

RUNNING HEAD: PIVOTAL RESPONSE TREATMENT

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Pivotal Response Treatment and the Development of Social Competence

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Pivotal Response Treatment and the Development of Social Competence

While interventions for autism spectrum disorders (ASDs) have long focused on teaching social skills, only more recently has the field begun to consider the importance of social competence. Social competence is an evolving concept that is broadly defined in the literature (Bierman & Welsh, 2000; Fisher & Meyer, 2002; Spence, 2003; Spence & Donovan, 1998; Stichter, Randolph, & Gage, 2007). Generally, social competence refers to the integration of social, emotional, and cognitive skills and behaviors that individuals need for successful social adaptation. The skills and behaviors required to demonstrate social competence vary with the age of the individual, cultural expectations, and the demands of a particular social situation. Socially competent individuals do not only rely on individual skills or discretely taught behaviors; rather, they are flexible, can read social cues and adjust their behavior to the social expectations of the environment. In doing so, socially competent individuals may have an easier time navigating the social world, developing meaningful friendships, and getting a job. Essentially, an individual's social competence is likely to significantly influence their quality of life.

The literature has primarily focused on teaching children with ASDs social skills as individual target behaviors, the underlying assumption of which is that the more skills you have, the more socially competent you are likely to be. However, Bellini, Peters, Benner, & Hopf (2007) conducted a meta-analysis of social skills interventions indicating that results are mixed and many interventions lack efficacy. Many social skills programs have focused on teaching social "rules" so that individuals with ASDs know how to behave under specified conditions. For many individuals with ASDs, this can be a very effective teaching strategy, and while they can learn to perform a given social skill under these conditions, generalization of the skill may

often be lacking, particularly in natural settings. The nuances of social behavior are so great that it would seem insurmountable to teach the rules of every social situation, not to mention all the related social skills necessary to navigate that situation. Rather, it may be better to focus on pivotal skills and behaviors that produce widespread generalization across a number of behaviors and environments.

Pivotal Response Treatment (PRT) is a comprehensive, naturalistic behavioral approach for children with ASDs (Koegel & Koegel, 2006; National Research Council, 2001) that may be particularly useful for improving social competence. While based on the science of applied behavior analysis (ABA), PRT does not primarily focus on the improvement of individual target behaviors as most traditional ABA approaches do; rather, PRT targets pivotal areas underlying the core symptoms of autism that, when changed, produce generalized improvements across many behaviors. To date, the literature has identified four pivotal areas for intervention: motivation, responsivity to multiple cues, self-management, and self-initiations (Koegel, Openden, Fredeen, & Koegel, 2006). Thus, there is an interesting analogy between targeting individual social skills and discrete behaviors versus social competence and pivotal areas, respectively: traditional ABA approaches and social skills interventions have focused more on teaching individual target behaviors whereas social competence and PRT address broader areas for intervention in autism. The purpose of this chapter, then, is to show how a focus on pivotal areas in PRT may lead to improvements in and the development of social competence in individuals with ASDs; to discuss how PRT has been translated into effective and accessible practice; and to identify unanswered questions and research priorities related to PRT.

Pivotal Response Treatment: An Evidence-based Approach

There is well over 20 years of empirical evidence supporting the efficacy and effectiveness of PRT for children with ASDs. PRT was first studied as the Natural Language Paradigm (NLP), designed to systematically incorporate parameters of natural language interactions into an ABA program that would improve generalization and maintenance of treatment gains. In two seminal studies, the NLP demonstrated more rapid and generalized improvements in prompted, deferred, and spontaneous speech than an analogue behavioral intervention (Koegel, Koegel, & Surratt, 1992; Koegel, O'Dell, & Koegel, 1987). Interestingly, in a critical review of 8 published studies, Delprato (2001) indicated that naturalistic behavioral approaches were more effective at improving language than traditional discrete trial training (DTT) interventions. Further, Koegel, Koegel, & Surratt (1992) showed collateral decreases in problem behavior, the first PRT-based study to demonstrate generalized improvement in an untargeted behavior. As more studies began showing this effect, the NLP became Pivotal Response Treatment to more directly reference the broader targets and effects of the intervention.

