

Large Scale Dissemination and Community Implementation of Pivotal Response Treatment: Program Description and Preliminary Data

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This paper describes a collaborative effort aimed at province-wide dissemination and implementation of pivotal response treatment (PRT) for young children with autism spectrum disorder (ASD) in Nova Scotia, Canada. Three critical components of the associated training model are described: (1) direct training of treatment teams (parents, one-to-one interventionists, and clinical supervisors/leaders); (2) training of trainers; and (3) follow-up and monitoring of treatment fidelity and child progress. A major goal of the Dalhousie University/IWK Health Centre–University of California at Santa Barbara partnership was to optimize effectiveness when translating PRT from the “lab” for dissemination in large geographical areas with

community service providers. Finally, we provide data on stakeholder satisfaction with the training workshops and end by identifying features that may have contributed to our success thus far.

DESCRIPTORS: pivotal response treatment, autism, parent education, trainer-of-trainer, translational research, early intervention, systems change

Evidence that early intensive behavioral intervention (EIBI) improves outcomes for children with autism spectrum disorder (ASD; Fenske, Zalenski, Krantz, & McClannahan, 1985; Howard, Sparkman, Cohen, Green, & Stanislaw, 2005; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993; for reviews, also see Bryson, Rogers, & Fombonne, 2003, Dawson & Osterling, 1994; Rogers, 1998) has resulted in the implementation of intervention programs throughout North America and elsewhere. In Canada, like many other countries, these efforts have been undertaken in the context of a legislated right to universal health care. Although debate continues about what constitutes “medically necessary” health care, virtually every province in Canada has implemented some form of early behavioral intervention for young children with ASD. At present, evidence for treatment efficacy of EIBI is confined largely to highly controlled university-based (vs. community-wide) intervention programs, and even then fundamental questions remain in regard to whether general community service providers could be trained on a large scale basis with high fidelity (Bryson et al., 2003; Dawson & Osterling, 1997; McEachin et al., 1993; Rogers, 1998). Within this context, in December 2005 the Nova Scotia Department of Health allocated funds for the development and implementation of a province-wide early intervention pro-

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gram for preschoolers with ASD. The critical and challenging task for stakeholders was to identify models of intervention and service delivery that make most sense within a publicly funded and universally accessible system.

The main goals of this paper are threefold. First, we outline the various factors that were taken into account in choosing the models of intervention and service delivery adopted in Nova Scotia. Here, priority was given to evidence-based intervention models that address critical functional needs of the diverse population with ASD and to a coordinated and family-centered model of service delivery. Second, we describe the associated model of training, which includes three critical components: (1) training of parents and health care providers in the intervention model; (2) training of trainers; and (3) comprehensive follow-up and monitoring of treatment fidelity and child progress, all designed to optimize effectiveness when translating treatment programs from the “lab” to large scale geographical areas, with the goal of implementation by community members. Third, we provide data on satisfaction with the training and end by identifying features that might have contributed to our success thus far.

The Intervention and Service Delivery Models

Several factors were identified as priority issues in choosing the models of intervention and service delivery. First and foremost was the requirement that the intervention model be evidence-based and capable of addressing fundamental intervention issues that remain outstanding. Among the most critical is the lack of generalization in learning and of self-initiated (vs. cue-dependent) behavior in children with ASD (Burke & Cerniglia, 1990; National Research Council, 2001; Koegel & Koegel, 2006). In addition, treatment fidelity continues to be a major issue, especially in community implementation, which is rarely evaluated (Allen & Warzak, 2000; Mudford, Martin, Eikeseth, & Bibby, 2001; Symes, Remington, Brown, & Hastings, 2006; Wolery & Garfinkle, 2002). In the absence of adequate evidence and given the wide diversity in children with ASD, debate also exists about which intervention models are best suited for whom, the intensity and length of intervention required to optimize outcomes, and how to ensure sustainability of intervention benefits (Bryson et al., 2003; Dawson & Osterling, 1997; Rogers, 1998; Schreibman & Koegel, 2005). All of these are priorities within a public system in which resources are limited and demand for ASD-specific intervention is high, that is, prevalence is estimated at 1 in 160 children (Chakrabarti & Fombonne, 2001; also see Bryson, 1997).

An additional priority was to develop a coordinated service delivery model in which all relevant health care providers could work with parents as an integrated team (Koegel & Koegel, 2006; Lucyshyn, Horner, Dunlap,

Albin, & Ben, 2002; Moroz, 1989). It was thus necessary to adopt an intervention model that is ideologically consistent both with existing evidence and with best practices recommended by the various professional disciplines typically involved in the treatment of young children with ASD (National Research Council, 2001). Current best practices include a focus on the development of social communication, play, and other functional skills while incorporating the principles of learning (also referred to as ABA or applied behavior analysis). To optimize functional skill development, it is further recommended that procedures based on learning principles be applied in the various naturalistic settings in which children function, including their homes, daycares or preschools, and the broader community.

