# Brief Parent Training in Pivotal Response Treatment for Preschoolers with Autism

by

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Abstract

Evidence of improved outcomes with early behavioural intervention has placed the early treatment of autism as a health research priority. However, long waiting lists for treatment preclude timely access, despite recommendations that intervention be provided as early as possible to optimize the children's outcomes. Pivotal Response Treatment (PRT) has been shown to be effective at promoting communication in children with autism. An integral component of PRT is parent training, as parents are considered to be the primary implementers in the PRT model. To date, research on parent training in PRT has focused primarily on a 25-hour program, although there is some evidence that less intensive training may still be effective. The objective of the present study was to evaluate the efficacy of brief training in PRT for parents of preschoolers with autism, who were awaiting, or unable to access, more comprehensive treatment. Eight preschoolers with autism and their parents participated in the study, which used a non-concurrent multiple (across-participants) baseline design. Parents were seen for three 2-hour training sessions on PRT. Measures focusing on child and parent outcomes, using standardized tests, questionnaires, and behaviour coded directly from video, were obtained before, immediately after, and 2 to 4 months following training. Overall, children's communication skills, namely functional utterances, increased following training. Parents' fidelity in implementing PRT techniques also improved after training and these changes were generally maintained at follow-up, although there was some variability. Generally children presented with low levels of disruptive behaviour across all phases, although disruptive behaviour decreased for the two children who displayed higher levels prior to training. There were no changes observed in child affect. Overall, there were no significant changes in parental self-efficacy, stress, or affect, although parents reported being very satisfied with the training. A moderate to strong relationship was found between parents' increased ability to implement PRT techniques and improvement in the children's communication skills. While discussion focuses on outstanding issues to be addressed, the present findings suggest that brief parent training promises to provide an immediate cost-effective intervention that could be adopted widely.

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# Chapter 1 Introduction

Autistic spectrum disorders are viewed as being among the most severe of the life-long neuro-developmental disorders. Evidence has demonstrated that the children's outcomes are substantially improved with early intensive behavioural intervention (e.g., National Research Council, 2001). These are generally resource-demanding programs with long waiting lists; therefore, many children throughout North America are not receiving treatment. To date, there is a paucity of data on less resource-demanding parent training programs, which could serve an important function while parents are waiting for (or in the absence of) more intensive treatment. This dissertation examined the efficacy of brief parent training in Pivotal Response Treatment for parents of preschoolers with autistic spectrum disorders. The dissertation begins with a brief description of autistic spectrum disorders and the related early intervention literature, with a focus on Pivotal Response Treatment. This is followed by a discussion of the general literature on parent training and then a detailed description of the studies that have evaluated training for parents of young children with autistic spectrum disorders. Some of the gaps in the literature are highlighted and the objectives of the present study are outlined. Data are presented for child and parent outcomes, followed by a discussion of the findings and outstanding issues to be addressed.

## *Autistic Spectrum Disorder*

Autism forms part of a spectrum of related conditions known as the Autistic Spectrum Disorders (including Asperger syndrome and atypical autism or Pervasive Developmental Disorders-Not Otherwise Specified; hereafter collectively referred to as autism). While the severity of autism varies, it is characterized by impairments in social

interaction and communication, and by the presence of repetitive and restricted behaviours, interests, and activities (American Psychiatric Association [APA], 2000). Autism is a life-long neuro-developmental disorder for which the prognosis has generally been poor, and the burden of suffering for families and costs to society have been high (Bryson, Rogers & Fombonne, 2003). Recent estimates place the prevalence of the entire spectrum of autism at 1 in 150 children (Center for Disease Control [CDC], 2007). Studies indicate that autism begins to appear in the first two years of life (e.g., Landa & Garrett-Mayer, 2006), although many children are not diagnosed before the age of 4 or 5 years (CDC, 2007).

Characteristic communicative impairments among children with autism include a delay in or a lack of speech, stereotyped and repetitive language, difficulty initiating and sustaining conversations, and impairment in the use of nonverbal methods of communicating (e.g., eye gaze, gestures). Among preschoolers with more narrowly defined autism (autistic disorder; APA, 2000), approximately 70% have no functional language (i.e., no daily spontaneous use of 3-word phrases; Chakrabarti & Fombonne, 2001), and behaviour problems such as aggression towards others are common (Howlin, 1998). The significance of this is underscored by the well-documented finding that behaviour problems decrease as a function of the development of functional language (e.g., Durand & Carr, 1992). For these reasons, current interventions for children with autism are generally intensive and focus primarily on developing language and social skills. Evidence for the effectiveness of early intervention (for reviews, see Landa, 2007; National Research Council, 2001; Rogers, 1998; Rogers & Vismara, 2008; Woods &

Wetherby, 2003) has placed the early detection and treatment of autism as a health care priority (Bryson et al., 2003; Filipek et al., 2000).

*Early Intervention*

While there are various models of treatment for children with autism (e.g., Mesibov, 1997; Panerai, Ferrante, & Zingale, 2002; Strain & Hoyson, 2000), most early intensive intervention programs are based on the principles of applied behaviour analysis (ABA; e.g., R.L. Koegel, L.K. Koegel, & McNerney, 2001; Lovaas, 1987; Sallows & Graupner, 2005; for a review, see Rogers & Vismara, 2008). Seminal research conducted by Lovaas (1987) provided evidence for the efficacy of discrete trial teaching, a particular form or application of ABA. Discrete trial teaching is a clinician-directed intervention, which focuses on teaching social, language, cognitive, and self-care skills, as well as decreasing inappropriate behaviours. In such programs, skills/behaviours to be learned are typically broken down into smaller parts and then massed trials are used to develop the sub-component skills. In its traditional form, the treatment is conducted using table-top work (e.g., flash cards) and reinforcers that are unrelated to the task being taught (e.g., food). For example, when being taught colours, a child might have 100 consecutive trials in which he is required to verbally identify the colour that is presented on individual cards, with correct responses being rewarded with a Smartie.

In Lovaas' (1987) comprehensive early intervention program, 19 preschoolers with autism received one-to-one discrete trial teaching for 40 hours a week over a 2-year period. Claims are that 47% of the children "recovered" by the first grade, although this work has several methodological limitations, and claims of "recovery" have not been replicated (for a critical review, see Gresham & MacMillan, 1998). However, several

more recent studies have provided at least some support for the efficacy of discrete trial teaching (e.g., Harris, Handleman, Gordon, Kristoff, & Fuentes, 1991; although for a non-replication, see Bibby, Eikeseth, Martin, Mudford, & Reeves, 2002; also see National Research Council, 2001, for a review). Notably, one treatment study of comparable intensity to that of Lovaas has replicated some of their findings, including large increases in measured IQ (effect size (*d*) = 0.90) and language skills (*d* = 0.65 and 0.24 for receptive and expressive language, respectively, *N* = 23, Sallows & Graupner, 2005). In the Sallows and Graupner study, children were matched based on IQ and then randomly assigned to either the clinic-directed or the parent-directed treatment group. The main limitation of this study is that the two groups received a similar number of hours of clinician-implemented discrete trial teaching and therefore the data were collapsed across groups for the analysis. Consequently, the study demonstrates that gains are made following intensive discrete trial teaching, but no comparison was made between different amounts of treatment.

A few non-randomized group-design studies have compared discrete trial teaching to eclectic treatments of children with autism. One study did not find a significant group difference in IQ, visual spatial skills, language, or adaptive behaviour after one year of treatment (approximately 28 hours of treatment per week; Eikeseth, Smith, Jahr, & Eldevik, 2002). However, the discrete trial teaching group (n = 13) did make significant pre-post gains on IQ, language, and adaptive behaviour measures, whereas the eclectic group (n = 12) did not. In another study, significantly higher IQ and adaptive behaviour scores were found in a group receiving a community-based intensive discrete trial teaching program (n = 21; 35 to 40 hours per week), when compared to a group receiving

less intensive, eclectic community-based services (n = 21; Cohen, Amerine-Dickens, & Smith, 2006). Interestingly, in the Cohen et al. study, both groups made considerable gains and no significant differences were found in expressive or receptive language. A more recent study (Magiati, Charman, & Howlin, 2007) found no significant differences in IQ, language, adaptive behaviour, play or severity of autism between children with autism who had received community-based, intensive discrete trial teaching (mean of 32 hours per week) compared to an eclectic, autism-specific preschool program (mean of 25 hours per week). Together, there is evidence for the efficacy of discrete trial teaching in enhancing the development of skills in children with autism. However, evidence of effectiveness of discrete trial teaching when implemented in communities is limited.

While the results from discrete trial teaching studies are promising for children with autism, major outstanding treatment issues remain, notably the lack of generalization of learning (e.g., Charlop-Christy & Carpenter, 2000; Lovaas, R.L. Koegel, Simmons, & Long, 1973) and of self-initiated (vs. cue-dependent) behaviour (e.g., Charlop-Christy & Carpenter, 2000) with this form of intervention. Concerns have also focused on the high costs (estimated at $32,820 a year per child; Jacobson, Mulick, & Green, 1998) and infeasibility of such resource-demanding interventions, particularly within publicly-funded health care or early education systems (Bryson et al., 2007). In an attempt to address these issues, a recent paradigm shift has occurred, in which the principles of ABA are being implemented in more naturalistic settings to enhance the learning of children with autism. This shift has coincided with an increased focus on targeting communication. One prominent example of this paradigm shift is Pivotal Response

Treatment (also referred to as Pivotal Response Training; PRT), developed by Robert Koegel, Laura Schreibman, and colleagues (R.L. Koegel et al., 1989).

