



An Interdisciplinary Approach to Treating Severe Behavior in a Juvenile Justice Facility: Teaching Behavioral Self-Management via Telehealth

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Abstract

Adolescents living in residential juvenile justice facilities often receive mental health services during their stay to address committed offenses, yet some display challenging behavior during moments of conflict within the facility. These challenging behaviors could result in risk of harm to self or others, or the individual may experience punishment from facility staff. The purpose of this study was to explore the effects of an additive voluntary focused intervention for individuals who continued to display challenging behavior despite participation in “treatment as usual” in a juvenile justice facility. We implemented a self-management intervention, supported through interprofessional collaboration, via telehealth with four male adolescents. Using Behavior Skills Training, we taught participants to self-monitor precursors for challenging behavior and identify an alternative behavior to engage in to prevent overt challenging behavior events. Alternative behaviors were responses incompatible with the challenging behavior, or served as a rule to prompt self-management of further behavior. Results show all four participants increased their selection of alternative behaviors when presented with an evocative situation and a precursor for a severe behavior event during simulations. In addition, three participants stated they would use alternative behaviors across precursors *not* presented during teaching; however, two participants required booster sessions to maintain appropriate responding during simulations. Outside of simulated sessions, facility staff reported modest decreases in participants’ challenging behavior during and after the intervention.

Keywords Interprofessional collaboration · Juvenile justice facilities · Precursors · Self-management · Telehealth

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Despite involvement in mental health treatment while residing in a juvenile justice facility, adjudicated adolescents may display challenging behaviors such as disruption, property destruction, and physical aggression in response to day-to-day interpersonal conflicts (Keiley & Seery, 2001; Zaremba & Keiley, 2011). Engaging in such behavior within a justice facility can result in highly punitive consequences such as extended periods of isolation and time out from preferred activities. In addition, studies suggest that adolescent offenders who display interpersonal aggression are at greater risk for recidivism (Worling & Långström, 2003). To minimize the risk associated with displaying challenging behavior while residing in, and after release from, juvenile facilities, it is critical that individuals acquire more contextually appropriate behaviors to engage in during conflicts, instead of challenging behavior.

Typically, adolescents in justice facilities receive mental health services to address concerns around the committed offense. Some common treatment approaches include, but are not limited to, Cognitive Behavioral Therapy (CBT), Cognitive Process Therapy (CPT), Dialectal Behavior Therapy (DBT), Attributional Retraining (AR), and Psychoeducational group interventions (Kumm et al., 2019). Despite progress with these therapy approaches, some adolescents may struggle with managing daily conflicts within the facility. If primary mental health service providers have access to interprofessional collaboration opportunities, they may seek help from other disciplines to better address daily behavioral concerns. One potential solution could be the addition of focused individual behavioral interventions with oversight from behavior analysts (Luna et al., 2022). Thus, behavioral services may be considered another additive component of intervention when “treatment as usual” is unable to fully address daily behavioral concerns within the facility.

Interprofessional collaboration is a dynamic process, defined by sharing, partnership, and interdependency among professionals from multiple disciplines in order to provide comprehensive treatment (D’Amour et al., 2005). Previous research has identified the beneficial role behavior analysis can play on interdisciplinary teams across various settings, including mental health, psychiatry, and other allied mental health professions. Specifically, added benefits may include structured components such as data collection, single-subject research design, and functional analysis of relevant environmental variables (Busch et al., 2020; Summers et al., 2022). Overall, behavior analysts can enhance treatment within facilities that provide mental health care, and professionals across disciplines would benefit from increased demonstrations of successful collaboration.

Despite the potential utility of behavior analysis within facilities, systemic variables may affect the success of behavioral treatments. Notably, due to the highly structured nature of these facilities, clinicians may not be able to alter environments that evoke positive behavior from adolescents. Additionally, facility staff members, who are the primary providers of consequences for challenging behavior, typically implement consequences as indicated by institutional guidelines, which may be punitive (Brogan et al., 2019a). Due to systemic operations, clinicians may be unable to provide direct training on behavior reduction strategies to all relevant staff members.

In addition to the challenges imposed by the physical and cultural structures of secure facilities, the very nature of the residents' behavior may pose challenges for clinicians. For example, some stimuli that evoke challenging behavior are private, internal events, and thus are inaccessible to direct observations by clinicians. Cooper et al. (2020) suggested that self-management strategies could be appropriate when behaviors are inaccessible or when external change agents may miss important instances of the behavior. Self-management strategies may also lead to better environmental conditions for larger groups of individuals, which is relevant for justice facilities. Moreover, self-management strategies allow the individual a degree of autonomy; this independence may foster generalization and maintenance of behavioral change (Cooper et al., 2020). Generalization and maintenance in the natural environment are particularly important for this target population because engaging in appropriate alternative behaviors in socially significant settings over time would contribute to successful rehabilitation back into previous environments, thus reducing risk of recidivism (Worling & Långström, 2003).

One important step in treating challenging behavior in these settings may involve identifying signals, both overt and covert, for challenging behavior. Thereafter, therapists can teach residents to use self-management strategies when those signals are present to prevent challenging behavior. Behavior analytic technology includes methods to (a) examine classes of behavior and (b) identify precursors for more severe behaviors. A functional response class exists when the same consequence maintains multiple behaviors with different forms (Cooper et al., 2020). Numerous studies have demonstrated that behaviors may occur in predictable patterns or response classes, thus creating a hierarchy of response forms (e.g., Harding et al., 2001; Herscovitch et al., 2009; Lalli et al., 1995; Najdowski et al., 2008). From a clinical perspective, precursors are less intensive or problematic responses that appear early in a response hierarchy or response chain and culminate in severe challenging behavior (e.g., Heath & Smith, 2019). Studies have demonstrated the clinical utility of training caregivers to intervene following precursor behaviors as a safer alternative to intervening directly on problem behavior (Borlase et al., 2017; Borrero & Borrero, 2008; Dracobly & Smith, 2012; Fritz et al., 2013; Herscovitch et al., 2009; Hoffmann et al., 2018; Langdon et al., 2008; Najdowski et al., 2008; Smith & Churchill, 2002). It is possible that clinicians can apply a similar approach to teaching self-management.

To date, few behavior-analytic studies have explored the potential utility of using private events as precursors when teaching self-management strategies. Anderson et al. (1997) explained that private events fall into one of four classes: (a) emotions, (b) thoughts, (c) perceptions, and (d) interoceptive and proprioceptive stimuli. As a related example, Moore et al. (2022) taught three individuals diagnosed with autism spectrum disorder to engage in relaxation responses when they emitted overt behaviors in the presence of specific events (e.g., loud noises) that were indicative of anxiety (an internal event). Although participants' private events were not observable to a therapist, those events directly or indirectly evoked challenging behavior. Through respondent conditioning, operant conditioning, or both, an individual may respond discriminatively in the presence of these private stimuli. For example, when in the presence of a peer who is cursing loudly, an adolescent may experience increased

heart rate, blushed face, visceral contractions, and simultaneously or subsequently engage in verbal behavior or avoidance reactions (Anderson et al., 1997). Thereafter, an adolescent's response can either be appropriate for the current setting (e.g., engaging in a coping strategy to devalue consequences for aggressive behavior) or less appropriate (e.g., allowing internal events to set the occasion for aggressive behavior to contact reinforcing consequences). Therapists typically focus on overt, operant behavior because respondent behavior is often covert. However, there may be value in teaching adolescents to control their respondent behavior in order to decrease their motivation for engaging in the less contextually appropriate operant behavior.

The purpose of the current investigation was to evaluate an additive voluntary focused two-part Behavior Skills Training (BST; Miltenberger, 2012) self-management intervention, supported through interprofessional collaboration, to teach adolescents residing in a juvenile justice facility to (a) identify private and public precursor behaviors of their own challenging behavior and (b) respond to precursor events by engaging in alternative appropriate behaviors. The overall goal of teaching residents' self-management strategies was to increase the probability they would emit alternative behaviors independent of an external change agent. Due to the COVID-19 pandemic, practitioners could only provide services to residents via telehealth modalities.