In response to these critical areas of need, the intervention model adopted in Nova Scotia was pivotal response treatment (PRT) (Koegel, 2000; Koegel & Koegel, 2006; Koegel, Koegel, Harrower, & Carter, 1999; Koegel, O'Dell, & Koegel, 1987). PRT is an empirically derived intervention (Simpson, 2005) in which motivational and learning principles are systematically applied in natural settings to optimize the development of “pivotal” or more general and fundamental (vs. specific) learning (National Research Council, 2001). Pivotal areas include motivation, self-initiated interactions, responsiveness to multiple environmental cues, and self-regulation of state. PRT is responsive to the child's initiations and inherent interests and to the need for variation in naturalistic learning opportunities. The main goals are to improve the condition of ASD by facilitating, first, the acquisition of social-communication skills and, second, play and other adaptive skills. Evidence that parents can be trained to successfully implement PRT (Koegel, Bimbela, & Schreibman, 1996; Koegel, Glahn, & Nieminen, 1978; Openden, 2005) optimizes the opportunities for consistency, intensity and sustainability of intervention.

The Nova Scotia service delivery model is both family-centered and coordinated: parents ultimately determine the intervention goals, and intervention is provided by coordinated teams consisting of parents, one-to-one interventionists (virtually all with a bachelor's degree in early childhood education, psychology, or the equivalent), clinical supervisors (master's-level psychologists, occupational therapists, and/or speech-language pathologists), and, in more densely populated regions of the province, clinical leaders (doctoral-level clinical psychologists). Clinical supervisors/leaders oversee the intervention program and assume clinical responsibility for intervention decisions, fidelity of treatment, monitoring of child progress, and satisfaction of parents and others involved in the child's care and education. Overall direction and support for the Nova Scotia EIBI program is provided by a provincial clinical leader (author S. E. B., jointly appointed at Dalhousie University and its affiliated pediatric tertiary health care facility, the IWK Health Centre).

The overriding and shared mission of the Dalhousie/IWK-UCSB partnership is to optimize intervention effectiveness in translating PRT from the “lab” to the context of the community, across a large geographical area. To this end, priority has been given to three main goals. The first is to ensure the development and maintenance of treatment fidelity in intervention teams (parents, interventionists, and clinical supervisors/leaders). The second is to foster a strong sense of “team” and of accountability through an emphasis on the critical importance of ongoing monitoring of child progress and parent satisfaction and on problem solving within the context of mutual respect and recognition of team members. The final priority goal is to develop system-wide (urban and rural) capacity and independence in implementing the intervention model and in monitoring treatment fidelity and child progress. These goals are being achieved through a training model that incorporates three critical components: (1) direct training of intervention teams, (2) training of trainers, and (3) comprehensive follow-up. Below we describe each in turn.

Phase 1: Direct Training of Intervention Teams

UCSB staff provided three initial, week-long training workshops, each to intervention teams in different regions of Nova Scotia (NS) – the largest city, one smaller city, and one town within a more rural area. Training workshops were formed around cohorts of children from each geographic region.

The Children

Within each of three regions of NS, children were selected randomly from existing clinical caseloads but with constraints to ensure that a range of communication functioning (nonverbal, somewhat verbal, and fluently verbal) and age (2–5 years) was represented in this training phase. Two of the 25 children selected had preschool-aged siblings who also had ASD, increasing the number of children to a total of 27 (11 in Region A, 6 in Region B, and 10 in Region C, with 1 girl in each region). The children had a mean age at intake of 4.4 years ($SD = 0.87$ years). The mean Developmental Index on the Merrill-Palmer-Revised Scales (Roid & Sampers, 2004) was 54.4 ($SD = 21.2$) for the 19 (of 27) children for whom formal testing could be completed (7 children were unable to obtain a standardized test score and 1 child was not available for testing). There were no significant differences in mean age or cognitive ability across regions.

The Teams

Participants in each of three direct training workshops were the teams supporting the initial cohort of 27 children enrolled in the Nova Scotia EIBI program; that

is, their parents, one-to-one interventionists, and clinical supervisors/leaders (hereafter referred to as team members). A total of 23 parents were trained; not all parents were able to attend and some did not attend the full week of training.

Most of the 22 interventionists were early childhood educators who had several years of previous experience working with preschool-aged children with ASD, some using ABA-based procedures. Virtually all of the 19 clinical supervisors and the 3 clinical leaders had substantial clinical experience with children with ASD and varying expertise in behavioral intervention. Each team member worked with one child during the initial training workshop; the teams surrounding each child included their parents, a one-to-one interventionist and at least one clinical supervisor/leader.

Prior to the Workshops

Training of intervention teams began with a 2- to 3-day introductory course provided by Nova Scotian professionals with expertise in ASD. This course took the form of lectures and discussions and included information on the nature of ASD, team cohesiveness, professional, and ethical issues, as well as introductory information on motivational and behavioral constructs relevant to understanding PRT. Team members (trainees) were also provided with reading materials, including two books (Koegel & LaZebnik, 2004; Koegel & Koegel, 2006) and five manuals describing PRT procedures (Dunlap, Koegel, & Koegel, 1985; Frea, Koegel, & Koegel, 1994; Koegel, Koegel, & Parks, 1992; Koegel et al., 1989; Wilde, Koegel, & Koegel, 1992). Prior to the workshop, each trainee (parents, interventionists, and clinical supervisors/leaders) provided a videotaped probe of him- or herself attempting to elicit language from his or her target child during everyday play interactions. These pretraining videos were made available to the UCSB trainers before the workshop, as was summary information on each child’s language/communicative level and behavioral profile.