Following these early studies, researchers from various laboratories began demonstrating that PRT was an efficacious approach for improving many different behaviors (Koegel, Koegel, & Brookman; 2003; Koegel, Koegel, Vernon, & Brookman-Frazee, 2010). Improvements have been documented in positive affect (Koegel, Bimbela, & Schreibman, 1996; Schreibman, Kaneko, & Koegel 1991); social skills and peer interactions (Harper, Symon, & Frea, 2008; Pierce & Schreibman, 1995, 1997); play skills (Gillett & LeBlanc, 2007; Stahmer, 1995; Thorp, Stahmer, & Schreibman, 1995); speech intelligibility (Koegel, Camarata, Ben-Tall, & Smith, 1998); question asking (Koegel, Camarata, Valdez-Manchaca, & Koegel, 1998; Koegel, Carter, & Koegel, 2003; Koegel, Koegel, Shoshan, and McNerney, 1999); adaptive behavior (Baker-

Ericzen, Stahmer, & Burns, 2007); and joint attention (Bruinsma, 2004; Fredeen, 2005; Vismara & Lyons, 2007).

Several recent reviews and reports have also identified PRT as an evidence-based practice. For instance, the National Research Council (2001) released a report reviewing the most current research to date for educating young children with autism and included PRT among its list of comprehensive programs. Simpson (2005) and Simpson et al. (2005) reviewed over 30 treatments for ASDs and categorized them into one of four categories: scientifically-based practice, promising practice, limited supporting information for practice, and not recommended. PRT was one of four interventions identified as a scientifically-based practice. Similarly, the National Autism Center recently released its National Standards Report (2009) to provide “comprehensive information about the level of scientific evidence that exists in support of the many educational and behavioral treatments currently available” (pp. 1) and PRT was identified as one of 11 established treatments.

PRT and the Development of Social Competence

While there is both substantial empirical support and accumulating evidence supporting the efficacy and effectiveness of PRT, the relationship between PRT and the development of social competence has rarely, if ever, been discussed. One explanation for this may be that specific measures of social competence have not been employed in studies where PRT was implemented. However, there are four ways in which the data relate to the development of social competence and perhaps suggest that incorporating social competence measures into PRT studies may be an important area for future research.

Early Emergence of PRT from Traditional Discrete Trial Training

PRT emerged from traditional Discrete Trial Training (DTT), both of which are interventions for children with ASDs based on the science of ABA. Two of PRT's original developers, Dr. Robert L. Koegel and Dr. Laura Schreibman, were graduate students of Dr. O. Ivar Lovaas and share early publications that led to the development of DTT (e.g. Lovaas, Koegel, Simmons, & Long, 1973; Lovaas, Schreibman, & Koegel, 1974; Lovaas, Varni, Koegel, & Lorsch, 1977; Russo, Koegel, & Lovaas, 1978; Varni, Lovaas, Koegel, & Everett, 1979). Essentially, the Natural Language Paradigm (NLP) attempted to improve upon traditional discrete trial methodology for teaching language, and specifically attempted to address concerns with generalization and maintenance of treatment gains while simultaneously improving spontaneous speech.

The NLP primarily focused on teaching language in a more naturalistic context in that more closely resembled the way typically developing children learn to produce speech. The first goal of the NLP, then, was to bring responding under the control of natural environmental stimuli, allowing children to better interact with and learn from real world environments.

Typically developing children become socially competent adults through the shaping of social behaviors learned from an early age in the real world, much of which is language-based (Hart & Risley, 1989, 1992, 1995). While children with ASDs can certainly be taught to use language in analogue environments, it is possible that the more social aspects of language and social communication may be missed, or at least may not be shaped as well as if language were learned in the natural environment. Learning speech in the NLP, then, may help children with ASDs be better able to learn and produce the social aspects of communication, which may in turn lead to the improved development of social competence.

A second goal of the NLP was to improve the generalization and maintenance of skills taught during intervention. While data indicated that many children with ASDs made great progress within traditional DTT programs, some did not maintain skills over time while others failed to generalize across settings or people (Gresham & MacMillan, 1998; Lovaas, Koegel, Simmons, & Long, 1973). Thus, the NLP shifted from arbitrary reinforcers used in traditional DTT programs to natural reinforcers that were directly and functionally related to the child's communication, producing better generalization and maintenance of treatment gains (Koegel, O'Dell, & Koegel, 1987; Koegel, Koegel, & Surratt, 1992). These improvements, particularly those in generalizing newly learned skills, relate directly to social competence: individuals better able to not only maintain, but also generalize social communication skills across environments and with different people tend to be more socially competent than those whose skills are limited to specific settings or with only particular individuals. Further, the ability to generalize skills may increase opportunities to develop social relationships, participate more fully in the community, and get a job, thereby enhancing an individual's quality of life (Openden, Whalen, Cernich, & Vaupel, 2009).