Method

Participants

Four adolescents residing in a secure male juvenile residential justice facility participated in the current study. Each participant was adjudicated for illegal sexual behavior and, subsequently, court-ordered to receive treatment via the Accountability Based Sex Offender Prevention Program (ABSOPP) at the facility. For a description of the services provided within ABSOPP, please see Brogan et al. (2018). Specifically, "treatment as usual" for adolescents within the facility included trauma-focused cognitive behavioral therapy provided by mental health specialists, educational services provided by the public school district, and recreational services provided by a university affiliated program (Brogan et al., 2018; Luna et al., 2022). As an additive component of ABSOPP, Licensed Behavior Analysts (LBAs), who were also doctoral students, and students from a local Applied Behavior Analysis (ABA) Master's program (hereafter, ABA therapists) provided trauma-informed behavior-analytic services to referred residents. Primary clinical mental health therapists or facility staff members referred participants for treatment due to repeated occurrences of challenging behavior within the facility. After referral, ABA therapists conducted an intake interview with the referred participant's primary clinical mental health therapist to better understand behavioral concerns and trauma history. Then, ABA therapists met with the referred participant to conduct an additional intake. Table 1 provides participant characteristics.

Table 1 Participant characteristics

Participant Number	Age in Years	Race	Referral Concerns	Concurrent Services	Precursors	Duration of Intervention
P1	18	Black	Disrespecting staff, Bullying other students, Aggression	TF-CBT, Recreational, Educational	Clenching jaw, Clenching fists, Taking off jacket	1 month, 18 days
P2	15	White	Aggression, Property destruction, Defiance, Social skills deficits	TF-CBT, Recreational, Educational	Vision clouds, Muscles tense, Head hurts	4 months, 3 days
P3	16	Black	Property destruction, Aggression	TF-CBT, Recreational, Educational	Ball up fists, Breathe rapidly, Muscles tense	3 months, 13 days
P4	12	White	Aggression, Property destruction, Self-injurious behaviors	TF-CBT, Recreational, Educational	Face gets hot, Palms sweat, Heart beats rapidly	10 months, 23 days

Age at start of the current intervention. Referral concerns reported by referral source (i.e., staff, clinical mental health therapists). Precursors identified during pre-assessment. Duration of intervention reports from first baseline session to last generalization session conducted with participants (maintenance sessions are not included). P = participant. TF-CBT = Trauma-Focused Cognitive Behavioral Therapy

After intake, ABA therapists compiled a list of possible treatment options that was later reviewed with participants for their input. Three participants selected this specific intervention (described below) as their first choice. Participant (P) 1 initially selected a different intervention; however, they experienced significant barriers with that intervention. Subsequently, P1 agreed to work on this protocol, as recommended by their primary clinical mental health therapist, to facilitate progress on the original intervention. Anecdotally, completing this intervention facilitated P1's progress with the originally selected intervention. ABA therapists periodically communicated with primary clinical mental health therapists via phone call, email, or video call to describe the focused intervention, as well as discuss participant progress or concerns. The primary clinical mental health therapists also provided guidance on variables that might affect treatment, emotional triggers, and aspects of their ongoing treatment that could be reinforced through the current intervention.

Setting

Due to the COVID-19 pandemic, facility administrators allowed only essential personnel to enter the juvenile facility. Thus, residents in the juvenile facility received remote therapy services via a secure video conferencing system, Zoom™. Facility staff maintained a therapy schedule for each dorm. A few minutes prior to the start of an appointment, staff accompanied participants in the transition from the ongoing activity within the dorm to a separate windowed room within the building. Rooms were equipped with a table, chair, computer with camera, and sometimes an additional table or cabinet. The participants attended appointments alone with staff walking past to check-in through the windows about every 10 min. The primary ABA therapist for the participant was remotely present during every appointment. Other ABA therapists or LBA supervisors remotely attended at least one appointment a week in order to record interobserver agreement and treatment integrity data, run generalization sessions, or observe for supervision purposes (LBAs only). Typically, ABA remote therapy appointments were 45 min in duration, one to two times per week. Each participant's involvement in ABA appointments was voluntary. Specifically, participants could opt out of appointments at any time. Prior to each individual appointment and intervention session, participants provided verbal assent to participate. ABA therapists served as the instructors and data collectors for the current study. Typically, ABA therapists conducted one, 10-trial session per 45 min appointment. They collected data electronically on an Excel® template. Each week, ABA therapists prompted facility staff to record daily data on each participant's behavior outside of therapy appointments. All conversations with staff members took place via telephone without video.

Response Measurement and Reliability

We defined participants' challenging behavior as: (a) loud, offensive, profane, or disrespectful comments or questions that may or may not be directed toward another individual or (b) physical action such as throwing, ripping, breaking, punching, or

forceful movement of objects in a manner other than the object's intended purpose (e.g., pushing a chair 2 m, throwing a pencil). By contrast, ABA therapists helped participants identify alternative behaviors for their challenging behaviors. ABA therapists assisted participants in selecting specific alternative behaviors they could emit during therapy sessions, as well as at any time and location throughout the facility. Their alternative behaviors included: (a) repeating a verbal rule to self (e.g., "I will not throw the chair."), (b) engaging in physical activity (e.g., taking a short walk), (c) squeezing loose ends of shirt or jacket, (d) taking three to five inward–outward breaths, and (e) completing a five senses activity (i.e., stating five things they could see, four things they could touch, three things they could hear, two things they could smell, and one thing they could taste). These alternative behaviors were adapted from resources on general coping strategies from the American Psychological Association¹ and Mayo Clinic².

During simulation sessions, ABA therapists recorded data on correct and incorrect responding. We scored a correct response when the participant either engaged in a trained alternative behavior or described the alternative behavior they would engage in. We also scored a correct response when the participant emitted a novel alternative behavior that was not one of the five selected for teaching, but could be an appropriate coping strategy (e.g., counting backwards from 100). More specifically, the alternative behavior had to be a self-managed response and incompatible with the challenging behavior in the moment. We scored an incorrect response when the participant either engaged in challenging behavior or stated that they would engage in a challenging behavior (specific or general). No participants displayed challenging behavior during simulation sessions. We scored a non-response when the participant either engaged in a verbal response stating that they do not know what to do or they failed to respond to a second presentation of the discriminative stimulus (S^D) within 15 s.

Outside of ABA sessions, staff members collected data on (a) the count of days (i.e., whether challenging behavior did or did not occur each day) participants displayed challenging behavior each week and (b) the severity of challenging behavior on a 5-point Likert scale (1 = not at all severe and 5 = severe danger to self or others). We included (b) because we knew that (a) lacked sensitivity for detecting small or transitional decreases in challenging behavior. If the participant did not display challenging behavior during the week, we coded a "0" for severity. ABA therapists neither informed staff members of participants' progression in training nor provided staff members with instructions for intervening with the participants. Due to the COVID-19 protocols put in place by the facility and limited interaction with all of the possible staff that could be on shift, researchers were unable to directly train staff to collect data on challenging behavior. Anecdotally, staff would confirm that they observed the participant every day that week, or they checked a records sheet maintained by staff across shifts that described any behavior incidents. Researchers

¹ <https://www.apa.org/topics/anger/strategies-controlling>

² <https://www.mayoclinichealthsystem.org/hometown-health/speaking-of-health/5-4-3-2-1-countdown-to-make-anxiety-blast-off>

did not collect interobserver agreement data. We converted data on daily occurrences into an average percentage of days with challenging behavior per week. We collected these supplemental measures through the maintenance phase to evaluate the extent to which participants' challenging behavior decreased outside of simulated sessions.

Interobserver Agreement

A second independent observer collected data during 41.4% of sessions across all four participants (range, 22.2% to 62.5%). We calculated agreements using trial-by-trial exact agreement. Each session contained 10 trials. For each trial, experimenters recorded a 1 for agreements (i.e., both observers scored a response as correct, incorrect, or as a non-response) and a 0 for disagreements (i.e., observers scored a given trial differently). We summed agreements and then divided by the number of opportunities and multiplied by 100% ($\# \text{ agreements}/\text{total opportunities} \times 100\%$).