PRT Training Workshops and Intervention Settings

Immediately following the introductory course, the teams participated in the PRT training workshop, provided in Nova Scotia by UCSB staff with extensive experience in developing and implementing PRT programs for children with ASD. The workshops in each region were implemented over five consecutive 6-hr days and took place 1–2 months apart. Day 1 of each workshop began with an introductory presentation on PRT (which was open to other community stakeholders), followed by a small group didactic session on the components of PRT (for fundamental techniques, see Table 1). Immediately afterward, team members videotaped themselves practicing the techniques with their target child. On each subsequent day, trainees also made video recordings of themselves implementing the

Table 1
Major Pivotal Response Treatment (PRT) Techniques Taught to Trainees in Initial Training Workshop

Intervention procedure	Trainees were taught to
1. Giving the child a choice.	provide children with opportunities to make choices between activities and stimulus items. This includes (a) following the child's lead in selecting activities by responding to the child's self-initiated verbal or nonverbal attempts to choose (e.g., the child reaches for a toy car or says "car," and the trainee responds by incorporating the car into the interaction); (b) providing two or more desirable alternatives (e.g., "Do you want to read a book or play with bubbles?"); (c) allowing the child to accept or reject an activity before providing another choice (e.g., "Do you want bubbles?"); or (d) prompting the child with an open-ended question (e.g., "What do you want?");
2. Using clear instructions.	provide opportunities for responses using concise requests and clear instructions to the child (e.g., showing a toy, asking a clear question, labeling an object). This includes gaining the child's attention either to the task or to the adult while presenting the request/instruction;
3. Providing immediate contingent effective rewards.	provide a reward immediately and contingently following the child's correct response or attempt to respond;
4. Using direct and natural reinforcers/rewards.	provide a reward that is directly related to the child's verbalization (e.g., providing the child with a requested item or engaging in an activity that the child requested, such as blowing bubbles after the child said "bubble"), rather than providing a reward that was unrelated to the child's expressive verbalization (e.g., in this case, candy);
5. Reinforcing both expressive verbal attempts and correct verbal responses.	deliver rewards following both the child's functional expressive verbal attempts and correct verbal responses; for example, if a child correctly responded or made a clear attempt at the target response "up" (such as saying "uh" or "p") while raising his or her arms to be picked up, the trainee immediately provided the reward by picking the child up; and
6. Interspersing maintenance and acquisition tasks.	intersperse maintenance tasks (easy familiar tasks that the child has already mastered) with acquisition tasks (tasks that are difficult or new) to increase the child's responsiveness and correct responding.

procedures, which they brought to the workshop the following day. On Days 2–5, a critical component of each workshop was the provision of individualized feedback by the UCSB trainers on the trainees' use of PRT procedures, as revealed by these video records.

Trainees had the opportunity to share and to discuss their experience implementing the PRT motivational and behavioral procedures within a small group. Discussion focused on constructive feedback with a heavy emphasis on the positive aspects of the trainees' efforts. When appropriate and relevant, trainees were further instructed in additional behavioral principles, including functional behavior assessment procedures (Frea et al., 1994). Questions and discussion on the techniques and trainee feedback were interspersed throughout each of 4 days, as were questions and discussion of the methods for systematically monitoring skill acquisition of both the trainees and the children. On the last day of the workshop, trainees provided a final videotape so that the efficacy of the workshop and the progress of the children could be evaluated.

The workshops took place in small rooms set up to facilitate video viewing, note taking, and discussion. Teams traveled to the workshop conducted in their region of the province. Most families were within reasonable daily driving distance of their workshop; two families stayed with their children at a hotel for four nights to participate in the training. Intervention (i.e.,

trainees' implementation of PRT procedures) took place at each child's home in his or her natural settings (e.g., living room, kitchen, or garden) or in hotels for the two families noted above.

Workshop Evaluations

The social validity (Wolf, 1978) of the workshops was assessed anonymously by all trainees, who completed a form addressing their satisfaction with various aspects of the content and presentation (for consolidated results, see Table 2). Although workshop evaluations were anonymous, trainees were asked to indicate whether they attended as a parent ($n = 23$), interventionist ($n = 22$), or clinical supervisor/leader (psychologists, occupational therapists, and speech-language pathologists; $n = 22$), the distribution of which was comparable across the three regional training workshops. As seen in Table 2, ratings of all aspects of the training were highly positive (mean ratings for virtually all items above 4.5 on a 5-point scale). According to 73% of participants, the length of the workshop was "just right," with 24% suggesting that more than a week would have been more helpful. Eighty percent of participants reported that the number of hours per day was appropriate, with equal percentages of the remainder suggesting either more or fewer hours. Written anecdotal comments emphasized the value of detailed feedback on videotapes as an essential and highly valued element of the training.

