

A Randomized Controlled Evaluation of Prevent-Teach-Reinforce for Young Children

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Glen Dunlap, PhD¹, Phillip Strain, PhD², Janice K. Lee, MEd, BCBA¹,
Jaclyn Joseph, PhD, BCBA², and Nancy Leech, PhD²

Abstract

Prevent-Teach-Reinforce for Young Children (PTR-YC) is a standardized model of positive behavior support designed to deliver individualized interventions for preschool-aged children with severe and persistent challenging behaviors. A randomized controlled trial was conducted to compare effects of PTR-YC with those of a “business as usual” (BAU) comparison condition implemented over the course of one school semester (approximately 3–4 months). Participants were 169 children in pre-K and Head Start classrooms in two states in the western United States. Mixed ANOVAs revealed statistically significant differences in pre–post scores on the problem behavior and social skills subscales of the *Social Skills Improvement System* (SSIS) as well as direct observation from video samples of the children’s appropriate engagement and challenging behavior, with all comparisons favoring the PTR-YC intervention. Results are discussed in terms of the need for effective strategies for enabling early childhood professionals to implement behavioral interventions with fidelity and effectiveness.

Keywords

challenging behavior, positive behavior support, early childhood intervention, randomized controlled trial

Challenging behaviors are among the most intractable obstacles for young children’s social-emotional development and school readiness (Strain & Timm, 2001). Challenging behaviors such as severe and persistent tantrums, aggression, and property destruction are concerns because they interfere with learning and the development of positive social interactions and because, untreated, they are associated with subsequent failure in academic and social functioning (Dunlap et al., 2006; Smith & Fox, 2003). For these reasons, it is now broadly acknowledged that it is essential to develop and implement effective interventions for challenging behavior when children are still in their toddler and preschool years.

A great deal of research has addressed interventions for challenging behavior, with the vast majority of strategies being based on the principles of applied behavior analysis and the process and procedures of positive behavior support (PBS; Bambara & Kern, 2005; Sailor, Dunlap, Sugai, & Horner, 2009). The most effective interventions are based on the results of a functional behavioral assessment (FBA) and, generally, include strategies involving manipulations of antecedent variables, explicit instruction on communication and other skills that can serve as functional replacements for the challenging behavior, and adjustments and enhancements of reinforcement schedules (Brown, Anderson, & De

Pry, 2015; Dunlap & Carr, 2007). Although most research on PBS and challenging behavior has been conducted with school-aged children, the same essential results have been found with toddlers and preschool-aged children (Conroy, Dunlap, Clarke, & Alter, 2005).

One limitation of the PBS approach is that the vast majority of studies using function-based interventions have been conducted with few participants and single case experimental designs. Although such designs can provide powerful evidence of internal validity, such demonstrations are restrictive in terms of the procedures’ external validity and general applicability. There is a need to expand the evidentiary database with standardized procedures and larger numbers of participants and implementation agents. That is, an expansion of the empirical evidence base for PBS will require group comparison studies to help establish more widespread applicability and generality.

¹University of Nevada, Reno, USA

²University of Colorado Denver, USA

Corresponding Author:

Glen Dunlap, University of Nevada, Reno, 2778 Mayberry Drive, Reno, NV 89509, USA.

Email: gledunlap@sbcglobal.net

The Prevent-Teach-Reinforce (PTR) model, and the current research, was established to address these limitations (Dunlap et al., 2010). PTR is a standardized model of PBS designed to be implemented by typical elementary and middle school teams (teachers, related school personnel, etc.) in regular and special education classrooms. PTR is an individualized process that leads interventionists through the process of goal setting, team building, FBA, behavior support plan development, implementation, and evaluation. Studies of the PTR model have shown it to be effective in a randomized controlled trial (RCT) and in experiments using single case experimental designs (e.g., Iovannone et al., 2009; Strain, Wilson, & Dunlap, 2011). Data also indicated that the model could be implemented with adequate fidelity (Iovannone et al., 2009). However, the procedures of PTR are not necessarily a good fit for early education and child care settings because, for example, the recommended intervention strategies are not always age appropriate and the context of implementation is more structured and academic than is common in prekindergarten environments. In response, *Prevent-Teach-Reinforce for Young Children* (PTR-YC; Dunlap, Wilson, Strain, & Lee, 2013) was developed to provide a standardized, effective, and feasible model of individualized PBS for classrooms serving toddlers and preschoolers.