During baseline, we obtained secondary observations during 100%, 60%, 83.3%, and 85.7% of sessions for P1, P2, P3, and P4, respectively. During post-teaching with feedback, we obtained secondary observations during 66.7%, 100%, 66.7%, and 36.4% of sessions for P1, P2, P3, and P4, respectively. During generalization, we obtained secondary observations during 0%, 100%, 50%, and 42.9% of sessions for P1, P2, P3, and P4, respectively. During maintenance, we obtained secondary observations during 0%, 10%, and 27.3% of sessions for P2, P3, and P4, respectively. P1 did not participate in maintenance sessions. Baseline phase mean agreement scores were 86.7% (range, 80% to 90%), 90% (range, 70% to 100%), 83.8% (range, 70% to 100%), and 83.3% (range, 60% to 100%) for P1, P2, P3, and P4, respectively. Post-teaching with feedback phase mean agreement scores were 100%, 100%, 100%, and 97.5% (range, 90% to 100%) for P1, P2, P3, and P4, respectively. Generalization phase mean agreement scores were 85% (range, 70% to 100%), 90%, and 100% for P2, P3, and P4, respectively. Maintenance phase mean agreement scores were 100% for both P3 and P4.

Treatment Integrity

We assessed treatment integrity for 44.2% of sessions (range, 25% to 68.2%) across all four participants. The first and second author created a checklist for each phase that consisted of the implementer's target behaviors (see [Appendix](#)). Some additional treatment integrity components were collected in the current investigation but have been omitted in the [Appendix](#) to better clarify the independent variable for readers. Components not included addressed therapists ensuring participant's orientation, preparing materials, and following facility safety procedures in the chance dangerous behavior occurred. During each session in which we assessed treatment integrity, an observer scored each checklist item as either correct or incorrect as applicable. At the end of each session, we summed the number of correct and incorrect checklist items. We divided the total number of correct items by the

total number of opportunities and then multiplied by 100% (# correct responses/total opportunities X 100%).

During baseline, we calculated a treatment integrity score for 0%, 100%, 83.3%, and 85.7% of sessions for P1, P2, P3, and P4, respectively. During BST, we calculated a treatment integrity score for 100% of sessions for all four participants. During post-teaching with feedback, we calculated a treatment integrity score for 33.3%, 100%, 66.7%, and 27.3% of sessions for P1, P2, P3, and P4, respectively. During generalization, we calculated a treatment integrity score for 100%, 100%, 0%, and 0% of sessions for P1, P2, P3, and P4, respectively. During maintenance, we calculated a treatment integrity score for 30%, 0%, and 0% for P2, P3, and P4, respectively. Treatment integrity scores for ABA therapists' implementation of procedures during baseline phase were 99.2% (range, 95.8% to 100%), 100%, and 100% for P2, P3, and P4, respectively. Treatment integrity scores during BST sessions were 97.5% (range, 95% to 100%), 92.9% (range, 85.7% to 100%), 91.4% (range, 82.8% to 100%), and 98.3% (range, 96.6% to 100%) for P1, P2, P3, and P4, respectively. Treatment integrity scores during post-teaching with feedback phase were 96.6% (range, 95% to 100%), 96.3% (range, 92.3% to 100%), 97.6% (range, 95.1% to 100%), and 88.3% (range, 73.3% to 97.2%) for P1, P2, P3, and P4, respectively. Treatment integrity scores during generalization phase were 100% for both P1 and P2. The treatment integrity score during maintenance phase for P2 was 98.6% (range, 95.8% to 100%).

Procedures

Pre-assessment

Prior to baseline, ABA therapists completed a pre-assessment with each participant in order to help them identify the evocative situations and precursors (both covert and overt) that usually preceded challenging behavior. The first author created a two-part template for the pre-assessment. ABA therapists conducted pre-assessments remotely by sharing their screen so that the participant could view the template. There were 10 blank slots at the top of the template with the prompt: "General situations that make you angry." The ABA therapist read the prompt aloud and typed the participant's response in the blanks. If the participant stopped responding for 15 s, the ABA therapist provided additional verbal prompts such as asking the individual to describe a recent incident that upset them. If the client verbally stated that there were no other situations, but had not filled all 10 blanks, the ABA therapist stopped providing prompts. Later, the ABA therapist contacted and prompted facility staff or clinical mental health therapists to fill the remaining evocative situations.

The bottom of the template consisted of a three-column narrative ABC analysis. The purpose of this portion of the assessment was to identify precursors to challenging behavior. The first, second, and third columns were labeled "What happens before (i.e., How are you feeling? What are you thinking? What is your body doing?)," "Challenging behavior (i.e., yelling, throwing, etc.)," and "What happens after (i.e., Feeling relaxed, less angry? What is your body doing?)," respectively.

ABA therapists prompted the participant to fill out this section by stating: “I want you to think about events that happen internally (e.g., emotion, thought) and physically (e.g., body temperature rising, fists clench, stomach churning) both before and after the challenging behaviors.” The goal was to complete at least three rows in order to have three precursors to use during intervention. Importantly, the precursor only needed to occur before some instances of challenging behavior. If the participant did not respond within 15 s, ABA therapists provided verbal prompts such as asking them to think about a recent incident and describe what was happening with their body. ABA therapists ended the pre-assessment when the participant (a) identified at least three precursors and (b) verbally stated they did not want to add anything else.

Because P4 struggled to identify specific precursors (both covert and overt) during the second part of the pre-assessment, the second author developed a visual prompt consisting of common events that might happen when getting angry. Examples included heart beating fast, balling up fists, face gets hot, and breathing fast, among others. The ABA therapist presented the visual prompt via screen share and then asked P4, “Do any of these happen to you?” The ABA therapist highlighted the ones that P4 selected. With this prompt, P4 identified six precursors; they ultimately selected three that happened most frequently. ABA therapists identified 10 unique scenarios for each participant. Examples of these scenarios include peers shoving, threatening, or excluding the participant; staff members taking items away from the participant; and staff members unexpectedly changing the participant’s schedule. Please refer to Table 1 (sixth column) for a list of the three precursors identified from the pre-assessment for each participant.

Session Overview

Each Zoom™ session consisted of 10 trials and lasted 5 to 10 min. Materials for all sessions included client protocol with scripts, data sheet, list of evocative scenarios, and target precursor. ABA therapists introduced each session by providing a brief description of procedures. During each trial, ABA therapists presented one of the evocative situations identified from the pre-assessment (e.g., “During free time your peers are playing a card game. When you ask them to play, they rudely say no and tell you to go away.”), then delivered the S^D: “Imagine [targeted precursor] starts happening. Tell me what you would do next.” ABA therapists randomly presented a different evocative scenario each trial such that the scenarios were different for every trial. ABA therapists collected data on correct, incorrect, or no response and the alternative behavior selected, if applicable. Contingent on a non-response, ABA therapists re-presented the scenario and S^D. We set the acquisition criteria at 90% or higher correct responding for three consecutive sessions across two therapists.

Baseline During the baseline phase, ABA therapists conducted a 10-trial probe session for all three precursors identified in the pre-assessment. ABA therapists conducted probe sessions in the order in which the respective participant identified precursors. Notably, we did *not* determine which precursor was the most reliable predictor of each participant’s challenging behavior. Thus, after conducting a single

probe session with the first two listed precursors from the assessment, ABA therapists arbitrarily selected the last precursor as the targeted precursor for each participant during the remaining baseline and teaching sessions. ABA therapists followed procedures listed in the session overview section above and responded to all correct and incorrect responses neutrally (e.g., saying “Ok.” “I see.”). ABA therapists provided general praise for participation. ABA therapists moved to teaching sessions once baseline responding was low and stable with no increasing trends.

Teaching During this phase, ABA therapists conducted two separate BST sessions with participants. Initially, ABA therapists (a) provided an overall description and rationale for the BST sessions and (b) explained that the goal was for the participant to learn alternative behaviors during simulations and then use those behaviors to respond to their precursors of challenging behaviors both within and outside of sessions.