Table 2
Evaluation of Initial Pivotal Response Treatment (PRT)
Training Workshop, for 67 Respondents (See Text)

	Mean	Range
1. How clearly were materials in the workshop presented?	4.82	3–5
2. How clear was the feedback you were given on the videotapes?	4.94	4–5
3. I received individual helpful attention.	4.87	3–5
4. How well do you understand the following procedures?		
(a) Clear instructions	4.90	4–5
(b) Maintenance tasks	4.48	3–5
(c) Shared control/child choice	4.92	4–5
(d) Responsivity to multiple cues	4.48	2–5
(e) Contingent reinforcement	4.71	2–5
(f) Rewarding attempts to respond	4.74	2–5
(g) Natural reinforcers	4.70	2–5
5. How comfortable are you with implementing the procedures after the workshop?	4.38	2–5
6. Please evaluate the following workshop components:		
(a) Motivational procedures of PRT	4.82	2–5
(b) Visual aides (video examples)	4.74	2–5
(c) Feedback on videotapes	4.47	3–5
(d) Question asking/initiations	4.54	3–5
(e) Functional assessment	4.58	3–5
(f) Data collection	4.74	3.5–5
7. Please evaluate the following general components:		
(a) Parent/professional model	4.77	3–5
(b) Creating videotapes	4.73	3–5
(c) Workshop presenters	4.87	4–5
(d) Overall workshop	4.83	4–5
8. How did you feel about the number of days of the workshop?		
(a) Just right	49	
(b) Too many	16	
(c) Too few	1	
9. How did you feel about the number of hours of each day of the workshop?		
(a) Just right	54	
(b) Too many	6	
(c) Too few	7	

Scale: 1 = *not at all* to 5 = *extremely*.

Phase 2: Training of Trainers

Following the successful implementation of the initial PRT training workshops, we proceeded to the next step in the province-wide model, the training of trainers. This training was designed to instruct successful trainees in how to train additional trainees throughout the remainder of the province.

Participants and Training/Intervention Settings

Additional training was provided to five trainee trainers (3 of whom were designated as provincial trainers) in a 5-day workshop. Training was provided by UCSB staff in Halifax, Nova Scotia. Throughout the workshop, each of the trainee trainers worked with one child's parents in their family homes. Trainees included four clinical supervisors (three master's-level psychologists and one occupational therapist) and one doctoral psychology student. All had attended one of the initial PRT training workshops and had met UCSB's criterion (>80%) for fidelity

of implementing PRT procedures with children with ASD (see below).

Prior to the Workshop

Just before the workshop, the trainee trainers video-recorded themselves coaching "new" (i.e., previously untrained) parents as the parents interacted with their children.

Train-the-Trainer Workshop

The main goals of this workshop were to teach the trainee trainers to provide *in vivo* PRT training and feedback, to use various materials for, and methods of, data collection and to use the data to identify targets for intervention and programming (for a description of workshop content, see Table 3). Briefly, on Day 1 trainees were taught to discuss the contents of the PRT manual and the motivational procedures of PRT with the parents, providing everyday examples of how the procedures could be implemented, as well as opportunities for questions. Trainee trainers were then taught to model the PRT procedures with the child before encouraging the parents to implement the procedures themselves. Feedback strategies discussed with the trainee trainers focused on instructional methods designed to empower parents, and on the importance of reinforcing parents' attempts to implement the new skills, giving specific feedback, and providing a rationale for the use of particular procedures. Immediately afterward, trainee trainers video-recorded themselves implementing the techniques while coaching parents as they interacted with their children.

Like the initial PRT training workshop, Days 2–5 consisted largely of individualized feedback on, and discussion of, trainees' use of the training procedures, with a focus on the positive aspects of their efforts. Each day during the workshop and again following the workshop, trainees made video recordings of themselves implementing the training procedures with their parent trainees. Trainee trainers were also taught to develop goals in coordination with the parents to increase the likelihood that the parents would work with the child outside of the direct service hours provided by clinical EIBI team members. Targeted goals included developing a functional lexicon, improving responsiveness, and engaging in family routines. Trainee trainers were provided with forms for different types of data collection, including time intervals and event recording of child behavior. In addition, the fidelity of implementation measure was used (see below) to record the percentage correct implementation of PRT procedures in the new trainee parents.

Workshop Evaluations

Evaluation of the Train-the-Trainer Workshop was completed by the five trainee trainers using a form parallel to that used in the initial PRT training workshops. As shown in Table 4, anonymously provided ratings of the workshop were highly positive, with the quality of individual feedback to trainee trainers being consistently

Table 3
Pivotal Response Treatment (PRT) Training Techniques Taught in the Train-the-Trainer Workshop

Training procedure	Trainer trainees were taught to
1. Discussion of PRT manuals and motivational procedures of PRT.	describe the basic principles of antecedents, behaviors, and consequences and the motivational procedures of PRT, providing examples of how to implement the techniques in the context of the child's daily routines. Trainer trainees were also taught to provide opportunities for trainees to ask questions;
2. Modeling PRT procedures.	begin training by modeling each of the motivational procedures of PRT with the child;
3. Providing feedback to trainees.	<p><i>Instruction.</i> A variety of feedback strategies were discussed, including methods intended to increase parent empowerment. Trainer trainees were taught to provide feedback within a partnership model rather than a clinician-directed model (Brookman-Frazee, 2004); for example, feedback within a partnership model: "It looks like Sean is interested in the ball. What could you have him say to access the ball?" versus "Have Sean say, 'ball' before you give him the ball."</p> <p><i>Reinforcing implementation of new skills.</i> Trainer trainees were taught to provide contingent reinforcement and praise following any prompting or instruction. That is, if a trainer trainee suggested that a parent implement a new procedure, the parent would be provided with immediate reinforcement for any attempt. Unsuccessful trials were treated as attempts and the trainer trainees were taught to provide a suggestion for the next trial (e.g., "That was good at following his lead. Next time let's try giving him the item he requested right after he says it."). That is, trainer trainees were taught to focus primarily on the parents' successes and to verbally reward them for these.</p> <p><i>Giving specific feedback.</i> Trainer trainees were taught to provide very specific feedback to trainees regarding the motivational procedures. For example, rather than "That was great!," saying "You did an excellent job of giving your child a choice, and when he responded you immediately gave him the toy he requested."</p> <p><i>Providing a rationale and global feedback.</i> Trainer trainees were taught to provide a rationale for why the procedures were being used. For example, regarding disruptive behavior, the functions of behavior were discussed, as were studies showing that use of the motivational procedures decreases disruptive behavior.</p>

