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Pivotal Response Treatment for Children with Autism in School Settings: A Review of the Literature

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**Pivotal Response Treatment for Children with Autism in School Settings:
A Review of the Literature**

by

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Chapter I: Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disability that is characterized by impairments in social communication and restricted and repetitive behaviors or interests (American Psychiatric Association [APA], 2013). The *Diagnostic and Statistical Manual of Mental Disorders-5* (DSM-5) (APA, 2013) is used to diagnose ASD according to the severity level of these impairments and the amount of support children require to improve their quality of life.

Language impairments pose particular challenges for children with more severe symptoms of autism (National Research Council [NRC], 2001). Some children with ASD initially have little or no functional words to communicate with other people. Others may acquire some words, phrases, and/or conversation skills, but their use of speech (e.g., pitch, tone, rate, or rhythm) tends to be unusual compared to their peers (Johnson, 2004). Additionally, children with ASD are often echolalic and repeat words or phrases many times (Johnson, 2004).

Another feature associated with ASD is challenging behaviors (NRC, 2001). For example, children with ASD engage in more severe and frequent repetitive patterns of movements than typically developing children. These behaviors include hand-flapping, rocking, spinning, and other repetitive movements (Matson, Wilkins, & Macken, 2009). They also tend to be intensely engrossed in certain areas of interest, objects, and behavioral routines that might seem nonfunctional to others (Matson et al., 2009).

The aforementioned deficits affect the ability of children with ASD to develop and maintain meaningful social interaction (NRC, 2001). Children typically have difficulties initiating interactions, sharing attention, turn-taking, forming and maintaining relationships, and participating in play activities with others due to a lack of social reciprocity (Rogers, 2000).

Moreover, they may not understand and use appropriate social cues, such as eye contact, facial expressions, or gestures in social situations (Johnson, 2004).

Pivotal Response Treatment (PRT) is an individualized and naturalistic early intervention that is purported to improve social, behavioral, and communicative outcomes for children with ASD (Koegel & Koegel, 2006). The goal of this paper was to review the literature that investigates: (a) what outcomes are reported for children with ASD, and (b) how teachers, paraprofessionals, and peers implement PRT. This chapter describes the components of PRT, historical background, research questions, focus of the paper, importance of the topic, and definitions.

Pivotal Response Treatment (PRT)

Pivotal Response Treatment (PRT), also called pivotal response training or pivotal response teaching, is a naturalistic behavioral intervention (National Autism Center [NAC], 2009). Naturalistic behavioral interventions emphasize motivating a child to learn a targeted skill by using natural materials (e.g., a child's preferred toys or activities) in natural contexts (e.g., during play or daily routines), while still based on the principles of behavioral intervention (Stahmer, Suhrheinrich, Reed, Bolduc, & Schreibman, 2010). According to Koegel, Koegel, Harrower, and Carter (1999), the PRT approach was designed to enhance four targeted pivotal areas that lead to consequent improvements across many other untargeted skills: motivation, self-initiation, self-management, and responsivity to multiple cues.

Improving motivation is the foundational procedure for the other pivotal areas. In PRT activities, children can increase their desire to perform by selecting a favorite activity or material and receiving direct reinforcement (Stahmer et al., 2010). For example, a child may choose a banana as a material for word requesting and practice saying the word "banana." Then, the

teacher provides a banana as a natural and direct reinforcement, depending upon the child's responding.

PRT encourages a child to develop self-initiation, which is a key factor to improving additional learning and social interaction (Koegel et al., 1999). Specifically, self-initiation training commonly requires a child to initiate social behaviors such as requesting turns, asking questions, and commenting (Koegel, Matos-Freden, Lang, & Koegel, 2012).

The third pivotal area is self-management, which is designed to enhance a child's behavioral responsibility by using self-monitoring skills or devices (Koegel et al., 1999). For instance, a child may put a sticker on his or her self-monitoring form when he or she follows the classroom rules. By using self-management, the child will be able to have ownership toward his or her own intervention (Koegel et al., 2012).

The last pivotal area is responsivity to multiple cues. It is also known as stimulus overselectivity because a child with ASD often pays attention to irrelevant stimuli (e.g., color of peer's clothes) instead of responding to relevant stimuli (e.g., teacher's directive) (Koegel et al., 1999). Thus, teaching to select multiple relevant cues is important in PRT procedures.

A number of other elements of PRT are considered particularly important to provide clear and developmentally appropriate instruction: presenting the cue, considering the child's response, and providing feedback (Stahmer et al., 2010). The teacher must present the proper cue and gain the child's attention in order to elicit a response from the child (Stahmer et al., 2010). Once the child responds to the cue (e.g., correct, incorrect, or attempt behavior), the teacher provides feedback depending upon the child's behavior (Stahmer et al., 2010). Table 1 indicates more information regarding the specific PRT elements and teaching guidelines.

Table 1

Pivotal Response Teaching Elements

PRESENTING THE CUE
<ul style="list-style-type: none"> • Child attention: Gain a child’s attention before providing cue. • Clear and appropriate cue: Provide related, clear and developmentally appropriate cues. A cue can be question, instruction, or other opportunity to respond (e.g., placing a child’s favorite snack in a difficult to open container to encourage asking for help). • Child choice: Allow child a choice of activity or materials to maximize the child’s interest in learning situation (e.g., using stickers that are chosen by child to complete addition on a mathematics worksheet). • Turn taking: Share control by taking turns with the materials and activity to learn the back-and-forth nature of verbal and social interaction (e.g., modeling more complex speech throughout a ball play). • Maintenance tasks: Intersperse previously mastered tasks among new tasks to ensure frequent success and reduce frustration during the teaching interaction (e.g., providing easier problems with new harder problems on worksheet). • Multiple cues: Require responding to multiple elements to enhance the child’s responsivity to multiple cues (e.g., asking a child to find a red marker in a mixed box of crayons and markers; accurate responding depends on attention to both color and object).
CONSIDERING THE CHILD’S RESPONSE
<ul style="list-style-type: none"> • Correct behavior: Was the child correct? • Incorrect behavior: Was the child incorrect? • Attempt: Was the child trying hard?
PROVIDING FEEDBACK
<ul style="list-style-type: none"> • Contingent consequence: Provide immediate consequences after a child’s behavior occurs. (e.g., rewarding appropriate behavior immediately after it occurs). • Direct reinforcement: Provide reinforcement directly related to the child’s response. (e.g., accessing to a toy car may be a direct and natural reinforcer for the child’s verbal response of <i>car</i>). • Good trying: Reinforce child’s goal directed attempts although he or she may not be completely accurate. (e.g., praising a child’s attempt to say <i>buh</i> for bubbles).

Note. Adapted from “Pivotal Response Teaching in the Classroom Setting,” by Stahmer et al., 2010, *Preventing School Failure*, 54, p. 266.

In addition to educational settings, PRT is an excellent approach to utilize in various community settings because of its focus on natural environments. Therefore, it promotes teacher (Smith & Camarata, 1999; Stahmer, Suhrheinrich, Reed, & Schreibman, 2012), peer (Kuhn, Bodkin, Devlin, & Doggett, 2008; McFadden, Kamps, & Heitzman-Powell, 2014), and family involvement in delivering interventions (Coolican, Smith, & Bryson, 2010; Hardan et al., 2015). In other words, the PRT approach allows children with ASD to maintain and generalize acquired skills across a variety of natural environments around them.