PTR-YC

The PTR-YC model is based on the process of PTR, but it was revised to be congruent with the developmental characteristics of young children and to address the needs of early childhood educators for a feasible and effective intervention approach in early care and education settings, including pre-K and Head Start classrooms. PTR-YC is an approach for implementing highly focused PBS interventions for young children who already exhibit patterns of serious challenging behaviors and should be part of a more comprehensive approach to promoting healthy social-emotional development and preventing challenging behaviors. In particular, PTR-YC is intended as the most intensive component of a multitiered framework (e.g., Fox, Dunlap, Hemmeter, Joseph, & Strain, 2003) and, therefore, prior to beginning the individualized process, it is recommended that teams first conduct simple assessments to determine whether or not certain classroom-wide practices are being implemented with integrity. If the practices are not being implemented consistently and with a high level of quality, it is suggested that the classroom-wide practices be implemented prior to, or simultaneous with, the introduction of an individualized PTR-YC process (Dunlap et al., 2013). The reason for this is that high-quality implementation of the classroom practices often serves to reduce or eliminate challenging behaviors without the need for relatively effortful and intensive, individualized interventions. The

classroom practices recommended in the PTR-YC model are (a) use of a 5:1 ratio of positive to negative or neutral attention; (b) use of clear, predictable schedules that are prominently displayed and taught to all children; (c) use of routines and routines within routines—that is, embedding multiple routines within the daily routines to enhance predictability; (d) direct teaching of behavioral expectations within each of the contexts of the daily schedule; and (e) direct teaching of peer-related social skills.

The five steps of the individualized PTR-YC model are as follows:

Step 1: Teaming and Goal Setting

The process begins with the formation of a team that includes individuals who interact with the child on a frequent and regular basis and who will be involved in developing and implementing the intervention. The classroom teacher is an essential team member and other classroom staff, consultants, and parents are involved as much as is possible and feasible. At the first team meeting, short-term goals are identified, and a goal-setting form is included to help team members accomplish this task. The team identifies and prioritizes one challenging behavior to decrease and one desirable behavior to increase that can be realistically accomplished in 2 to 3 months. Only two behaviors are targeted at a time to enhance the team's focus and increase the likelihood of fidelity and successful outcomes.

Step 2: Data Collection

Once goals are identified, data collection is initiated to establish baseline levels of behavior and, later, to determine whether the behavior intervention plan (BIP) is working. In PTR-YC, data collection is intended to be simple and valid, making it easy for teachers and other school staff to collect and use meaningful information on child progress. Given their simplicity and ease of use, the preferred data collection method is behavior rating scales (Iovannone, Greenbaum, Wang, Dunlap, & Kincaid, 2014), which are perceptual ratings of behavior completed after a designated time period and typically take only about 10 s or less to complete each day. Team members contribute to identifying how and when behavior will be measured and recorded and collaborate on the details of how data-based decision making will occur. The PTR-YC manual provides tools and examples for this purpose.

Step 3: FBA

As in any BIP, an FBA is necessary to identify the environmental factors that contribute to the challenging behavior and determine the function or purpose of that behavior, which guides team members to identify appropriate

intervention strategies to implement. The FBA process in PTR-YC uses three checklists corresponding to antecedent factors (Prevent), needs for function-based instruction (Teach), and issues related to consequences (Reinforce). Each checklist has multiple-choice and open-ended response options that are common in preschool classrooms. The checklists take about 10 to 15 min for each team member to complete. The team convenes and uses PTR-YC forms to summarize the data and formulate hypothesis statements, which are succinct and complete statements that reflect the team's view of the elements that contribute to the child's challenging behavior. The hypothesis statements are used to identify appropriate strategies for the BIP.

Step 4: BIP

The BIP in PTR-YC includes at least one strategy from each of the three categories—Prevent (contextual and antecedent manipulations), Teach (instructional strategies), and Reinforce (adjustments of consequences). The requirement that a plan must include at least one strategy from each of the categories ensures that the plan is more robust, meaning that any inadequacies in the implementation of any one component are likely to be compensated for by the effects of other components. The manual contains a menu of evidence-based intervention options within each category as well as considerations and examples describing details of implementation. Teachers typically are the primary interventionists and should have the greatest input into identifying appropriate and feasible intervention strategies to implement in the classroom. Although there is no one right way to develop a BIP, team members need to select interventions that match the function of the challenging behavior (identified in the hypothesis statement) while meeting the needs and preferences of the team members who will be implementing the strategies. The BIP is a written document that includes the identified strategies, detailed steps about how the strategy will be implemented, and what materials and training or coaching is needed to implement the plan. All the details for implementing the plan need to be addressed before actual implementation begins. Each strategy should include scripts or task analyses of how the strategy should be implemented; any supplies, materials, or resources that are required; specific information about when, how often, and who will implement the strategy; and finally, what positive consequences will be delivered when the child successfully engages in the socially appropriate behavior.

Step 5: Using Data and Next Steps

The final phase of PTR-YC is actually an ongoing instruction on how to make decisions based on the data collected during the BIP implementation. In addition, guidance is

provided regarding what teams should do when problems reappear, when it is time to introduce new target behaviors, and when transitions are anticipated.