The purpose of the first BST session was to teach the participant the five different alternative behaviors. ABA therapists completed BST by: (a) listing and describing five selected alternative behaviors and asking the participant to describe them in their own words, (b) modeling the alternative behaviors, (c) asking the participant to practice each alternative behavior, and (d) providing positive or corrective feedback on the participant’s practice response. If the participant’s practice response did not topographically match the model’s demonstration, ABA therapists re-presented the model and asked the participant to practice again. ABA therapists solicited and answered participant questions about alternative behaviors. Data for participant responding during BST sessions are not presented; however, ABA therapists used specific criteria to determine when to introduce the second BST session or the post-teaching with feedback phase. Participants met criteria to move to the second BST session once they correctly practiced each of the five alternative behaviors at least once.

The purpose of the second BST session was to teach the participant when to use the alternative behaviors (i.e., in response to the *targeted* precursor). During this session, ABA therapists:

1. Explained the target precursor selected for teaching.
2. Informed the participant that they would (a) present a situation that would make them angry, (b) state the targeted precursor, and (c) prompt the participant to practice engaging in one of the five alternative behaviors.
3. Modeled how to respond to an evocative situation and precursor with an alternative behavior.
4. Asked the participant to practice responding to the precursor by using the same trial setup described in the session overview section above.
5. Provided positive or corrective feedback on the practice response. Contingent on an incorrect response, ABA therapists asked participants to practice again.
6. Solicited and answered participant questions about identifying precursors and engaging in alternative behaviors.

If the participant verbally stated the alternative behavior (e.g., “I would take five inward–outward breaths.”), ABA therapists asked the participant if they would like to practice physically doing the behavior. If the participant agreed, ABA therapists re-presented the scenario and S^D and allowed them to practice the behavior. ABA therapists and participants also verbally reviewed how to consider the appropriateness of an alternative behavior based on the current context (e.g., unable to do a physical activity in the classroom so provide a verbal rule to self instead). They also helped participants identify how some behaviors may be appropriate (e.g., leave to ask a staff member for help), but that it may not be as effective for diffusing challenging behavior in the moment (e.g., because a staff member may not be readily available). Participants met criteria to move to post-teaching sessions once they engaged in three consecutive correct responses. ABA therapists ensured that participants used at least two different alternative behaviors across rehearsals. If participants used the same strategy for two rehearsals in a row, ABA therapists reminded participants to use a different alternative behavior during the next rehearsal.

Post-teaching Post-teaching sessions began with a review prior to the first trial of the session in which the ABA therapist asked the participant to list the previously learned alternative behaviors and to describe when to start engaging in one (i.e., when a precursor is present). ABA therapists then initiated a trial as listed in the session overview section above. Correct and incorrect responses received a consequence from the ABA therapist. Specifically, ABA therapists responded to a correct response with affirming positive behavior-specific feedback (e.g., “Awesome job using an alternative behavior.”). Conversely, following incorrect responses, ABA therapists implemented error correction by providing a verbal description of what would likely happen next for that scenario in their environment due to failing to engage in an appropriate alternative behavior (e.g., “Since you decided to [challenging behavior stated by the participant] you would likely get your book taken away for the day.”). The ABA therapist then asked the participant to describe an appropriate alternative behavior. The ABA therapist proceeded to model the correct alternative behavior the student provided and then re-present the evocative situation and S^D. If the participant could not identify an appropriate alternative behavior, ABA therapists provided a verbal reminder of the behaviors reviewed during BST. ABA therapists continued error-correction procedures until the participant engaged in a correct independent response. As described above, if the participant verbally stated the alternative behavior, ABA therapists asked if they would like to physically practice.

There was one modification for P4 during the post-teaching sessions. Although P4 typically stated they would engage in behaviors more appropriate than challenging behaviors, such as filing a grievance with facility staff about the event, we wanted P4 to engage in an alternative behavior that would reduce the challenging behavior in the moment. In order to make this more salient for P4, ABA therapists added a rule stating: “I would like you to first respond to the signal

with the alternative behavior. For example, if your heart starts beating fast, you want to engage in an alternative behavior so your heart slows down before you do anything else. After this, you can go talk to staff or file a grievance if you feel it is necessary.” ABA therapists continued to present this rule at the start of each session throughout the remainder of the post-teaching phase. After participants met the acquisition criteria for the target precursor, they advanced to generalization sessions.

Generalization To assess generalization of skills to the precursors probed in baseline, ABA therapists repeated baseline procedures with the two precursors that they had not targeted during teaching. The generalization criteria consisted of the participant engaging in a correct response during 90% or greater of trials for non-targeted precursors during generalization probe sessions. If the participant responded correctly during less than 90% of trials during the generalization session, ABA therapists planned to introduce teaching for that specific precursor. This would have consisted of running baseline and teaching as described above until the participant met the 90% acquisition criterion during post-teaching sessions. This did not happen for any participants in the current study. P4 participated in extra generalization sessions.

Maintenance One month after participants met the initial acquisition and generalization criteria, ABA therapists assessed maintenance of those effects across both targeted and non-targeted precursors using baseline procedures. If the participant responded with an appropriate alternative behavior during less than 80% of trials for a given precursor, ABA therapists conducted a booster teaching session. Booster sessions consisted of asking the participant to identify and demonstrate all five alternative behaviors and then ABA therapists provided feedback. If the participant was not able to identify any of the alternative behaviors, ABA therapists completed BST 1 procedures for that specific behavior. Next, ABA therapists completed BST 2 procedures with only one practice response required before running a session of 10 trials with the precursor that had responded below the criteria. ABA therapists used the procedures from the post-teaching phase to complete this session (i.e., ABA therapists provided differential consequences for correct and incorrect responding). ABA therapists conducted 10-trial sessions until the participant responded with an alternative behavior during at least 90% of trials. ABA therapists ran maintenance sessions at least once a month until the participant responded with 80% or higher accuracy for each precursor, or continued running sessions monthly if there was time and the participant agreed to the practice session. ABA therapists also added a component of graphical feedback for P2 prior to sessions in order to increase motivation for correct responding.

Due to P1’s impending release from the juvenile facility, they did not participate in all of the aforementioned phases. To maximize training time, ABA therapists omitted the precursor probes during baseline, weekly data collection from staff members, and maintenance checks. Additionally, staff report data were not collected during the maintenance phase for P4.

Fig. 1 Percentage of trials with alternative behaviors across phases. *Note.* Open data points represent probe sessions with precursors not used during teaching. Filled data points denote each participant's targeted precursor. P = participant

Social Validity Questionnaire

After ABA therapists completed the generalization probes, they invited each participant to complete a social validity questionnaire. If available, a secondary ABA therapist administered the questionnaire. ABA therapists delivered the questionnaire remotely by screen sharing a Word™ document. Procedures included providing the scale anchors (i.e., 1 = not at all true, 3 = somewhat true, 5 = very true), reading each statement aloud, and then recording the participant's verbal response. Table 3 provides both the questions and average ratings of each question.