PRT was designed to be implemented by multiple caregivers in natural settings, in order to promote generalization of learned skills to different environments and people. While the systematic use of behavioural principles remains central, PRT differs from discrete trial teaching in that it focuses on enhancing the child's motivation to communicate (e.g., R.L. Koegel & L.K. Koegel, 2006). Koegel and colleagues have conceptualized the motivation to respond to social and environmental stimuli as being a core deficit in children with autism (e.g., R.L. Koegel & Egel, 1979; R.L. Koegel & Mentis, 1985) and have explored strategies to increase their motivation (e.g., R.L. Koegel, O'Dell, & L.K. Koegel, 1987). Motivation is thought to be low in children with autism, as they exhibit patterns of behaviour, such as low rates of initiating, that are similar to behaviours reported in the learned helplessness literature (Weisz, 1979). The claim is that children with autism experience repeated failure, which results in infrequent reinforcement. Additionally, adults often "help" by doing things for them, which may lead the children to learn that their responses are independent of the reinforcement. These repeated and prolonged experiences of non-contingent reinforcement are thought to teach children that their behaviour does not affect the environment and may lead them to avoid social and environmental stimuli (R.L. Koegel & Mentis, 1985). Motivation is difficult to operationalize and therefore to directly observe; however, an increase in responding to social and environmental stimuli is assumed to indicate an increase in motivation (R.L. Koegel et al., 2001). R.L. Koegel et al. (2001) have hypothesized that increasing

motivation in children with autism will result in widespread improvements, thus making motivation a pivotal target of intervention.

Motivational strategies, such as reinforcing attempts, following the child's lead, and interspersing well-learned with new tasks, have been shown in children with autism to lead to an increase in responding to and initiating social interactions with others. For example, one study demonstrated that children with autism learned faster when their attempts to respond verbally were reinforced, compared to when only strictly defined successive approximations were reinforced (R.L. Koegel, et al., 1987). By reinforcing attempts, children experience more success and quickly learn that their behaviour is affecting their environment. Another example is a study that demonstrated a decrease in social avoidance when children with autism were engaged in activities they preferred (R.L. Koegel, Dyer, & Bell, 1987). When children are less avoidant, they spend more time exploring the environment and therefore have more opportunities to learn. In PRT, behavioural and motivational techniques, such as contingent reinforcement and reinforcing attempts, are systematically implemented in natural settings to enhance motivation and improve communication skills. Hence, PRT is a naturalistic child-directed intervention that focuses on increasing the child's motivation to communicate and interact with his/her caregiver. To provide an example, if a child chooses to play with playdough, the parent joins in that activity. While they are playing the parent might ask the child whether he wants the blue or red playdough. When the child attempts to answer he is reinforced immediately by receiving the colour of playdough he requested. Throughout their time playing together the parent asks a variety of easy and more difficult questions related to the playdough activity.

PRT has been shown to increase verbal communication, the main target of intervention (e.g., R.L. Koegel, Symon, & L.K. Koegel, 2002; Openden, 2005; Symon, 2005), and also to decrease non-targeted, problematic behaviours in children with autism (e.g., L.K. Koegel, R.L. Koegel, Hurley, & Frea, 1992). To date, the majority of studies have evaluated components of PRT (e.g., reinforcing attempts; R.L. Koegel et al., 1987), although initial data from a community-based PRT program look promising (Smith et al., 2008; also see Bryson et al., 2007, for details of the program). PRT can be implemented by various individuals in the child's life, with parents being viewed as the primary implementers in the PRT model (R.L. Koegel, Openden, Fredeen & L.K. Koegel, 2006; Schreibman & R.L. Koegel, 2005). This shift towards including parents as central players in intervention programs is part of a larger movement within the area of child psychopathology (Mahoney et al., 1999).

*Parent Training*

Historically, parents of children with psychological disorders were viewed as being the cause of their child's problems or at least tangential to their child's treatment (e.g., Bettelheim, 1967). However, starting in the 1960's, clinicians and researchers began incorporating parent education/parent training into their intervention programs (e.g., Schopler & Reichler, 1971). Parent training has been defined as "systematic activities implemented by professionals to assist parents in accomplishing specific goals or outcomes with their children" (Mahoney et al., 1999, p.131). Parent training programs have been used for a broad range of child problems, including anxiety disorders, sleep, and feeding problems. However, most of the research on parent training has been conducted with children with disruptive behaviour disorders (i.e., Attention Deficit

Hyperactivity Disorder, Oppositional Defiant Disorder or Conduct Disorder) or children with developmental disorders (e.g., autism).

There are several advantages to using a parent training model. First of all, training of parents helps to ensure consistency of treatment across settings (e.g., home, playground), which results in greater generalization of child skills (Kaiser et al., 1996; Wacker et al., 2005). Moreover, the skills children gain are more likely to be maintained when parents are the ones implementing the intervention (e.g., Anastopoulos, Shelton, DuPaul, & Guevremont, 1993; Kaiser et al., 1996). With regard to parent outcomes, studies have demonstrated that parent training programs, when compared to no intervention, are associated with a decrease in parental stress, depressive symptoms, and parent/marital and family problems (Anastopoulos et al., 1993; Baker, Landen, & Kashima, 1984; Bristol, Gallagher, & Holt, 1993; Pisterman et al., 1992), and an increase in parental confidence and self-efficacy (Anastopoulos et al., 1993; Pisterman et al., 1992; Tucker, Gross, Fogg, Delaney, & Lapporte, 1998).

It bears emphasizing that possible differences in parent outcomes between parent training and clinician-implemented programs have not been well-established. Thus, it remains unknown whether parents benefit more from one over the other. A number of concerns have been raised about the increased burden and role conflict for families participating in parent training programs (e.g., Turnbull, Blue-Banning, Turbiville, & Park, 1999). However, results from studies that have investigated parent and family problems in parents participating in training programs have not supported those concerns (e.g., Baker et al., 1984; R.L. Koegel, Schreibman, Britten, Burke, & O'Neill, 1982). Therefore, for many families the benefits of parent training may well offset concerns

about increased burden and role conflict. Additionally, parent training models are more cost-effective than clinician-directed interventions and therefore have the potential to serve a greater number of families (Dretzke et al., 2005; Edwards, Ceilleachair, Bywater, Hughes, & Hutchings, 2007).

Overall, it appears as though the advantages of parent training, including the increased generalization and maintenance of skills, and increased parental self-efficacy, are critical when considering the relative merits of different approaches to intervention. These advantages are particularly relevant when working with children with autism, in whom the lack of generalization of skills learned during intensive clinic-based interventions are well documented (e.g., Lovaas et al., 1973).

*Parent Training in Autism*

The importance of training parents of children with autism was first highlighted in early studies demonstrating that both generalization and maintenance of skills were problematic following treatment of this population (e.g., Browning, 1971, Lovaas et al., 1973). Early work conducted by Lovaas and colleagues (1973) showed that the children whose parents were trained in the intervention continued to improve following clinic treatment, whereas those whose parents were not deteriorated. While promising, the intensity of the parent training component in the Lovaas et al. study has not been replicated, as mothers were asked to stay at home in order to participate in their child's treatment. Since that study, several parent training programs of varying intensities have been shown to be effective in enhancing skill development in children with autism (e.g., Aldred, Green, & Adams, 2004; Drew et al., 2002). Most of the parent training intervention programs have focused on improving communication or language skills,

although a few have demonstrated improvements in such other areas as imitation (Ingersoll & Gergans, 2007) and disruptive behaviour (Frea & Hepburn, 1999; Malmberg, 2007; RUPP, 2007; Sofronoff, Leslie, & Brown, 2004).

An early study (Hemsley et al., 1978; also see Howlin, 1981) found significant improvements in children with autism whose parents had received in-home training, when compared to control groups. Parents were non-randomly assigned to either the parent training group (n = 16), no-treatment control group (n = 14), or a control group receiving intermittent outpatient treatment (n = 16). The parent training intervention focused on increasing language and social skills, as well as reducing challenging behaviour, by teaching parents behaviour modification techniques, including breaking a problem down into small targets, and using natural reinforcers, "time-out" methods and graded exposure. Parents received 1 to 2 hours of training per week, followed by less frequent (bi-weekly) sessions, for a total of 6 months of training. Parents were asked to spend at least 30 minutes a day implementing the intervention with their child, although they were encouraged to use the techniques during routines throughout the day. Increases in both child skills (language and social, assessed using observational and standardized measures, $d = 0.38$ - 0.94) and parent skills (assessed by direct observation) were demonstrated following training. These changes were maintained and increased over the year following the six months of parent training.

Hemsley et al's (1978) study was one of the first group-design parent training studies to evaluate whether parents were able to implement the techniques with fidelity (hereafter referred to as parent fidelity) after training. Parent fidelity is a critical measure to include in parent training studies, as it is important to confirm that the treatment is

being implemented accurately and to be able to link gains in child skills to parents' ability to use the intervention strategies. The Hemsley et al. study has a number of strengths, including the use of two control groups and measurement of parent fidelity. However, there were also a number of weaknesses, such as non-random assignment to groups and the use of an intervention that was not manualized (i.e., the intervention was not detailed in a manual). Overall, this early study demonstrated that parent training led to increases in both parent implementation skills and child social and communication skills, and that these changes were maintained.

In another group design study, parent training was demonstrated to be effective above and beyond day treatment programs (Ozonoff & Cathcart, 1998). Twenty-two children (2 to 6 years of age) were non-randomly assigned to either the parent training group (Treatment and Education of Autistic and Related Communications Handicapped Children; TEACCH-based home program; Schopler & Reichler, 1971) or the control group (day treatment alone). All children were concurrently attending various specialized day treatment programs, the majority of which used discrete trial teaching. TEACCH is an eclectic intervention that uses structured teaching, environmental adaptations, and alternative communication training to promote communication, cognitive, and pre-academic skills. Parents in the parent training group received 10 hour-long sessions on TEACCH over 4 months. Following intervention, children in the parent training group showed significantly greater gains in a number of areas (i.e., imitation, fine motor, gross motor, and cognitive performance, $d = 0.28 - 0.54$). The main limitations of this study were that children were not randomly assigned to groups and no follow-up data were collected. In addition, the intervention was not manualized and parent fidelity was not

measured; therefore it is not known whether parents actually learned to implement the techniques. In brief, the results of this study show that a feasible and cost-effective parent training program, within a TEACCH model, can lead to short-term gains in developmental functioning in children with autism, when compared to day treatment programs alone. Evidence of gains in multiple child skills following parent training in naturalistic interventions is consistent with the findings from a number of pre/post and multiple-baseline design studies (e.g., Charlop-Christy & Carpenter, 2000; Kaiser, Hancock, & Nietfeld, 2000; Mahoney & Perales, 2005; Solomon, Necheles, Ferch, & Bruckman, 2007). In addition, skill acquisition has been shown to be similar for mothers and fathers who were taught two techniques (i.e., expectant waiting and imitating with animation) for promoting their child's social reciprocity (N = 8 families; Seung, Ashwell, Elder, & Valcante, 2006).