Research Approach and Research Questions

The purpose of the present investigation was to evaluate the effects of PTR-YC compared with a “business-as-usual” (BAU) condition which was simply the procedures that would be in place had no research been proposed. The study was conducted as an RCT with randomization occurring at the classroom level. One child with challenging behavior from each classroom was selected to participate, with each child's participation lasting for approximately one semester. The study was conducted over a total of seven semesters. Primary dependent variables included standardized measures of problem behavior and social skills, using the *Social Skills Improvement System* (SSIS), and direct observations of engaged time and challenging behavior. These data were obtained near the beginning and near the end of each child's participation, although some process data were collected throughout.

The primary questions that were asked were as follows: (a) Will PTR-YC or BAU be more effective in reducing preschool children's levels of problem behavior, as measured by the SSIS? (b) Will PTR-YC or BAU be more effective in increasing preschool children's social skills, as measured by the SSIS? (c) Will PTR-YC or BAU be more effective in increasing preschool children's appropriate engagement, as measured by direct observations? and (d) Will PTR-YC or BAU be more effective in reducing preschool children's levels of challenging behavior, as measured by direct observations?

Method

Participants

Participants included (a) teachers in early childhood education programs that included preschool-aged children with challenging behaviors, and (b) preschool-aged children with severe and persistent challenging behaviors. Teachers participated on a voluntary basis, provided informed consent to be part of the study, and were qualified by their administrative unit to serve as a lead teacher for preschool classrooms. Child participants were identified by their teachers through a process in which the teachers informally ranked children in their classroom as having the highest levels of challenging behaviors. The child with the highest level of challenging behavior was chosen to participate, and parental informed consent was solicited. If consent could not be obtained for the first child on the list, the next child was selected until a child with serious challenging behaviors and parental consent was identified. Children were

eligible to participate if they (a) displayed challenging behaviors that were reported to occur at least twice per week in the classroom, (b) displayed challenging behaviors in the classroom for at least 6 weeks or that were evident from other programs or in the home for at least 3 months, and (c) were reported to be absent from the program less than one time per week. Children were excluded from the study if they did not have challenging behaviors that met the above criteria, if they had excessive absences that would interfere with data collection, or there was an expectation that they would leave the program within 4 months due to medical concerns or to the child's family moving from the area. Although all children demonstrated high rates of challenging behaviors, it was not a requirement that they be identified as having a disability; therefore, not all children had Individualized Education Programs (IEPs).

Selection of teachers. Teachers were recruited with the assistance of official administrative personnel (center directors, principals, etc.) who arranged for researchers to describe the study and participation opportunities through preservice meetings, distribution of written materials, and individual meetings. Teachers were informed that participation was entirely voluntary, that assignment to the experimental or comparison condition would be randomly determined, and that responsibilities included engaging in and facilitating data collection. When teachers understood the study and agreed to participate, they signed an informed consent agreement to participate for one semester and identified the children with the most serious challenging behaviors as candidates for study participation. The teacher (and classroom) was then randomly assigned to one or the other study condition (PTR-YC or BAU). Random assignment was conducted within each of the two state sites (Reno, NV and Denver, CO) at the beginning of each semester. A biased coin design (Efron, 1971) was used to achieve random assignment. The biased coin technique involved tossing a hypothetical coin that was biased toward the condition needing participants. Poker chips were placed in a container with one color designating the PTR-YC condition and a different color indicating BAU. When the sample was balanced, the container held one chip of each color. When the sample was unbalanced, the container held three chips with two of the chips representing the underrepresented condition. One poker chip was blindly selected and the color indicated the group to which the teacher was assigned.

Participating teachers led classrooms in the following settings, all of which were in northern Nevada or central Colorado: public preschool ($n = 72$), Head Start ($n = 20$), and educational child care ($n = 16$). A teacher who participated in one semester was eligible to participate in a subsequent semester with a different child; however, the initial assignment to a study condition was continued throughout the teacher's participation with the study. Participating

teachers across both conditions of the study had similar characteristics. Over 95% were female, and they ranged in experience from first-year practitioners to those with more than two decades of teaching. Teachers' formal education in both conditions ranged from a high school diploma to a master's degree.

Child selection. Only one child was selected per classroom, and the condition to which the child was assigned was determined by the random assignment of the teacher. Child selection was based on the teacher's rankings with the child with the most serious challenging behaviors being the first to be considered. If inclusion criteria were met and the parent gave consent, then that child was the designated participant. If the parent of the top-ranked child did not give consent, then the family of the next-ranked child was approached, and so on (as necessary).

As with teachers, child characteristics were essentially identical across the study's conditions. A total of 169 children with informed consent completed all phases of the study, with 89 in the PTR-YC and 80 in the BAU conditions, although there were missing data for some variables due to absences and equipment malfunctions. The totals for each of the main effects variables are indicated in Table 1 in the "Results" section. Approximately 45% of children were identified with a disability and had an IEP, 82% were male, 65% were White, 25% were Hispanic, 5% were Black, and the remaining 5% were Asian or "Other." Attrition amounted to 8% of the study sample. Eight children whose parents had signed informed consent were lost in the PTR-YC condition, and six were lost in the BAU condition. These instances of attrition occurred for various reasons including families moving to a distant destination, teachers withdrawing from participation, and other circumstances that prevented the collection of posttest data.

