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Evaluating the Effectiveness of Prevent–Teach–Reinforce for High School Students With Emotional and Behavioral Disorders

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Abstract

Although there is a wealth of research supporting the effectiveness of using functional behavior assessment (FBA) to inform development of behavior intervention plans (BIPs), schools continue to find the FBA and BIP process challenging for implementation, particularly for students with emotional and/or behavioral disorders (EBDs) in high school settings. The current study evaluated the use of the prevent–teach–reinforce (PTR) FBA model for three high school students with EBD in self-contained settings. Results indicated that PTR was effective at reducing problem behaviors and increasing replacement behaviors for all three students. Teachers implemented the interventions with high levels of fidelity. Social validity scores obtained from both teachers and students indicated acceptability of the PTR process and outcomes. Limitations and areas for future research are suggested.

Keywords

multitiered system of support, functional behavior assessment, behavior intervention planning, secondary education, prevent–teach–reinforce

Students who have been identified as having an emotional and behavioral disorder (EBD) display challenging behaviors that negatively affect academic performance (Nelson et al., 2004; Reid et al., 2004; Trout et al., 2003). These students perform increasingly poorly as they move into high school, many receiving Ds and Fs, and experience almost three times the amount of suspensions and expulsions as students in any other disability category (Bradley et al., 2008). If behaviors are not ameliorated, long-term outcomes include employment difficulties (Zigmond, 2006), frequent contact with the juvenile justice system (Barrett et al., 2014), and higher drop-out rates than any other disability category (Zablocki & Krezmien, 2012).

Developing intervention strategies based on a functional behavior assessment (FBA) has substantial research support (e.g., Bambara & Kern, 2005; Carr et al., 2002). The purposes of the FBA are to identify the relation of challenging behaviors with environmental events (i.e., antecedents predicting and consequences following behavior occurrences) and to develop a hypothesis statement that describes the relationships and offers the most logical purpose or function of the behavior (Sugai et al., 1998). The hypothesis drives the behavior intervention plan (BIP) development by directly modifying the antecedents so that the challenging behavior is prevented, teaching appropriate behaviors that the student will perform in place of challenging behaviors to match the function, and changing responses following student use of challenging behaviors so that the challenging behavior will no longer obtain the function (Horner, 1994; Horner & Carr, 1997; Reid & Nelson, 2002; Sugai et al., 2000).

Although there is substantial research on the effectiveness of FBAs, there is less research evaluating their use with students in high school settings (Anderson et al., 2015) and with EBD (Lane et al., 2009). Literature examining high school practices has identified that the primary disciplinary approaches used are punitive and exclusionary

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strategies. For example, office discipline referrals (ODRs) begin to increase in middle school (Vincent et al., 2012) compared with elementary schools. In high schools, suspension and expulsion are the most commonly used strategies (Flannery et al., 2014). It has been suggested that researchers should examine implementation of FBA approaches with high school age students (Anderson et al., 2015; Bruni et al., 2017).

Prevent–teach–reinforce (PTR) is a standardized FBA/BIP model process for use with school-based teams (Dunlap et al., 2019). The PTR process uses a collaborative, multistep approach that is facilitated by a coach who is skilled in guiding teams and applying behavioral principles. PTR is manualized yet retains flexibility so that each intervention plan is customized and aligned with the hypothesis. All PTR intervention plans include at least one strategy that directly modifies the antecedent (prevent), one strategy to teach appropriate replacement behaviors (teach), and strategies to reinforce replacement behaviors and change responses to challenging behavior (reinforce). Built into the PTR process is an active coaching procedure in which teachers are supported while implementing behavior intervention strategies and making data-based decisions.

PTR consists of five steps (Iovannone et al., 2009). *Step 1* (*Teaming*) establishes the student-focused school team members and agreement on team functioning. Team members vary in size but each team should have representatives who have knowledge of (a) the student, (b) behavioral principles, and (c) the context (e.g., school, community, resources). In PTR-secondary (PTR-SEC), the student is expected to be a team member, providing input and reaching consensus; however, the student typically meets with a trusted individual outside of team meetings to enhance open communication and trust.

Step 2 (*Goal setting*) identifies, operationalizes, and prioritizes the behaviors that will be targeted to be reduced and increased. The *Individualized Behavior Rating Scale Tool* (*IBRST*; Iovannone et al., 2014), a daily progress monitoring method, is developed and data collection commences at the conclusion of this step. The *IBRST* is further described in the "Measures" section. Once the *IBRST* is developed, the teacher (and any other team member who will be collecting data) will use it to rate the student's behaviors at least once each day. The data will be reviewed in each subsequent step of the PTR process, particularly during coaching following the intervention implementation and in the evaluation step to determine the impact of the intervention on the student's behaviors. Contingent upon the *IBRST* data trends, next step decisions are made.

Step 3 (*PTR assessment*) asks each team member, who knows the student and the environmental context in which the targeted behaviors occur, to complete the assessment that describes the antecedents, consequences, and potential behavioral functions. The PTR assessment consists of 11 questions in the antecedent section, six questions in the function (teach) section, and five questions in the consequence or reinforce section for a total of 22 questions. Questions are in multiple choice format with opportunities to provide additional comments following each item. The PTR assessment can be completed independently by each team member or a coach can use it as an interview (separate or joint interviews). When gathering FBA data from the student, a trusted adult uses the PTR assessment as an interview with the student. To supplement, the PTR coach conducts direct observations of the student's behaviors to help support the team in organizing the synthesized information and building a consensual hypothesis of the behavior(s). The *IBRST* is reviewed during this step (and each subsequent step), primarily as a dependent variable to determine the trends of targeted behavior occurrence. The PTR assessment is not currently validated; however, the questions on the assessment were drawn from the most widely used structured FBA interviews used in the literature (e.g., March et al., 2000; O'Neill et al., 2015).