The first randomized control trial (RCT) to include parent training as part of the intervention was conducted by Jocelyn, Casiro, Beattie, Bow, and Kneisz (1998). This study investigated the effectiveness of an eclectic, caregiver-based intervention program that included staff from community day-care centers (i.e., both parents and day-care staff). Thirty-five children were randomly assigned to either the treatment (n = 16) or the routine care control group (n = 19). The intervention, which incorporated behavioural principles and knowledge about language development, focused specifically on developing an understanding of autism, performing functional analysis of behaviour, and facilitating language and social development. The program consisted of five weekly 3-hour educational seminars for parents and day-care staff, 10 weekly 3-hour on-site consultations to day-care centres, and psycho-educational and supportive work with the

families. In total, parents received 15 hours of training during the seminars, plus two home visits by an Autism Behaviour Specialist. The day-care staff received more training than the parents. Following intervention, both the parents and daycare staff showed a significant increase in their understanding of autism. Children in the intervention (vs. control) group demonstrated a greater increase in language scores (as measured by the Early Intervention Developmental Profile or the Preschool Developmental Profile; $d$ = 0.66). No significant group differences were seen in autism symptoms, level of parental stress or arousal or in scores on the Family Assessment Measure, although parents in the treatment group reported higher degrees of satisfaction than parents in the control group. Unfortunately, the researchers did not assess parent or teacher fidelity, the intervention was not manualized, and maintenance of treatment gains was not assessed. This study provides some evidence for the effectiveness of a joint parent-daycare staff training program in increasing child language skills. However, it does not provide evidence supporting a training program that only includes parents.

A second RCT compared two versions of a manualized non-naturalistic (discrete trial teaching) behavioural intervention: one that consisted of intensive clinician-implemented treatment and parent training, and one that consisted of parent training alone (Smith, Groen, & Wynn, 2000). Twenty-eight children with autism were matched on IQ and then randomly assigned to either the intensive treatment group (n = 15) or the parent training group (n = 13). The intensive treatment group received approximately 24.5 hours per week of individual treatment during the first year, which included some parent training, while the parent training group received 3 to 9 months of parent training (5 hours per week). Results indicated that the intensive intervention that included parent

training was more effective than parent training alone (as measured by standardized instruments administered by blind assessors; IQ $d = 0.76$, visual-spatial skills $d = 0.75$, and language development $d = 0.66$). This study has a number of limitations, including the use of a design that precludes any clear conclusions about the effectiveness of parent training. Furthermore, while treatment fidelity was monitored for the staff, parent fidelity was not measured. In addition, the parent training program was long (minimum of 60 hours in total) and would not be feasible for many families. A multiple baseline design study (N = 2) has provided preliminary evidence that parents can acquire the discrete trial teaching procedures using a briefer parent training program (12-18 hours in total). However, there was no change in child outcomes over the six to nine week period of the study (Crockett, Fleming, Doepke, & Stevens, 2007). Based on the results from these two studies, there is only very preliminary evidence that parents can learn to implement discrete trial teaching with fidelity and minimal evidence that parent training in discrete trial teaching is beneficial for children with autism.

In another RCT, Drew and colleagues (2002) demonstrated that a consultation-based parent training program lead to better outcomes for children with autism than routine services. This parent training intervention program focused on teaching joint attention, a nonverbal form of communication, as well as behavioural management, again integrated into everyday routines. Twenty-four preschool children with autism were matched for age and then randomly assigned to either the parent training group (n = 12) or the routine services only group (n = 12). A consultation model was used in which a speech-language therapist trained the parents at home during a 3-hour session every 6 weeks for one year (approximately 180 hours in total). Following the 12-month

intervention period, children in the treatment group were more likely to have moved from being nonverbal (11 nonverbal children in each group prior to treatment) to having single-word or phrase speech (7 vs. 2 children, based on parent report on the Autism Diagnostic Interview-Revised; ADI-R; Lord, Rutter, & Le Couteur, 1994). There was also a trend towards better language comprehension in the treatment group (as measured by the MacArthur Communicative Development Inventory; MCDI; Fenson et al., 1993; $d$ = 0.73). There was no significant group difference in parental reports of stress. Limitations of the study include the absence of an intervention manual, an objective measure of language, a measure of parents' treatment fidelity, and follow-up data. In addition, no measure of joint attention was included, even though the intervention specifically targeted joint attention. Overall, the results from this study demonstrate that a consultation-based model of parent training, focusing primarily on joint attention skills, is effective in increasing expressive language skills in preschoolers with autism, compared to routine services.

Additional support for the efficacy of parent training programs designed to target joint attention has come from two multiple-baseline design studies, in which both parent fidelity of implementation and child joint attention skills increased following parent training (N = 3 in both studies; Rocha, Schreibman, & Stahmer, 2007; Schertz & Odom, 2007). Interestingly, the two studies used different techniques, with Rocha and colleagues teaching parents behavioural strategies (i.e., components of discrete trial teaching and PRT), and Schertz and Odom focusing on enhancing the parent-child relationship. Together, these three studies provide preliminary evidence that parent training focused on

promoting joint attention leads to an increase in both joint attention skills and perhaps expressive language, in young children with autism.

In the most recent RCT study, a manualized intervention designed to target how parents communicate with children with autism was found to produce greater gains compared to routine care alone (Aldred et al., 2004). This study included 28 2- to 5-year-old children with autism who were randomly assigned to either the treatment group or the routine care control group. The intervention, called Child's Talk, was primarily consultation-based and consisted of six psycho-educational workshops followed by monthly training sessions for 6 months, and then 6 months of less frequent visits with the trainer. Child's Talk, a pragmatic language intervention, focused on developing parents' sensitivity and responsiveness to their child's attempts to communicate. Parents were asked to spend 30 minutes per day implementing the strategies with their child during daily routines. At the end of the 12 months of intervention, the treatment group demonstrated a greater increase in expressive language (again, as measured by the MCDI; Fenson et al., 1993; effect size not available), social interaction (as measured by the Autism Diagnostic Observation Scale; ADOS; Lord, Rutter, & DiLavore, 1999; large effect size, $d = 0.78$), and communicative acts (coded from video by coders blind to treatment group; $d = 0.73$). There were no significant differences in observed levels of parent- or child-initiated shared attention (i.e., joint attention), as coded from video. However, parents in the treatment group were more likely to use synchronous communication (i.e., communication that maintained the child's response; $d = 0.93$) when compared to the control group. Like the RCTs described above, major limitations of this study include not measuring parent fidelity or maintenance of child skills. Overall, this

study provides some evidence for the efficacy of a communication parent training program for parents of children with autism.

While the majority of parent training programs have been conducted on an individual basis, group-based models of parent training have also been shown to lead to gains in language skills in children with autism (McConachie, Randle, Hammal, & LeCouteur, 2005). The More than Words program (Sussman, 1999) is an eclectic, manualized, group parent-training program designed to help parents facilitate their children's communication skills. The program aims to improve parents' ability to observe, engage their child in structured routines, and structure the environment to motivate their child to communicate. This program consists of weekly sessions of group instruction (totaling 20 hours), plus three home visits for individual discussion and video feedback. Parents of 51 children (aged 24 to 48 months) with suspected autism participated in the study and were assigned, based on availability of the treatment, to either the intervention group or the control group. Four months following the training course, children in the intervention group demonstrated a significantly greater gain in parent-reported vocabulary (as measured by the MCDI; Fenson et al., 1993; $d = 0.42$), although no group differences were seen in social-communication (as measured by the ADOS, Lord et al., 1999) or behaviour problems (Behavior Screening Questionnaire, Richard & Graham, 1971). Parents who had completed the training were better than the control group at using the facilitative strategies taught in the course (coded from video by coders blind to group and time; $d = 0.51$), although there were no group differences in parent stress or adaptation. The main limitations of this study are that the children were not diagnosed as having autism, group assignment was not random, no follow-up data

were collected, and there were no objective measures of language. Overall, this study demonstrates that parents can learn the More than Words facilitative strategies, and that these strategies are associated with larger gains in parent-reported child vocabulary, compared to gains for children whose parents did not participate in the More than Words program.

In summary, evidence is provided for the greater effectiveness of parent training programs of varying intensities that teach parents of children with autism strategies that can be implemented during daily activities, when compared to routine care. Parent training in discrete trial teaching may not be as beneficial as a combination of intensive clinician-implemented treatment and parent training in discrete trial teaching (Smith et al., 2000). However, one study found that parent training based on a TEACCH model, in addition to discrete trial teaching-based day treatment, was effective above and beyond the day treatment alone (Ozonoff & Cathcart, 1998). Both individual and group parent training formats of have been shown to increase parent skills, and one study demonstrated that mothers and fathers are equally able to learn intervention strategies (Seung et al., 2006).

Some general concerns emerge upon reviewing the parent training studies outlined above. First of all, while most of the interventions incorporated behavioural principles, typically an eclectic mix of techniques was used which was often not well described. Furthermore, in most cases these interventions have not been manualized or replicated by independent investigators, both of which are criteria for a well-established treatment (Chambless et al., 1998). Another major concern is the lack of data on parents' ability to implement the techniques taught during the training. In fact, none of the RCT

studies outlined above assessed parent fidelity of implementation. This is a crucial outcome measure to include when evaluating parent training programs, as it is important to be able to link gains in child skills to parents' ability to use the intervention strategies. In contrast, studies investigating parent training in PRT (see below) have consistently measured parents' fidelity of implementation.