Measures

Teachers provided demographic information for themselves and for selected children. Measures of child outcomes included the social skills and problem behavior rating scales of the SSIS, direct observation of children's engaged time, and direct observation of children's challenging behavior.

SSIS Rating Scales. The SSIS (Gresham & Elliott, 2008) was used to measure levels of problem behavior and social skills. The SSIS was developed as a replacement for the *Social Skills Rating System* (Gresham & Elliott, 1990) with updated norms, improved psychometrics, and greater sensitivity for detecting change in the behavior of preschoolers. The teacher form of the SSIS was used to assess changes in children's social skill development and problem behavior. Internal consistency for the SSIS is quite high (.96) as is 6-week test reliability (.90). In terms of criterion-related

Table 1. Means and Standard Deviations of the Pre/Post Scores Separately by Group.

Index	Group	Pre		Post	
		M	SD	M	SD
SSIS PB (n = 158)	Treatment	34.94	12.21	27.80	13.20
	Control	31.00	10.77	29.37	11.66
SSIS SS (n = 160)	Treatment	49.95	19.43	66.11	19.61
	Control	48.73	16.85	55.37	18.54
Engaged time (n = 153)	Treatment	74.25	20.75	87.39	11.38
	Control	73.10	19.32	78.08	18.15
Challenging behavior (n = 152)	Treatment	7.29	8.63	3.05	4.41
	Control	5.29	7.48	4.03	5.80

Note. SSIS = Social Skills Improvement System; PB = problem behavior; SS = social skills.

validity, the SSIS correlates highly with the *Child Behavior Checklist* (.81) and the *Walker-McConnell Scale of Social Competence* (.75). The SSIS was administered for every participating child at baseline (pretest) and at a 4-month posttest.

Engaged time (ET). Engaged time refers to the amount of time a child spends visibly and actively engaged in, attending to, and working on relevant classroom activities and routines. Examples of ET include following teacher directions, appropriate and positive social interactions with peers, following classroom routines, actively participating in activities, using materials in appropriate ways, and expressing emotions appropriately. ET was measured using momentary time sampling (Ayres & Ledford, 2014; Gast & Ledford, 2014). At pre- and posttest, three 10-min video recordings were taken for each child during a teacher-identified classroom routine or activity associated with a high probability of challenging behavior. Observation intervals were 10 s each, for a total of 60 intervals measured for each video sample. Each interval was scored as “engaged” or “not engaged,” and a percentage of intervals engaged was calculated by dividing the number of engaged intervals by the total number of intervals. Data were averaged across days for primary analyses. A similar strategy has been shown to yield a reliable portrayal of ET (Strain et al., 2011).

All video samples were scored at the Reno campus. Undergraduate students were trained as data collectors on the definition of engaged time examples and nonexamples and how to collect and document engaged time data. The training included viewing sample videos with the data collectors, recording data according to the operational definitions, and comparing and discussing scores for each practice interval. This process of viewing sample videos and comparing data occurred until all data collectors obtained a minimum of 90% interrater agreement for three consecutive sample videos.

Challenging behavior. Challenging behavior refers to behaviors that disrupt a child’s learning or the learning of others (Smith & Fox, 2003). Challenging behavior can include physical and/or verbal aggression to self, others, or the physical environment; noncompliance; taking objects away from others; tantrums; crying/screaming; and elopement or attempts to elope. Challenging behavior was measured using momentary time sampling. The same three 10-min videos that were obtained at pre- and posttest observations for engaged time were used, and the identical process for recording and scoring the dependent variable was used as well. Each interval was scored as “challenging behavior” or “no challenging behavior,” and a percentage of intervals with challenging behavior was calculated by dividing the number of challenging behavior intervals by the total number of intervals. Data were averaged across days for primary analyses. Training for data collectors occurred in the same manner and to the same criterion as with engaged time.

Interobserver agreement for video observations. Throughout the study, 37% of video samples were assessed for interobserver agreement for engaged time and challenging behavior. The assessed samples were equally distributed across conditions and classrooms. Interobserver agreement was estimated by having a second observer independently code the video samples, and then the records obtained by the primary and secondary observers were compared for agreements and disagreements. For engaged time, total agreement averaged 90%, with a range of 70% to 100%. For challenging behavior, total agreement averaged 99%, with a range of 97% to 100%.

Social validity. Social validity was assessed with two instruments—one for teachers and one for families who were randomly assigned to the PTR-YC condition. Both forms were administered at posttreatment. The teacher instrument was an adaptation of the *Treatment Acceptability Rating Form* (Reimers & Wacker, 1988) that was used in previous research on the PTR model (Dunlap et al., 2010). This form used a Likert-type 5-point scale (1 = *low*, 3 = *neutral*, 5 = *high*) to assess teachers’ judgments of the effectiveness, efficiency, and usability of the intervention. The family instrument was based on questionnaires that were used with families in previous research (e.g., Strain & Bovey, 2011). The family form also used a Likert-type 5-point scale (1 = *low*, 5 = *high*) to assess families’ perceptions of the effectiveness, efficiency, and usability of the intervention.