Historical Background

In the 1960s and 1970s, Lovaas (1977) successfully demonstrated that behavioral approaches such as Discrete Trial Teaching (DTT) were effective for children with autism to learn a variety of skills using systematic procedures. The DTT procedures were derived from Applied Behavioral Analysis (ABA), which is based upon Skinner's theories (Skinner, 1957) that focus on antecedents (stimulus/events that happen before a behavior), specific behaviors (child's action in response to a stimulus), and consequences (result of the behavior) in a highly structured environment (Lovaas, 2003). In teaching sessions of behavioral approaches, an instructor directly teaches a child target skills with repetitive practice, while a child responds to the instructor's guide in a passive way (Paul, 2008; Tarbox & Najdowski, 2008). In other words, DTT procedures include high levels of adult controls during all aspects of the interaction (Paul, 2008).

During the 1980s, behavioral approaches were criticized (Fay & Schuler, 1980). Researchers pointed out that the DTT system often required thousands of trials to teach a single word, so a child's learning occurred very slowly (Koegel, Camarata, Koegel, Ben-Tall, & Smith, 1998). In addition, children with autism failed to maintain and generalize skills to environments

outside the teaching context because DTT had devalued the importance of a child's motivation and self-initiated learning opportunities (Koegel et al., 1998).

To address the concerns of such highly structured programs, Koegel, O'Dell, and Koegel (1987) created Pivotal Response Treatment. Originally named the Natural Language Teaching Paradigm, PRT is a form of naturalistic behavior intervention based on the principles of ABA (NAC, 2009). As an alternative to ABA approaches, PRT emphasizes increasing a child's interests and motivation in naturalistic settings to promote maintenance and generalization of child skills. Moreover, children with ASD can take an active part in PRT intervention by having a choice of activity or materials and interacting with others in natural environment (Koegel et al., 1998).

Research Questions

Two questions guided the development of this starred paper:

1. What outcomes are reported for children with ASD when PRT is implemented by teachers, paraprofessionals, and peers?
2. How are teachers, paraprofessionals, and peers trained to implement PRT for children with ASD in school settings?

Focus of the Paper

The focus of this paper was to review the extant empirical research that examines PRT effectiveness for children with ASD. This paper also investigates training issues for the teachers, paraprofessionals, and peers who implement PRT in school environments. In order to find studies on the topic, I extended the publication range from 1997 to 2015. Most of the participants ranged in grade levels from preschool to elementary school children identified with ASD. Only domestic studies were included for review.

I retrieved peer-reviewed studies from the Academic Search Premier and PsycINFO databases using several keywords and combinations of keywords: *autism, ASD, pivotal response, PRT training, teacher, paraprofessional, and peer*. I also conducted searches of many journals, including the *Journal of Autism & Developmental Disorders, Journal of Child Psychology & Psychiatry, Journal of Positive Behavior Interventions, and Research in Autism Spectrum Disorders*.

Importance of the Topic

The Centers for Disease Control and Prevention (CDC; 2010) reported that an average of 1 in 88 children has been diagnosed with ASD, and official statistics from a recent parent survey show that the prevalence of autism is estimated as high as 1 in 50 school-aged American children (Blumberg, 2013). Without a doubt, this is the fastest growing disability in the United States.

The increasing prevalence of children with ASD has had a significant effect on public school systems. Teachers have become the primary intervention agents in providing appropriate interventions and services in school settings.

As a special education teacher, I have taught children with special needs for 3 years. In my experiences of teaching students with ASD, I have realized that it is important for teachers to have a broad understanding and knowledge of how to identify and select appropriate evidence-based strategies to meet an individual's educational needs. However, researchers point out that many teachers lack the knowledge and skills to implement research-based interventions (Stahmer & Ingersoll, 2004; Suhrheinrich, Stahmer, & Schreibman, 2007). Thus, my primary academic interest in this paper is to review empirical studies focused on the PRT implementation by teachers in school settings, rather than clinical settings by trained professionals. Therefore, by conducting this literature review, I hope to investigate the effects of implementing PRT and learn

how to assist teachers, paraprofessionals, and peers in delivering PRT for children with ASD in school settings.

Definitions

In this section, I define key terms used throughout this literature review to clarify unfamiliar or technical terms.

Choice and shared control. “Providing choices of preferred activities, follows the student’s lead within activities, arranges materials to establish shared control between the student with autism and the communicative partner” (Robinson, 2011, p. 115).

Clear opportunity. Providing a clear opportunity to practice the target behavior. If the student is not verbally engaged in reciprocal interaction, the partner gives clear prompts to evoke a verbal response, such as models the correct word/language” (Robinson, 2011, p. 116).

Contingent consequence. “Providing consequences immediately following and dependent on the student’s behavior. If the student does not respond appropriately, the teacher should withhold reinforcement” (Suhrheinrich, 2011, p. 344).

Contingent responsivity. “Prompting the children to respond to each other’s initiations with the requested information or material” (Feldman & Matos, 2013, p.172).

Direct reinforcement. “Providing reinforcement that is directly related to the student’s appropriate behavior, such as receiving a dinosaur figurine after answering a question about what happened to the dinosaur in a story or intangible” (Suhrheinrich, 2011, p. 344).

Fidelity of implementation. The degree to which teachers and other program providers implement program as intended by the program developers. This idea is sometimes also termed “integrity” (Carroll et al., 2007, p. 1).

Functional verbal utterance. The use of at least normal vocal loudness, body and facial orientation toward the partner and/or relevant toy/object, and vocalizations that appear functional or task-directed and purposeful (Coolican et al., 2010).

Joint attention. “An interaction that involves two people sharing attention with respect to an object or event, and monitoring each other’s attention to that object or event” (Adamson & Baker, as cited in Rudy, Betz, Malone, Henry & Chong, 2014, p. 269).

Physical proximity. “Once the children are initiating and responding on their own for reciprocal interactions, the partner physically fades themselves from the immediate environment, but still remain close enough to monitor the children and provide instruction if needed” (Feldman & Matos, 2013, p. 172).

Reinforcement of attempts. “Providing reinforcement after most of the student’s reasonable goal-directed attempts” (Suhreinrich, 2011, p .344).

Chapter 2: Review of the Literature

Children with autism spectrum disorders (ASD) have deficits in social, behavioral, and communicative skills. The purpose of this paper was to evaluate the effectiveness of Pivotal Response Treatment (PRT) for improving these skill deficits. In addition to student outcomes, this chapter examines training issues with regard to the teachers, paraprofessionals, and peers who implement PRT in school settings. This chapter includes 10 studies that are divided into three sections: teacher-mediated interventions, paraprofessional-mediated interventions, and peer-mediated interventions. The studies are presented in chronological order, beginning with the oldest study.

Teacher–Mediated Interventions

Classroom teachers are primary intervention agents who address the individualized needs of students with ASD in the school environment. Thus, it is important to evaluate the effectiveness of teacher-mediated interventions because it is directly related to the possibility of student success. This section includes one qualitative and four quantitative studies that describe teacher-delivered PRT strategies for children with ASD in classroom settings and teacher training programs for effective PRT implementation.

Smith and Camarata (1999) examined the efficacy of PRT procedures implemented by general education teachers in classroom settings following training in clinic settings. The participants included three general education teachers and three children with autism who had impaired social interaction and language use and were 4 to 6 years of age.

At the clinic, teachers were trained to use PRT naturalistic language teaching procedures that motivated children to use functional language and engage in social interaction. The trainer modeled how to respond to a child's behaviors and how to interact with a child appropriately

during teaching procedures. The trainers provided corrective feedback on the teacher's attempts with a child in the classroom. Additionally, the teacher and the trainer attended collaboration sessions for additional feedback twice weekly for 5 to 15 min. After completing training sessions, teachers implemented PRT strategies to their children with autism in their classrooms or recess settings during the regular school day.