*Pivotal Response Treatment.* As described above, PRT is a manualized intervention that incorporates behavioural and motivational principles that are implemented by caregivers in multiple natural settings. As such, a key and integral component of PRT is parent training, as parents are the primary implementers in the PRT model (R.L. Koegel et al., 2006; Schreibman & R.L. Koegel, 2005). Parent training in PRT involves providing parents with online feedback, with a particular emphasis on positively reinforcing appropriate implementation of the techniques. Parent training in PRT has been shown to result in increases in the child's communication (e.g., children developed and used more language when interacting with their parents), and in parents' positive affect and parent-child interactions (e.g., R.L. Koegel, Bimbela & Schreibman, 1996, R.L. Koegel et al., 2002; Schreibman, Kaneko, & R.L. Koegel, 1991).

A number of multiple baseline design studies have evaluated individual parent training in PRT (R.L. Koegel et al., 2002; Symon, 2005). Both R.L. Koegel et al. (N = 5) and Symon (N = 3) evaluated a week-long intensive (25-hour) parent training program in PRT, conducted in the clinic. Following the intensive training week, increases were found in parents' use of PRT techniques, in children's functional utterances, and in parents' positive affect, as coded from videos. Overall, these improvements were maintained at follow-up, which ranged from 1 to 12 months. Symon also demonstrated

that mothers who had attended the intensive training program were able to teach the skills to another caregiver (i.e., child care provider or father) once they returned home.

Consistent with the findings from the multiple baseline design studies described above, one RCT has provided evidence for the efficacy of a group PRT workshop for parents of children with autism (Openden, 2005). Thirty-two parents were matched based on their pre-training fidelity of implementing PRT techniques and then randomly assigned to either the treatment group or the waiting-list control group. The intervention consisted of 20 hours of group training (5 hours a day for 4 consecutive days). All outcome measures were coded from video by coders who were blind to treatment group. The treatment group had significantly higher post-test scores on measures of fidelity of parent implementation (very large effect size, $d = 6.35$), elevated expressions of parent positive affect ($d = 0.99$), and enhanced child communication (as measured by responsiveness to opportunities for language, $d = 1.17$, and functional verbal utterances, $d = 1.51$). This study yielded very large effect sizes, providing strong evidence for the efficacy of a 20-hour group parent training workshop in PRT. These three studies lend support for the effectiveness of 20 to 25 hours of parent training in PRT, with improvements in parents' ability to implement the PRT strategies and gains in child communication skills.

Preliminary evidence has also been provided for briefer (12 hours) parent training in PRT. One non-random assignment group design study (N = 22) demonstrated that some parents are able to learn PRT techniques after 12 weekly one-hour individual sessions (Stahmer & Gist, 2001). However, parents who also participated in an information support group (n = 11) were more likely to master the strategies than parents

who only completed parent training (8 versus 4 parents met the fidelity criterion). The information support sessions covered numerous topics, including diagnostic issues, community resources, respite, family issues, and acceptance of the diagnosis. For parents who mastered the PRT techniques, regardless of group, there was a significantly larger increase in parental report of their children's vocabularies (as measured by the MCDI; Fenson et al., 1993). There was also an overall increase in the number of words the child used (coded from video) from pre- to post-intervention. However, no significant difference was found in words used by the children (coded from video) between parents who had and had not met the fidelity criterion. Additional support for 12 weekly one-hour individual parent training sessions comes from a large-scale (N = 158) community-based study in which significant improvements were found in parental report of adaptive skills (as measured by the Vineland Adaptive Behavior Scales; Sparrow, Balla, & Cicchetti, 1984; large effect size, $d$ = 1.73 and 1.50 for boys and girls, respectively; Baker-Ericzen, Stahmer, & Burns, 2007) immediately following training. Unfortunately the researchers did not evaluate other child outcomes or parents' fidelity of implementation. Overall, these studies provide some evidence for the effectiveness of a 12-hour parent training program in PRT in improving both parent PRT skills and child outcomes, with more parents mastering the techniques if they also participated in an information support group.

Taken together, several studies have demonstrated that 20 - 25 hours of parent training is sufficient for parents to learn PRT techniques (e.g., R.L. Koegel et al., 2002; Openden, 2005; Symon, 2005). This is a relatively resource- and time-intensive training program, which is not necessarily feasible, particularly when resources are limited and

waiting lists are long. One study found that some parents are able to learn to implement PRT techniques with fidelity after 12 hours of parent training, with participation in an additional parent support group increasing the likelihood of technique mastery (Stahmer & Gist, 2001). This study lends some support for the effectiveness of less intensive parent training in PRT. However, no follow-up data were collected. Moreover, the sample may be unrepresentative, as parents were required to pay a fee, based on a sliding-fee scale, for the training and the majority of families were from middle to high socioeconomic status. There is thus a need for more research designed to assess the effectiveness of brief parent training in PRT strategies.

Future research also needs to consider changes in multiple domains of child behaviour, particularly given that PRT utilizes strategies to increase motivation, which is thought to lead to widespread changes in numerous areas. Previous research has demonstrated that after parents learn to implement PRT strategies, improvements are seen in child communication skills (e.g., R.L. Koegel et al., 2002; Openden, 2005; Symon, 2005) and in parent positive affect (R.L. Koegel et al., 1996; R.L. Koegel et al., 2002; Schreibman, et al., 1991). However, to date studies examining brief parent training in PRT have not included measures of communication (only measures of language), or of parent or child affect. Moreover, collateral reductions in disruptive behaviour have been shown following clinician-implemented PRT, although no studies have examined the effect of parent training in PRT on disruptive behaviour. Therefore, outstanding questions include whether changes in child communication skills, disruptive behaviour, and affect occur subsequent to brief parent training.

Additionally, when evaluating parent training programs, it is critical not only to assess child outcomes, but parent outcomes as well. Parents may be more likely to continue implementing the treatment if the training has a positive impact, or at least is not detrimental to their psychological well-being. To date no studies have evaluated changes in parental perception of self-efficacy or stress following parent training in PRT. Parental self-efficacy has been defined as "a parent's belief in their ability to influence their child and the environment in ways that would foster the child's development and success" (Ardelt & Eccles, 2001, p. 945). Parental self-efficacy has been shown to mediate the relationship between behaviour problems in children with autism and maternal anxiety and depression (Hastings & Brown, 2002). Bandura (1997) has suggested that mastery experiences are the most effective way of developing strong self-efficacy. Consistent with this, parental self-efficacy has been shown to increase following family intervention and parent training with other clinical groups (e.g., Evans et al., 2003; Tucker et al., 1998). Given these findings, it is important to assess changes in parental self-efficacy following training in PRT for parents of children with autism.

With regard to parental stress, parents of children with autism have been shown to have high levels of stress (for a review, see Boyd, 2002). The amount of parental stress has been linked to severity of child behavioural problems, with more behaviour problems being related to higher levels of stress (Lecavallier, Leone, & Wiltz, 2006). Furthermore, interventions that improve the child's skills and/or decrease behaviour problems have been shown to have a positive effect on parental stress (for a review, see Hastings & Beck, 2004), although parent training studies for parents of children with autism have not found a change in parent-reported stress following parent training (Drew et al., 2002;

Jocelyn et al., 1998; McConachie et al., 2005). Due to the high stress levels among parents of children with autism, it is important to examine whether brief parent training in PRT has an effect on parental stress. Finally, the majority of studies investigating parent training in PRT have been conducted by the originators of PRT and their colleagues, thus emphasizing the need for replication by others.

As mentioned above, a handful of studies investigating parent training programs have used an RCT design, including one study that evaluated 20 hours of parent training in PRT (Openden, 2005). Among the major advantages of using an RCT design is that it provides a test of whether the intervention of interest is more effective than an alternative treatment or no treatment. An RCT design was not chosen for the present study for a number of reasons. RCTs were originally developed for laboratory studies in which researchers are able to exert control over many of the variables. This situation is very different from the loosely controlled clinical world, which makes applicability of findings from RCT designs questionable (see Schopler, 2005, for a compelling argument). The large variability among children with autism also makes it practically impossible to create two similar and homogeneous comparison groups, even when using random assignment (unless the sample sizes are very large). For the purposes of the present study, this problem is complicated further by the fact that not only child variables, but also parent variables would need to be equivalent across groups. Finally, a recent article discussing the challenges of evaluating interventions for individuals with autism highlights the great contribution made by single-subject designs both to research and clinical practice (Lord et al., 2005).

Single-subject designs are methodologically rigorous and can be used to establish evidence-based treatments (Kazdin, 1982). They allow the researcher to provide a detailed description of the participants and the treatment effects. Single-subject designs are more commonly used to establish treatment efficacy early on in the evaluation of a treatment (Smith et al., 2007). The present study constitutes an initial attempt to evaluate the efficacy of brief parent training in PRT and, for that purpose, a single-subject design was chosen.

*Present Study*

The present study was designed to examine the efficacy of brief training in PRT for parents of young children with autism. The main question of interest was whether child improvements occur in multiple domains of behaviour, notably in communication, affect, and disruptive behaviour, following parent training. The study also was designed to determine whether brief training in PRT is sufficient for parents of preschoolers with autism to learn how to implement the strategies with fidelity. Consistent with the importance placed on parent outcomes when assessing parent training programs (e.g., Baker et al., 1984; Pisterman et al., 1992; Schreibman, 1983), parent affect, perceived self-efficacy and stress were examined as well. Finally, the current study was also designed to determine whether gains were maintained following training. Based on the main target of training (i.e., to provide parents with skills to enhance child communication) and the likelihood of seeing differences in outcome measures over the short time span of the study, primary and secondary objectives were established.

The primary objectives of the present study were to examine:

1. post-training changes in
    a. children's communication: functional verbal utterances and the type of utterances (e.g., overall responsivity, prompted, initiated, echolalic, and incorrect); and
    b. parental perceived self-efficacy; and
2. the fidelity with which PRT techniques were implemented by parents following brief parent training;

The secondary objectives were to examine:

1. Post-training changes in
    a. children's language, disruptive behaviour, and positive affect; and
    b. parents' positive affect and perceived stress; and
2. Maintenance of treatment gains.