Step 4 (*PTR intervention*) asks the team to rank order intervention strategies listed on a PTR intervention menu. The team is required to come to consensus on a minimum of one intervention that directly modifies the antecedent so that behavior is prevented; one replacement behavior intervention that teaches the student an appropriate way to obtain the behavioral function; and consequential interventions, one to reinforce the performance of the replacement behavior as well as one that changes responses to the problem behavior. The coach guides the teacher in developing procedural steps for each selected intervention and uses behavioral skills training (BST) procedures (Miltenberger, 2012) to ensure that the teacher can fluently implement the behavior plan. The BST sequence consists of instruction, modeling, role-playing, and feedback. During the implementation phase, the coach observes the teacher implementing the intervention at least one time a week, conducts fidelity measures, and debriefs with the teacher to provide performance feedback and if necessary, make any immediate corrections to the plan.

Step 5 (*evaluation*) requires the full team to meet, review the student outcome and teacher implementation fidelity data, and make next-step decisions contingent upon data trends.

Although FBAs and BIPs have been used in school settings for the last two decades, reviews of the literature suggest that what is called FBA/BIP in schools does not align with evidence-based practices (see Anderson et al., 2015; Blood & Neel, 2007; Cook et al., 2007; Van Acker et al., 2005). Common issues seen in school-based FBA/BIPs include poorly defined target behaviors, interventions not aligned with hypotheses, limited detail on intervention procedures, and absence of coaching support or follow-up data monitoring once interventions are implemented. PTR adheres

to the scientific underpinnings of function-based support. There are four unique features of PTR that may be missing from typical school-based FBA/BIPs. First, PTR is manualized so that the process is implemented with consistency by coaches who facilitate teams through the steps. The process is independent of forms, that is, PTR is not a compliance form that is completed by a school team. Instead, the consistency is the process that is implemented within each PTR step. This includes strategies that are used to come to consensus on team decisions. Second, PTR embraces a collaborative model. It is facilitated by a coach who has knowledge of the behavioral principles underlying FBA/BIPs; yet the coach does not make the decisions for the team nor does the coach tell the team what they should or should not do. Instead, the coach provides guidance, through providing choice options of actions the team might take, asking open-ended questions, and engaging in active listening. The goal is to balance both technical adequacy of the hypothesis and intervention plan with feasibility, acceptability and usefulness of the process for the adult and student who will be participating in the intervention development and implementation. Third, PTR embeds an active coaching process to support teachers in implementing interventions. This includes behavior skill training (BST) in which the coach models, provides the teacher opportunities to rehearse the strategies, and provides performance feedback. The coaching process occurs, at a minimum, weekly, and fidelity measures are part of the coaching process with teacher reflection used to guide performance feedback and decision making. Coaching is *always* provided as opposed to only providing the support if time allows it. Finally, PTR intervention plans are precise and aligned with the hypothesis. Each strategy selected from each category (i.e., prevent, teach, reinforce) is task analyzed so that the teacher will know the exact behaviors to perform when implementing the strategy. The steps are obtained by the coach asking the teacher guiding questions about the intervention including when the strategy will be delivered within a routine, how it will be delivered (materials, scripts, physical placements), and responses to different scenarios (e.g., providing positive comment if student makes a choice, how to redirect if student does not respond to a prompt).

To date, there have been two randomized controlled trials of PTR: one conducted with students in Grades K–8 (Iovannone et al., 2009) and one with students in preK classrooms (Dunlap et al., 2018). Results of both studies showed significant improvement of behaviors of students receiving PTR compared with the control group who received services as usual. Teachers implemented strategies with fidelity and rated the process high in social validity. Several single-subject studies have been conducted that show PTR is effective with a variety of individuals in diverse settings, including young children in child care settings (Kulikowski et al., 2015), general education students (Barnes et al., 2019; DeJager & Filter, 2015), students with autism in inclusive settings (Strain et al., 2011), and families in home settings (Bailey & Blair, 2015; Sears et al., 2013); however, to date there has been no research showing that PTR can be effective in high school settings with students who have EBD.

The purpose of this research was to evaluate the effectiveness of PTR when used for students with EBD in high school settings. Specifically, the research questions were: (a) To what extent will PTR decrease problem behavior and increase appropriate behavior in adolescents who are classified as EBD in a high school setting?; (b) To what extent will the teachers implement the PTR intervention with fidelity?; (c) To what extent will the teachers and students find the PTR process and outcomes to be socially valid?

Method

Participants and Settings

This study was conducted with three students and their two teachers in a self-contained special education classroom in a public high school in central Florida. Teachers were considered for inclusion in the study if they were instructing students with EBD at a high school level. Each student participant met the following criteria: (a) had an individualized education plan (IEP) disability classification of EBD, (b) were enrolled in Grades 9 to 12, (c) were between 14 and 18 years of age, and (d) were engaging in problem behaviors that disrupted instruction. The district behavior analyst sent out flyers describing the research project to all high school teachers who taught students with EBD and two teachers in the same classroom, both meeting criteria, volunteered. After enrolling the teachers, they recommended potential students, and the primary author reviewed student information to ensure each met inclusion criteria. After obtaining parental consent and student assent, students were enrolled in the study. The two teacher participants taught in the same self-contained setting. Linda was 40 years old, had a bachelor's degree in social services, and 8 years of teaching experience, with the last 5 years teaching in the current setting. Rachel was 28 years old, had a bachelor's degree in psychology and a master's degree in leadership, and 5 years teaching experience, all in the current classroom setting. In the classroom, Rachel was the designated math and science teacher while Linda was the designated history and English teacher. All students learned via self-paced online learning modules and the teachers provided in-person assistance and teaching based on which module a student was completing. Both teachers were present in the classroom each day and jointly nominated each student for participation in the study.

Student 1 was Cyrus, a 15-year-old multiracial male enrolled in the ninth grade. Cyrus had been diagnosed by licensed professionals as having a bipolar disorder, attention deficit and hyperactivity disorder (ADHD), and

oppositional defiant disorder (ODD). Cyrus was classified as EBD in elementary school and began receiving IEP supports in a self-contained classroom in the fourth grade. Cyrus's most recent accountability assessment scores indicated that he was performing below grade level in math and reading. He was nominated because he had difficulty initiating and maintaining independent academic work.