In addition to improving generalization, incorporating natural reinforcers also put the focus of the intervention squarely on functional, social communication. While many children in traditional DTT programs were learning a variety of different skills, the requirement to use language was often for the purpose of labeling or identifying objects or pictures. Having language becomes meaningful, though, when children are able to use it to communicate within a social context (e.g. between parent and child, with teachers and peers). By moving away from arbitrary reinforcers that were not functional to the interaction in favor of natural reinforcers that were directly related to the child's interest and communicative response, the NLP emphasized

the social function of language. Indeed, the ability to use communication across social contexts may be central to the development of social competence.

Third, the NLP attempted to address prompt dependency by improving spontaneous speech. Another possible explanation for problems with generalization and maintenance in traditional DTT programs was that responding was often taught and remained under stimulus control of verbal prompts to produce language. That is, some children with ASDs did not speak unless they were instructed to do so by a therapist, limiting their ability to learn to interact with others. Thus, by improving spontaneous speech, children may be better able to generalize interactions to additional communicative partners. Further, the ability to not only respond to, but also initiate language is likely critical to the development of social competence.

Finally, the NLP produced collateral decreases in problem behaviors. Many traditional DTT programs often began with compliance training to gain instructional control and reduce behaviors that interfered with learning, particularly for children who entered treatment with high rates of problem behavior. Koegel, Koegel, & Surratt (1992), in a seminal study on language and problem behavior, compared occurrences of problem behavior during language training taught using an analogue behavioral approach (i.e. DTT) versus the NLP using a repeated reversals design. In all three children, lower rates of problem behavior occurred in the NLP conditions. Of primary importance is that language—not problem behavior—was targeted during intervention, thus documenting a collateral improvement in an untargeted behavior in the NLP. Consequently, the name of the intervention began to transition from the Natural Language Paradigm to Pivotal Response Treatment as researchers increasingly began to identify and document collateral changes in other untargeted behaviors (Koegel, Openden, Fredeen, & Koegel, 2006).

While being socially competent likely implies the absence of problem behavior, it is important to note that the collateral reduction of problem behavior occurs within the natural environment and thus comes under the control of natural environmental stimuli (as discussed earlier). Thus, learning within the natural environment, where children with ASDs are more frequently exposed to social stimuli, can be maximized with respect to the amount of time (i.e. hours of intervention) and learning opportunities (i.e. communicative exchanges and interactions). Further, by targeting pivotal areas of responding, it is likely that, in addition to social communication, many other behaviors are exposed to, learned, and appropriately shaped by the natural environment.

Core Intervention Components for Implementing PRT

Implementing PRT requires, at a minimum, three critical intervention components: early intervention, intervention in natural environments, and parent training. While the many remaining unanswered questions in autism have led to widespread disagreement on a number of issues, there is general agreement about the importance of early identification and that providing intervention to children with autism while they are young may lead to more substantial developmental gains (Dawson & Osterling, 1997; Koegel, Openden, Fredeen, & Koegel, 2006; Lovaas, 1987; McGee, Daly, & Jacobs, 1994; National Research Council, 2001; Kasari, 2002; Strain & Cordisco, 1994). In the PRT model, intervention begins as early as possible and during the earliest stages of brain development to maximize treatment outcomes. While there are many skills for children with ASDs to be taught within an intervention program, subtle social behaviors are often the most difficult to teach. When children are engaged in meaningful intervention within social contexts from an early age, appropriate social behaviors may be learned more incidentally and, as children get older, may not need to be taught directly.

Developing social competence may be as much about practice as it is about specific social skills; thus, by implementing PRT with young children, the number of opportunities to teach, learn, shape, and reinforce appropriate social behavior increases dramatically, improving the likelihood that children with ASDs can become socially competent adults.