rated "5" on a 5-point scale. Some differentiation among the various elements of training was evident in the ratings; for example, trainees appeared somewhat more confident of their ability to give parents feedback on implementation of clear instructions than on maintenance tasks. In addition, trainees indicated that they had made more progress toward the goal of learning to give *in vivo* feedback than the goal of data collection.

Comprehensive Follow-up

A 12-month follow-up measure is currently being scored, with sample data provided below. This measure focused on two major issues: (1) fidelity of trainees' (i.e., parents, one-to-one interventionists, and clinical supervisors/leaders, including parent trainees of trainee trainers) implementation of PRT procedures and (2) concurrent child progress. Video recordings of trainees working with their target child were collected immediately prior to the start of intervention, following the initial week of PRT training, and at various intervals during 12-month follow-up. Videotapes are being scored for fidelity of PRT implementation and child vocalizations by both UCSB staff and EIBI team members in Nova Scotia.

UCSB Consultation

Consultation with UCSB staff during 12-month follow-up has involved three to four direct contacts, typically via 1-hr conference calls, managed through the provincial (Nova Scotia) clinical leader (S. E. B.). Con-

sultation has focused on treatment strategies for addressing challenging clinical issues, typically involving children in whom the development of expressive language has been limited.

Fidelity of Implementation of PRT Procedures

Representative videotaped probes of trainee-child interactions were assessed for fidelity (accuracy) of implementing the motivational and behavioral procedures of PRT using a continuous 2-min interval coding system for 10 min (i.e., five 2-min intervals). Coding focuses on the following six key PRT procedures: providing child choice with shared control, clear opportunities/instructions, immediate reinforcement contingent on the child's behavior, direct natural reinforcers, reinforcement for verbal attempts as well as correct verbal responses, and an appropriate balance of maintenance (easy) tasks (adapted from Koegel, Symon, & Koegel, 2002; Symon, 2002), all of which are predicted to show positive changes posttraining and during 12-month follow-up. A subset of representative trainees' videotapes has been coded for fidelity of PRT implementation by experienced doctoral-level UCSB staff. To build capacity within Nova Scotia, we have also established interrater agreement (>80%) between a UCSB staff and local EIBI team members (two trainee trainers) and between the two EIBI team members in coding the fidelity of their own and other team members' PRT implementation. Local team members are now establishing reliability with others throughout the province.

Table 4
Evaluation of the Train-the-Trainer Workshop,
for Five Respondents

	Mean	Range
1. I received helpful individual attention.	4.8	4-5
2. How comfortable are you with implementing the following procedures yourself?		
(a) Clear instructions	4.28	3-5
(b) Maintenance tasks	4.28	4-5
(c) Shared control/child choice	4.14	3-5
(d) Contingent reinforcement	4.42	3-5
(e) Rewarding attempts to respond	4.42	4-5
(f) Natural reinforcers	4.56	4-5
(g) Opportunities for language	4.28	3-5
3. How comfortable are you giving feedback on the implementation of the following procedures?		
(a) Clear instructions	4.28	4-5
(b) Maintenance tasks	3.85	3-4
(c) Shared control/child choice	4.14	3-5
(d) Contingent reinforcement	4.14	3-5
(e) Rewarding attempts to respond	4.00	3-5
(f) Natural reinforcers	4.00	3-5
(g) Opportunities for language	4.00	3-5
4. Please evaluate the extent to which the following workshop goals were met:		
(a) Identifying targets/opportunities for child within session	4.28	3-5
(b) Identifying targets/opportunities for parents within session	4.71	4-5
(c) Giving <i>in vivo</i> /on-line feedback	4.85	4-5
(d) Data collection/evaluation progress	3.16	3-4
5. How comfortable are you with the following procedures after the workshop?		
(a) Identifying targets/opportunities for child within session	3.80	3-4
(b) Identifying targets/opportunities for parents within session	4.00	3-5
(c) Giving <i>in vivo</i> /on-line feedback	4.00	3-5
(d) Data collection/evaluation progress	3.40	3-4
6. Please evaluate the following general components of the workshop:		
(a) Parent education	4.66	4-5
(b) Videotaping	4.66	4-5
(c) Feedback on videotapes	5.00	5
(d) Peer feedback/problem solving	4.33	2-5
(e) Workshop presenter	4.83	4-5
(f) Overall workshop	4.67	4-5
7. How did you feel about the number of days of the workshop?		
(a) Just right	5.00	
(b) Too few/too many	0.00	
8. How did you feel about the number of hours of each day of the workshop?		
(a) Just right	5.00	
(b) Too few/too many	0.00	

Scale Question 1: 1 = *strongly disagree* to 5 = *strongly agree*; Questions 2-5: 1 = *not at all* to 5 = *extremely*; Question 6: 1 = *poor* to 5 = *excellent*; Questions 7-8: Number of respondents.