Fidelity. Implementation fidelity of the PTR-YC intervention was assessed with a 13-item checklist that was used to assess whether or not key elements of the PTR-YC intervention process were implemented. The checklist covered each of the five steps of the PTR-YC process and was

Fidelity Checklist for PTR-YC Implementation Process		
Child Code: _____	Date: _____	
Staff (person completing the form): _____		
Instructions: Indicate whether or not the following activities occurred by checking "Yes" or "No."		
1. Was a team assembled to address plans for intervention?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
2. Did the team include the primary teacher or care giver?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
3. Were goals specified for reductions in challenging behavior and increases in social-emotional behavior?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
4. Were data collection systems established to measure challenging behavior?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
5. Were data collection systems established to measure at least one social-emotional behavior?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
6. Were at least 3 days of baseline data collected on challenging behavior?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
7. Did the primary teacher or caregiver provide input for a functional behavioral assessment?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
8. Did a functional behavioral assessment result in a hypothesis statement (or summary) that included a description of the target behavior and associated antecedent and consequence events?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
9. Was a behavior intervention plan developed in written form?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
10. Did the behavior intervention plan include strategies involving antecedent manipulations?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
11. Did the behavior intervention plan include strategies involving manipulations of positive reinforcers?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
12. Did the behavior intervention plan include strategies for teaching specific social-communicative behaviors?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Were progress monitoring data collected to determine the effects of the behavior intervention plan?	<input type="checkbox"/> YES	<input type="checkbox"/> NO

Figure 1. Fidelity checklist.

Note. PTR-YC = Prevent-Teach-Reinforce for Young Children.

completed by research staff as the PTR-YC process unfolded for participants assigned to the PTR-YC condition and at posttest for participants assigned to the BAU condition. The fidelity checklist is shown in Figure 1. The data revealed that participants in the PTR-YC condition completed 100% of the 13 steps, and participants in the BAU condition completed, on average, less than one of the 13 steps.

Research Design and Procedures

The research design was a randomized controlled group design. Random assignment and child selection were usually completed within the first 3 to 5 weeks of the semester. Baseline data collection began immediately following the receipt of parental informed consent. Experienced and highly trained research personnel obtained data in the classroom, generally over a period of 1 to 2 weeks. During this period, teachers assigned to the experimental (PTR-YC)

condition were provided with information about the PTR-YC process. As soon as the baseline data were obtained, the PTR-YC process was initiated in the experimental classrooms, while the teachers assigned to the BAU condition were instructed to continue implementation of the intervention and support procedures that they customarily provided. The PTR-YC process was completed in approximately 2 to 3 months, with posttest data collection for both groups occurring around 3 to 4 months following baseline.

PTR-YC. A detailed description of the PTR-YC intervention was provided above. Once baseline data collection was complete, the PTR-YC process was initiated and the five steps were followed. A member of the research staff was assigned as a facilitator for each classroom. All facilitators had extensive training in applied behavior analysis, PBS, and the specifics of the prevent-teach-reinforce framework, and had at least 5 years' experience in training, coaching, and facilitation for teams of preschool professionals. An

early step was for the facilitator to work with the classroom teacher to identify other team members. In all cases, the teacher was the central team member but some teams were augmented with classroom aides, related services personnel, or parents. The facilitator was responsible for helping the team proceed through each step of developing and implementing data collection, completing the PTR-YC assessment, and designing the intervention plan. The facilitator attended all team meetings and provided coaching for plan implementation until the elements of the intervention plan were implemented with fidelity. However, all interventions were actually implemented by the teacher and other classroom staff. Although the facilitator offered initial training and coaching, the facilitator did not conduct interventions with any child in the classroom.

Business as usual (BAU). Participants who were randomly assigned to the BAU comparison condition experienced the regular practices that were being implemented in the classroom (e.g., use of child guidance techniques, classroom management strategies, behavior specialist personnel through the school or program, adding additional personnel to the classroom). Teachers were able to access any services available to them through their program, school, or school district, but research study personnel provided no information, supports, or services. The same baseline and posttest data were collected as in the PTR-YC condition, with a similar time frame (3–4 months). Overall, child, teacher, and classroom demographics were similar to those in the PTR-YC condition.

Data Analysis

To examine the main effects associated with this RCT, mixed ANOVAs were conducted for each of the primary outcome indices: (a) SSIS problem behavior scores, (b) SSIS social skill scores, (c) direct observation of challenging behavior, and (d) direct observation of engaged time. Prior to conducting mixed ANOVAs for each outcome, the following assumptions were tested and met: (a) independence of observations, (b) normality, and (c) sphericity. Resultant data for each index are described next.