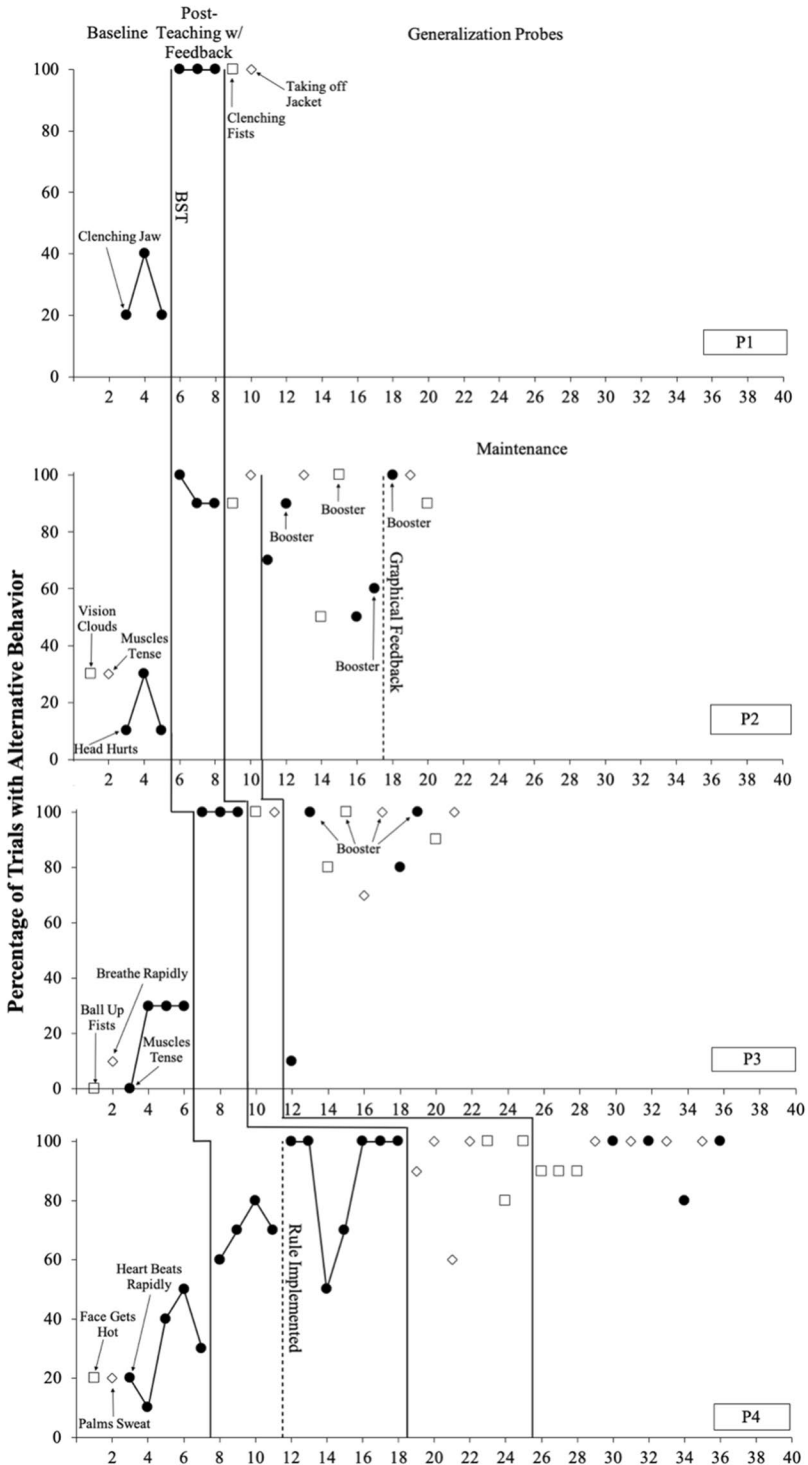
Experimental Design and Analyses

We evaluated the effects of teaching appropriate alternative behaviors in response to a targeted precursor for decreasing challenging behavior using a four-tiered nonconcurrent multiple baseline (NMBL) across participants design (Carr, 2005; Coon & Rapp, 2018; Watson & Workman, 1981). We embedded generalization probes within the NMBL design to evaluate changes following non-targeted precursors and included maintenance assessments. We also used a three-tiered NMBL across participants design to evaluate change in participants' behavior outside of programmed sessions. For both NMBL graphs, we evaluated the effects of training using visual analysis. Specifically, we made decisions about phase changes based on data depicted in Fig. 1.

In addition, we evaluated changes in the percentage of days with challenging behavior and staff ratings of severity in the dorms across phases (depicted in Fig. 2) separately for P2, P3, and P4 using a Mann–Whitney Wilcoxon test (Mann & Whitney, 1947; Wilcoxon, 1945) with R studio. The purpose of this test was to compare data collected across phases and determine whether any differences were statistically significant. The Mann–Whitney Wilcoxon test compares repeated measurements from the same participant to determine differences in mean ranks. We repeated the test for each phase (i.e., Baseline to Intervention, Baseline to Maintenance, and Intervention to Maintenance) separately for each participant, and repeated this process for both occurrence and severity data. For these analyses, we combined data collected during post-teaching with feedback and generalization phases and labeled it Intervention. These tests evaluated if occurrence and severity of participants' challenging behavior were significantly higher in one phase as compared to another.

Results

Figure 1 shows results for the four participants. During baseline, P1 rarely stated that they would engage in appropriate alternative behaviors ($M = 26.7\%$, range, 20% to 40%) with the targeted precursor (clenching jaw). Following BST, P1



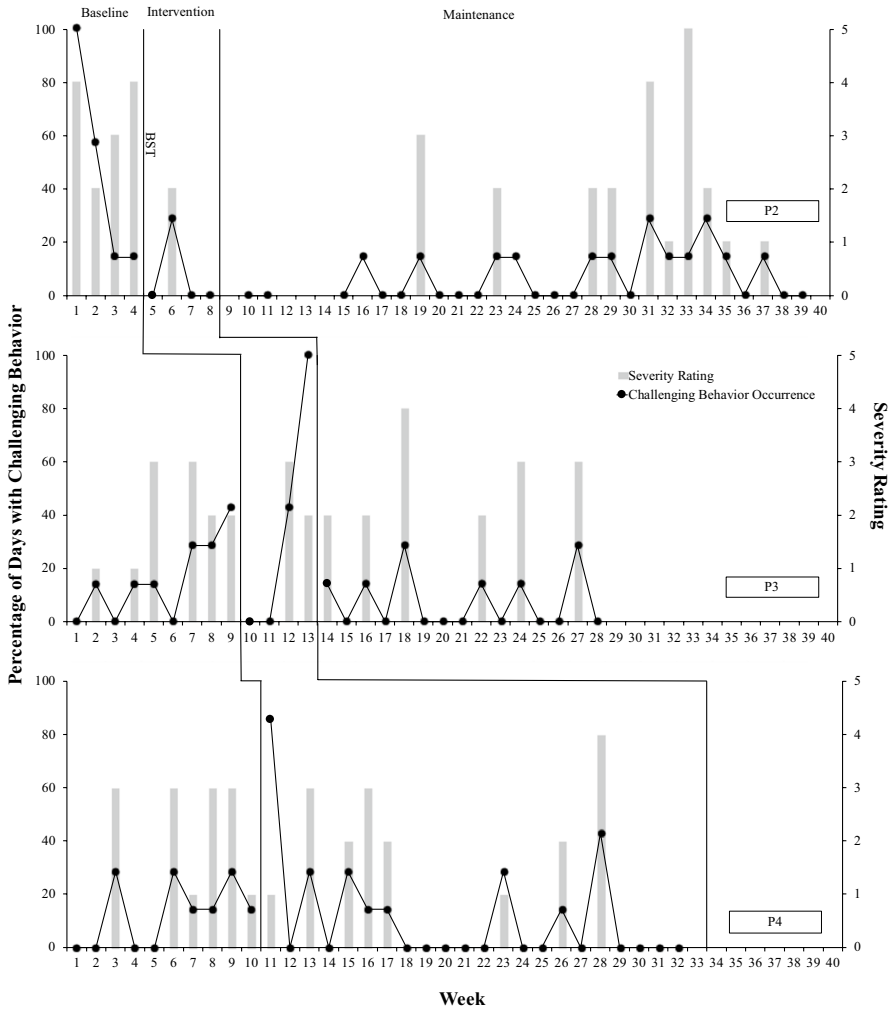


Fig. 2 Staff report of challenging behavior. *Note.* Percentage of days with any challenging behavior (primary y-axis) across weeks for P2 (upper panel), P3 (middle panel), and P4 (lower panel) and severity of behavior (secondary y-axis). P = participant. Missing occurrence data points represent weeks ABA therapists were unable to collect data. Weeks with occurrence data points at 0% and missing severity bars represent absence of challenging behavior during the week. No staff report data recorded for P4 during the maintenance phase. Intervention combines data collected during post-teaching with feedback and generalization phases

responded with a correct response during 100% of opportunities with the targeted precursor. P1 continued to provide statements of alternative behaviors 100% of the time when ABA therapists presented novel precursors; however, without pre-baseline probes for those precursors, we could not determine whether this performance was indicative of generalization.