Child Progress

Trainees were also required to monitor their children's target behavior, the primary target for all being the production of "functional verbal utterances", operationally defined as intelligible verbal utterances that are functional in the interaction. These were individualized for each child (Symon, 2005). Again, a subset of the data on

frequency of functional verbal utterances was coded from video records collected immediately prior to training, after the first week of training, and at regular intervals during 12-month follow-up. Interrater agreement on the representative data was established between a UCSB staff and the two local EIBI team members (see above), and between EIBI team members, who will establish reliability in coding for functional verbal utterances with others throughout the province.

Sample Data

An example of fidelity of PRT implementation data from two trainees (an interventionist and a psychologist) working with one representative child from the initial PRT workshop is provided in Figure 1. The data are expressed as the percentage of times across five 2-s intervals that each of the six PRT procedures was implemented correctly. As illustrated, trainees' scores (73% and 50%) did not meet criterion (>80%) prior to training, but did at 1-month follow-up (100% and 97%, respectively). For each of these two trainees, individual areas of improvement for the six PRT procedures evaluated for fidelity of implementation are shown in Table 5.

Figure 2 shows the corresponding change in communicative behavior in the child working with the trainees depicted in Figure 1. These data are expressed as the frequency of functional verbal utterances. As illustrated, there is a concomitant increase in child verbal utterances associated with the trainees' improved fidelity of PRT implementation, such as for the interventionist (from 30% pretraining to 70% at 1-month follow-up).

Figure 3 shows fidelity of PRT implementation data for representative trainees (a parent, an interventionist, and a speech-language pathologist) who were trained by a trainer trainee (vs. directly by UCSB staff). Again, trainees trained by the trainer trainee did not meet fidelity criterion (80%) prior to their training but did at follow-up (i.e., 60-70% vs. 100%, respectively). Table 6 shows the individual scores for fidelity of implementing the six PRT procedures for the trainees trained by the trainer trainee.

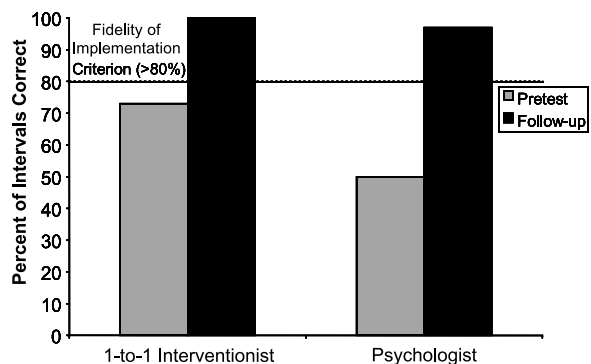


Figure 1. Percentage of intervals scored as correct on fidelity of PRT implementation for each trainee at pretest and follow-up.

Table 5
Percentage of Intervals Scored Correct on Fidelity of Implementation for Each PRT Procedure and Trainee at Pretest and Follow-up

	Clear	Maintenance tasks	Shared control	Contingent	Natural reinforcers	Reinforce attempts	Total
One-to-one interventionist							
Pretest	80	100	100	60	60	40	73
Follow-up	100	100	100	100	100	100	100
Psychologist							
Pretest	100	100	100	0	0	0	50
Follow-up	100	80	100	100	100	100	97

Child change data for the child whose intervention was provided by the above trainees are shown in Figure 4. As can be seen, the child showed concomitant improvements in communication, producing functional verbal utterances over 95% of the intervals during the interactions that were video-recorded following training of the trainees by the trainer trainee.

Discussion and Research Plan

Evidence that children with ASD benefit from early behavioral intervention comes largely from highly controlled university-based intervention programs (Dawson & Osterling, 1997; Howard et al., 2005; Harris & Handleman, 2000; Harris, Handleman, Gordon, Kristoff, & Fuentes, 1991; Rogers, 1998; Smith, Groen, & Wynn, 2000). Despite the wide proliferation of publicly funded early intervention programs for children with ASD, very little is known about either their quality or their effectiveness in improving the children’s outcomes. These issues are of great concern. A large body of literature has documented the challenges across diverse fields in establishing treatment effectiveness when translating behavioral interventions shown to be efficacious in university-based centers to “real-life” commu-

nities (Addis, Wade, & Hatgis, 1999; Turner & Sanders, 2006). In the field of ASD, these challenges are further complicated by the lack of research on how evidence-based interventions might be effectively disseminated into community settings.