Results

Comparing study groups on the SSIS problem behavior index revealed a statistically significant interaction effect between time and group, $F(1, 156) = 10.40, p = .002$. The statistically significant interaction represented a small effect size ($\eta_p^2 = .062$). Table 1 presents the means and standard deviations for both groups at pre and post, and Figure 2 represents the interaction between time and group. Inspection of the figure suggests that the groups started at different levels for SSIS problem behavior, and then at posttest, the

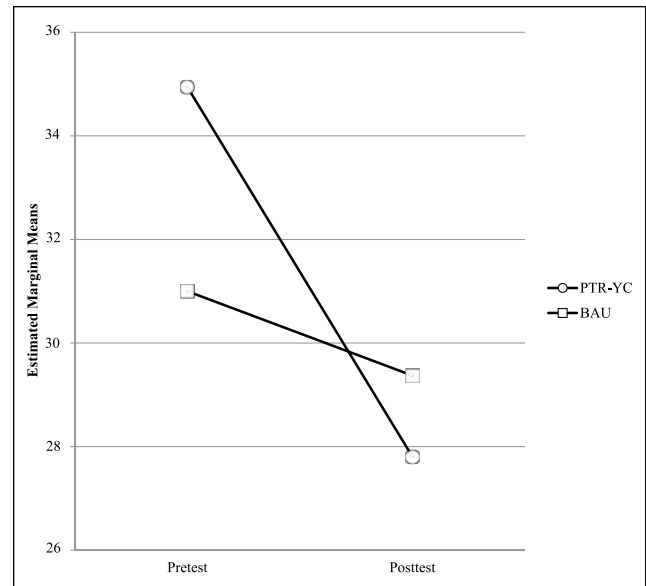


Figure 2. Plot of the interaction of time by group for SSIS problem behavior scores.

Note. SSIS = Social Skills Improvement System; PTR-YC = Prevent-Teach-Reinforce for Young Children; BAU = business as usual.

intervention group has a slightly lower score ($M = 27.80$) than the BAU group ($M = 29.37$). The BAU group had less change from pre- to posttest than the PTR-YC group.

Results for the mixed ANOVA specific to SSIS social skills revealed a statistically interaction effect between time and group, $F(1, 158) = 10.52, p = .001$. The effect size was small for the interaction analyses ($\eta_p^2 = .062$). Table 1 presents the means and standard deviations for both groups at pre and post, and Figure 3 graphically represents the relationship between time and group. Both study groups start at essentially the same social skills score, and then at posttest, the PTR-YC group has a much higher score ($M = 66.11$) than the BAU group ($M = 55.37$).

Results specific to directly observed levels of challenging behavior revealed a statistically interaction effect between time and group, $F(1, 150) = 6.19, p = .014$. Table 1 presents the means and standard deviations for both groups at pre and post, and Figure 4 graphically represents the interaction between time and group. Figure 3 shows that the PTR-YC group has a statistically higher level of challenging behavior at start and that the PTR-YC group has less challenging behavior than the BAU group at posttest, with both groups decreasing over time. A small effect size for the interaction analysis was identified ($\eta_p^2 = .040$).

Examining directly observed levels of engaged time revealed a statistically significant interaction effect between time and group, $F(1, 151) = 7.56, p = .007, \eta_p^2 = .048$. Table 1 presents the means and standard deviations for both groups at pre and post, and Figure 5 graphically depicts the interaction between time and group, indicating similar

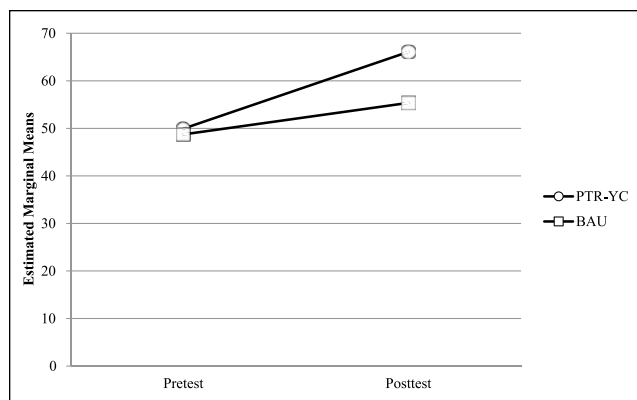


Figure 3. Plot of the interaction of time by group for SSIS social skills scores.

Note. SSIS = Social Skills Improvement System; PTR-YC = Prevent-Teach-Reinforce for Young Children; BAU = business as usual.