These objectives were achieved by evaluating the efficacy of providing 8 families of preschoolers with autism with three 2-hour sessions of individual training in PRT. As an early attempt to assess the efficacy of brief parent training in PRT, a non-concurrent multiple-baseline across participants design was used. A non-concurrent multiple baseline design is essentially composed of a series of AB designs, replicated across participants with different lengths of baseline (Carr, 2005). The baseline phase of the design (A) provides a control for temporal or developmental effects. The effect of the treatment (B) is established by demonstrating that a participant's behaviour changed when the intervention was introduced, without changing the baseline behaviour of the other participants (Carr, 2005). Pre-training baseline, post-training, and 2 to 4 month

follow-up data were collected on a number of functional, child and parent outcome measures (e.g., communication and parental self-efficacy).

The present study addresses a number of gaps in the research literature. First of all, there is a paucity of well-controlled research on brief parent training programs. Brief programs are less resource-demanding and can therefore provide service to a greater number of families.

The critical question addressed by the present study is whether child communication (target behaviour) improves following parent training. Secondly, it is important to determine whether parents can learn to implement the PRT techniques with fidelity after 6 hours of training. There is also a need for intervention studies that include multiple measures of the behaviours of interest (Lord et al., 2005). The majority of parent training studies, including those evaluating PRT, have used only one measure of communication, even though it is the target behaviour. The present study extends previous parent training research by evaluating changes in communication using two observational measures, one of which provides detailed information about the nature of child utterances (e.g., initiation, echolalia), as well as assessing expressive and receptive aspects of language using standardized measures. The present study is also distinguished from other brief parent training programs in PRT by examining collateral changes in child disruptive behaviour, child and parent affect, and parental self-efficacy and stress.

Finally, it is important to determine whether gains in child and parent outcomes are maintained following training. To date, studies evaluating brief parent training in PRT have not examined maintenance of gains following training; therefore, a critical

component of the present study is the evaluation of post-training maintenance of treatment gains.

*Specific Hypotheses.* As to the *primary* objectives (Objectives 1 and 2 above), it was predicted that relative to pre-training, post-training and follow-up would be associated with an improvement in the children's communication skills, and an increase in parental fidelity of PRT implementation and perceived self-efficacy. Secondarily (secondary Objectives 1a and b above), it was predicted that relative to baseline, the children would demonstrate an increase in language, decrease in problematic behaviours, and both parent and child affect would become more positive post-training and at follow-up. It was also expected that parental stress would decrease after training.

## Chapter 2 Method

### *Participants*

Participants included eight families of children newly diagnosed with autism, who were recruited through the IWK Autism Service and associated Early Intensive Behavioural Intervention eligibility list. Thirty families on the Early Intensive Behavioural Intervention eligibility list were sent a letter (see Appendix A) by the Autism Team Coordinator informing them of the study. Twelve interested families contacted the author (JC) to learn more about the study. Of these, three families chose not to participate after being provided with a detailed description of the study. One of those families chose not to participate because both parents worked long shifts and they decided that they would not have enough time with their child to practice the intervention. The two other families did not provide an explanation.

Inclusion criteria for participation were that families had a child between 2 and 5 years of age diagnosed with autism, lived within 30 km of the IWK Health Centre, and that parents had a minimum of grade 8 education. Families were excluded from the study if the child was already receiving some form of ABA treatment; if the child had a major sensory, motor or neurological impairment/disorder (e.g., uncorrected visual or hearing loss, or physically incapacitating brain damage); and if the parents had a significant (diagnosed and/or treated) cognitive or mental health disorder. Only one family was excluded from the study, specifically because they lived more than 30 km away from the IWK Health Centre.

All children except one met criteria for autism on the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 1999) and the Autism Diagnostic Interview-

Revised (ADI-R; Lord et al., 1994, Risi et al., 2006; see below for details on each child). Based on clinical judgment of clinicians (PhD Psychologist and Developmental Pediatrician) with expertise in autism using the DSM-IV-TR (APA, 2001), all children were given a diagnosis of autism. Table 1 summarizes the children's characteristics at baseline (also see below for details on each child). Behavioural descriptions provided below were based on non-standardized observations, by the author (JC), of the child in their home at the beginning of the study. Cognitive testing was conducted by the PhD Psychologist who completed the diagnostic assessment and the language testing was conducted either by the author (JC; 7 children) or by the research coordinator of another study the child was participating in at the Autism Research Centre. All families spoke English as their primarily language and were of middle to upper-middle socioeconomic status (Hollingshead Index; Miller, 1983). Parent education ranged from partial high school to graduate degree. All but two of the families (Child 1 and 2) had completed the Hanen "More than Words" program (Sussman, 1999) within 1 to 2 months prior to beginning the study. This is a parent training program designed to help parents promote communication and social skills in their child with autism. The publicly-funded program was facilitated by two Speech-Language Pathologists and consisted of eight 2.5 hour group sessions and three home visits.

*The Children.* Child 1, a 4-year, 8-month old boy, lived with his mother and a female relative. He attended preschool five days a week. Child 1's scores on the ADI-R and ADOS fell in the autism range in all areas. In terms of cognitive ability, Child 1 was significantly delayed, as assessed by the Differential Ability Scales (Elliot, 1990). He understood simple two-step instructions and spontaneously used 4- to 5-word phrases. He

occasionally initiated social interactions and really enjoyed having his mother read books to him. Child 1 occasionally exhibited disruptive behaviour, although he did not engage in severe repetitive behaviours. His mother participated in all three training sessions.

Child 2, a 3-year, 3-month old boy, lived with his parents and sibling, and attended a playgroup two mornings a week. One of his parents spoke two languages; however English was the primary language spoken at home. Child 2's scores on the ADI-R fell below the cut-off (4 and 3 points below the cut-off for reciprocal social interaction and communication, respectively); however, his scores on the ADOS were above the autism cut-off, and he was given a diagnosis of autism by a Developmental Pediatrician and Psychologist. Cognitively, he scored in the borderline range on the Wechsler Preschool and Primary Scale of Intelligence, 3rd Edition (Wechsler, 2002). He understood simple instructions and spontaneously used 4- to 5-word phrases. He sometimes initiated social interactions and engaged in parallel play with his sibling. Child 2 rarely exhibited disruptive behaviour or severe repetitive behaviours. His mother completed all three training sessions, and his father participated in the first and last training sessions.

Child 3, a 3-year, 8-month old boy, lived with his parents and sibling. He attended a playgroup one morning a week. Child 3's scores on the ADI-R and ADOS fell in the autism range in all areas. Child 3 had a seizure disorder and was taking divalproex sodium (125 mls, 3 times a day for the course of the study). His parents noted some regression in his language and a decrease in his interest in interacting with his sibling when he was 30 months old. Cognitively he was significantly delayed, as assessed by the Bayley Scales of Infant and Toddler Development 3rd Edition (Bayley-III; Bayley, 2005). Child 3 understood simple instructions and according to his parents used around 30 word

approximations, some of which were used meaningfully. Based on observations in the home, and consistent with parent reports, Child 3 rarely initiated interactions with others. Child 3 was socially aloof; however, he was fairly easily engaged by physical games (e.g., tickles). He rarely engaged in disruptive behaviour, although he did frequently exhibit repetitive behaviours (e.g., rocking). Both parents completed the three training sessions, although only his mother was videotaped for the study.

Child 4 was a 3-year, 9-month old boy who lived with his parents and two siblings. He attended daycare two full days and three half days a week. Child 4's scores on the ADI-R and ADOS fell in the autism range in all areas. In terms of cognitive ability, Child 4 scored below average on the Bayley-III; however, he demonstrated strengths in letters and numbers, including reading and writing single words. Child 4 spontaneously used 3-word phrases and he understood simple instructions. He did engage in some immediate echolalia, but also occasionally verbally initiated interactions. Child 4 was easily engaged by physical games (e.g., chase), and rarely exhibited disruptive behaviour or severe repetitive behaviours. Child 4's mother participated in the three training sessions.

Child 5, a 4-year, 3-month old boy, lived with his parents and two siblings, and attended daycare five days a week. Child 5's scores on the ADI-R and ADOS fell in the autism range in all areas. Child 5 had a seizure disorder; however, he had been off medication and seizure-free for three months before beginning the study. Cognitively, Child 5 was below average, as assessed by the Bayley-III. He understood simple instructions and used a number of one-word approximations. He was described by his Speech-Language Pathologist as having some oral-motor difficulties. Child 5 sometimes initiated interactions and was easily engaged by physical games (e.g., tickles). He rarely

exhibited disruptive behaviour or severe repetitive behaviours. Both parents completed the three training sessions, although only his father was videotaped for the study.

Child 6 was a 2-year, 4-month old girl who lived with her parents and sibling. She started attending daycare five days a week during her last month of participation in the study. Child 6's scores on the ADI-R and ADOS fell in the autism range in all areas. Cognitively she was significantly delayed, as measured by the Bayley-III. She understood 1-step commands during familiar routines (e.g., "give it to me") and made a few single-word approximations. Child 6 was socially aloof and, according to observations in the home, rarely initiated interactions with others unless she was seeking help. She enjoyed playing with cause and effect toys. Child 6 occasionally exhibited disruptive behaviour (e.g., screaming) and repetitive behaviours (e.g., marching in a circle, flicking). Child 6's mother completed the three training sessions.

Child 7, a 4-year, 4-month old boy, lived with his parents and sibling, and attended daycare three days per week. Child 7's scores on the ADI-R and ADOS fell in the autism range in all areas. Cognitively he was significantly delayed, as assessed by the Bayley-III. He mostly used single words, but sometimes used 2- and 3-word phrases. Child 7 was socially aloof and according to observations in the home, infrequently initiated interactions with others unless he was seeking help. He seldom engaged in disruptive behaviour, although he frequently exhibited repetitive behaviours (e.g., rocking). He was a very active boy and enjoyed music. Child 7's father completed all three training sessions.