The second panel displays data for P2. During baseline sessions, P2 stated that they would engage in appropriate alternative behaviors during less than 40% of trials ($M = 16.7\%$, range, 10% to 30%) when the therapist presented the targeted precursor (head hurts). After participating in the intervention, P2 stated more appropriate alternative behaviors in response to the targeted precursor ($M = 93.3\%$, range, 90% to 100%). P2 continued to provide correct responses under conditions testing for stimulus generalization, such that P2 stated they would use appropriate alternative behaviors in response to novel precursors during the majority of trials ($M = 95\%$, range, 90% to 100%). Response maintenance varied across the maintenance phase such that P2 required booster sessions. P2's correct responding increased after each booster session; however, responding during session 17 after a booster session did not meet criteria so graphical feedback was added. After receiving graphical feedback, P2 met the criteria for maintenance sessions.

P3's responding during baseline was stable and low ($M = 22.5\%$, range, 0% to 30%). Following implementation of BST, P3 stated they would use appropriate alternative behaviors during 100% of opportunities with the targeted precursor (muscles tense). Likewise, P3 engaged in correct responding during 100% of opportunities with novel precursors during generalization probes. Response maintenance was initially low; however, after a booster session, correct responding increased. P3 participated in booster sessions after the three ensuing maintenance checks. Two of these booster sessions were conducted despite P3's responding meeting the maintenance criterion of 80% correct. Subsequently, P3's use of alternative behaviors across different precursors was at 80% or above.

During baseline, P4's correct responding with the targeted precursor was initially low, but it increased on sessions five and six and then stabilized ($M = 30\%$, range, 20% to 50%). After participating in BST, P4's correct responding increased but it did not meet the acquisition criteria. After implementing the rule, correct responding increased to 100% for two sessions, but decreased sharply during session 14, which involved an unplanned, novel therapist. Thereafter, P4's correct responding to the targeted precursor increased and remained high during session 18, which was conducted by a novel therapist (phase $M = 81.8\%$, range, 50% to 100%). During generalization probes, P4 engaged in correct responding during 90% or more of trials for five out of seven sessions. Therapists ran additional probes after the two sessions in which responding fell below criteria. Given responding recovered during both additional probe sessions and P4 had already demonstrated responding at criterion, further teaching was not introduced (phase $M = 90\%$, range, 60% to 100%). P4 engaged in correct responding during 80% or more of trials for each session in the maintenance phase, not requiring any booster sessions.

Figure 2 represents data from weekly staff reports of challenging behavior for P2 (upper panel), P3 (center panel), and P4 (lower panel). As previously noted, we did not collect weekly staff reports for P1 during any phases or P4 during the maintenance phase. The primary y-axis displays percentage of days each week that the participant engaged in challenging behavior (black circles). The secondary y-axis displays staff severity rating of challenging behavior on the 5-point Likert scale (gray bars). Phase lines correspond to each participant's progression through phases during sessions with their ABA therapists. As previously stated, data collected

Table 2 Mean percentage of challenging behavior occurrence and severity ratings across phases

Participant Number	Dependent Measure	Phase		
		Baseline vs. Intervention	Baseline vs. Maintenance	Intervention vs. Maintenance
P2	Occurrence	46.43% vs. 7.14%	46.43% vs. 7.41%*	7.14% vs. 7.41%
	Severity	3.25 vs. 0.50**	3.25 vs. 0.92**	0.50 vs. 0.92
P3	Occurrence	15.78% vs. 35.71%	15.78% vs. 7.62%	35.71% vs. 7.62%
	Severity	1.50 vs. 1.25	1.50 vs. 1.07	1.25 vs. 1.07
P4	Occurrence	12.86% vs. 11.69%	–	–
	Severity	1.40 vs. 0.82	–	–

Phase means correspond to Fig. 2. No staff report data recorded for P4 during the maintenance phase. Intervention combines data collected during post-teaching with feedback and generalization phases. P = participant. *approached significance with $p = 0.05568$. ** $p < 0.05$

during post-teaching with feedback and generalization phases were combined and are labeled as Intervention.

During baseline for P2, there was a decreasing trend in the percentage of days in the dorm with challenging behavior ($M = 46.4\%$ [i.e., challenging behavior occurred about four days of the week], range, 14% to 100%). However, during this phase, there was at least one coding irregularity (i.e., staff reported they were only there four days of the week with challenging behavior, but could not determine if challenging behavior occurred other days). During the intervention and maintenance phases there was an overall average decrease in P2's challenging behaviors throughout the week ($M = 7.1\%$, range, 0% to 28% and $M = 7.4\%$, range, 0% to 28%, respectively). The graph also shows relatively high severity ratings in baseline that decreased in the following phases. There were slight increases in ratings toward the end of the maintenance phase. A Mann–Whitney Wilcoxon test indicated a statistically significant decrease in the ratings from the baseline to the intervention phase ($W = 15.50$, $p = 0.02$), as well as a significant decrease from the baseline to maintenance phase ($W = 89.50$, $p = 0.01$). There was not a statistically significant difference in ratings from the intervention phase to the maintenance phase ($W = 57.50$, $p = 0.59$). The decrease in days with challenging behavior from the baseline phase to the intervention phase was not statistically significant ($W = 14$, $p = 0.07$); however, the change between the baseline phase and the maintenance phase approached significance ($W = 84$, $p = 0.06$). There was not a statistically significant difference in the days with challenging behavior between the intervention and maintenance phases ($W = 58.50$, $p = 0.76$) (see Table 2).

P3's challenging behavior increased in the dorm across weeks during baseline ($M = 15.8\%$, range, 0% to 42%). During the intervention phase, challenging behavior decreased during the first two weeks, but later increased to the baseline level ($M = 35.7\%$, range, 0% to 100%). In the maintenance phase, P3's challenging behavior decreased and stabilized ($M = 7.62\%$, range, 0% to 28%). The percentage of days with challenging behavior did not differ statistically from the baseline phase to the intervention phase ($W = 15.50$, $p = 0.69$), the baseline phase to the maintenance

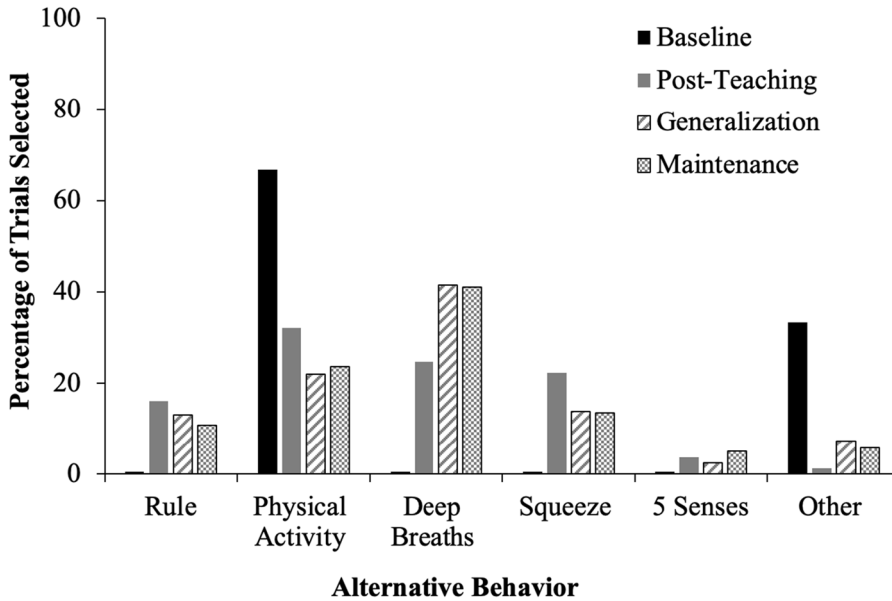


Fig. 3 Selection of alternative behaviors across phases. *Note.* P1 did not complete the maintenance phase. The calculation for maintenance includes only P2, P3, and P4's data. Missing data from one 10-trial session for P4. P = participant

phase ($W = 83.50$, $p = 0.31$), or the intervention phase to the maintenance phase ($W = 21$, $p = 0.31$). Likewise, although mean severity ratings were lower in the intervention and maintenance phases than in the baseline phase, the differences between the baseline phase and the intervention phase ($W = 18$, $p = 0.73$), the baseline phase and the maintenance phase ($W = 74$, $p = 0.33$), and the intervention phase and the maintenance phase ($W = 27.50$, $p = 0.78$) were not statistically significant (see Table 2).