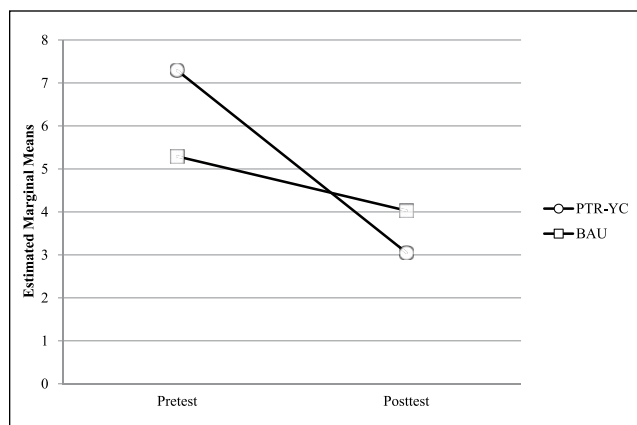


Figure 4. Plot of the interaction of time by group for challenging behavior.

Note. PTR-YC = Prevent-Teach-Reinforce for Young Children; BAU = business as usual.

levels of engagement at pretest with PTR-YC participants reaching much higher levels of engagement at posttest.

The teachers' ratings of the acceptability of the PTR-YC process and intervention plan are shown in Table 2. All ratings were on a 5-point Likert-type scale with "1" meaning a low score, "3" being neutral, and "5" meaning a high score. The specific anchors are shown for each item. Sixty-nine percent of participating teachers assigned to the PTR-YC condition returned the form, and the numbers in the third column represent the average ratings. Inspection of these data indicate that the teachers generally found PTR-YC to be acceptable, likely to produce favorable outcomes, and unlikely to be associated with discomfort or negative side effects.

Parents of the children participating in the PTR-YC condition completed a different social validity form. Fifty-four percent of these parents returned the form in person or in a

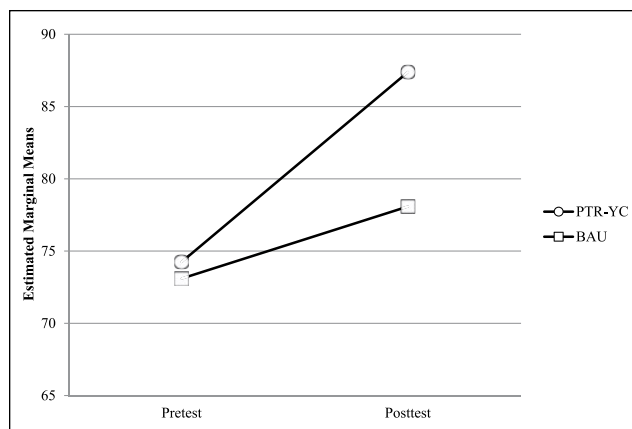


Figure 5. Plot of the interaction of time by group for engaged time.

Note. PTR-YC = Prevent-Teach-Reinforce for Young Children; BAU = business as usual.

self-addressed, stamped envelope. Results are shown in Table 3. On this form, the key statements are in the middle column, and parents responded with a numerical 1 to 5 rating to indicate their level of agreement with the statements. The average ratings are in the third column. These data reflect generally favorable perceptions about the acceptability and effects of the PTR-YC approach.

Discussion

The purpose of the present investigation was to evaluate the effects of PTR-YC compared with a BAU condition. The following primary questions were asked: (a) Will PTR-YC or BAU be more effective in reducing preschool children's levels of problem behavior, as measured by the SSIS? (b) Will PTR-YC or BAU be more effective in increasing preschool children's social skills, as measured by the SSIS? (c) Will PTR-YC or BAU be more effective in increasing preschool children's appropriate engagement, as measured by direct observations? (d) Will PTR-YC or BAU be more effective in reducing preschool children's levels of challenging behavior, as measured by direct observations? All four research questions assessed the difference between groups (PTR-YC vs. BAU) and effect of time (pre- and posttest). For all four measures, a statistically significant interaction was found, indicating that the change between pre- and posttest depended on group. For the SSIS social skills and engaged time measures, the PTR-YC and BAU groups started at similar levels and then the PTR-YC group had higher SSIS social skills and engaged time scores at posttest than the BAU group. For both SSIS problem behavior ratings and directly observed challenging behavior levels, the PTR-YC group started at pretest with higher scores than the BAU group, and then the PTR-YC group had lower scores at posttest than the BAU group. These results

Table 2. Teachers' Social Validity Ratings.