A non-concurrent multiple baseline across-subjects design was employed, and videotaping was used to record the target children's natural flow of the conversation during less structured activities at school (e.g., recess or lunch time). The 15-min spontaneous language samples were divided into 10-s intervals to estimate the child's intelligible and unintelligible utterances (i.e., an utterance not understandable to the observer). During initial teaching sessions, the trainer introduced the naturalistic language teaching procedures and modeled the teaching interactions with the child while the teacher observed. After these training sessions, collaboration sessions with the teacher and the trainer occurred twice weekly for 5 to 15 min. Teachers also completed a questionnaire using a 7-point Likert scale to determine their reactions to PRT interventions.

The results indicated that all three children with autism gained in the intelligibility of utterances. Child 1 improved his percentage of intelligible utterances more than 90% after intervention compared to around 21-44% during his baseline, and others showed similar results. In addition, children increased the number of verbal interaction. For example, Child 2 spoke in less than 10% of time intervals before the intervention. However, he engaged in speaking an average of 43% of intervals following intervention. On the questionnaire, teachers' scores ranged from 5 to 7 and responded they found the intervention to be "practical," "applicable," and "unobtrusive" (Smith & Camarata, 1999, p. 147).

Smith and Camarata (1999) concluded the naturalistic language teaching intervention based on PRT techniques was effective for children with autism to increase their language use and social interaction when implemented by general education teachers in classrooms. The authors also pointed out that the intervention positively impacted not only the target students, but also all students in the classroom because the teacher noted it helped with other problems in the classroom. These results strongly supported the successful dissemination of PRT from controlled clinical environments to teacher implementation in natural classroom environments.

Suhrheinrich (2011) examined the components of a 6-hour group workshop with individual coaching programs on teachers' implementation of PRT for children with autism in classroom settings. Twenty teachers who worked in pre-kindergarten through second grade special education settings participated, and they were divided into two groups based upon recruiting method. Ten teachers who attended the training program were "district-selected," and the other 10 teachers who volunteered to attend were identified as "self-selected."

To collect baseline data, the participants taught their students with autism using PRT procedures without any supports or feedback in the classrooms. For teacher training, the participants received a PRT manual, *How to Teach Pivotal Behaviors to Children with Autism: A Training Manual* (Koegel et al., 1989), and attended a 6-hour group workshop adapted from previous research (Suhrheinrich et al., 2007). This training program included 2 hours of instruction, 2 hours of modeling PRT components, 1 hour of practicing PRT implementation with students and feedback from a professional, and 1 hour of discussing questions. A computer, projector, toys, instructional materials, and a video camera were used as training materials. After completing the workshop, individual coaching for teachers occurred once a week in their classrooms. During the coaching sessions, the trainer provided specific feedback on the

components of PRT based on observation of student-teacher interaction and fidelity levels of implementation. The mastery fidelity level was established at 80% correct implementation of each PRT component over the 10-min videotaped sample.

The results revealed significant improvement in teachers' abilities to implement PRT components, especially following the additional coaching sessions. Specifically, only 15% of teachers mastered all components of PRT immediately after the group workshop. However, 30% of teachers showed mastery after receiving the first coaching, and total of 40% demonstrated mastery as a result of the second coaching session. Moreover, the types of recruitment methods affected teacher training results. All teachers in the self-selected group reached the mastery criteria for PRT in an average of 2.14 hr, whereas only 10% of teachers in the district-selected group acquired them with taking more time, an average of 7.07 hr.

These key findings indicate effective teacher training models should include an individualized feedback and coaching program following the group workshop. Without coaching, training did not have a substantial impact on teachers' behavior. Motivation to participate in the training program should also be considered.

Gouvousis (2012) evaluated the relationship between PRT implementation by a classroom teacher and changing expressive language (i.e., spontaneous, prompted, and echoic words and phrases) in children with ASD within a classroom setting. The participants included one classroom teacher and three children with ASD who ranged in age from 3 to 4 years old. The children had a spontaneous vocabulary of no more than 20 words in a preschool autism public school setting.

The study employed a multiple baseline design across participants that included baseline, teacher training, PRT treatment, and generalization phases. During the baseline phase, the

teacher and children's existing behaviors were measured in teacher-led lesson activities (targeted activities) and teacher play and peer play activities (non-targeted activities). During the teacher-training phase, the teacher learned PRT techniques that focused on expressive language in children with ASD by attending a PRT training program called the Collaborative Consultation Model. They read the PRT manuals, modeled and role played activities, and received feedback during lesson activities. When the teacher implemented PRT strategies correctly and independently during training, treatment sessions were conducted. After completing the intervention phase, the generalization phase assessed teacher and children's behavior change in non-targeted activities. All of these procedures were conducted in a school setting using a handycam, a CD player, and assorted toys.

A one-way ANOVA evaluated differences in the teacher's PRT behaviors (e.g., child attending, clear opportunity, follow child's lead, turn-taking, and child's choice). Statistically significant improvements in the means for all teacher behaviors were found for all three children during the targeted activity. For instance, the data of child attending behavior in Child 1 demonstrated 71.8% during baseline, 90.8% during teacher training, and reached 100% during PRT treatment ($F_{(2,16)} = 11.039, p < .001$). Significant differences in Child 2 and Child 3 were also reported in the child attending behavior; Child 2 showed 40.6% during baseline, 80.9% during teacher training, and 94.9% during PRT treatment ($F_{(2,28)} = 54.207, p < .001$); and Child 3 showed 27.3% during baseline, 92.2% during teacher training, and 100% during PRT treatment ($F_{(2,25)} = 201.007, p < .001$). Moreover, the teacher not only successfully implemented all PRT strategies in the lesson activities, but also generalized PRT techniques such as providing clear opportunities and contingent reinforcement to all three children in the teacher play activities.

Data indicated that all children systematically increased their spontaneous, echoic, and prompted words/phrases following the PRT intervention. Specifically, Child 1 had a 2.25% frequency of spontaneous words during baseline, which improved to 11.6% and 26.3% during teacher training and PRT treatment ($F_{(2, 26)} = 21.950, p < .001$). Child 2 also increased in spontaneous phrases from 1.94% during baseline, 3.27% during teacher training, and 9.64% during PRT treatment ($F_{(2, 28)} = 16.113, p < .012$). Child 3 significantly improved in echoic phrases from 1.76% during baseline, 4.2% during teacher training, and 15.8% during PRT treatment ($F_{(2, 25)} = 10.977, p < .001$). Generalization in using prompted words and spontaneous phrases also occurred in Child 3 during teacher play. Furthermore, positive changing in child play behaviors (i.e., non-targeted activities) were noted in Child 1 for symbolic play, increasing about 28% during generalization compared to around 7% during baseline. Child 2 and Child 3 also improved their play behaviors such as joint attention, eye contact, and functional play concurrent with a decrease in inappropriate play.

Based upon these findings, Gouvousis (2012) concluded the training program supported the teacher's ability to acquire PRT strategies and successfully use them to improve children's expressive language skills. In addition, PRT intervention positively affected children with ASD to increase appropriate play skills, which may motivate them to engage in more peer interaction.

Stahmer et al. (2012) conducted a qualitative investigation of teachers' perspectives on PRT benefits and barriers when used as a classroom intervention strategy for children with ASD. The participants included 13 teachers who had teaching experience with at least one child with ASD in their classroom, and they were divided into three separate groups based on self-report: (a) PRT trained and using (PRT-USE, focus group), (b) PRT trained and not using (PRT-NO USE), and (c) Not PRT trained (NOT TRAINED).

Once provided with an overview of this program, all participants followed the interview guide and instructions. The teachers read a short passage describing the hypothetical case of children with ASD and determined the type of intervention for the case student (e.g., how PRT might or might not be used). In addition, they answered questions regarding how they would use PRT techniques with the setting and activities. Overall, the teachers' interview questions addressed the benefits of PRT, barriers to the use of PRT, specific training issues, recommendations for specific PRT components, and areas in need of empirical validation and adaptation. The data were analyzed by using the grounded theory model and compared across the groups to summarize the trends.