Child 8 was a 4-year, 1-month old boy who lived with his parents. Initially, he attended daycare five days per week, which was reduced to two during his last month of

participation. His parents had completed a one-day workshop on discrete trial teaching prior to participating in the study. Child 8's scores on the ADI-R and ADOS fell in the autism range in all areas, with the exception of restricted, repetitive, and stereotyped patterns of behaviour. Cognitively he was significantly delayed, as assessed by the Bayley-III. He used single words most of the time, although he did use some 2-word combinations. He rarely displayed disruptive behaviour or severe repetitive behaviours. He was even-tempered and smiled often. Child 8 was sick for 1 month during the follow-up period. Both of his parents completed the three training sessions, although only his father was videotaped for the study.

*Study Design*

A non-concurrent multiple (across-participants) baseline design was used to evaluate the efficacy of brief parent training in PRT. Participants remained in the baseline (pre-training) phase until the primary outcome measures (i.e., fidelity of implementation of PRT techniques and functional verbal utterances) had reached the stability criterion (see definition below). The intervention was evaluated at the end of the 2-week training period (post-training) and 2 to 4 months following training (follow-up).

*Parent Education Procedures, Settings, and Materials*

*Parent Training Sessions.* Parents received 6 hours of individual training in PRT techniques, in three separate sessions (over 2 weeks). Prior to the first training session, parents were provided with a copy of "How to teach pivotal behaviours to children with autism: A training manual" (R.L. Koegel et al., 1989) and with a handout that included a PRT checklist (see Appendix B). The training focused on strategies for increasing child motivation, in order to enhance learning. Because the primary component of PRT with

young children is increasing motivation and because the training was brief, training on responsivity to multiple cues and self-management were not included. The first two parent training sessions were conducted in a room in the Autism Research Centre at the IWK Health Centre (Halifax, Nova Scotia). The 12 by 13 foot room contained a small table with chairs and a variety of toys (e.g., playdough, bubbles, pop-up toy, puzzles). Parents were also encouraged to bring toys from home that they thought their child would be motivated to play with. The third parent training session was conducted in the family's home in order to promote generalization of parental PRT skills. During the first session, parents were introduced to basic PRT principles, and immediately afterwards the trainer modeled the techniques with the child. For the remainder of the session, parents implemented PRT techniques with their child, while receiving feedback from the trainer. PRT was taught in the context of play with the child. The second and third sessions consisted mainly of *in vivo* feedback for the parents, as well as problem solving on issues that had arisen since the previous session.

*Digital Video Cameras.* A Sony DCRDVD305 DVD Handycam Camcorder with surround sound microphone was used to collect the video probes.

*Child Outcome Measures*

Child outcomes were measured by direct behavioural observations of communication, affect, and disruptive behaviour. In order to be as comprehensive as possible, two methods (functional verbal utterances and type of utterance) were used to measure changes in communication. Additionally, standardized measures of language were used to assess child outcomes.

*Primary Outcomes.* Following R.L. Koegel et al. (2002), the primary child outcome measure was functional verbal utterances (FVUs), which was used as one indicator of communication (see Appendix C). FVUs were coded from 10-minute video segments using continuous 15-second interval recordings and were coded by a coder who was blind to study phase. The occurrence or non-occurrence of FVUs was recorded for each 15-second interval, and the percentage of intervals with FVUs was analyzed. A FVU was operationally defined as including: a) the use of at least normal vocal loudness; b) body and facial orientation towards the adult and/or relevant stimulus materials; and c) vocalizations that appear functional or task-directed and purposeful. The verbal utterance needs to appear to be meaningful to the parent; however, it does not need to be phonetically correct. If the child engaged in disruptive behaviour or if the utterance was stereotypic or echoed, the interval was coded as a non-occurrence.

As a second outcome measure of communication, 5-minute video segments were coded for whether child utterances were appropriate (i.e., functional and directed) versus inappropriate (e.g., stereotypic, echolalic or incomprehensible) and the degree to which they were directly prompted (i.e., model prompted, indirectly prompted, or initiation, see Appendix D) using an incidence scoring form. The coder was blind to study phase. A Model Prompted response was defined as a child response that is preceded by a parental prompt that is functionally equivalent to the response (e.g., P: "bubbles?" C: "babo"). Model prompts often consist of one- or few-word statements that are repeated exactly or approximated by the child. An Indirectly Prompted response was defined as a response that is not preceded by a model prompt, but is preceded by some other parental action. This can include an open-ended question (e.g., What do you want?), a choice question

(e.g., Do you want the red car or the blue car?), a leading prompt (e.g., 1, 2, 3, ...), or a delay (e.g. holding up a toy and waiting for the child to ask for it). A model prompted response was considered to be an easier form of response than an indirectly prompted response, as the child is not required to generate his/her own answer. An Initiation was defined as occurring when the child communicated spontaneously; that is, without any directive action from the parent (e.g., the parent had not said anything and/or was not using a time delay). The verbalization had to be functional and appropriate to the situation (i.e., delayed echolalia and stereotypic responses are not considered initiations). An Inappropriate Response was defined as a response that was echolalic, non-communicative, non-functional, unintelligible to his/her parent, out of context, inappropriate, undirected or disruptive. No Response occurred when the child did not respond verbally to the parent's question or prompt. Overall Responsivity was calculated as the percentage of times the child responded appropriately, following either a model prompt or an indirect prompt.

*Secondary Outcomes.* Three standardized measures of language were used to determine whether expressive and receptive language improved at follow-up. These included the Preschool Language Scale, 4th Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002), the Peabody Picture Vocabulary Test, 3rd Edition (PPVT-III; Dunn & Dunn, 1997), and the MacArthur Communicative Development Inventory (MCDI; Fenson et al., 1993).

The PLS-4 (Zimmerman et al., 2002) is an individually administered test used to determine whether children (birth to 6 years 11 months) have a language disorder or delay. The PLS-4 has two core subscales: Auditory Comprehension and Expressive

Communication. The PLS-4 has good reliability and validity. Test-retest reliability ranged between .82-.97 for the subscales and total language score and inter-rater reliability was .99 (Zimmerman et al.). Overall internal consistency was good, with Cronbach's alpha ranging from .86-.93 (Zimmerman et al.). The PLS-4 has good face validity and good convergent validity with the Denver II (Zimmerman et al.).

The PPVT-III (Dunn & Dunn, 1997) is an individually administered test of single-word receptive vocabulary. The PPVT-III has excellent test-retest reliability (.91-.94), alternate forms reliability (.89-.99), and internal consistency (Cronbach's alpha ranging from .89-.96; Dunn & Dunn). Additionally, the PPVT-III has good face validity and good concurrent validity with the Wechsler Intelligence Scale for Children, 3rd Edition (.82-.92; Dunn & Dunn).

The MCDI (Fenson et al., 1993) is a questionnaire that contains a list of words, phrases and gestures; parents check those their child understands and produces. The MCDI Words and Gestures form was used for Child 3 and 6. The following sections were included in this study: Phrases Understood, Words Understood, and Words Understood and Produced. The MCDI Words and Sentences form was used for the other 6 children; Words Produced is reported below. The MCDI has good test-retest reliability (.90) and excellent internal consistency (Cronbach's alpha ranging from .95-.96 for the vocabulary scales; Fenson et al., 1993). Moreover, the MCDI has good face validity and good concurrent validity with the Expressive One Word Picture Vocabulary Test (.53-.86; Fenson et al.).

Disruptive behaviour was assessed by coding for the occurrence or non-occurrence of the behaviour during 15-second intervals of a 10-minute video segment (see Appendix

E). Disruptive behaviour was operationally defined as (a) vocal (e.g., screaming, whining or crying); (b) physical (e.g., hitting, kicking, throwing, pushing); or (c) oral (e.g., biting, spitting).

A final secondary child outcome measure assessed changes in child affect. In order to replicate previous findings of increased positive affect (Brookman-Frazee, 2004), 10-minute video segments were coded on a 5-point Likert scale by coders who were blind to study phase (see Appendix F). The rating scale for affect was adapted from a similar scale used and developed by Brookman-Frazee. To date, no test of the external validity of this measure has been published.

*Parent Outcome Measures*

Parent primary and secondary outcomes were identified prior to beginning the study. These were assessed by self-report measures of stress and self-efficacy (see below), and by direct behavioural observations of fidelity of PRT implementation and parent affect at pre-training, post-training, and follow-up (coded from video).

*Primary Outcomes.* In order to assess whether parents had learned the techniques, fidelity of implementation was coded by coders who were blind to study phase. A continuous 1-minute interval coding system was used (10 1-minute intervals) to code 10-minute video segments of the parent interacting with his/her child. Each interval was coded as either correct or incorrect for each of the following 5 techniques (adapted from R.L. Koegel et al., 2002; see Appendix G).

1) Clear Opportunities: The parent provides concise commands, clear opportunities for language, or clear instructions to the child. The parent is also

able to maintain the child's attention either to the task or to themselves while presenting the instructions.

2) Child Choice: The parent does any of the following: a) provides the child with a choice of two or more alternatives; b) follows the child's lead in selecting an activity; c) allows the child to accept or reject an activity; or d) prompts the child to select an activity from an open-ended question.

3) Contingent: The parent provides a reward immediately after the child's correct verbal response or attempt. The parent does not provide a reward if the child does not respond or responds inappropriately (e.g., is disruptive).

4) Natural Rewards: The parent provides a contingent reward that is directly related to the child's expressive verbalizations (e.g., if the child requests bubbles, the parent blows the bubbles).

5) Rewards Attempts: The parent provides contingent rewards that are delivered following both the child's functional verbal attempts and correct verbal responses.

If no communicative opportunities were provided for the child during an interval, all techniques were scored as incorrect for that interval. The fidelity of implementation score consisted of the average percentage of intervals, across all five strategies, during which parents were demonstrating appropriate use of the techniques. The criterion for fidelity of implementation was set as parents' demonstrating appropriate use of the techniques during 75% of the intervals (consistent with Stahmer et al., 2001).