Student 2 was Damien, a 15-year-old White male enrolled in the ninth grade. Damien was classified as having a specific learning disorder and a medical diagnosis of ADHD. He was identified as eligible for EBD in the sixth grade and started receiving services in a self-contained EBD classroom. The most recent accountability assessments indicated that he was performing below grade level in math and reading. He was nominated due to off-task behavior that interfered with completion of work and caused a disruption to the group learning environment.

Student 3 was Diante, a 15-year-old Black male enrolled in the ninth grade. Diante was classified as having a speech and language impairment and EBD and began receiving IEP supports in a self-contained classroom in third grade. At the time of the study he received 50% of his IEP supports in the EBD classroom and attended general education for the rest of his classes. His most recent accountability assessments indicated that he was not meeting grade level expectation in reading and math. He was nominated due to inappropriate social interactions with adults and peers.

Dependent Measures

Direct observation of student behavior. Systematic direct observation of the problem and replacement behaviors occurred three to four times per week in the classroom by the first author and a trained observer. Observation sessions were consistent across students and lasted between 20 and 50 min during the time period of the day in which the teachers reported problem behavior occurring most often. Cyrus's problem behavior was task refusal defined as stating "No!" making jokes, staring into space, sleeping, putting head down on desk, listening to music, or singing aloud during work times. Task engagement was targeted as his replacement behavior and was defined as actively working on assigned tasks (e.g., completing study sheets, completing quizzes/tests, and/or engaging in on-topic conversations). A 10-s partial interval recording system was used for direct observation and results were converted to a percentage of intervals with occurrence for both targeted behaviors.

Damien's target problem behavior was off-task defined as engaging in nonassigned tasks (e.g., looking at nonwork-related websites, playing on phone), off-topic conversations (e.g., talking with peers or teachers about nontask topics), and leaving assigned area without permission. His replacement behavior was academic engagement defined as completing assigned tasks (e.g., working on an assigned website or working on print-out study sheets), engaging in on-task conversations, and staying in assigned area (e.g., sitting at desk, walking to the printer to get study sheets, walking to instructional assistant/teacher desks to receive assistance). A duration in minutes measurement system was used to record both behaviors and results were converted and reported as a percentage of session time.

Diante's target problem behavior was disrespectful adult interaction defined as calling teachers by their first names to get the teachers attention, demanding teacher assistance/compliance (e.g., "Come here!" "Stop!"), whining "no!" or responding in a voice tone louder than normal conversational volume in response to a teacher directive or touching teacher property without permission. His replacement behavior was appropriate adult interactions defined as using proper teacher salutations, appropriately requesting assistance (e.g., "I need help please; Can you help me please?"), appropriately responding to teacher directives by complying with requests or verbally responding in a normal conversational tone of voice, or asking before touching teacher property. A frequency measurement system was used to record both behaviors, which was reported as rate per minute.

IBRST. The *IBRST* (Iovannone et al., 2014) was utilized as a secondary measure of student behaviors for daily progress monitoring by the teachers. The *IBRST* has been shown to have adequate interrater reliability (.72–.83) and concurrent validity (.70; Barnes et al., 2019). The *IBRST* uses a 5-point Likert-type scale in which each scaled point represents the rater's perception of the behavior performance during a specified time period with 5 representing a *challenging time period* to 1 representing a *fantastic time period* for problem behavior and the reverse for replacement behavior (i.e., 5 representing a *fantastic time period* and 1 representing a *challenging time period*). Each IBST was customized for each student by guiding the teachers in selecting the most appropriate measurement (e.g., frequency, duration, percentage of time) for each operationally defined behavior, the measurement range assigned to each scaled Likert-type point (e.g., 5–7 assigned to Likert-type point 5), and the specified time period (e.g., whole day, specific routine, subject, activity) in which the *IBRST* ratings would be recorded. At the conclusion of the specified time period, teachers would circle the rating that best described the occurrence of the targeted behaviors. Because teachers routinely shifted their activities and instruction from one student to the next and it was not guaranteed that one teacher would be with one participant the entire observation time, both teachers met briefly to discuss and come to a consensus on the *IBRST* rating for each participant each day.

For Cyrus, teachers selected percentage of time as the measurement type and the math and history routine as the time period for rating his task refusal behavior. Data were always collected during second period where Cyrus was

instructed to work on math or history (both subjects were problematic for him). His task refusal scale ratings were established as *81% to 100% of the time* (5), *61% to 80% of the time* (4), *41% to 60% of the time* (3), *21% to 40% of the time* (2), and *0% to 20% of the time* (1). The scale was reversed for his replacement behavior. For Damien, teachers selected duration of time as the measurement type and the 50-min first period of the day as the time for rating his off-task behavior. A latency scale was selected as the measurement type for rating his academic engagement during the same routine. His off-task behavior ratings were established as *41 to 50 min off-task* (5), *31 to 40 min* (4), *21 to 30 min* (3), *11 to 20 min* (2), and *0 to 10 min* (1). Academic engagement ratings were established as beginning his work within *0 to 10 min* (5), *within 11 to 20 min* (4), *within 21 to 30 min* (3), *within 31 to 40 min* (2), and *within 41 to 50 min* (1). For Diante, teachers selected frequency as the measurement type and the first and fourth 50-min periods of each day for rating his disrespectful and appropriate adult interactions. For both targeted behaviors, ratings were established as *more than 8 times* (5), *6 to 7 times* (4), *4 to 5 times* (3), *2 to 3 times* (2), and *0 to 1 times* (1).