Question	Scale (1–5)	Average rating
1. Given this student's behavior problems, how acceptable do you find the PTR-YC behavior plan?	1 = not at all acceptable; 5 = very acceptable	4.72
2. How willing are you to carry out this behavior plan?	1 = not at all willing; 5 = very willing	4.83
3. To what extent do you think there might be disadvantages in following this behavior plan?	1 = none likely; 5 = many likely	2.03
4. How much time will be needed each day for you to carry out this behavior plan?	1 = little time; 5 = much time	1.98
5. How confident are you that the behavior plan will be effective for this student?	1 = not at all confident; 5 = very confident	4.60
6. How likely is this behavior plan to make permanent improvements in this student's behavior?	1 = unlikely; 5 = very likely	4.33
7. How disruptive will it be to carry out this behavior plan?	1 = not at all disruptive; 5 = very disruptive	1.77
8. How much do you like the procedures used in the proposed behavior plan?	1 = not at all; 5 = very much	4.67
9. How willing will other staff members be to help carry out this behavior plan?	1 = not at all willing; 5 = very willing	4.55
10. To what extent are undesirable side effects likely to result from this behavior plan?	1 = no side effects likely; 5 = many side effects likely	1.77
11. How much discomfort is this student likely to experience during this behavior plan?	1 = no discomfort; 5 = very much discomfort	1.63
12. How willing would you be to change your routines to carry out this behavior plan?	1 = not at all; 5 = very willing	4.52
13. How well will carrying out this behavior plan fit into the existing routine?	1 = not at all; 5 = very well	4.52
14. How effective will the intervention be in teaching your student appropriate behavior?	1 = not at all effective; 5 = very effective	4.61
15. How well does the goal of the intervention fit with the team's goals to improve the student's behavior?	1 = not at all; 5 = very much	4.77

Note. PTR-YC = Prevent-Teach-Reinforce for Young Children.

indicate that PTR-YC is more effective in increasing SSIS social skills and engaged time and decreasing SSIS problem behavior and directly observed challenging behavior than BAU classroom techniques.

The data from this RCT further expand the evidence in support of the overall PTR process for addressing challenging behavior across a broad age-span, range of discrete challenging behaviors, and diversity of implementers (Bailey, 2013; Iovannone et al., 2009; Strain et al., 2011). From a practice standpoint, it is relevant to note that the PTR process has always been compared with BAU and not an absence of intervention for addressing challenging behavior. While there is evidence for behavioral improvement in comparison group children in this and other published comparisons, it is clear that the PTR-YC process yielded a level of behavior change that is demonstrably superior. Of particular note in this study is the very high level of implementation fidelity achieved by typical providers. While no direct experimental manipulations assessed

the operation of specific variables associated with reaching high levels of fidelity, the high fidelity implementation of the PTR-YC process is likely responsible.

As with any intervention practice, it is always relevant to ask the question, "For whom is this appropriate?" Some tentative answers are available from this RCT, largely due to the sheer number and diversity of participants. For example, positive behavior change was achieved by new teachers and those with many years of experience, in inclusive settings and in developmentally segregated environments, for male and female children, for typically developing youngsters and those with identified developmental disabilities, and across a wide-range of challenging behavior (e.g., physical aggression, noncompliance, elopement, material destruction, withdrawal).

While we are optimistic about the results obtained across a diversity of participants, settings, and challenging behaviors, it is important to point out that all teams were provided with support by very highly trained challenging behavior

Table 3. Parent Social Validity.

Topic	Scale (1–5)	Average rating
1. Applied	1 = PTR-YC objectives are not of interest; 5 = PTR-YC objectives are of great interest	4.42
2. Effective	1 = PTR-YC produced no behavior change in preschool; 5 = PTR-YC produced large behavior change in preschool	4.19
3. Flexible	1 = PTR-YC was rigid, not individualized; 5 = PTR-YC encouraged creativity	4.42
4. Generalizable	1 = PTR-YC produced no effects in home and community; 5 = PTR-YC produced large effects in home and community	3.96
5. Inexpensive	1 = investment of time and materials was too great; 5 = investment of time and materials was low	4.56
6. Practical	1 = PTR-YC resulted in no time savings in my child management; 5 = PTR-YC resulted in large time savings in my child management	3.83
7. Simple	1 = PTR-YC demands were too complex; 5 = PTR-YC demands were easy to meet	4.49
8. Socially acceptable	1 = PTR-YC strategies presented were not acceptable to me; 5 = PTR-YC strategies were very acceptable to me	4.80

Note. PTR-YC = Prevent-Teach-Reinforce for Young Children.

experts. This is a manualized approach; however, the manual is not a substitute for expertise in the implementation of function-based intervention. Therefore, for programs interested in utilizing PTR-YC, there is a high likelihood that providers will need some initial training/orientation and also coaching. While we did not collect any systematic data, it was observed anecdotally that as teams conducted multiple cases, they became much more proficient, ultimately needing less coaching to generate and implement effective PTR-YC BIPs.

Another important practice implication relates to the availability of typically developing children as intervention agents. Because we worked across many different classroom organizational structures, we were able to informally detect important differences in the implementation of PTR-YC intervention plans. For example, most of the children with challenging behavior had some type of peer-related social skill need and many BIPs included strategies to teach specific peer-related social skills. Coaches reported that teams in segregated settings experienced difficulties implementing plans that included these strategies without typically developing peers to act as intervention agents.

In subsequent analyses of this database, we aim to explore specific moderators such as classroom quality, children's verbal language capacity, and provider characteristics. Other important areas for future research include analyses to study team's increasing independence and efficiency in PTR-YC use across cases, sustained use of the PTR-YC process across time, and the relationship between the availability of typically developing peers and PTR-YC outcomes.

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