The second primary parental outcome measure evaluated changes in parental self-efficacy. The Parental Self-Efficacy Scale is a domain-specific measure of parents' perception of self-efficacy related to their child's challenging behaviour (Hastings &

Brown, 2002; see Appendix H). It is a parent-report questionnaire consisting of five items that are rated on a 7-point scale. The measure has good face validity and excellent internal consistency, with Cronbach alpha of .94 for mothers and .92 for fathers (Hastings & Brown, 2002). To date, no test of the external validity of this measure has been conducted.

*Secondary Outcomes.* A secondary parent outcome measure examined changes in stress levels, as indexed by the Parental Stress Scale (Berry & Jones, 1995). The Parental Stress Scale is a parent self-report questionnaire that specifically assesses parental stress in relation to their child (see Appendix I). It consists of 18 items that are rated on a 5-point Likert scale. The Parental Stress Scale has good internal consistency, with a Cronbach alpha of .83, and good test-retest reliability over a period of 6 weeks (.81; Berry & Jones, 1995). The Parental Stress Scale has also been shown to have good validity, as indexed by a correlation of .75 with total scores from the Parenting Stress Index (Berry & Jones, 1995).

Changes in parent affect were also assessed as a secondary outcome (see Appendix J). Two-minute video segments were coded on a 5-point Likert scale adapted from a scale used by R.L. Koegel et al. (1996) by coders who were blind to study phase. To date, the external validity of this measure has not been established.

In order to determine whether parents were satisfied with the brief training in PRT, parents completed a questionnaire, created by the author (JC), at the end of training. The questionnaire consisted of five questions that were rated on a 10-point scale (see Appendix K). Parents were also given a calendar and were asked to keep track of the

amount of time they spent doing PRT with their child each day and to keep notes of how their child was progressing.

*Data Collection Procedures*

During pre-training, post-training, and follow-up, 15-minute videotaped probes were collected. The trainer and a research assistant, or two research assistants, videotaped one parent interacting with his/her child during a typical play activity (i.e., playing with toys) at the family's home. Probes were collected during the pre-training phase until the primary outcome measures reached the stability criterion (minimum of 4 probes). The stability criterion for both child FVUs and fidelity of implementation was defined as a minimum of four probes within 30% of the mean. The pre-training phase ranged from 3 to 7 weeks. Three to five video probes were also collected on separate days during the post-training and follow-up phases. The first 10 minutes of each probe were coded for the outcome measures.

Before training, immediately after, and at follow-up, parents completed the questionnaires outlined above. After training, parents also completed the parent satisfaction questionnaire. Before training and at follow-up, the children completed a standardized language assessment, including the MCDI completed by their parents.

*Inter-Observer Reliability*

The primary coder for each outcome measure was blind to treatment phase. In order to establish inter-observer agreement on each of the measures coded from videos, an independent coder coded 30% of the videos, which included an equal number of randomly selected pre-training, post-training, and follow-up videos from different children. The reliability coder for parent fidelity of implementation, and parent and child

affect was blind to treatment phase. The reliability coder for FVUs, nature of child utterances, and disruptive behaviour was the author (JC). For videos coded for the occurrence versus non-occurrence of behaviours (i.e., FVUs, disruptive behaviour and fidelity of implementation), inter-observer reliability was calculated two ways. First, the percentage of inter-observer agreement was calculated by dividing the total number of agreements by the total number of agreements and disagreements, and multiplying by 100. Secondly, in order to account for chance agreement, the kappa coefficient (Cohen, 1960) was calculated. A kappa coefficient above .75 represents excellent agreement (Watkins & Pacheco, 2000). Pearson correlations were conducted for measures that were at the interval/ratio level (i.e., percentage of each type of utterance and mean parent and child affect).

Overall, inter-observer agreement was good for all measures coded from videos. The mean inter-observer agreement was 86%, with kappa = .85 for FVUs; 97%, with kappa = .97 for disruptive behaviour; and 80%, with kappa = .79 for fidelity of implementation. With regard to the type of utterances, inter-observer reliability was excellent (model prompted: $r = .80$; indirectly prompted: $r = .96$; initiations: $r = .93$; inappropriate responses: $r = .88$; no response: $r = .98$). Inter-observer reliability for affect was good, with $r = .73$ and .85, $p < .01$, for parent and child affect, respectively.

*Analyses*

Both statistical analyses and visual inspection were used to evaluate the data. The data were first analyzed using the Wilcoxon matched-pairs signed-ranks test (Wilcoxon, 1945), which is a non-parametric procedure that can be used to evaluate pretest-posttest designs with small sample sizes (Sheskin, 2007). The Wilcoxon test was used to

determine whether, overall, a statistically significant change occurred after the training (i.e., pre-training to post-training), and whether gains were maintained at follow-up (i.e., post-training to follow-up). Effect sizes were also calculated, in order to determine the magnitude of the changes. Effect sizes of 0.2, 0.5, and 0.8 are considered small, medium, and large effects, respectively (J. Cohen, 1992). For child FVUs and parent fidelity of implementation, individual data were displayed graphically and inspected for changes in level upon introduction of the training (as recommended by Kazdin, 1982). Spearman's correlations were used to assess the relationship between changes in parent fidelity and changes in child communication (i.e., FVUs and responsivity) from pre-training to post-training and follow-up.

## Chapter 3 Results

The results for the child outcome measures (both primary and secondary) will be presented first, followed by the primary and secondary parent outcome measures, as well as the relationships between the parent and child measures. During each of the three phases (i.e., pre-training, post-training, and follow-up), between 3 and 5 videos were taken per parent/child dyad. One data point during the follow-up phase was removed for Child 4, because the child had been awakened just before the video was taken and was not in a state to play. Sample size for some of the analyses of questionnaire data varied due to parents not returning the questionnaires.

### *Child Primary Outcome Measures*

*Functional Verbal Utterances.* Figure 1 and Table 2 provide data on the percentage of intervals with functional verbal utterances (FVUs) during parent-child interactions. Overall, the children's production of FVUs increased following training (Wilcoxon ($Z$) = -2.52, $p < .05$, $d = 1.00$; mean change = 25.84%, range = 4.5-58%). Moreover, the gains in FVUs seen following training were maintained at follow-up ($Z$ = -0.92, $p > .05$, $d = 0.14$).

More specifically, all eight children demonstrated an increase in FVUs after training, although Child 1 and Child 6 had minimal gains between pre- and post-training (mean increase of 9.0% and 4.5%, respectively). Between the post-training and the follow-up phase Child 1, 5, and 6 made gains in FVUs (mean increase of 8.3%, 11.2%, and 25.7%, respectively). Three children (Child 3, 4, and 7) demonstrated very slight decreases in FVUs between post-training and follow-up (mean decrease of 4.5%, 5.7%, and 9.0%, respectively), while Child 2 and 8 displayed a larger decrease in FVUs from

post-training to follow-up (mean decrease of 29.4% and 20.0%, for Child 2 and 8, respectively).

*Nature of Child Utterances.* Children's utterances were coded based on whether they were appropriate (i.e., functional and directed) and the degree to which they were prompted (i.e., model prompted, indirectly prompted or spontaneous initiation; see Appendix D for definitions). Overall, the percentage of times the children responded appropriately (responsivity) increased significantly following training ($Z = -2.52$, $p > .05$, $d = 0.85$; see Table 3), which was maintained at follow-up ($Z = -0.56$, $p > .05$, $d = 0.25$). The percentage of responses that were preceded by a model prompt did not differ from pre- to post-training, nor post-training to follow-up ($Z = -1.12$, $d = -0.42$ and $Z = -0.14$, $d = 0.14$, $p>.05$, respectively; see Table 4). However, there was a significant increase in the percentage of responses that were indirectly prompted ($Z = -2.24$, $p < .05$, $d = 0.91$), which was maintained at follow-up ($Z = -0.14$, $p > .05$, $d = -0.18$). The percentage of initiations did not change significantly following training ($Z = 0.0$, $p > .05$, $d = 0.04$) or from post-training to follow-up ($Z = -0.28$, $p > .05$, $d = -0.11$). Similarly, the percentages of inappropriate responses did not change across the three phases ($Z = -0.56$, $d = 0.11$ and $Z = -0.84$, $d = 0.30$, $p > .05$, for pre- to post-training and post-training to follow-up, respectively). There was a significant decrease in the percentage of no responses following training ($Z = -2.24$, $p < .05$, $d = 0.73$), which was maintained at the follow-up ($Z = -0.14$, $p > .05$, $d = 0.16$).

*Child Secondary Outcome Measures*

*Language.* Three standardized measures were used to assess language pre-training and at follow-up: the Preschool Language Scale, 4$^{th}$ Edition (PLS-4; Zimmerman et al.,

2002), Peabody Picture Vocabulary Test, 3rd Edition (PPVT-III; Dunn & Dunn, 1997), and MacArthur Communicative Development Inventory (MCDI; Fenson et al., 1993). Results from the PLS-4 and PPVT-III are presented in Table 5. All eight children completed the PLS-4 at pre-training and follow-up. Overall, there was no significant difference in age-equivalent scores between pre-training and follow-up on the Auditory Comprehension (AC) scale of the PLS-4 ($Z = -0.34$, $p > .05$, $d = 0.05$). However, there was a trend towards higher age-equivalent scores at follow-up compared to pre-training on the Expressive Communication (EC) scale of the PLS-4 ($Z = -1.83$, $p = .07$, $d = 0.34$). In two children (Child 2 and 6), large gains were made on the PLS-4 in the 4 to 6 months between pre- training and follow-up. For Child 2 (who used 4- and 5-word phrases pre-training), age equivalence for AC and EC increased by 13 and 12 months, respectively, over a 6-month period. For Child 6 (who had no words pre-training), age equivalence for AC and EC increased by 3 and 7 months, respectively, over a 5-month period.