The results indicated the teachers perceived PRT as a useful and practical classroom intervention for children with ASD. They reported several benefits of PRT, such as increasing children's motivation and generalization of learning skills. In contrast, they reported problems such as a lack of clear structure, difficulty implementing in group settings, and difficulty incorporating PRT strategies into a child's individual education plan or curriculum. Table 2 summarizes teachers' perspectives as related to specific PRT components.

Table 2

Summary of PRT Components and Focus Group Feedback

PRT COMPONENT	FOCUS GROUP FEEDBACK
Gains attention	<ul style="list-style-type: none"> • Important, but easy to forget • Difficult to ensure all students are attending in a group • Can be difficult with ASD students in general
Clear opportunity	<ul style="list-style-type: none"> • Easy to implement consistently
Maintenance tasks	<ul style="list-style-type: none"> • Difficult to identify for each student • Minimizes frustration • Difficult to train paraprofessionals
Child choice (shared control)	<ul style="list-style-type: none"> • Important for maintaining student motivation • Difficult to address some goals with student chosen materials • Not appropriate in all classroom settings/activities

Table 2 (continued)

PRT COMPONENT	FOCUS GROUP FEEDBACK
Turn taking (shared control)	<ul style="list-style-type: none"> • Difficult to implement, especially in group settings • Difficult in nonplay-based activities • Sometimes not appropriate
Multiple cues	<ul style="list-style-type: none"> • Challenging to consistently have multiple cue materials available • Description of multiple cues in the manual is confusing • May not be appropriate for children with minimal language
Contingent consequence	<ul style="list-style-type: none"> • Part of general good teaching • Challenging when the behavior is correct but not at an proper time
Direct reinforcement	<ul style="list-style-type: none"> • Highly effective • Some children only work for edibles or tangible reinforcers • Can be difficult to find for every skill, especially academics
Reinforcing attempts	<ul style="list-style-type: none"> • Useful strategy for keeping motivation high
Training	<ul style="list-style-type: none"> • Better training materials/manual needed • Prerequisite knowledge of ABA necessary • Breakdown of components for paraprofessionals needs • Specific techniques for working in groups needed
Resources	<ul style="list-style-type: none"> • How to integrate PRT with other strategies • Individualizing for each student • How to use PRT with IEP goals/curriculums • Data collection system • Information/handouts for parents

Note. Adapted from “What Works for You? Using Teacher Feedback to Inform Adaptations of Pivotal Response Training for Classroom Use,” by Stahmer et al., 2012, *Autism Research and Treatment*, p. 5.

Other interesting results existed in teachers’ common perspectives on the individual components of PRT. They valued some components as the easy components to implement (i.e., clear opportunities and reinforcing attempts), whereas some were perceived as difficult with low importance (i.e., taking turns and multiple cues), particularly in group settings. In response, the teachers recommended the provision of training materials, parent resources, and data collection resources. In conclusion, these findings support the use of teacher-implemented PRT interventions with children with ASD in classroom settings.

Suhrheinrich (2015) quantitatively studied the applicability of the Train-the-Trainer model (TTT) to teach teachers to implement PRT for children with autism in the classroom. The

TTT model involved training a person to implement a specific intervention and then teaching that person to provide ongoing training to other people. Study participants included three school staff members (e.g., behavior interventionists/autism consultants), nine special education teachers, and 21 children with autism from ages 3 to 8. Participants were assigned to three groups that consisted of one trainer, three teachers, and seven students.

Each group participated in a baseline condition to measure trainer and teacher behaviors in school settings. For initial training, school staff members received 15 hours of individual training program over 3 weeks that included four areas: using PRT in classrooms, assessing implementation of PRT, providing feedback, and conducting a PRT workshop for teachers. Subsequent to this initial training, school staff began training the teachers in their schools. The teachers attended 10 hours of training over 9 weeks that included 6 hours of group workshop that focused on PRT elements, video modeling, observation, practice with feedback, and assessment. The remaining hours of training offered 30-min classroom coaching sessions once a week for 7 weeks. After completing teacher training, teachers taught a target student by delivering PRT strategies during regular instructional time. All participants were required to meet an implementation criterion of 80% accuracy.

All three staff members demonstrated proficiency in teaching the procedures to classroom teachers and in assessing teachers' PRT implementation with fidelity. Specifically, two trainers completed the teacher workshop with 100% accuracy, and one showed 91% completion. Relative to teacher data, teachers improved in their capacity of implementing all components of PRT. For instance, teachers in Group A implemented 54% of PRT components during baseline, 76% during treatment, and 73% during follow-up. Teachers in Groups B and C showed similar patterns of improvement. On the other hand, some variabilities were found in

how and what the teachers learned because their start levels were different. Six of nine teachers acquired 100% of the previously unknown components, whereas two teachers showed 50% and 33% of learning, and one teacher showed no improvement.

This study demonstrated that TTT could be used effectively to encourage teachers' implementation of PRT in classroom environments. Suhrheinrich (2015) emphasized that the TTT had advantages as a cost-effective and sustainable training method.

Paraprofessional–Mediated Interventions

Paraprofessionals are an important educational team member for students with ASD. This section includes two quantitative studies that describe the implementation of PRT training programs for paraprofessionals and the effects of PRT implementation on children with ASD in school settings.

Robinson (2011) assessed the impact of a modeling and video feedback training package with paraprofessionals to teach them to use PRT with children with autism in school settings. The participants included four paraprofessionals who supported a student with autism for at least 50% of the school day and four students with autism ages ranging from 3 to 8 years old who attended fully inclusive classrooms. Their socialization ages were estimated to be 1 to 3 years old, and communication levels were from 1 to 6 years old. In addition to the four students with autism, four students with severe disabilities (three with autism and one with Down syndrome) participated in order to measure paraprofessionals' generalization of skills.

All procedures took place in natural school environments, and a digital camcorder was used to record the paraprofessionals in order to collect data and provide video feedback for review sessions. As a part of the multiple baseline across participants design, nine baseline probes were conducted across 6 weeks for each participant pairs. After collecting baseline data,

paraprofessionals were introduced to PRT components. They modeled how to minimize communication and proximity when facilitating social interaction during three brief training sessions. Video feedback sessions were then continued until the paraprofessional implemented PRT with at least 80% fidelity across two consecutive probes. Two generalization probes were conducted in untrained activity and untargeted students, and follow-up measures assessed the paraprofessionals' maintenance of PRT procedures. In addition to fidelity of implementation, four levels of paraprofessional involvement were examined, which are described in Table 3.

Table 3

Paraprofessional Involvement Levels

LEVELS OF INVOLVEMENT	DEFINITION
Hovering	<ul style="list-style-type: none"> The paraprofessional being within approximately 3 feet of the student, and the student not engaged in the target behavior, and the paraprofessional not actively providing the student with opportunities to practice the behavior (e.g., providing instructions related to non-target behaviors or directly playing with the student).
Implementing	<ul style="list-style-type: none"> The paraprofessional being within approximately 3 feet of the student, and actively attempting to provide the student with opportunities to practice the target behavior or actively reinforcing an occurrence of the target behavior (e.g., prompting the student to verbally label a desired item and reinforcing a verbal initiation).
Monitoring	<ul style="list-style-type: none"> The paraprofessional observing the student engage in the target behavior or engaging in the natural reinforce that was delivered contingent on the occurrence of the target behavior.
Uninvolved	<ul style="list-style-type: none"> The paraprofessional being more than 3 feet away from the student, and the student not engaged in the target behavior, and the paraprofessional not actively providing the student with opportunities to practice the behavior.