Treatment fidelity. To measure the extent teachers implemented the PTR intervention plan with fidelity, the first author conducted direct observations. A PTR plan assessment checklist was used that included each specific step teachers would perform for each strategy. The observer indicated whether each step was or was not implemented or whether there was no opportunity (e.g., routine was interrupted by a fire drill, reinforcement not delivered due to nonoccurrence of replacement behavior). Fidelity scores were calculated by dividing the number of steps implemented by the total number of possible steps and multiplying by 100%. Once again, since teachers moved frequently about the classroom to instruct multiple students, it was decided that the steps on the fidelity checklist would be scored as completed or not regardless of which teacher completed the steps (e.g., Rachel may have completed the first few steps then Linda took over and completed the next steps). Individual teacher fidelity was not feasible to conduct due to the classroom structure.

Social validity. After all data were collected, teachers completed an adapted *Treatment Acceptability Rating Form–Revised* (*TARF-R*; Reimers & Wacker, 1988) to determine the acceptability and effectiveness of the PTR process. The 13-item questionnaire asked questions related to how they felt about the PTR intervention (e.g., the willingness to implement the interventions, the time needed to do the process). Teachers rated each item using a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). In addition, students completed a modified *TARF-R*, a 5-item scale using a similar 5-point Likert-type rating in which they rated their acceptance and impact of their PTR intervention plan.

Interobserver Agreement (IOA)

A second trained observer who was a graduate student collected direct observation data along with the first author for 40% of baseline sessions for Cyrus, 37.5% for Damien, and 40% for Diante and 50% of postintervention sessions for Cyrus, 33.3% for Damien, and 33% for Diante. IOA was calculated for Cyrus by dividing the number of interval agreements by the sum of interval agreements plus disagreements and multiplying by 100. For Cyrus, mean IOA was 100% during baseline for both behaviors and 93% during postintervention for task refusal and 99.7% for task completion. For Damien, both observers recorded the onset and offset of each observation with IOA calculated by dividing the smaller duration by the larger and multiplying by 100. Baseline mean IOA for Damien was 93% for both behaviors and 100% at postintervention for off-task and 99% for academic engagement. Diante's IOA was calculated by dividing the smaller number of frequency counts by the larger number and multiplying by 100. Diante's mean baseline IOA was 93% for disrespectful adult interactions, 100% for appropriate adult interactions, and postintervention mean values were 97% for disrespectful interactions and 100% for appropriate adult interactions.

Fidelity IOA was conducted during fidelity observation checks for 50% of sessions for Cyrus, 33% for Damien, and 25% for Diante. Observers were considered in agreement when both scored an intervention step as being completed, not completed, or N/A. IOA was calculated by dividing the number of agreements by the total number of steps and multiplying by 100 for a percentage. During intervention, the overall IOA on fidelity of implementation was 100%.

Experimental Design and Procedures

The study used a nonconcurrent multiple baseline design across participants. Due to classroom, teacher, and data collection constraints, it was not feasible to enroll all three participants in the study at the same time therefore participants started the study at different times. The interventions were staggered across students while allowing for the continuous collection of data for each student's target behaviors. This design can rule out common threats to internal validity such as maturation, test–retest sensitivity, and control for instrumentation changes (Campbell & Stanley, 1966). However, the design is limited in ruling out history effects that might occur coincidentally with intervention implementation (Harvey et al., 2004).

Procedures

PTR. The five steps of the PTR process were described earlier. All five steps of the PTR process were completed through a series of meetings in which the first author met separately

with the teachers and the student and synthesized the information given by each. Meeting time duration with teachers ranged from 15 to 60 min and 10 to 25 min with students.

For this study, *Step 1* (*teaming*) was completed through recruitment of study participants. Each team consisted of the first author, the participating teachers, and the participating student. No separate meeting was held for this step.

Meeting 1: Step 2 (*goal setting*) and *Step 3* (*PTR assessment*) occurred during the initial meeting. Student target behaviors for intervention were identified, operationalized, and prioritized during this meeting with the teachers first and then the students (separately), and agreement was reached on the primary behavioral targets that were considered important to both (described earlier). After meeting with the teachers, the first author met with each student privately during an afternoon class time. Initially, rapport building exercises were conducted asking students about their vision for their lives outside of school, the important people and events in their lives, and supports they would need in order to reach their aspirations along with obstacles that could prevent them from reaching their life goals. Following rapport building, students and the first author discussed specific behaviors that they felt they needed to decrease or increase. The behaviors that the teachers identified that also matched those of the students were then discussed and agreement on the final targeted behaviors was reached. After reaching consensus on the targeted behaviors, the *IBRST* for each student was developed and was used by the teachers to come to consensus on the rating for each student's targeted behaviors daily.

Following development of the *IBRST*, teachers independently answered the questions on the PTR assessment and delivered it to the first author upon completion. In gathering the student FBA information, the first author interviewed each student. In addition, direct observation of student behaviors in the classrooms were conducted by the first author to confirm that the FBA information from teachers and students was accurate. The first author synthesized the information from each informant and developed draft hypothesis statements for team consideration. The teams came to consensus on the following hypotheses for each student's target behavior:

Cyrus: When (a) teachers were attending to other students (independent work time) and (b) Cyrus was asked to begin working on a nonpreferred subject (i.e., history or math), he would engage in task refusal. As a result, he avoided having to engage in academic work and received attention from adults and peers.

Damien: When he was (a) asked to begin a nonpreferred task (i.e., math) that was too difficult or (b) told that work was wrong, he would engage in off-task behaviors. As a result, he gained attention from adults and he avoided or delayed the task demand.

Diante: When (a) he had minimal work to complete, (b) a request was made of him, and (c) teacher attention was elsewhere, he would engage in disrespectful interactions with adults. As a result, he gained attention from adults in the form of verbal interactions or access to requested activities with preferred adults.

Baseline phase. Baseline data collection began the day after the initial meeting. Teachers were instructed to continue providing services as usual and to score student behavior on the *IBRST* after the targeted routine or time period. Systematic direct observations of student behavior were conducted by the first author during the baseline phase.