Second, as a naturalistic behavioral intervention, PRT is implemented primarily in home, school, and community settings. As discussed earlier, maintenance and generalization of treatment gains has long been a concern for children with autism as well as an important intervention outcome (Gresham & MacMillan, 1998). Thus, an increased focus on delivering intervention in natural contexts has emerged wherein generalization is built directly into the intervention (National Research Council, 2001; Openden, Whalen, Cernich, & Vaupel, 2009). Indeed, problems with generalization may have more to do with the teaching and the environments in which intervention is delivered than the child. Thus, PRT does not remove children with ASDs from the typical settings in which we ultimately want the behaviors we teach to occur. Rather, intervention is delivered and embedded within real world environments. If we want children with ASDs to grow up to become socially competent individuals, then we need to regularly expose them to natural environmental stimulation and implement intervention in social contexts so that social behaviors can be more easily learned, maintained, and generalized.

Finally, parent training is central to the PRT model as parents are often considered primary intervention agents. Research has shown that parents can learn to effectively implement intervention for children with autism (Brookman-Fraze, Vismara, Drahot, Stahmer, & Openden, 2009; Koegel, Symon, & Koegel, 2002; Laski, Charlop, & Schreibman, 1988; McGee, Morrier, & Daly, 1999; Meadan, Ostrosky, Zaghlawan, & Yu, 2009; Openden, 2005; Symon, 2005). As discussed, intervention typically begins early and in the child's natural environment

(i.e. home) where children spend the majority of their time interacting with their parents.

Because reciprocal, natural interactions between a caregiver and child greatly influence child development (Wetherby & Prizant, 2000), it is critical that parents not only are involved in the treatment of their children, but also learn to implement intervention procedures with fidelity. By doing so, intervention is systematically implemented within a context that closely resembles the ways typically developing children develop (i.e. through early and repeated interactions with their parents), yielding increased opportunities for learning appropriate social behaviors.

Parent training also likely improves both the quantity and intensity of treatment as intervention can be delivered throughout the child's waking hours and is not solely dependent on a highly quality therapist. While studies and reports have differed with respect to the recommended number of intervention hours (Kasari, 2002; Lovaas, 1987; National Research Council, 2001; Sheinkopf & Siegel, 1998), children with ASDs should be engaged in meaningful learning opportunities for as much of the day as possible. Thus, training parents to implement PRT may increase the number of hours of intervention and, more importantly, improve treatment intensity. Additionally, embedding intervention during typical, everyday parent-child interactions across all environments (e.g. home, grocery store, park, restaurants) may further drive the development of social competence.

As we increasingly begin to view ASDs from a lifespan perspective, we have become more aware of the numerous life changes that families face. For instance, teachers change year to year, therapist turn over, and families relocate. Parents who receive training in PRT may be better prepared to coordinate with and/or provide training for other caregivers and professionals, thereby increasing the spread of effect of the intervention (Symon, 2005). Such coordination of

care allows for more consistent implementation of intervention and further supports learning the skills necessary for children with ASDs to become socially competent adults.

Implementing PRT within Social Skills Interventions

PRT has also been used as the primary intervention for directly teaching social skills. While PRT is generally implemented within the context of play-based interactions, particularly for young children, Stahmer (1999) and colleagues have used PRT to target appropriate play skills in children with ASDs, including object play (Stahmer, Ingersoll, & Carter, 2003), symbolic play (Stahmer 1995; Stahmer & Schreibman, 1992), and sociodramatic play (Thorp, Stahmer; & Schreibman, 1995). Play skills are critical for early language and social development (Siller & Sigman, 2002; 2008) and likely relate to the development of prosocial behaviors and social competence.

A number of PRT studies have evaluated peer implemented interventions in which typically developing peers learn to use PRT with children with ASDs. Pierce & Schreibman (1995) taught typical peers to implement PRT strategies in the classroom and found that children with autism maintained longer interactions, initiated play and conversations, and increased engagement in language and joint attention behaviors. A later study documented improvements in collateral language and play behaviors maintained 3 months following the end of treatment (Pierce & Schriebman, 1997). Outside of the classroom, Harper, Symon, & Frea (2008) taught typical peers to implement PRT during recess activities and found increases in social initiations and turn taking. Baker, Koegel, & Koegel (1998) utilized the obsessive interests of children with autism as the motivational variable for improving social interaction with peers on the playground. For instance, typical peers were taught to play a tag game on a giant outline of the United States for a child who perseverated on maps. Dramatic increases in the percentage of

social interactions were found and maintained during follow up. Perhaps more importantly, the children with autism generalized social interactions during other play activities with peers. In a related study implemented with siblings, similar results were demonstrated when incorporating the thematic ritualistic activities of children with autism into typical games (Baker, 2000).