Note. Adapted from “Teaching Paraprofessionals of Students with Autism to Implement Pivotal Response Treatment in Inclusive School Settings Using a Brief Video Feedback Training Package,” by Robinson, 2011, *Focus on Autism and Other Developmental Disabilities*, 26, p. 108.

The results indicated all paraprofessionals significantly improved their fidelity of PRT implementation. The mean score across the four participants was 7% during baseline, which increased to 87% during the treatment. During the generalization, all four participants demonstrated successful PRT implementation across activities (93.75%) and students (84.75%).

Moreover, they maintained the skills at 89% in the follow-up session. They also improved in their mean percentage of time spent engaging in the appropriate levels of involvement during intervention, such as hovering (12%), implementing (46%), monitoring (40%), and uninvolved (2%) compared to spending the majority of times in hovering (34%) and uninvolved (58%) during baseline.

All students increased their social communication target behaviors. Student A increased the number of verbal requests from no requests during baseline to a mean of 20 requests during intervention. Other students' target behaviors (e.g., reciprocal verbal interactions, word combinations, and spontaneous peer-directed verbalizations) also greatly expanded during interventions, generalization, and follow-up sessions.

The modeling and video-based feedback training package was effective in training paraprofessionals to implement PRT in inclusive school settings. Paraprofessionals reported they had more confidence when assisting their students. More importantly, all students with autism improved in their targeted social communicative skills as a result of paraprofessional training.

Feldman and Matos (2013) studied the effect of training paraprofessionals in a PRT-based social facilitation procedure on social interaction of children with autism in school settings. The participants included three paraprofessionals who supported a student with autism for at least 75% of the school day, typically developing peers, and three children with autism ages ranging from 5 to 8 years old who attended inclusive classrooms. Their ages of socialization were estimated around 2 to 4 years old according to the *Vineland Adaptive Behavior Scales* (Sparrow, Balla, & Cicchetti, 1984).

All probes were conducted during school activities and incorporated commonly used materials such as art supplies and board games. Baseline probes were taken when the

paraprofessionals engaged with children in their normal school activities. During the training sessions, the paraprofessionals reviewed the PRT manual and learned to apply the PRT-based social facilitation procedures (i.e., child choice, clear instructions, contingent responsivity, natural rewards, appropriate communication, and physical proximity) while receiving specific feedback. The total training time was approximately 2 to 3 hours over 6 to 9 days. After completing training, paraprofessionals' implementation was assessed by using a 10-min fidelity probe. Generalization and follow-up probes were conducted subsequent to intervention.

The analyses of results revealed that all paraprofessionals improved their fidelity of implementation on the social facilitation procedures following the training. Participant A showed a dramatic increase to an average of 99% fidelity, Participant B from 6-80%, and Participant C from 2-99%. Generalization also occurred to an untrained activity in all of them, and they continued to implement intervention with high level of fidelity in follow-up probes. In addition, the social facilitation (i.e., prompting the children to join a social game or engage in reciprocal social interactions, including verbal or nonverbal interactions) and monitoring (i.e., observing the children's social interactions or waiting for 30 s to see whether the children reengaged with each other once their interactions had terminated) behavior increased each of 18% and 76% compared to under 2% during baseline. All paraprofessionals reported they were "very satisfied" with their abilities to facilitate social interactions between the children with autism and their peers (Feldman & Matos, 2013, p. 173).

The students' results also demonstrated significant differences in their social engagement with typically developing peers. Prior to intervention, the children with autism rarely engaged in reciprocal social interactions with their peers. Subsequent to intervention, their social behavior rapidly increased to correspond with the paraprofessionals' implementation of the PRT

techniques. Specifically, Student A changed in his reciprocal social interaction from 0% to an average of 97%, Student B showed from 11% to 90%, and Student C increased from 2% to 96% when the paraprofessionals implemented the procedures correctly. Additionally, all students with autism maintained their skills at high levels in follow-up probes.

Feldman and Matos (2013) demonstrated that paraprofessionals successfully learned to utilize PRT-based social facilitation procedures by receiving effective training in inclusive school settings. Moreover, children with autism significantly improved their reciprocal social engagement with peers and showed consistent interaction as the impact of PRT implementation by paraprofessionals. Therefore, providing PRT training for paraprofessionals not only developed their skills, but also increased social interaction behaviors between children with autism and their peers in school settings.

Peer–Mediated Interventions

Many researchers have emphasized that typically developing peers or classmates play an essential role in educating children with ASD by providing appropriate models for social interaction and communication in a naturalistic setting (McFadden et al., 2014; Pierce & Schreibman, 1997). The peers who assisted children with disabilities also receive educational benefits, such as learning appropriate social behaviors by practicing and providing positive behavioral and communicative modeling to peers who have disabilities (Kuhn et al., 2008). This final section presents three quantitative studies that evaluate the effectiveness of using peers to implement PRT for children with ASD in school settings.

Pierce and Schreibman (1997) inquired into the use of PRT implementation by multiple peers to enhance the language use and toy play behavior of children with autism in a school

environment. The participants included eight typical peers and two children with autism, ages 7 to 8 years old, who were characterized as socially unresponsive.

During baseline sessions, children were observed to determine how they played with several toys without any instructions or prompts in the classroom. After completing baseline sessions, the five peer-training procedures were implemented in order:

1. Learn the PRT strategies using both pictorial and written form of the manual,
2. Practice implementing them in a classroom setting without a child with autism over several weeks,
3. Practice with a target child as a pair during 10-min play probes,
4. Receive feedback and suggestions from a therapist, and
5. Finish training sessions with 80% accurate implementation of PRT strategies.

During treatment sessions, peers played with a target child without any adult assistance in a natural environment. Post-treatment assessments extended across 3 months to assess generalization.

The two children with autism showed improvement in their language use. Prior to intervention, Child A's average number of spoken words was 7.9 in 30 s, which increased to a 9.9 frequency after treatment. Child B also improved to 17.2 compared to 6 at his baseline. Additionally, the quality of their language significantly changed in that they began using longer sentences and improved grammar, syntax, and context use, and frequency of verbal interchanges between the target child and peers. Furthermore, both children used their new learning skills to generalize to peers who did not participate in this study.

In the aspects of toy play, positive behavior changes were identified. Both children with autism greatly extended the range of play toys with using 15 to 20 different toys in post-

treatment compared to playing with the same three or four toys repetitively in pre-treatment sessions.

Pierce and Schreibman (1997) concluded these findings supported peer training programs such as PRT training because it was effective to promote social interactions by increasing language use and appropriate play behaviors between children with autism and typical peers in the classroom setting. The researchers also pointed out that variation in peers' abilities to deliver the intervention is an important aspect of their finding. Peers who showed better abilities than others for using PRT strategies produced more positive language results in peers with ASD.

Harper, Symon, and Frea (2008) hypothesized that children with autism would increase their social skills as a result of peer-mediated PRT focused on motivational strategies during recess time. Participants included two males with autism, ages 8 and 9 years old, who were fully included third-grade students along with the six typically developing classmates who participated in this study.

Before the intervention, baseline data were measured by observing the participants' play during recess periods. Seven 20-min peer-training sessions were conducted across seven consecutive school days. During the training sessions, the peers learned the components of PRT strategies such as gaining attention, varying activities, narrating play, reinforcing attempts, and taking turns while using a visual training card and cue card to assist their learning. After completing training sessions, two groups were formed that included two or three peers and one student with autism. The peers utilized the PRT strategies to initiate and maintain play with the target participants during recess period. Generalization probes were also conducted during four to five playground sessions.

As a result of peer-mediated PRT, both participants significantly improved their social interactions (i.e., gaining attention, turn-taking play) during recess. For example, Child A increased his ability to gain attention from no occurrences during baseline to a mean of 4.8 occurrences per 10-min probe following the intervention. Likewise, Child B was not able to take turns with peers during baseline, but improved to an average of 1.5 turn-takings independently following the intervention. These improvements maintained during the generalization phase. Furthermore, the results of social validation demonstrated that both target students learned appropriate social behaviors such as verbally refusing peers and engaging in more age-appropriate play during recess.