Meetings 2, 3, and 4: Step 4 (PTR intervention). The first author met with each teacher and student separately and asked them to rank order between two and four interventions from each category (prevent, teach, and reinforce). To guide selection of interventions, the first author provided descriptions and examples of how they might be implemented in the classroom to the teachers and to the students. When students completed their rank ordering, it was noted that they preferred the interventions that allowed them to earn breaks and preferred activities during breaks such as listening to music or computer time however, they were amenable to other interventions. After the independent meetings, the first author met again briefly (e.g., 3–5 min) with the teachers and the students to review the selections made and come to consensus on the final interventions. Interventions selected for each participant are described in Table 1. For each strategy selected, the first author and teachers developed a procedural checklist that task analyzed the steps that would be implemented for each intervention. Teachers were then trained on the intervention plan using BST procedures. Criteria for completing each step of the plan were set at 100%. Next, the first author met with each of the students to review their individualized plans. Interventions were demonstrated with students using components of BST (verbal instruction, modeling, and rehearsal) to ensure students understood the intervention components.

Intervention implementation. Within 1 week of training, the behavior plan was implemented in the classroom during the targeted class period or routine. BST procedures were used with the teachers the first day of intervention implementation to ensure accuracy. Following each subsequent fidelity observation, teachers were provided performance feedback that included four components: (a) review of data, (b) corrective feedback, (c) praise for correct implementation, and (d) addressing questions and comments (Codding et al., 2005).

Postintervention data collection. Direct observations of student target behaviors and teacher implementation fidelity

Table 1. Final Prevent–Teach–Reinforce Intervention Plan Strategies Selected by Teacher and Student Participants.

Participant	Prevent	Teach	Reinforce
Cyrus	Providing choices-between two topics	Task engagement Self-management of task completion	Provide escape upon task engagement Positive praise each time help requested Redirect to replacement behavior
Damien	Noncontingent Reinforcement—teacher interacting and making positive noncontingent comments during 3 to 5 min at beginning of school day	Academic engagement Social problem-solving strategies—taught to appropriate request a break and assistance	Provide escape contingent upon academic engagement Deliver positive praise statements for academic engagement and using social problem-solving strategies
Diante	Visual support-classroom management—behavioral expectations defined and listed on a visual posted on wall	Appropriate adult interactions Specific social skills—taught appropriate adult interaction behaviors (same as behavioral expectations)	Deliver positive praise contingent upon performing behavior expectation Redirect to replacement behavior-gesture to expectation on visual support that should be performed

measures were conducted (as described earlier). The teachers continued to rate the target and replacement behaviors using the *IBRST*. Social validity questionnaires were completed by teachers and students after the final data points were collected.

Meeting 5: Step 5 (Progress monitoring and data-based decision). The first author met with the teachers 1 week after the last data point was collected, and reviewed data to determine intervention effectiveness and next steps. As it was nearing the end of the school year, the teachers indicated they would like to continue implementing the plan the following school year.

Follow-up. The first author was able to conduct a 2-week follow-up probe with one student (Damien), during which direct observation data on his target behavior and implementation fidelity data were collected. Follow-up probes were not collected for Cyrus due to not being in school for the remainder of the school year nor for Diante due to his intervention phase being completed close to the end of the school year.

Results

Student Behaviors

Research Question 1 asked to what extent PTR would decrease problem behavior and increase replacement behavior of high school students classified as having EBD in high school settings. Results of this question are shown in Figure 1, which displays direct observation data for all three participants. As can be seen, all three participants decreased problem behavior and increased replacement behavior after the PTR plans were implemented. During baseline, problem behavior mean levels were 92% of intervals (Cyrus), 61% of session time (Damien), and .24 per minute (Diante). An increasing trend in baseline was seen for both Damien and Diante. Following implementation of the PTR intervention plans, immediate decreases were seen in problem behavior occurrence for all three participants with a decreasing trend seen for Cyrus, stable performance for Damien, and a relatively variable trend for Diante. Mean levels of problem behavior during intervention implementation were 23% of intervals (Cyrus), 4% of session time (Damien), and .07 per minute (Diante). No overlapping data points were observed between baseline and intervention for Cyrus. There was one overlapping data point for both Damien and Diante.

During baseline, mean levels of replacement behaviors were 10% of intervals (Cyrus), 40% of session time (Damien), and .03 per minute (Diante). A decreasing trend was seen for Damien. After PTR intervention, immediate increases in replacement behavior levels were seen for both Cyrus and Damien while Diante's replacement behavior increased minimally. Mean levels of replacement behaviors during intervention implementation were 85% of intervals (Cyrus), 94% of session time (Damien), and .10 per minute (Diante). There were no overlapping data points observed between baseline and intervention for Cyrus and several overlapping data points for Damien and Diante. A 2-week follow-up probe was conducted for Damien and data showed that both his problem and replacement behavior levels maintained at intervention levels.

IBRST

The *IBRST* ratings recorded by teachers (see Figure 2) were collected as a process measure and to provide supplemental