More recent studies have used cooperative arrangements to provide training in PRT for both typical peers and children with ASDs. Cooperative arrangements require mutually reinforcing activities to ensure that peers also receive reinforcement and maintain interactions with children with ASDs. For instance, Koegel, Fredeen, & Koegel (2003) trained parents to implement PRT to facilitate social interaction between 2 sibling dyads during cooperative play. In addition to increased reciprocal interactions, both children with autism generalized social interactions with untrained peers. Klein (2007) trained paraprofessionals to use PRT and cooperative arrangements to facilitate social interactions between children with autism and their typically developing peers on the playground during recess. Once paraprofessionals were trained to implement intervention procedures with fidelity and could generalize teaching to untrained activities, the reciprocal social behavior of the children increased rapidly. Similar work has also been done with paraprofessionals working at an inclusive summer camp to facilitate social interactions among all children (Brookman, Boettcher, Klein, Openden, Koegel, & Koegel, 2003; Koegel, Klein, Koegel, Boettcher, Brookman-Fraze, & Openden, 2006).

PRT and cooperative arrangements have also been used during play dates among children with ASDs and their typically developing peers (Koegel, Werner, Vismara, & Koegel, 2005). Many children with ASDs are not invited to play dates while others are invited but the play date rarely ends positively, meaning children with ASDs may be missing critical opportunities to interact with peers and develop the skills associated with social competence. Again,

improvements were found in reciprocal social interactions between the children with ASDs and their peers. Further, the data showed an increase in play date invitations from peers, perhaps indicating increases in the peers' desire to spend additional time with the children with autism. Clearly, interacting successfully with peers is paramount to becoming socially competent.

As a pivotal area, self-management has also demonstrated improvements in social behaviors, including generalized changes in untargeted social behaviors (Koegel & Frea, 1993; Koegel, Harrower, & Koegel, 1999; Koegel, Koegel, Hurley, & Frea, 1992). Boettcher (2004) used self-management to teach social conversation skills, skills that are often overlooked yet essential for developing social competence. While children with ASDs have been taught to respond with on topic comments, many do not initiate questions during social conversation. For instance, during baseline, when Boettcher presented one participant with a leading statement such as, "I saw a great movie last night", the child frequently directed the conversation back to his perseverative interest and responded, "Do you like elevators?" instead of asking about the movie. Thus, children were taught to ask appropriate, on-topic questions that were related to the other person's interests (e.g. "What movie did you see?" or "Who did you go to the movies with?"). Data indicated that self-management was an efficacious intervention for teaching these social conversation skills and that the skills were maintained and generalized to new settings with new conversation partners (e.g. untrained adults or typically developing peers). Part of being a socially competent individual includes showing an interest in others during conversation through initiating questions even when the topic may not be immediately reinforcing.

Collateral Improvements in Untargeted Social Behaviors

While increases in targeted social communication and social skills are critical for children with ASDs, collateral improvements in untargeted social behaviors may be the most impactful on

the development of social competence. Through a focus on pivotal areas of responding, these behaviors are not taught directly; rather they are generalized behaviors that emerge naturally and as a result of the intervention. Thus, many of the studies demonstrating efficacy of PRT have documented improvements in both targeted and untargeted behaviors (Koegel, Openden, Fredeen, & Koegel, 2006).

Collateral improvements in positive affect—a measure of happiness, interest, and enthusiasm—that occur while PRT is implemented, have been demonstrated across a number of studies. Schreibman, Kaneko, & Koegel (1991) compared the affect of parents who were trained in PRT versus those who were trained in an analogue behavioral intervention. Results indicated that parents in the PRT condition exhibited significantly more positive affect, suggesting that natural parent-child interactions may be more pleasant for parents to implement. Significant differences were also found in a similar study that compared affect during family interactions at dinnertime (Koegel, Bimbela, & Schreibman, 1996). If parents appear happier while interacting with their child, they may engage their child more often, increasing the intensity of intervention even during activities that would not typically be thought of as therapy time (e.g. dinnertime).