Harper et al. (2008) concluded these data proved their hypothesis that peer-mediated PRT was effective for increasing social interactions (e.g., initiations to play and turn-taking) for children with autism during recess play activities. They emphasized the important finding that improvements were maintained during generalization, which could lead to reciprocal interactions. In this study, the use of multiple peers as trainers for one child with autism motivated them to participate in play activities. Moreover, the study indicated teachers could train peers within a brief period of time (i.e., in less than 2 weeks) in the natural school environment.

Kuhn et al. (2008) examined whether peers with disabilities could learn to implement PRT with children who are identified with autism. Because some children with autism spend a majority of their time in special education settings, investigators wanted to determine if special education peers could implement the PRT procedure in the special education setting. Participants included two male children with autism ages 7 to 8 years old and five peers with other mild disabilities who were divided into two groups. Group A included one child with mild mental

retardation (MMR) and one child with specific learning disability (SLD), and Group B included one child with developmental delay (DD) and two children with SLD. Except for one child with SLD in Group A, all participants spent the entire school day in special education classrooms.

Students' natural play with toys in a classroom served as baseline data. The five peers attended eight 20-min PRT training sessions about 2 to 3 days per week and used picture prompts to help them remember the strategies. Other training procedures included modeling, feedback, and role-playing for mastery of the skills with 80% fidelity. When implementing procedures, the picture prompts were gradually faded until peers could implement the strategies independently by the final treatment sessions. Stickers and prizes were used as a reinforcement to encourage successful implementation.

The results indicated both target students increased in their number of interaction opportunities with Group A. Child 1 improved his interaction opportunities from less than one occurrence during baseline to 16 opportunities during treatment, and Child 2 showed similar results. However, Group B demonstrated lower achievement levels when compared to Group A. The rates of responses to peer prompts also showed substantial differences in both students. Child 1 responded an average of 20% of prompts prior to intervention, but it increased to around 84% with Group A. Child 2 changed responding rates from 41% to 70% with Group B. Both students in Group A increased initiations of conversation and play, whereas no corresponding increases were noted for Group B.

Kuhn et al. (2008) addressed important evidence in the study that some peers with mild disabilities can successfully implement PRT with children who have autism. Thus, multiple peers could deliver PRT intervention in general education classrooms and special education

classrooms. Another finding related to the difference in results between Groups A and B suggested that peers who had lower functioning might need more intensive training and practices to implement PRT strategies and to generalize the skills from training to play setting (Kuhn et al., 2008).

Summary of Chapter 2 Research

This chapter provided a review of 10 studies that evaluated the effects of implementing PRT based on school settings for children with ASD. Table 4 summarizes the findings of these studies and categorizes studies by the types of intervention approaches.

Table 4

Summary of Chapter 2 Findings

AUTHORS	PARTICIPANTS	PROCEDURE	FINDINGS
TEACHER-MEDIATED PRT			
Smith & Camarata (1999)	Three teachers and three children with autism in kindergarten classrooms	-Teachers implemented the naturalistic language procedures adapted from PRT -Dependent variables: child's language utterance, child's interactions, and fidelity of implementation	<ul style="list-style-type: none"> • All general education teachers successfully implemented the naturalistic language teaching procedures to children with autism in the school settings. • Children improved their language utterances and generalized spontaneous language use.
Suhrheinrich (2011)	20 teachers in pre-kindergarten to second-grade special education settings	-Teachers attended 6-hr PRT training, including manual instruction and modeling -Dependent variables: fidelity of implementing and effects of teacher characteristics	<ul style="list-style-type: none"> • 15% of the teachers mastered PRT when providing the workshop alone, whereas total of 40% teachers mastered them with two additional individual coaching sessions. • Teacher characteristics (self-selected, district-selected, levels of pre-training) affected training outcomes.
Gouvousis (2012)	One teacher and three preschool children with ASD ages 3-4 years old	-Teachers learned PRT procedures in classroom through a collaborative consultation model -Dependent variables: child's language, play, joint attention and teacher's lesson	<ul style="list-style-type: none"> • The teacher showed improvement implementing all PRT strategies into lesson and play activities and generalized the skills. • Children increased their expressive language, such as spontaneous, prompted, echoic words with improving play skills.

Table 4 (continued)

AUTHORS	PARTICIPANTS	PROCEDURE	FINDINGS
TEACHER-MEDIATED PRT			
Stahmer, Suhrheinrich, Reed, & Schreibman (2012)	Thirteen teachers serving children with ASD ages 3-8 years old	-Teachers reported issues for using PRT in classroom settings by following the interview questions -Primary themes were identified: benefits and barriers of PRT, training issues, recommendations of PRT components and adaptation	<ul style="list-style-type: none"> Teachers perceived PRT as a useful intervention for teaching students with ASD in their classroom. Reported barriers: using PRT in group, integrating with IEP/curriculums. Also, expressed lack of value some components of PRT, such as turn taking and multiple cues.
Suhrheinrich (2015)	Three school staff, nine special education teachers, and 21 students with autism ages 3-8	-Teachers received training program for implementing PRT from trained school staff in school settings -Dependent variables: trainer's and teacher's implementation PRT and their satisfaction	<ul style="list-style-type: none"> Six of nine teachers mastered all components of PRT by receiving training with ongoing feedback from school staff, and maintained their abilities at follow-up. The train-the-trainer model (TTT) was effective to disseminate PRT in school settings.
PARAPROFESSIONAL-MEDIATED PRT			
Robinson (2011)	Each of four children with autism between 3-8 years old, peers, paras	-Paraprofessionals attended PRT training, and applied it to target students -Dependent variables: child's communication, paraprofessional involvement, and fidelity	<ul style="list-style-type: none"> Training consisting of modeling and video feedback was effective in improving paraprofessional PRT implementation and levels of involvement. Students improved their social communication target behaviors.
Feldman & Matos (2013)	Each of three children with autism between 5-8 years old, peers, paras	-Trained paraprofessionals implemented PRT -Dependent variables: child's reciprocal social engagement, paraprofessional involvement	<ul style="list-style-type: none"> PRT was implemented with fidelity, and generalized to untrained activities. Children with autism increased rapidly their reciprocal social behaviors.
PEER-MEDIATED PRT			
Pierce & Schreibman (1997)	Two children with autism and eight typical peers	-Typical peers learned PRT strategies in classroom, and implemented it to children with autism. -Dependent variables: child's language, play behavior, and generalization	<ul style="list-style-type: none"> Children with autism engaged in high levels of interactions, initiations, varied toy play and language use following peer-implemented PRT training intervention in classroom setting. Generalization across settings, stimuli, and peers was found.

Table 4 (continued)

AUTHORS	PARTICIPANTS	PROCEDURE	FINDINGS
PEER-MEDIATED PRT			
Harper, Symon, & Frea (2008)	Two children with autism ranging and six third-grade student peers	<p>-Typical peers delivered PRT strategies to children with autism in school setting</p> <p>-Dependent variables: gaining attention, initiation to play, and turn-taking</p>	<ul style="list-style-type: none"> • Participants improved their social interaction with typical peers, such as initiations to play and turn-taking behaviors during recess play activities. • Peers-implemented PRT were effective at increasing social interactions for children with autism.
Kuhn, Bodkin, Devlin, & Doggett (2008)	2 children with autism 7-8 years old and 5 peers with disabilities in special education setting	<p>-Peers with disabilities learned PRT strategies, and implemented it to children with autism</p> <p>-Dependent variables: initiations, responses, and interaction opportunities</p>	<ul style="list-style-type: none"> • Children with autism indicated positive changes: Number of opportunities for interactions, responses, initiations of play and conversation. • Some peers with disabilities can implement PRT successfully.