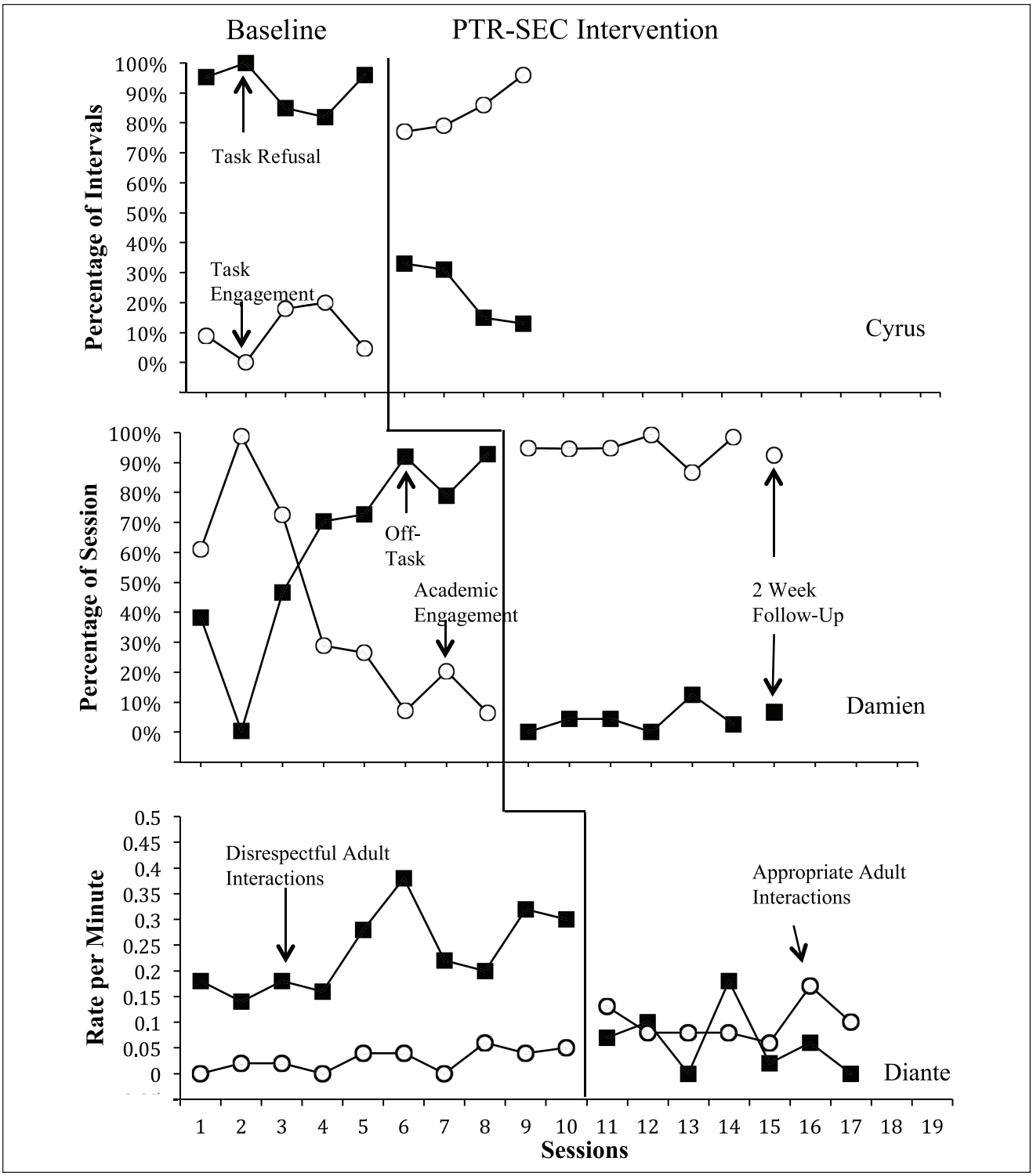

Figure 1. Student problem and replacement behavior.
Note. This graph represents student behavior in the classroom during the targeted session routine/period.

data to answer Research Question 1. Similar to direct observation results, all three students reduced their problem behaviors and increased their replacement behaviors after the PTR intervention plan was implemented. During baseline, mean ratings of problem behaviors were 4.6 (Cyrus), 3.1 (Damien), and 4.7 (Diante). Baseline ratings for Cyrus