Improvements in positive affect have also been reported during intensive parent training programs (Koegel, Symon, & Koegel, 2002; Tran, 2008) and group parent training programs (Openden, 2005). For instance, Openden (2005) trained groups of 7-10 parents to implement PRT with fidelity and found a significant difference in the number of times the parents smiled before and after the training. While it is noteworthy that parents seemed to be enjoying the interactions with their parents more once they received training in PRT, the increase in parent smiling may be important for the child's development of social competence as children with autism may have difficulty with appreciating the affect that is intrinsic to social interactions

(Weiss & Harris, 2001). Yet, if children are engaged in motivating, enjoyable interactions with their parents paired with increased opportunities to observe their parent smiling, children with autism may have an easier time relating to the intrinsic rewards of social interaction.

Collateral improvements in positive affect in children with ASDs suggest that they may indeed be enjoying the interaction. Koegel & Frea (1993) used the pivotal area of self-management for targeting social communication skills in two adolescent boys with autism and found generalized improvements in facial expression and affect. As discussed earlier, Koegel, Werner, Vismara, & Koegel (2005) used PRT during play dates to improve reciprocal social interactions and also documented collateral improvements in positive affect for not only the children with autism, but also their typically developing peers.

Improvements in child affect have also been demonstrated with younger children. Brookman-Frazer (2004) compared two models of parent training, clinician-directed and parent/clinician partnership, while teaching parents to implement PRT with their children. Decreased parent stress and increased parent confidence were observed in the parent/clinician partnership model. Further, in addition to increases in child responsiveness and engagement, improvements in child affect were also observed. Koegel, Vernon, & Koegel (2009) evaluated whether embedding social interactions into natural reinforcers, delivered while PRT was implemented to improve language, would lead to increased levels of child-initiated social behaviors. Embedded social reinforcers produced collateral improvements in child-initiated social engagement during communication, nonverbal dyadic orienting, and general child affect. Improvements in child affect likely indicates that the children in these studies are enjoying the interactions, meaning they may be less avoidant of and more likely to engage in social interactions that, in turn, may help them become more socially competent individuals.

Among the many important skills and behaviors that relate to the development of social competence is initiating joint attention. Over the last two decades, we have come to understand the critical importance of joint attention and its relationship to later language and social development (Bruinsma, Koegel, & Koegel, 2004; Mundy, 1995; Mundy & Crowson, 1997; Mundy & Sigman, 1989; Mundy, Sigman, & Kasari, 1990, 1993, 1994; Tomasello, 1998; Tomasello & Farrar, 1986). Thus, recent interventions have directly targeted improvements in joint attention (Dawson, Rogers, Munson, Smith, Winter, Greenon, Donaldson, & Varley, 2010; Gulsrud, Kasari, Freeman, & Paparella, 2007; Ingersoll, Dvortcsak, Whalen, & Sikora, 2005; Jones, Carr, & Feeley, 2006; Kasari, Freeman, Paparella, 2006; Kasari, Paparella, Freeman, & Jahromi, 2008; Rocha, Schreibman, & Stahmer, 2007; Whalen & Schreibman, 2003).

Collateral improvements in child initiation of joint attention, though, have also been documented in PRT. Bruinsma (2004) taught parents of young children with autism (children had less than 10 functional words at baseline) to implement PRT to improve expressive language. Increases in joint attention—specifically, eye gaze alternation to share enjoyment—were documented as a collateral effect of PRT. Further, this increase generalized to another familiar adult and on the Early Social Communication Scales (ESCS; Mundy, Delgado, Block, Venezia, Hogan, & Seibert, 2003; Seibert, Hogan, & Mundy, 1982) following intervention. Vismara & Lyons (2007) implemented PRT in conjunction with the perseverative interests of young nonverbal children with autism. Collateral improvements in joint attention initiations for social sharing were demonstrated with both highly preferred and less preferred stimuli. Finally, Fredeen (2005) implemented PRT with elementary school-aged children with autism to increase the quantity and quality of initiations toward typically developing peers. Joint attention

initiations increased as a collateral effect of PRT and generalized to untrained peers at post-intervention and follow-up.