Chapter 3: Conclusions and Recommendations

The increase in the number of school-aged children who are diagnosed with autism spectrum disorders (ASD) makes it critical that more teachers learn to use evidence-based intervention strategies with this population. Pivotal Response Treatment (PRT) is a strategy that has been recommended to improve the social and communicative behaviors of children with ASD, and this paper examines the efficacy of this approach in school settings. In Chapter 1 of this paper, I introduced background information related to autism and PRT. Chapter 2 presented research findings regarding the effectiveness of PRT. In this final chapter, I discuss conclusions and make recommendations for future research and current practice.

Conclusions

The 10 studies included children diagnosed with ASD from the ages of 3 to 9 years old. The studies examined the effects of PRT on children with autism following implementation by teachers, paraprofessionals, and peers in school settings. Nine of the 10 studies employed single-subject, multiple-baseline designs to assess behavioral outcomes, whereas one study used an informal survey method. The intervention outcomes are discussed according to the type of PRT implementation agents in schools.

Teacher-mediated interventions. Two studies demonstrated positive PRT effects when implemented by classroom teachers, including three general education teachers and one special education teacher (Gouvousis, 2012; Smith & Camarata, 1999). Following intervention, children showed remarkable improvement in their spontaneous language use and social interaction (Smith & Camarata, 1999), expressive language use (e.g., prompted words), and play skills (Gouvousis, 2012). Generalization also occurred when the child used language during non-targeted activities (Gouvousis, 2012). These positive outcomes suggest that PRT is an effective and useful means

of developing children's language and socialization skills. Thus, teachers should be encouraged to implement PRT in their classrooms.

Suhrheinrich (2011) showed that a group workshop with individual coaching was an effective means of training teachers to implement PRT strategies correctly. Suhrheinrich (2015) also reported that the Train-the-Trainer (TTT) model (i.e., training supervisors to train others) positively impacted teachers' abilities to master PRT components in school settings. These findings show that the traditional model of teacher training (i.e., single-session of group workshop) is not enough for teachers to acquire a new intervention strategy. Instead, individual coaching systems for providing ongoing feedback should be considered.

Teacher perceptions of PRT as a classroom intervention were also investigated in this paper. Teachers reported PRT could be used successfully to increase children's motivation (Stahmer et al., 2012; Suhrheinrich, 2015). However, teachers also identified an implementation barrier. Specifically, implementing PRT with multiple students in group settings was challenging because teachers felt they lacked specific techniques for using PRT in the context of a classroom setting (Stahmer et al., 2012; Suhrheinrich, 2015). Sixteen percent of teachers used PRT with a large group, whereas 66% of them implemented it in a one-on-one setting (Suhrheinrich, 2015).

Paraprofessional-mediated interventions. Two studies reported on PRT implementation by paraprofessionals. Outcomes revealed a significant increase for children with autism in their social communication skills (Robinson, 2011) and reciprocal social engagement with peers (Feldman & Matos, 2013). Moreover, students' target behaviors generalized and maintained in follow-up sessions (Robinson, 2011). Modeling and video feedback were shown to be effective method in teaching paraprofessionals to deliver PRT intervention. It helped paraprofessionals improve their fidelity of PRT implementation and generalize the intervention

across activities (Feldman & Matos, 2013; Robinson, 2011) and students (Robinson, 2011). In other words, providing PRT training for paraprofessionals enhanced their skills and eventually contributed to positive student outcomes.

Peer-mediated interventions. Children with autism responded positively to PRT strategies implemented by general education peers in the classroom, playground, or recess environments (Harper et al., 2008; Pierce & Schreibman, 1997). Specifically, children with autism improved social interaction skills such as initiations, turn-taking, language use, and appropriate play behaviors with their peers. These improvements maintained during the generalization phase (Harper et al., 2008; Pierce & Schreibman, 1997). For peer-training, peers learned the PRT strategies using visual cards with the manual to prompt their learning (Harper et al., 2008; Pierce & Schreibman, 1997). Harper et al. cited the time and cost efficiency of using general education peers to implement PRT intervention. When using peers to implement PRT, it is important to consider peers' abilities to implement the intervention (Pierce & Schreibman, 1997).

Kuhn et al. (2008) examined whether peers with disabilities could successfully implement PRT in a special education setting. Children with autism demonstrated improvements in their number of interaction opportunities, response rates, and initiations of conversation and play following the PRT intervention by peers with disabilities. Because the outcomes were different based upon peers' abilities, providing intensive training and opportunities to practice PRT intervention was considerable for peers who had lower abilities in natural settings.

Summary. The findings of Chapter 2 studies demonstrate that PRT is an effective intervention for children with autism to improve their language use, communication, and social interactions in school settings. PRT intervention successfully led to maintenance and transfer for

students' learning to new environments. Teachers, paraprofessionals, and peers were able to implement PRT with fidelity by receiving continued and individualized training program, and they perceived it to be a positive experience.

Recommendations for Future Research

The majority of the PRT research has been conducted by professional trainers in clinical settings. Although I located 10 studies conducted in school settings, more research is needed to develop classroom-specific techniques for use by teachers, paraprofessionals, and peers. Future research is indispensable to develop appropriate adaptations in PRT strategies to disseminate successfully into classroom settings. Ideally, studies could be conducted with more participants.

Future studies should also control for variables that might affect outcomes. Individual factors (e.g., prerequisite skills, interests, or abilities) and unpredictable environmental variables could have an effect on study outcomes. Future studies need to include these kinds of variables to assess accurate results.

Some researchers have suggested partial interval time-sampling observations do not provide the specific information needed, such as the exact frequency or duration of the behaviors. For example, two correct uses of a clear opportunity are not differentiated from six correct uses. Thus, future studies should consider carefully these measurement issues to prevent from overestimating the participant's behavior.

Implications for Current Practice

Implementing evidence-based interventions for children with autism into school settings can be challenging for teachers because these practices may require significant training and resources that are not available in many school settings. As a special education teacher, I have

found it sometimes challenging to build a bridge between theory and application in my classroom.

Prior to writing this literature review, it was difficult for me to understand how to use the specific PRT procedures and implement them effectively with individual students in my classroom. This review helped me understand that the PRT manual is an effective means of understanding and implementing PRT components as an adjunct to PRT training. Fortunately, in the state of Minnesota, PRT training is typically available through school districts or regional/state training opportunities. I strongly agree that the individual coaching systems are critical to ensure high treatment fidelity, so I hope these effective training systems in the United States will be introduced to many other countries. This will have a positive effect on teachers' abilities to apply PRT intervention in their classroom.

Once trained, teachers can serve an essential role in training other team members to implement PRT. Paraprofessionals who assist children with autism during the majority of school routines must receive essential training, and teachers must provide positive, supportive supervision. Given the findings of this research review, I feel modeling and video feedback should be used to achieve better outcomes.

Peer participation is not an avenue I would have considered prior to this review of literature. Although minimal research has been published on the use of peer-delivered PRT, I believe the findings to date show promise for its use. Peer-delivered PRT was shown to be effective not only for children with autism, but also for peers to learn appropriate social behaviors. I agree with the recommendations to use natural materials in their natural environments. For example, a child's favorite toy can be an effective material to prompt social interaction with peers during recess time. Additionally, it is important to use visual prompts (e.g.,

cue cards), verbal prompts, and rewards to increase motivation and to enhance fidelity of implementation.