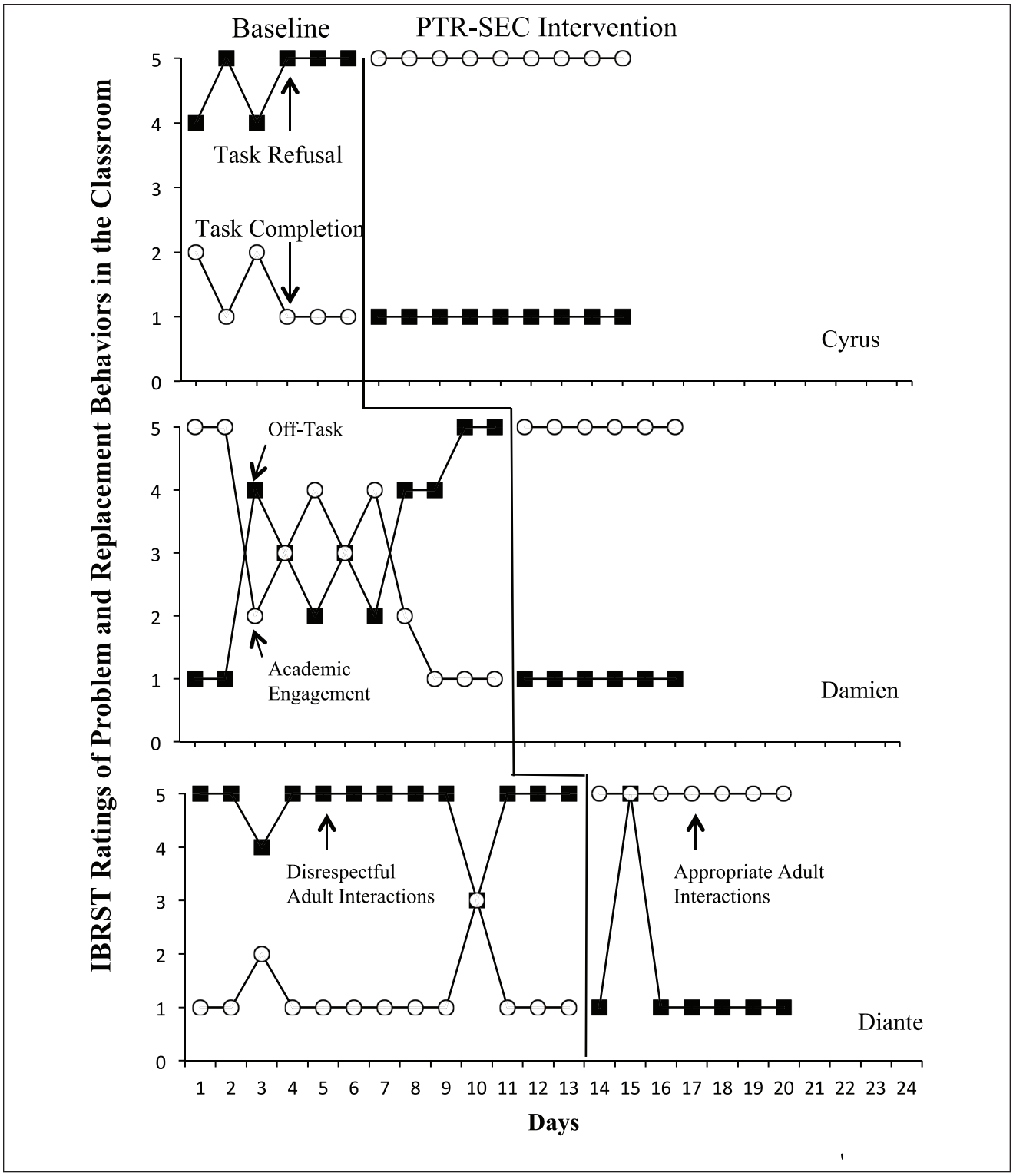

Figure 2. Teacher *Individualized Behavior Rating Scale Tool* ratings across participants.
Note. This graph represents teacher's ratings of problem and replacement behaviors in the classroom during the targeted routine/period.

and Diante were relatively stable, ranging between 4 and 5 while Damien's were variable with an upward trend toward the end of baseline. Following implementation of the PTR intervention plans, mean ratings of problem behavior decreased to 1.0 (Cyrus), 1.0 (Damien), and 1.8 (Diante). No overlapping data points between baseline and intervention

phases were recorded for Cyrus or Diante while several were recorded for Damien.

Replacement behavior mean values during baseline were 1.3 (Cyrus), 2.8 (Damien), and 1.2 (Diante). Data points for Cyrus and Diante were relatively stable while Damien's were variable with a decreasing trend seen at the end of baseline. Following implementation of the PTR intervention plans, mean ratings of replacement behavior increased to 5.0 for all three students and were stable. No overlapping data points between baseline and intervention phases were observed for Cyrus or Diante and several overlapping data points were recorded for Damien.

Treatment Fidelity

Research Question 2 asked to what extent would teachers implement the PTR intervention plan with fidelity. Teacher implementation fidelity was assessed in 50% of the observation sessions for each of the three students. The overall mean fidelity of implementation for all three plans was 97% (range = 83%–100%). Two fidelity observations were completed for Cyrus with both being 100%, three fidelity observations were completed for Damien with mean fidelity at 96% (range = 89%–100%), and four observations for Diante with a mean score of 96% (range = 83%–100%).

Social Validity

Research Question 3 asked to what extent would teachers and students find PTR to be acceptable and effective. The mean teacher rating of 5.0 on the TARF-R showed that both teachers found PTR procedures to be highly acceptable and effective. These results indicated that the teachers were very willing to carry out the plan, did not find the plan disruptive to carry out, and could fit the plan into their existing routines. Student mean social validity scores were 3.8 (Cyrus), 4.6 (Damien), and 3.6 (Diante). All three students indicated high agreement with liking the procedures used in the intervention plan (Research Question 3).

Discussion

The purpose of this study was to evaluate the use of PTR to reduce problem behavior and increase appropriate behavior of high school students with EBD in need of individualized behavioral supports. Although there are numerous studies showing the effectiveness of PTR for developing individualized behavior interventions (e.g., Dunlap et al., 2018; Iovannone et al., 2009), none has explored its use with teachers in high school settings and students with EBD. The following research questions were asked: (a) to what extent would PTR improve behaviors, (b) to what extent would teachers implement PTR with fidelity, and (c) to what extent will teachers and students find PTR to be socially valid. A multiple baseline design was used to answer the research questions and results indicated that PTR can be effective as used by high school teachers of students with EBD. The intervention plans developed and implemented resulted in immediate reductions of problem behavior for all three participating students and increases in appropriate behavior for two of the students with the third student showing mild improvement (Diante). The teachers implemented the intervention plans with high levels of fidelity. Students and teachers found the PTR process and outcomes to be acceptable. Thus, this study further supports the use of FBA/BIP processes to address individual student problem behavior and adds to the literature on high school implementation.

PTR has several features that are somewhat unique that may have contributed to the results. First, the procedural steps of each strategy comprising the PTR intervention plan describes in detail the behaviors the teachers would perform when implementing the intervention. This, along with the coaching and performance feedback activities built into the process, can increase teacher self-efficacy in implementing strategies, which in turn facilitates adult behavior change. Both teacher participants were enthusiastic about participating in the PTR process and furthering their knowledge on FBA and BIP development. However, even with effective classroom management techniques already in place and a good working relationship between them, both were often observed seated at their desks working on their computers for extended periods of time with minimal interaction with students prior to intervention. Many student responses, including requests for help and attempts to gain attention (both appropriate and inappropriate) went unacknowledged. As part of the PTR process, teachers received coaching and modeling on how to implement the steps of the behavior plans, which included how to interact positively with students (as part of antecedent manipulations) and how to respond to student's appropriate and inappropriate behaviors. Manualizing intervention has been suggested as a primary motivator for enhancing adult behavior change by increasing teacher competencies and self-efficacy (Sanetti et al., 2013). Furthermore, having a manualized approach for FBA/BIPs may enhance its adoption by other educators and increase its use with students needing individualized behavior intervention supports.

A second feature of PTR is ensuring the intervention plan has contextual fit for implementation. This may have contributed to the high intervention implementation fidelity and social validity ratings. Rather than tell the teachers which behavior interventions they should implement and how, PTR asks team members to rank order strategies, and final selections are made based on the highest ranking strategies that have agreement with both the teacher and the student and are linked with the hypotheses. The interventions and procedural steps are not dictated to the teacher by an "expert"; rather, the teacher is guided to develop the steps

of the selected interventions based on what is feasible and acceptable to do in their context. Contextual fit has been cited as a crucial feature for teacher willingness to implement interventions (see Sugai et al., 2012). What is unknown is the level of training that may be required for educators to become "PTR coaches" and effectively guide teams in selecting and developing interventions. Further research on professional development needs is warranted.