Translation into Effective & Accessible Practice

While there are extensive data that support the efficacy of the model, PRT may not be as widely implemented as other behavioral approaches. With the continuing rise in the incidence of autism spectrum disorders to 1:10 (Centers for Disease, Control, and Prevention, 2009), the need to translate efficacious interventions into effective and accessible practice has become ever more urgent. In addition to the publication of training manuals (Koegel, Koegel, Bruinsma, Brookman, & Fredeen, 2003; Koegel, Schreibman, Good, Cerniglia, Murphy, & Koegel, 1989) and a book that covers communication, social, and academic development (Koegel & Koegel, 2006), translational research studies have demonstrated the effective dissemination of PRT.

With the increasing prevalence of autism has come a shortage of highly trained professionals to meet the growing demand for effective services. Thus, in addition to improving treatment intensity, parent training may also be an important methodology for broadly disseminating treatments. That is, the number of children reached could be substantially increased if highly trained professionals spent less time working directly with children in favor of training parents to implement intervention. In addition to maximizing impact, such an approach may be a more cost-effective way to disseminate effective services for children with ASDs, who require extensive costs for treatment over their lifetimes (Ganz, 2007; Jacobson & Mulick, 2000; Jacobson, Mulick, & Green, 1998).

Koegel, Symon, & Koegel (2002) provided week-long intensive parent training in PRT for parents who lived geographically distant from an intervention center (e.g. rural or remote areas). Parents were brought to a university campus and received 25 hours of training on how to

implement the motivational procedures of PRT for improving social communication with their child. Data indicated improvements in parents' correct implementation of PRT and affect as well as in the child's expressive language. More importantly, parents' generalized their newly learned skills at home and maintained them over time. These data suggest that parents could be effective interventionists and could produce improvements in their children without more frequent visits from highly trained professionals. Further, in a replication study (discussed earlier), Symon (2005) assessed the spread of effect of parent training by asking parents to train other significant caregivers in PRT (e.g. spouse, grandparent) once they returned home. Results indicated that parents were able to successfully train others and that child gains in social communication and appropriate behaviors improved with other caregivers. Thus, parents can learn to not only implement PRT correctly, but also train others who regularly interact with their child, further expanding the number of families who receive effective services.

As briefly discussed earlier, Openden (2005) assessed whether groups of parents could be trained together to implement PRT within a randomized clinical trial. Parents, most of whom resided in rural/remote areas, participated in groups of 7-10 in a 4-day workshop in the motivational procedures of PRT for improving social communication. Following one day of didactic instruction, parents returned home and video-taped their implementation of PRT with their child. Each day, every parent in the group presented their videotape and received feedback from the workshop presenter (as well as the other parents in the group). Results showed significant differences between treatment and waitlist control groups on fidelity of implementation of PRT, parent affect, and child social communication. These data suggest that group parent training may be an effective mechanism for broader dissemination of PRT.

The training model employed in the Openden (2005) study may also be useful for training groups of parents and professionals to correctly implement PRT, thereby improving coordination of care and wraparound support as well as further increasing the number of families impacted. Bryson, Koegel, Koegel, Openden, Smith, & Nefdt (2007) trained teams of parents and intervention providers to implement PRT as part of a province-wide dissemination project in Nova Scotia, Canada. Teams included a minimum of one or both parents, a one-to-one interventionist, and a clinical supervisor, and were trained in three different locations. Further, clinical supervisors received an additional train-the-trainer training to further disseminate the model in others areas around the province. One-year outcome data on the first cohort of children showed significant improvements in expressive and receptive language and behavior problems (Smith, Koegel, Koegel, Openden, Fossum, & Bryson, in press). These data have important implications for large scale dissemination, implementation, and accessible effective service delivery for children with ASDs.

Questions Unanswered & Research Priorities

While a substantial research base supporting PRT exists, there remain a number of important unanswered questions that may be considered research priorities. First, further translational research is necessary to make PRT accessible to more families with children with ASD. The development of a comprehensive curriculum—including the scope and sequence of what is to be taught over a child's lifetime—that could be tested for efficacy and effectiveness may be a critical step towards more widespread implementation. One of the major benefits of many behavioral programs is that they are often clearly laid out so that teachers and/or therapists can easily develop and implement an appropriate program. With respect to the individual differences in children, adolescents, and adults with ASDs; the need for individualization of

treatment; and the desire to maintain a high level of teaching creativity, developing such a curriculum will likely be challenging and require ongoing testing and refinement. Koegel, Openden, Fredeen, & Koegel (2006) laid out the structure for a PRT curriculum that may be used as a framework for further development.