This paper described a collaborative attempt by UCSB and Dalhousie/IWK Health Centre to translate and implement PRT (Koegel, Openden, Fredeen, & Koegel, 2006) for young children with ASD province-wide in Nova Scotia. PRT has been recognized as a comprehensive approach for educating children with autism (National Research Council, 2001). The efficacy of its various components, including parent training, has been demonstrated using well-controlled experimental designs (e.g., Koegel, Koegel, & Brookman, 2003; Koegel et al., 1999; Koegel, Koegel, & Surratt, 1992; Koegel, O’Dell, & Dunlap, 1988; Koegel et al., 1987). Although PRT is an empirically derived behavioral intervention designed to be readily implemented in natural settings, research to date has been conducted primarily in research centers by staff with extensive expertise in PRT. Thus, in planning the implementation of PRT throughout a province-wide system, careful consideration was given to issues in translational research (Chambless et al., 1996; Chambless et al., 1998; Deegear & Lawson, 2003; Task Force on Promotion and Dissemination of Psychological Procedures, 1995).

Among the potentially critical features outlined here is that stakeholders throughout Nova Scotia shared a commitment to strategies that maintain scientific integrity, stressed a family-centered model of service delivery, included a comprehensive plan for staff and parent training, and focused on child and family outcomes. Data on intervention team members’ satisfaction with both the initial PRT training workshop and the Train-the-Trainer workshop are overwhelmingly positive.

Overall, the trainers were viewed as enthusiastic, positive, and skilled at imparting knowledge at a level that allowed real behavioral changes in the trainees. This was borne out by sample data from team members working with a 5-year-old boy with minimal functional language (depicted in Figure 1 and Table 1). Particularly striking is the dramatic increase in contingent reinforcement by trainees of the child’s verbal attempts. Consistent with a well-established literature (Koegel et al., 1988), this increase was associated with an equally dramatic increase in the child’s functional verbalizations.

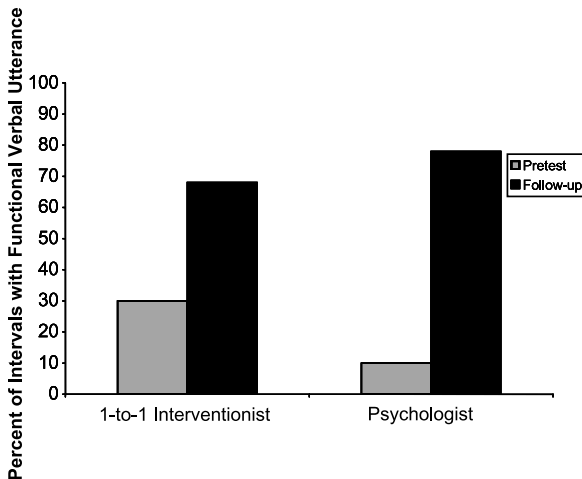


Figure 2. Percentage of intervals with functional verbal utterances produced by the child with each trainee at pretest and follow-up.

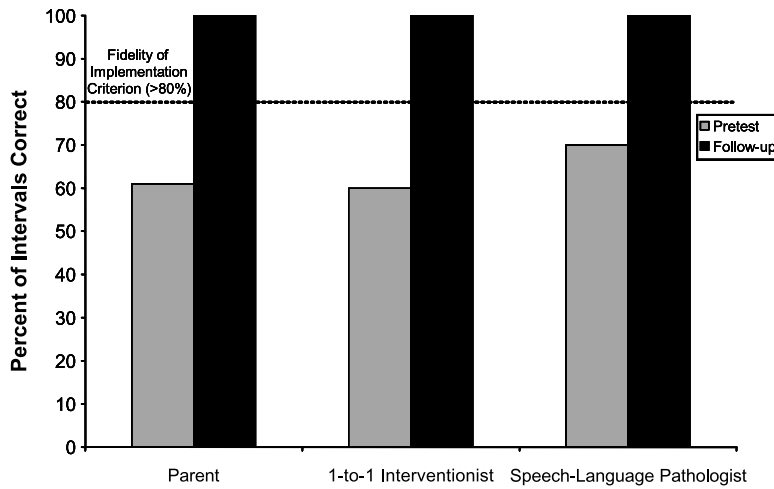


Figure 3. Percentage of intervals scored as correct on fidelity of PRT implementation at pretest and follow-up for trainees taught by trainer trainee.

Among the collateral gains observed anecdotally was a corresponding increase in the child’s social engagement. This was evident during the first week of training, at which time the child’s sister, referring to the marked change in her brother’s behavior, blurted out, “It’s magic!” Within the following month, the child began to spontaneously “repair” his communicative attempts. Preliminary data on the speed and fidelity with which trainees implemented the principles of PRT and the ease with which they established interrater reliability with a UCSB expert for coding both fidelity and functional vocalizations are very promising. Future papers will detail our findings on fidelity of PRT implementation of newly trained intervention team members (including parents). We also will report on the effectiveness of the Train-the-Trainer Model in disseminating

PRT throughout the province and most importantly on child outcomes.