Staff reported P4's challenging behavior was relatively low and stable during baseline ($M = 12.86\%$, range, 0% to 28%). During the intervention phase, P4 had one week with a high percentage of days with challenging behavior. Subsequently, P4's days with challenging behavior decreased and stabilized ($M = 11.69\%$, range, 0% to 85%). The percentage of days with challenging behavior did not differ statistically between the baseline and intervention phases ($W = 130$, $p = 0.37$). Similarly, although severity ratings by staff members were slightly lower during the intervention phase than in the baseline phase, the difference was not statistically significant ($W = 138$, $p = 0.21$; see Table 2).

Figure 3 is a summary of the alternative behaviors participants selected during sessions across phases. To calculate the percentage of trials wherein participants selected an alternative behavior, we counted the number of trials in each 10-trial session that a participant selected an alternative behavior. We determined the total for each participant during every phase of the program. We then recorded which specific alternative behavior was selected in order to create a proportion for the five

Table 3 Results of social validity questionnaire

Survey Items	Average Ratings and Ranges
You felt safe and supported when working on replacement strategies.	4.25 (range, 3–5)
You liked the way we practiced the replacement strategies.	5
You can identify signals for destructive behavior and use at least one of these strategies instead of the challenging behavior.	4.5 (range, 4–5)
You engage in less verbally or physically destructive behaviors since learning these strategies.	4.5 (range, 4–5)
You would recommend this to another person that would like to work on their anger.	4.5 (range, 4–5)

Ratings based on a 5-point Likert scale where (1) was not at all true and (5) was very true

alternative behaviors. For ease of presentation, we combined data for all four participants. Data on strategy selection from one 10-trial session for P4 were missing. To account for this, we excluded 10 trials from the overall calculation. During baseline, participants typically chose a physical activity or a different behavior that we did not introduce in teaching. Anecdotally, behaviors coded as “Other” during baseline were often less effective behaviors for diffusing challenging behavior in the moment (e.g., involving staff). During sessions of the post-teaching phase, results show that participants used all of the behaviors presented during teaching with somewhat balanced allocation, except for the five senses strategy, which participants selected least. We observed the same pattern during the generalization and maintenance phases, with participants continuing to choose a variety of behaviors. Finally, participants provided an average rating of at least a “4” for each survey item on the social validity questionnaire, suggesting they found the training useful (Table 3).

Discussion

The current study highlights how “treatment as usual” can be supplemented with individual focused intervention supported by interprofessional collaboration within a juvenile justice facility. It outlines a potential intervention for adolescents struggling with challenging behavior commonly observed in facilities, including disruption, property destruction, and physical aggression (Keiley & Seery, 2001; Zaremba & Keiley, 2011), despite their involvement in clinical mental health services for their primary offenses. It also adds to the literature base on behavior-analytic treatments within juvenile justice facilities (Luna et al., 2022). Lastly, readers can glean potential limitations for treatment success in these settings such as the nature of the challenging behavior, lack of access to participants or facility staff, as well as stringent facility policies, procedures, and guidelines that are in place (Brogan et al., 2019a).

Results of the focused self-management intervention indicate that BST delivered via telehealth was effective for teaching four adolescent males in a juvenile justice facility to identify precursors for challenging behavior and replace with appropriate alternative behaviors during simulated contexts. This adds to behavior analytic

literature on private events as precursors to challenging behavior and how to incorporate these events when teaching self-managed responses (Anderson et al., 1997; Moore et al., 2022). Further, we found participants' behavior generalized by stating they would use alternative behaviors in response to precursors not introduced during teaching. Participants also demonstrated maintenance of the self-management response. Two participants needed multiple booster sessions throughout the maintenance phase, but one participant maintained correct responding in the absence of boosters over a 7-month period post-intervention. We also found modest decreases in the occurrence, and to some extent severity, of challenging behavior outside of the treatment setting for all participants for whom staff collected data. Additionally, participants provided high social validity ratings for the procedures and outcomes of this study.

One potential mechanism for the behavioral change observed could be the strengthening of rule-governed behavior in the presence of specific stimuli (i.e., precursors). Specifically, the rule could be: "In the presence of [precursor], I [alternative behavior] not [challenging behavior]." This rule could then prompt a self-management response to inhibit further challenging behavior (Cooper et al., 2020). Alternatively, engaging in a specific behavior (e.g., coping strategy) to control respondent behavior present during conflicts could serve as an abolishing operation, decreasing the effectiveness of reinforcement for challenging behavior and thus decreasing engagement in challenging behavior (Anderson et al., 1997). In both cases, engaging in a contextually appropriate alternative behavior instead of displaying challenging behavior in the natural environment could then lead to reinforcement, ultimately strengthening the chain of responses.

Our findings for participants' alternative behaviors warrant some discussion. These data show that our teaching protocol was effective at providing a variety of alternative behaviors, which were never utilized in baseline assessments, to use in response to typically evocative situations. We can also glean information about participant preference, which allowed ABA therapists to have conversations with participants about how some behaviors might be more helpful in certain situations or to consider the role of client preference on increased effectiveness. Additionally, these data provide some evidence for response generalization, such that participants provided other strategies not introduced during teaching.

All four participants completed the intervention in less than a year (not including maintenance sessions). Immediately after baseline assessment, BST sessions were introduced which exposed participants to alternative behaviors to employ in the natural environment. Ultimately, this access provided alternative responses that were more appropriate for the setting, thus reducing contact with punishment from staff for engaging in severe challenging behavior and increasing reinforcement for engaging in alternative behaviors. Additionally, repeated exposure to intervention components like practice opportunities, error correction, feedback, booster sessions, and displays of generalized behavior change, likely support generalization and maintenance of self-management skills, and thus potentially reducing risk of recidivism after their release from the facility.

Also, the current investigation hopefully brings some attention to the potential utility of interprofessional collaboration within juvenile justice facilities. Individuals

residing within these facilities often participate in clinical mental health services, but the technology of ABA has a wealth of strategies that may serve useful when challenging behavior starts to increase. Some important contributions that were added to “treatment as usual” for the current participants included indirect assessment methods, systematic data collection, reinforcement and error correction strategies, BST, and generalization procedures to check for emergence of untaught behaviors. Additionally, collaboration with clinical mental health therapists informed treatment by considering participants’ emotional triggers, as well as strategies that were effective or ineffective for participants across other treatments.

To that point, readers may consider ways that interprofessional collaboration could be coordinated in other relevant settings. In the current study, clinical mental health therapists and ABA therapists had an ongoing working relationship within the facility. There was a specific process for referral and intake, and regular availability for meetings to discuss continued care. Practitioners in similar settings may consider starting a streamlined process for communicating the need for collaboration. From there, primary therapists could provide relevant information regarding the individual’s background and current areas of needed support based on their own assessments and observations to aid more individualized care in other treatments. Lastly, working together to create regularly scheduled times to coordinate and discuss care can help to ensure the individual is making progress. Although more collaboration with clinical mental health therapists was likely warranted in the current study, it demonstrates the benefits of collaborating with professionals from multiple disciplines working together within juvenile justice facilities, instead of working in isolation, and hopefully provides clinicians with a structure from which systems could be developed.

Some limitations should also be noted. First, some readers may be concerned about scoring participants’ verbal behavior. Because ABA therapists conducted sessions via Zoom™, scoring and consequating verbal responses helped ensure participant safety. Specifically, ABA therapists were not present to deescalate any challenging behavior that may have occurred in response to presented stimuli. No participants engaged in overt challenging behavior throughout any sessions of the intervention; however, all participants engaged in both correct and incorrect responses using verbal behavior during all phases of the intervention. This suggests that the participants could discriminate evocative stimuli. In addition, the age and language skill level of each participant suggested higher accuracy and believability of a verbal report (Greco et al., 2005). As described earlier, ABA therapists attempted to increase physical engagement in appropriate alternative behaviors by asking the participants if they would like to practice those behaviors, and then representing trials if they agreed. Unfortunately, we did not record the frequency of participants’ requests to practice. Focusing on verbal behavior may affect whether participants engage in alternative behaviors across different settings and over time. Implementors should identify the critical stimuli involved in challenging behavior events to include in teaching sessions, and determine ways to better support self-management outside of treatment settings in relevant environments such as involving facility staff, practicing skills with other professionals, or observing participants in natural environments to identify their use of alternative behaviors.