Another way for increasing implementation is for more research on PRT to be conducted in schools and particularly in inclusive general education classrooms. While early intervention targets in inclusive school settings have been identified (Koegel, Koegel, Frea, Fredeen, 2001) and a few studies have evaluated PRT interventions either in the classroom (Koegel, Harrower, & Koegel, 1999; Koegel, Koegel, Frea, Green-Hopkins, 2003) or with academic tasks (Koegel, Singh, & Koegel, 2010; Koegel, Tran, Mossman, & Koegel, 2006), most of the research supporting PRT has been conducted in home, clinical, and community settings. Almost all children with ASDs will attend schools, making our understanding of how best to train teachers to correctly implement PRT in inclusive, general education classrooms essential.

A second research priority is to improve our understanding of individual response to treatment. While PRT appears to be effective for many children with ASDs, the individual differences within the disorder imply that it is unlikely that any one treatment will be efficacious for all individuals with ASDs. Sherer & Schreibman (2005) analyzed archival data to investigate how child characteristics may be associated with different outcomes with PRT and developed 2 distinct behavioral profiles for responders and nonresponders. These profiles were then used to correctly predict which children would demonstrate positive changes (responders) and those that did not exhibit improvements (nonresponders). Further research in this area is critical to improving our identification of phenotypes that can be matched to interventions most likely to produce positive outcomes, thereby maximizing the impact of early intervention.

We may also begin to better understand response to treatment if intervention studies more carefully defined participant characteristics, including the use to standardized diagnostic assessments. Many published treatment studies in autism merely indicate that participants met criteria for autism consistent with the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994) or were diagnosed by an outside, independent agency. This information tells us very little about the characteristics of an individual with ASDs, limiting our understanding of response to treatment. If research participants are more carefully described across studies using gold standard diagnostic assessments, we may be better able to identify profiles of children that may predict response to PRT or any other treatment.

Relatedly, more research should be done to improve response to treatment for those who do not respond to PRT. For instance, Koegel, Shirotova, & Koegel (2009a, 2009b) used individualized orienting cues to facilitate first-word acquisition in children who had failed to respond to PRT in the past and found increased correct responding to verbal models and subsequent word use. Through the modification of existing PRT instructional methods, it is plausible that even the most challenging children with ASDs may be able to respond to treatment.

Finally, future research should evaluate the efficacy of PRT with very young children as well as adolescents and adults with ASDs. Like many interventions, PRT has been primarily developed and evaluated with children from about 2-years-old through the elementary years. As we begin identifying children at 18-, 14-, or even 12-months, it is likely that the associated treatments will look different from those that are implemented with 2- and 3-year-olds. For instance, the Denver Model has been adapted and evaluated as the Early Start Denver Model for younger children with autism (ESDM; Dawson, Rogers, Munson, Smith, Winter, Greenson,

Donaldson, & Varley, 2010; Rogers & Dawson, 2009). While there is considerable overlap with ESDM, similar efforts should be developed and tested for PRT.

The increase in the incidence of children with ASDs and the inevitable transition of these children into adulthood indicates that future research should assess the effects of PRT with older populations. LeBlanc, Geiger, Sautter, & Sidener (2006) used the NLP to increase vocalizations of older adults with cognitive impairments. While the participants in this study were not diagnosed with autism, they were between the ages of 54 and 57, had fairly significant impairments, and had limited verbal communication, implying that these procedures may also be efficacious with adolescents and adults with autism. Of central importance for this population is a focus on the functional skills and outcomes that are most likely to improve quality of life. For many adolescents and adults with ASDs, quality of life may be most threatened by poor social skills and interactions, often with community members, peers, romantic interests, and employers. However, Koegel (2007) suggests that social development in high functioning autism and Asperger's Disorder, once thought to be relatively unchangeable, may be mediated through interventions that improve motivation, self-management, and initiations, each of which are pivotal areas. While a number of interventions that incorporate PRT may indeed be effective for this population (Koegel & LaZebnik, 2009), future research should specifically select for older participants to evaluate the potential benefits of PRT on the communicative, social, adaptive behavioral, vocational, and life skills that most significantly impact quality of life for adolescents and adults living with ASDs.

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