Based on our experience thus far, features of the training model that we believe may be critical to effective translation from the “lab” to communities include the following. First, the Dalhousie/IWK Health Centre–UCSB collaboration includes a mixture of senior and junior clinical researchers with expertise in autism including the developers of PRT, the developers of the training model, a provincial clinical leader responsible for the dissemination of the model province-wide, and a clinical researcher responsible for the provincially funded evaluation of the intervention program. Second, a team-based training model was developed to ensure that intervention was coordinated among parents, one-to-one interventionists and clinicians (speech-language

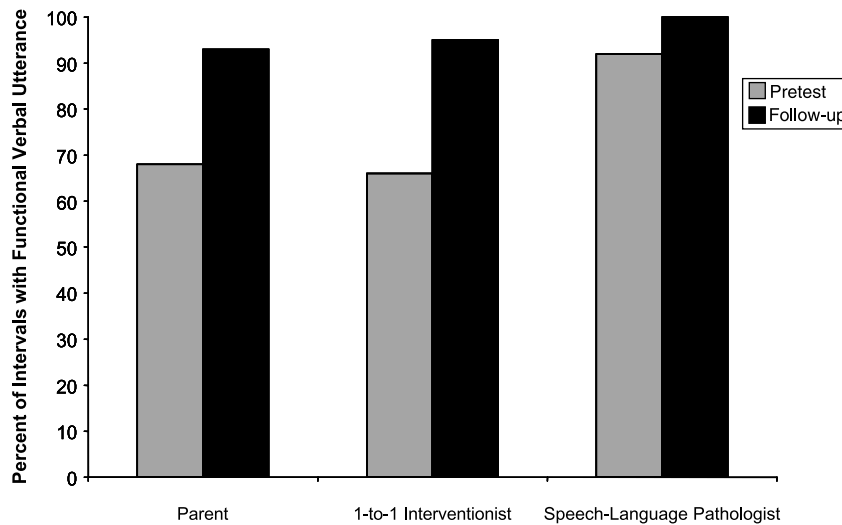


Figure 4. Percentage of intervals with functional verbal utterances produced by the child at pretest and follow-up for taught by the trainer trainee.

Table 6
Percentage of Intervals Scored Correct on Fidelity of Implementation for Each PRT Procedure and Trainee at Pretest and Follow-up for the Train-the-Trainer Model (Training Implemented in a New Part of the Province)

	Clear	Maintenance tasks	Shared control	Contingent	Natural reinforcers	Reinforce attempts	Total
Parent							
Pretest	67	100	100	33	33	33	61
Follow-up	100	100	100	100	100	100	100
One-to-one interventionist							
Pretest	100	100	100	20	20	20	60
Follow-up	100	100	100	100	100	100	100
Speech-language pathologist							
Pretest	100	100	100	40	40	40	70
Follow-up	100	100	100	100	100	100	100

pathologists, occupational therapists, and psychologists). Equally importantly, the values and positive teaching principles fundamental to PRT are represented at all levels of training, whether of child, parent, or clinician, as is a commitment to high quality intervention through the ongoing monitoring of treatment fidelity. Accordingly, the training model focused specifically on fidelity of implementation of PRT procedures, and comprehensive follow-up will assess the maintenance of treatment fidelity. Finally, the Train-the-Trainer Model allows for ongoing support of parents, interventionists, and clinicians, as well as dissemination of the intervention model throughout the largely rural regions of the province.

Several additional issues remain to be addressed. Although substantial research has demonstrated that parents can be successful change agents in their children's intervention programs (Herschell, Calzada, Eyberg & McNeil, 2002; Koegel, Bimbela, & Schreibman, 1996), there is a paucity of research on the variables associated with successful parent education (Mahoney et al., 1999). Among the important outstanding research questions are, "What techniques are most essential in teaching parents the skills necessary for effective intervention?" and "How can this be achieved in a way that enables parents to see themselves as valued and essential?"

There is also a need to identify the qualities that characterize effective trainers. Preliminary findings reported here suggest that parents, one-to-one interventionists, and clinical supervisors/leaders alike responded very well to the training method, as evidenced by the speed with which they met the fidelity of implementation criteria. They also reported that the training was valuable and demonstrated a great deal of enthusiasm in acquiring the relevant skills, although the role of trainer attributes in facilitating learning remains unclear. Similarly, and as shown in other fields (Nalavany, Ryan, Gomory, & Lacasse, 2005), it will be important to identify the qualities of an individual (e.g., empathy, warmth, genuineness, and joyful expressiveness) that predict a good match with this model of intervention. Knowledge of optimal staff attributes may result in greater training success, enhanced job satisfaction, and better child outcomes.

Another potentially rich area of research relates to parent support. Although not measured within the context of our training, it was evident that group supervision facilitated the sharing of experiences among parents, as well as the one-to-one interventionists and clinicians. Building in these and additional opportunities for such shared experiences may enhance training and provide emotional support for parents. This would be consistent with previous research on families of children with chronic illness and those with children with disabilities who have been shown to benefit from parent-to-parent support (e.g., Brookman, 1988; Ireys, Chernoff, Stein, DeVet, & Silver, 2001). In the training model adopted here, not only were parents able to discuss their concerns about their child and share their uplifting moments with each other, but they also had the opportunity to hear about both their own and their child's strengths from the viewpoint of others, including the professionals.

In summary, early intervention for young children with ASD has been identified as a health care priority (Filipek et al., 2000). This has resulted in widespread implementation of publicly funded, autism-specific early intervention programs, largely in the absence of research on either their quality or effectiveness, or on how efficacious university-based intervention programs might be most effectively transferred to the broader community. Here we detail our collaborative attempt to achieve this goal through the implementation of PRT province-wide using a comprehensive training model. Our preliminary findings are very supportive of future research in this area.

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