:	Family:			
Coach:	Data Collector:			
BSP Meeting Components	**Y**	**N**	**N/A**	**Notes/Comments:**
1. Welcome statement to families			■	
2. Checks in with family about how things have been going since previous meeting			■	
3. Asks family 1-2 questions about their experience with ABC data collection Tally			■	
4. Reviews the following points regarding function: • Function = purpose of child's CB • To gain or escape something			■	
5. Describes connection between function and identification of strategies to prevent or reduce CB			■	
6. Reads family's hypothesis statement <u>and</u> rephrases it with language from the family's ABCs (see example in script)			■	

8. Asks family if the statement reflects their experience with their child's CB:
• If yes – prompts the family to mark YES
• If no – asks clarifying questions and checks for agreement again (***box above would be N/A and all below boxes would be Y or N***)
   o If still no – prompts the family to mark NO <u>and</u>
   o supports family as they add more ABC data until new hypothesis statement appears
   o Reviews new hypothesis statement <u>and</u> asks family if they agree
	Mark cells below			

9. Introduces BSP overview video			■	
10. Reviews logistics of video: • length of video, • how to indicate that they want to stop,			■	

• follow along in app			■	
11. Reminds family of where the video is located <u>and</u> encourages them to watch again as needed			■	
12. Orients family to infographic (i.e., describes purpose and highlights the info included)			■	
13. Describes the relation between antecedents and prevent strategies			■	
14. Asks family: What prevent strategies are listed on their child's BSP			■	
• If no response – reminds family where the antecedents are listed in the app <u>and</u> provides the child's prevent strategies (***mark N/A if family responds***)				
15. Describes the relation between challenging behavior and new skills/teach strategies			■	
16. Asks family: What new skills are listed under teach strategies in their child's BSP			■	
• If no response – tells them the strategies from their child's BSP (***mark N/A if family responds***)				
17. Reviews the importance of efficiency of replacement skill			■	
18. Asks family the following questions to specify child's replacement skill:				
• How does the child currently communicate this particular want/need?				
• How would you like the child to communicate instead?				
• Are there things, aside from CB, that the family would not accept from the child to communicate this want/need?				
19. Repeats the specifics of the replacement skill back to the family to verify understanding.				
20. Describes the relation between consequences and new response strategies			■	
			■	

21. Asks family: What new response strategies are listed on their child's BSP <u>and</u> waits 10s for a response • If no response – tells them the strategies from their child's BSP (***mark N/A if family responds***)				
22. Tells family the next step in the process will be a few observations without coaching			■	
23. Provides brief overview of coaching <u>and</u> what to expect (i.e., one strategy at a time, training before each type; see script for example)			■	
24. Informs the family that they will reach out to schedule first training in several days			■	
Totals				

% Fidelity = $\dfrac{total\ yes}{total\ yes + total\ no}$

% Fidelity = _____96.3%_____ Total Scored Components (total yes + total no): __

Total YES: __
Total NO: __

BST Procedural Fidelity				
Date:	Family:			
Coach:	Session ID:			
BST Components	**Y**	**N**	**N/A**	**Notes/Comments:**
1. Welcome statement to families			■	
2. Reviews agenda			■	
3. Reminds family that meeting will be recorded (and start recording)			■	
4. Asks family 1-2 questions about their experience since last meeting Tally			■	
5. Reviews the following points regarding universal strategies: • Introduce all strategies • Discuss "relevant" strategies • Discuss purpose • Discuss importance			■	
6. Introduce target strategy (PDF)			■	
7. Walk family through accessing the PDF infographic			■	
8. Direct instruction on PDF: • Describe two components of PDF • Describe difference between PDF and general praise • Give examples of PDF • Talk with family about examples			■	
9. Scaffolded Scenario Practice: • Show first video clip and give example of PDF in context • Show second video clip • Prompt caregiver to give example of PDF in context • Support caregiver (if needed) to come up with example of PDF			■	
10. Review baseline data			■	
11. Discuss next steps			■	
12. Give reminder about recording and uploading videos			■	
13. Schedule next coaching session			■	
Totals				

% Fidelity = $\frac{total\ yes}{total\ yes + total\ no}$ x 100

% Fidelity = ___100%___

Total YES: __

Total NO: __   Total Scored Components (total yes + total no): __

Pre- Questionnaire

What is your name?	
What is your gender?	
What is your age?	
What race/ethnicity do you identify as?	
What is the highest level of education you have completed?	
Other:	
What is your occupation?	
What is your child's name?	
What is your child's birthdate?	
What is your relationship to the child?	
Other:	
Does your child have any siblings?	
What are the names and ages of the siblings?	
Do any other family members live in your household?	
Who else lives in the household?	

What languages do you speak with your child?	
Is your child currently enrolled full- or part-time in daycare, preschool, or another childcare setting?	
What is your child's diagnosis?	
What services does your child receive?	
Has your child ever been hospitalized or experiences a significant illness or injury?	
Is there anything else about your child's developmental history that you'd like to share?	
How satisfied are you with your relationship with your child?	
How often does your child engage in challenging behaviors?	
To what extent does this behavior negatively impact you and your family's life?	
How confident do you feel using strategies to prevent your child's challenging behavior?	
How confident do you feel teaching your child to use their words instead of challenging behavior?	
To what extent do you feel your child communicates their wants and needs in an appropriate way?	
How confident do you feel in responding to your child's challenging behaviors?	

Post Questionnaire

How satisfied are you with your relationship with your child?	Very satisfied Somewhat satisfied Neutral Unsatisfied Very unsatisfied
How often does your child engage in challenging behaviors?	About once per month About once per week A few times per week Daily Multiple times per day
To what extent does this behavior negatively impact you and your family's life?	Significant impact Some impact A little impact No impact
How confident do you feel using strategies to prevent your child's challenging behavior?	Very confident Somewhat confident Not very confident Not confident at all
How confident do you feel teaching your child to use their words instead of challenging behavior?	Very confident Somewhat confident Not very confident Not confident at all
To what extent do you feel your child communicates their wants and needs in an appropriate way?	All the time Often Sometimes Not very often Never
How confident do you feel in responding to your child's challenging behaviors?	Very confident Somewhat confident Not very confident Not confident at all
How satisfied are you with the FBSApp?	Very satisfied Pretty satisfied Satisfied Not too satisfied Not satisfied at all
How satisfied are you with the coaching you've received?	Very satisfied Pretty satisfied Satisfied Not too satisfied Not satisfied at all
How satisfied are you with your experience in this study?	Very satisfied Pretty satisfied Satisfied Not too satisfied Not satisfied at all

What was the most useful aspect of participating in this study?	
What was the most useful component of the app?	
What was the least useful aspect of participating in this study?	
How likely are you to use the FBSApp in the future?	Very likely I might use it I probably won't I definitely won't
How likely are you to recommend the FBSApp to other families?	Very likely Pretty likely I might I probably won't I definitely won't
What changes, if any, would you make to the app or procedures?	
Is there anything else you'd like for us to know?	