Summary

The studies that investigated PRT implementation by familiar mediators in natural school settings have shown positive effects for children with autism in learning and maintaining skills in a variety of areas. Specifically, functional communication, social interaction, adaptive behaviors, and play skills improved. Children with autism should have opportunities to receive this treatment in their classroom, and effective training programs should be provided for teachers, paraprofessionals, and peers. Further research also should be conducted to maximize the use of PRT in the education field by developing adaptable strategies and resources into school programs, as well as addressing limitations of current studies. I believe sustained endeavors toward dissemination of PRT will contribute to significant progress for educating children with autism.

References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Blumberg, S. J. (2013). *Changes in prevalence of parent-reported autism spectrum disorder in school-aged U.S. children: 2007 to 2011-2012*. Hyattsville, MD: U.S. Department of Health and Human Services.
- Carroll, C., Patterson, M., Wood, S., Booth, A., Rick, J., & Balain, S. (2007). A conceptual framework for implementation fidelity. *Implementation Science, 2*, 240-248.
- Centers for Disease Control and Prevention. (2010). Prevalence of autism spectrum disorder among children aged 8 years—autism and developmental disabilities monitoring network, 11 sites, United States, 2010. *Morbidity Mortality Weekly Report, 63*, 1-21.
- Coolican, J., Smith, I. M., & Bryson, S. E. (2010). Brief parent training in pivotal response treatment for preschoolers with autism. *Journal of Child Psychology & Psychiatry, 51*, 1321-1330.
- Fay, W. H., & Schuler, A. L. (1980). *Emerging language in autistic children*. MD: University Park Press.
- Feldman, E. K., & Matos, R. (2013). Training paraprofessionals to facilitate social interactions between children with autism and their typically developing peers. *Journal of Positive Behavior Interventions, 15*, 169-179.
- Gouvousis, A. (2012). Teacher implemented pivotal response training to improve communication in children with autism spectrum disorders. *Dissertation Abstracts International, 72*, 4616.

- Hardan, A. Y., Gengoux, G. W., Berquist, K. L., Libove, R. A., Ardel, C. M., Phillips, J. ...
Minjarez, M. B. (2015). A randomized controlled trial of pivotal response treatment
group for parents of children with autism. *Journal of Child Psychology & Psychiatry*, *56*,
884-892.
- Harper, C. B., Symon, J. G., & Frea, W. D. (2008). Recess is time-in: Using peers to improve
social skills of children with autism. *Journal of Autism & Developmental Disorders*, *38*,
815-826.
- Johnson, C. P. (2004). Early clinical characteristics of children with autism. In V. B. Gupta (Ed.),
Autism spectrum disorder in children. New York: Marcel Dekker.
- Koegel, R. L., Camarata, S., Koegel, L. K., Ben-Tall, A., & Smith, A. E. (1998). Increasing
speech intelligibility in children with autism. *Journal of Autism and Developmental
Disorders*, *28*, 241-251.
- Koegel, R. L., & Koegel, L. K. (2006). *Pivotal response treatments for autism: Communication,
social & academic development*. Baltimore, MD: Paul H. Brookes.
- Koegel, L. K., Koegel, R. L., Harrower, J. K., & Carter, C. M. (1999). Pivotal response
intervention I: Overview of approach. *Journal of the Association for Persons with Severe
Handicaps*, *24*, 174-185.
- Koegel, L., Matos-Freden, R., Lang, R., & Koegel, R. (2012). Interventions for children with
autism spectrum disorders in inclusive school settings. *Cognitive and Behavioral
Practice*, *19*, 401-412.
- Koegel, R. L., O'Dell, M. C., & Koegel, L. K. (1987). A natural language teaching paradigm for
nonverbal autistic children. *Journal of Autism and Developmental Disorders*, *17*,
187-200.

- Koegel, R. L., Schreibman, L., Good, A., Cerniglia, L., Murphy, C., & Koegel, L. (1989). *How to teach pivotal behaviors to children with autism: A training manual*. Santa Barbara, CA: University of California.
- Kuhn, L. R., Bodkin, A. E., Devlin, S. D., & Doggett, R. A. (2008). Using pivotal response training with peers in special education to facilitate play in two children with autism. *Education and Training in Developmental Disabilities, 43*, 37-45.
- Lovaas, O. I. (1977). *The autistic child: Language development through behavior modification*. New York: Irvington Press.
- Lovaas, O. I. (2003). *Teaching individuals with developmental delays: Basic intervention techniques*. Austin, TX: Pro-Ed.
- Matson, J. L., Wilkins, J., & Macken, J. (2009). The relationship of challenging behaviors to severity and symptoms of autism spectrum disorders. *Journal of Mental Health Research, 2*, 29-44.
- McFadden, B., Kamps, D., & Heitzman-Powell, L. (2014). Social communication effects of peer-mediated recess intervention for children with autism. *Research in Autism Spectrum Disorders, 8*, 1699-1712.
- National Autism Center. (2009). *The National Autism Center's national standards report*. Randolph, MA: National Autism Center.
- National Research Council. (2001). *Educating children with autism*. Washington, DC: National Academy Press.
- Paul, R. (2008). Interventions to improve communication in autism. *Child & Adolescent Psychiatric Clinics, 17*, 835-856.

Pierce, K., & Schreibman, L. (1997). Using peer trainers to promote social behavior in autism:

Are they effective at enhancing multiple social modalities? *Focus on Autism & Other Developmental Disabilities, 12*, 207-18.

Robinson, S. E. (2011). Teaching paraprofessionals of students with autism to implement pivotal

response treatment in inclusive school settings using a brief video feedback training package. *Focus on Autism and Other Developmental Disabilities, 26*, 105-118.

Rogers, S. J. (2000). Interventions that facilitate socialization in children with autism. *Journal of*

Autism and Developmental Disabilities, 30, 399-409.

Rudy, N. A., Betz, A. M., Malone, E., Henry, J. E., & Chong, I. M. (2014). Effects of video

modeling on teaching bids for joint attention to children with autism. *Behavioral Interventions, 29*, 269-285.

Skinner, B. F. (1957). *Verbal behavior*. New York: Appleton-Century-Crofts.

Smith, A. E., & Camarata, S. (1999). Using teacher-implemented instruction to increase

language intelligibility of children with autism. *Journal of Positive Behavior Interventions, 1*, 141-151.

Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984). *Vineland Adaptive Behavior Scales:*

Interview edition. Circle Pines, MN: American Guidance Service.

Stahmer, A. C., & Ingersoll, B. (2004). Inclusive programming for toddlers with autism spectrum

disorders: Outcomes from the children's toddler school. *Journal of Positive Behavior Interventions, 6*, 67-82.

Stahmer, A. C., Suhrheinrich, J., Reed, S., Bolduc, C., & Schreibman, L. (2010). Pivotal

response teaching in the classroom setting. *Preventing School Failure, 54*, 265-274.

Stahmer, A. C., Suhrheinrich, J., Reed, S., & Schreibman, L. (2012). What works for you?

Using teacher feedback to inform adaptations of pivotal response training for classroom use. *Autism Research and Treatment*, pp. 1-11.

Suhrheinrich, J. (2011). Training teachers to use pivotal response training with children with autism: Coaching as a critical component. *Teacher Education and Special Education*, 34, 339-349.

Suhrheinrich, J. (2015). A sustainable model for training teachers to use pivotal response training. *Autism: The International Journal of Research & Practice*, 19, 713-723.

Suhrheinrich, J., Stahmer, A. C., & Schreibman, L. (2007). A preliminary assessment of teachers' implementation of pivotal response training. *Journal of Speech and Language Pathology—Applied Behavior Analysis*, 2, 1-13.

Tarbox, R. S. F., & Najdowski, A. C. (2008). Discrete trial training as a teaching paradigm. In J. K. Luiselli, D. C. Russo, W. P. Christian, & S. M. Wilczynski (Eds.), *Effective practices for children with autism: Educational and behavioral support interventions that work*. New York: Oxford.