Relatedly, there were no major changes in frequency and severity of behavior for P3 and P4 in their dorms. Notably, baseline occurrence for both participants was low and variable, which affected the amount of change following intervention. Despite staff members' reports of low behavior frequency, low behavior severity, or both during baseline, they referred participants for behavioral services. Sporadic increases in challenging behavior for each participant may have stemmed from limitations imposed by COVID-19 restrictions. For example, residents were required to spend nearly all of their time in assigned dorm and they could not receive visits from family members and friends. Thus, the dynamics between residents in each dorm were inherently more complicated and intense during this restriction period.

A few limitations about this data collected by the staff should be acknowledged. First, researchers were unable to directly train staff on data collection. Second, researchers did not observe participants in tandem with staff to conduct interobserver agreement checks. Instead of recording specific behavior incidents, we asked staff binarily whether behavior happened or not each day that week to enhance accuracy. Additionally, staff were either in close proximity to the participant each day or had the facility record sheet to reference. Unfortunately, reliability checks were not feasible with the facility's COVID-19 protocols. However, these data do provide a general picture of staff's reflections on participants' behavior outside of treatment sessions. These weekly check-ins also served as an opportunity for ABA therapists to build relationships with staff and acknowledge their concerns. If future studies were to attempt the intervention and use staff rating as a measure of efficacy, implementors should consider providing structured data collection training to staff, in addition to conducting periodic reliability measurements. If staff are to be involved in data collection for multiple therapies, professionals across disciplines may want to collaborate in order to find ways to consolidate measures and conduct one general training to prevent undue stress for facility staff.

Another limitation of the study is that we did not use a validated assessment process to identify precursors or the function of challenging behavior due to the inability to enter the facility and conduct direct observations. As a result, we lacked data to determine the conditional probabilities of behaviors and their precursors, as well as maintaining consequences for the challenging behaviors. Instead, we relied on verbal descriptions from facility staff, clinical mental health therapists, and participants. Despite this limitation, all participants were able to identify covert or overt behaviors that occurred prior to severe behavior events. Lastly, not identifying the function risks the possibility that alternative behaviors were not functionally equivalent to the challenging behaviors.

One participant, P4 encountered a few barriers while completing the intervention that are important to note. Specifically, P4 needed additional prompts to identify precursors of challenging behaviors, which may have led to the identification of inaccurate or less relevant precursors. In addition, P4 required a rule to engage in the target response during the post-teaching phase due to repeatedly providing strategies that were not most effective for decreasing challenging behavior in the moment (i.e., filing a grievance). It is possible that older individuals are better able to identify what happens prior to a severe behavior event, maybe due to more advanced language skills or experience discussing these topics, and subsequently

engage in a self-controlled response. This highlights another opportunity for collaboration among professionals, as working together to identify barriers to treatment and successful strategies in other environments could lead to better outcomes. Alternatively, it is possible that P4's responding would have continued to improve during the initial intervention (without the rule) with additional sessions. However, because the rapid change in P4's correct responding was not characteristic of a transition state (Brogan et al., 2019b), it is likely their progression had stalled and that they required additional intervention components.

Relatedly, ABA therapists did not coordinate with therapists from other disciplines when designing the described intervention. Other treatment approaches typically used in juvenile justice facilities, such as CBT and DBT or programs like anger management, often use methods similar to the focused intervention described in this paper to identify evocative events and teach self-management responses. This is particularly relevant for two reasons. First, participants' exposure to similar interventions from other service areas could confound effects observed in a secondary treatment. Second, other disciplines may have effective and evidence-based methods available to reach a particular outcome. For example, a component of DBT is identifying triggers for behaviors and constructing a hierarchy for those triggers (Bond et al., 2020). Authors developed a precursor analysis for the purposes of this particular focused behavioral intervention, when increased collaboration may have provided a resource to achieve the same outcome. These points highlight the need for structured interprofessional collaboration within juvenile justice facilities. Although it is helpful to have other professionals available for referral, treatment outcomes would possibly be more efficient, effective, and generalized if involved professionals communicated so that goals were incorporated into one overarching treatment plan.

In the future, researchers may be interested in implementing this protocol in a face-to-face format. Although we found some success implementing the protocol virtually, there may be benefits to being present with the individual such as conducting behavior observations, prompting alternative behaviors when precursors are present, and less reliance on verbal behavior. Additionally, researchers may want to consider working collaboratively with professionals from other disciplines to conduct initial assessments or use a more systematic evaluation of precursors identified in previous literature (Borlase et al., 2017; Borrero & Borrero, 2008; Dracoby & Smith, 2012; Fritz et al., 2013; Harding et al., 2001; Herscovitch et al., 2009; Hoffmann et al., 2018; Langdon et al., 2008; Smith & Churchill, 2002). Utilizing functional analysis technology (Iwata & Dozier, 2008) that the target population determines socially valid would also better guide selection of alternative behaviors. Lastly, soliciting social validity ratings or other types of feedback from stakeholders within the facility (i.e., therapists from other professions, staff members) or collecting data on relevant measures would better inform the effectiveness of and preferences on interprofessional collaboration.

As a whole, the current findings provide direction for practitioners when "treatment as usual" within juvenile justice facilities needs to be supplemented. We hope that this study furthers intervention research on the topics of precursor behaviors and self-management strategies for adolescents in residential facilities, overcoming barriers to treatment in facility settings, and the role behavior analysis can play in addressing challenging behavior in juvenile justice facilities.

Appendix

Baseline and Probe Sessions:

1. Introduces session by providing brief description of procedures.
2. Presents evocative scenario and discriminative stimulus (S^D).
3. Neutrally responds to participant's response.
4. Re-presents scenario and discriminative stimulus if no response to S^D after 15 s.
5. Gives praise for participation after session completion.

Teaching – BST 1:

1. Introduces session by providing brief description of procedures, and gives rationale/goal of completing procedures.
2. Lists and describes alternative behaviors, and prompts participant to describe in own words.
3. Models alternative behaviors.
4. Prompts participant to describe alternative behavior just modeled and delivers behavior specific positive and/or corrective feedback.
5. Asks participant to practice alternative behavior.
6. Provides behavior-specific positive and/or corrective feedback on practice response.
7. Re-presents model and asks participant to practice again contingent on incorrect practice response.
8. Asks for and answers any participant questions.
9. Repeats procedures for each alternative behavior.

Teaching – BST 2:

1. Introduces session by providing brief description of procedures.
2. Explains target precursor and informs about structure of practice trials.
3. Models engaging in an alternative behavior in response to precursor.
4. Prompts participant to describe response just modeled and delivers behavior specific positive and/or corrective feedback.
5. Asks participant to practice engaging in an alternative behavior in response to precursor.
6. Provides behavior-specific positive and/or corrective feedback on practice response.
7. Re-presents model and asks participant to practice again contingent on incorrect response.
8. Asks for and answers any participant questions.
9. Provides opportunity or encourages participant to practice replacement action if they only verbally stated a replacement action.
10. Reviews appropriateness and effectiveness of alternative behavior based on context.
11. Ensures participant used at least two different alternative behaviors during rehearsal sessions.

Post-Teaching:

1. Introduces session by providing brief description of procedures.
2. Asks participant to list alternative behaviors and delivers behavior specific positive and/or corrective feedback.
3. Asks participant to identify when to start engaging in alternative behavior and delivers behavior specific positive and/or corrective feedback.
4. Delivers evocative scenario and S^D.
5. Provides behavior-specific positive praise for correct responding.
6. Implements error correction after incorrect response until correct independent response.
7. Re-presents scenario and S^D if no response to discriminative stimulus after 15 s.
8. Provides opportunity or encourages participant to practice replacement action if they only verbally stated a replacement action.

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The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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