A third PTR feature is having the students involved in most of the steps. Although having teacher buy-in is essential for implementing strategies, it is equally important to have student buy-in, particularly for adolescents (Flannery et al., 2009). Students were involved in reaching consensus on the specific behaviors that would be targeted, the hypothesis statements related to their behaviors, and the interventions that would be included on their plans. While gathering student input, they were able to give their perspectives as well as understand the teacher perspectives. For example, Diante did not consider that all of his behaviors defined by his teachers as a concern were disrespectful. Instead, he stated that he was just "joking around" with his teachers. Although the teacher and Diante had different perspectives, they were able to come to consensus on targeting the disrespectful behavior and including the "joking around" behaviors in the definitions. When coming to consensus on the behavior interventions, student involvement included considering and embedding student interests and preferences into the intervention plan. For example, Diante's intervention strategy of a visual prompt utilized the acronym "PANDA" which was created from one of his favorite songs. The other students in the classroom also sang this song, and this acronym began to be the verbal prompt students used to remind each other to ask for help. For instance, Diante was observed telling Damien "you have to PANDA it" when Damien did not use "please" when asking for help. Damien's intervention plan also incorporated time with his preferred adult, his football coach, as a reinforcer to provide attention contingent upon Damien's performance of his replacement behavior.

A side effect of PTR was teachers using the strategies from the individualized intervention plans with the other students in their classrooms. Both Damien's and Diante's interventions included specific social skills training (social problem-solving strategies for Damien and social skills training for Diante) that involved the teachers implementing behavior analytic techniques of prompting, prompt fading, and differential reinforcement to teach the necessary skills. Rachel reported that she began using these strategies with all of the students in the classroom and observed an overall class wide increase in appropriate behavior. During the last week of data collection for Diante, the social worker was present in the classroom and made the observation that all of the students within the classroom "were doing such a great job" appropriately asking for assistance and items, a behavior that was not occurring prior to implementation of the PTR process. This could have important implications that may guide coaches working with individual teachers. By developing individualized interventions that have contextual fit and could be effective practices to use with other students, it is possible that teachers may extend strategy application to other students or even whole classroom systems.

Limitations and Future Directions

Several limitations exist with the current study. First, the study was conducted in a self-contained setting in a high school and only studied the PTR impact on three students and their two teachers. Teams were small, consisting of the teachers, the first author, and the students, and the students did not receive any instruction outside of the classroom other than Diante for 50% of his day. Teachers in this study may have been more willing to implement the interventions due to their familiarity with the students. None of Diante's general education teachers was included on his team. More research is needed to not only replicate this study, but to explore whether PTR can be effective in multiple high school environments with diverse student groups (e.g., general education, other disabilities) and with general education teachers.

A second limitation is the *IBRST*. The *IBRST* was collected as a feasible process method for teachers to collect daily progress monitoring data and use the data to make decisions about next steps. However, the current study did not do an analysis on the agreement of the *IBRST* ratings with systematic direct observation. Upon visual inspection of the graphs, there were some differences observed between the *IBRST* ratings and direct observation data points. This could be attributed to inaccurate estimates of behavior occurrence when setting up the *IBRST* or could be teacher subjectivity. However, it is important to note that the general trends of the *IBRST* data points were very similar to the direct observation data points. Although the *IBRST* was never meant to replace direct observation, it was feasible and highly accepted by teachers. Barnes et al. (2019) conducted a validity study comparing the *IBRST* ratings to direct observation and found a good strength of agreement (McHugh, 2012; $k = .70$). Future research may want to further examine external validity of the *IBRST* and its practicality for data-based decision-making.

Additional limitations were the brief duration of the study (approximately 4–6 weeks per student), the inclusion of only one follow-up probe for one student (Damien), and lack of individual implementation data for each teacher. Conclusions cannot be made regarding the sustainability of PTR implementation by teachers nor the long-term impact on student behaviors. Additional research is needed to evaluate whether PTR can be sustainable. More importantly,

given that the study participants were in a segregated setting for behavioral concerns, more research is needed to determine whether implementation of PTR or other FBA/BIP processes could not only be sustained in both teacher implementation and student behavior change but also to allow students access to less restrictive environments. Another limitation is the use of a nonconcurrent multiple baseline design. A nonconcurrent multiple baseline design is used frequently in applied behavior analysis research (e.g., Greer et al., 2016; Gunby et al., 2010; Kelley & Miltenberger, 2016); however, it is an inherently weaker design. Unfortunately, when conducting research in applied settings it can be difficult to recruit and start participants at the same time.

Future research should build upon this study while addressing some of the limitations. First, fidelity of implementation is a prime area for further research. Due to the structure of both teachers' days, we were unable to obtain separate fidelity data from each teacher; rather we evaluated the fidelity of the strategy steps being delivered independent of the person delivering the specific step. Future research might examine whether this method of measuring fidelity is sound or how having two teachers implementing different intervention steps of a strategy in a specific routine impacts the implementation adherence, quality, or dosage. Second, the *IBRST* ratings were also completed collaboratively and consensually rather than independently by each teacher. Further research might compare and contrast the reliability and validity of shared ratings with independent ratings. Third, the PTR Assessment validation would be important so that school teams have confidence that the information obtained from the tool results in a hypothesis that generates an effective function-based support plan. A treatment utility study might be considered in which masked evaluators review both the hypotheses derived from the assessment and the PTR intervention plan and rate the extent to which the interventions are aligned with the hypothesis and the plan improved student behavior.

In summary, this study adds to the field of FBA and BIP research for students with EBD in high school settings. The results from the study suggest that PTR can be feasibly and effectively implemented to improve student behaviors and potentially change teacher or adult interactions with students.

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