Five of the 8 children (Child 1, 2, 4, 5, and 8) were able to complete the PPVT-III at both time points (see Table 5). Overall, there was no significant difference in age-equivalent scores between pre-training and follow-up on the PPVT-III ($Z = -1.60$, $p = .11$, $d = 1.16$). Individual PPVT-III scores indicated that single-word receptive vocabulary increased at a rate greater than expected following training for 3 of the 5 children: over the 4 to 6 month period of the study, age equivalence increased by 7 months for Child 1, 23 months for Child 2, and 12 months for Child 4.

The MCDI Words and Gestures questionnaire was completed for Child 3 and 6 (see Table 6), as the Words and Sentences Inventory was not appropriate for these two children. Both children were reported as being able to understand more phrases (increase

of 1 and 7 phrases understood for Child 3 and 6, respectively), and words (increase of 47 and 65 words understood for Child 3 and 6, respectively) following the training. Similarly, both children demonstrated considerable increases in the number of words both understood and produced, as reported by parents at follow-up (increase of 41 and 46 words for Child 3 and 6, respectively). The MCDI Words and Sentences inventory (see Table 7) was completed at both time points for 4 children (Child 1, 5, 7, and 8), as two parents failed to return the questionnaire at follow-up. Three of the four children made gains in the number of words produced at follow-up (increase of 69, 22, and 54 words for Child 5, 7, and 8, respectively).

*Disruptive Behaviour.* Overall, no change was seen in disruptive behaviour between pre- and post-training phases ($Z = -0.73$, $p > .05$, $d = 0.17$) or between post-training and follow-up phases ($Z = -1.18$, $p > .05$, $d = 0.08$). However, with two exceptions (Child 1 and 6), there was minimal disruptive behaviour during the videotaping sessions (i.e., average of less than 10% of intervals), regardless of the phase (see Table 8). Child 1 displayed more disruptive behaviour during the pre-training phase ($M = 27\%$), which decreased following training ($M = 17\%$ for post-training phase). This decrease in disruptive behaviour was maintained at the 3.5-month follow-up ($M = 19.2\%$). Child 6 also displayed some disruptive behaviour, which did not decrease following the training ($M = 12.5\%$ and $17.0\%$ for pre- and post-training phases, respectively). However, the percentage of intervals with disruptive behaviour was lower during the follow-up phase ($M = 6.9\%$).

*Child Affect.* Overall, no significant differences were seen in child affect between the phases (see Table 9; $Z = -1.52$, $d = -0.02$ and $Z = -0.14$, $d = -0.15$, $p > .05$, for pre- to post-training and post-training to follow-up, respectively).

*Qualitative Notes.* Parents were asked to make notes of qualitative changes they noticed in their children following the training. These notes universally indicated positive changes in communication. The parents of Child 3 noted he "seems to be initiating more...saying words first without any prompting". Child 6's parent noted "She started using a lot of words without prompting. She's saying new words everyday". Child 7's parent reported that "he understands more".

*Parent Primary Outcome Measures*

*Fidelity of Implementation.* As can be seen in Figure 2 and Table 10, parents' fidelity of implementation of PRT techniques (fidelity) improved after training ($Z = -2.25$, $p < .05$, $d = 2.09$; mean change = 27.16%, range = 12.0-44.4%) and this gain was maintained at follow-up ($Z = 0.0$, $p >. 05$, $d = 0.13$). During the pre-training phase none of the parents met criterion for fidelity (i.e., implemented the techniques during a minimum of 75% of the intervals). However, 5 of 8 parents (62.5%; 4 mothers) met criterion for fidelity during the post-training phase. Four of these parents (50%; 3 mothers) continued to meet the fidelity criterion at follow-up.

More specifically, all parents demonstrated an increase in skill level after training, with Parent 1, 2, 4, 6, and 7 meeting the criterion for fidelity post-training. Three parents (Parent 1, 2, and 5) continued to make gains at the follow-up (mean increase of 11.2%, 3.0%, and 14.8%, respectively). The other five parents (Parent 3, 4, 6, 7, and 8) displayed

either no change or a slight decrease in fidelity between post-training and follow-up (mean decrease of 0.6%. 4.4%, 6.7%, 1.5%, and 4.0%, respectively).

*Parental Self-Efficacy.* Perceived parental self-efficacy was measured at pre-training, post-training, and follow-up using the Parental Self-Efficacy questionnaire (Hastings & Brown, 2002). A higher score indicates greater perceived parental self-efficacy, with 35 being the highest possible score. Overall, there was no significant difference in parental self-efficacy scores between pre- and post-training (see Table 11; $Z = -0.42$, $p > .05$, $d = 0.32$; $n = 6$ or between post-training and follow-up ($Z = -0.95$, $p > .05$, $d = 0.06$, $n = 6$). In general the parents demonstrated a high level of perceived self-efficacy pre-training. For the parents who demonstrated average (within one SD of the mean of a clinical sample; Hastings & Brown, 2002) or high (at least one SD above the mean) pre-training levels of self-efficacy (Parents 1, 2, 3, 6, 7, and 8), scores did not change post-training or at follow-up ($M = 29.0$, 29.8, 29.3, for pre-training, post- training, and follow-up, respectively). For parents with lower levels of parental self-efficacy pre-training (Parents 4 and 5, whose scores were at least one SD below the mean of a clinical sample), scores increased to within the average range by the follow-up ($M = 13.0$ and 20.0, for pre- training and follow-up, respectively).

*Parent Secondary Outcome Measures*

*Parental Stress.* Parental stress was measured at the three time points using the Parental Stress Scale (Berry & Jones, 1995; see Table 12). Higher scores represent more stress, with a maximum score of 90. With the exception of Parent 4, parents reported low levels of parental stress pre-training (within one SD of the mean for a non-clinical sample; Berry & Jones, 1995). Overall, there was no significant difference in parental

stress between pre- and post-training (see Table 12; $Z = 0.63$, $p > .05$, $d = 0.21$; $n = 6$). Reported levels of parental stress did not change in the follow-up phase ($Z = 0.56$. $p > .05$, $d = 0.04$, $n = 6$). Parental stress decreased following training for six parents (i.e., Parent 1, 2, 3, 4, 5, & 7) and increased following training for Parent 6 and 8 (see Table 12).

*Parent Affect.* Overall, no significant differences were seen in parent affect between the study phases (see Table 13, $Z = 0.17$, $d = 0.33$ and $Z = 0.98$, $d = 0.03$, $p > .05$, for pre- to post-training and post-training to follow-up, respectively).

*Parent Satisfaction.* Overall, parents found the whole training experience to be very helpful ($M = 9/10$). They rated the training sessions as being very helpful ($M = 8.7/10$) and the training manual as being fairly helpful ($M = 7.1/10$). Parents rated the training in PRT as being more helpful in increasing their child's language ($M = 7.6/10$) than decreasing disruptive behaviour ($M = 5.2/10$). All of the parents' qualitative comments were very positive. For example, one parent stated "I found the training very helpful. It made me feel much more confident in what I'm doing." Another parent said "I'm amazed at how little effort on our part can create such a big change for our child so far."

*Time Implementing PRT.* Parents were asked to keep a record of the amount of time they spent implementing PRT with their child each day. Overall, parents reported spending 0.5 to 2 hours a day implementing PRT with their children, with a range of 4 to 10 hours a week. It is important to note that these numbers are likely an underestimate, as parents reported that it was difficult to estimate the amount of time they spent doing PRT, because they were incorporating the techniques into routines throughout the day.

Spearman correlations ($r_s$) were calculated on change scores in parent fidelity, changes in child FVUs and time spent implementing PRT. Changes in parent fidelity from pre- to post-training and from pre-training to follow-up were not significantly correlated to time spent implementing PRT ($r_s = .41$, $p > .05$ and $r_s = .06$, $p > .05$, respectively). Similarly, changes in child FVUs from pre- to post-training and from pre-training to follow-up were not significantly correlated to time spent implementing PRT ($r_s = .46$, $p > .05$ and $r_s = -.49$, $p > .05$, respectively).

*Relationship Between Parent Fidelity and Child Communication*

Figure 3 illustrates the relationship between the fidelity with which parents implemented treatment and child FVUs. In order to examine this more closely, Spearman's correlations ($r_s$) were calculated on change scores in parent fidelity and in child communication (i.e., FVUs and Responsivity) from pre-training to post-training and follow-up. A small correlation was found ($r_s = .12$, $p > .05$) between changes in parent fidelity and child FVUs from pre-training to post-training. The relationship between changes in parent fidelity and child FVUs between pre-training and follow-up was moderate ($r_s = .50$, $p > .05$; see Figure 4), indicating that as the fidelity of parents' implementation of PRT skills increased, child FVUs also increased. In terms of the relationship between changes in fidelity and changes in responsivity, no correlation was found between pre- and post-training ($r_s = -.05$, $p > .05$). However, there was a strong correlation between pre-training and follow-up ($r_s = .88$, $p < .05$; see Figure 5), indicating that the degree to which parent PRT skills improved was related to the extent to which child responsivity increased between pre-training and follow-up.

## Chapter 4 Discussion

The present study is the first to systematically evaluate the efficacy of brief (6-hour) training in PRT for parents of young children with autism. This was accomplished using a non-concurrent multiple baseline (across participants) design with eight families. The eight preschoolers (1 girl) were all diagnosed with autism and ranged in cognitive and language ability from mildly to severely impaired, with the majority of children falling in the severe range. Parents' level of education ranged from partial high school to graduate degree. One of the primary questions of interest was whether child communication would improve after parents completed brief training in PRT. Other main questions were whether brief training in PRT is sufficient for parents of preschoolers with autism to learn how to implement the strategies with fidelity and whether parents' perceived self-efficacy improved following training. Secondary questions of interest included whether child improvements would occur in multiple domains of behaviour other than those directly targeted, notably in affect and disruptive behaviour, following parent training. Parent stress and affect were examined as well. Finally, the current study was designed to determine whether any observed gains would be maintained 2 to 4 months following training. Child outcomes will be discussed first, followed by parent outcomes, the relationship between parent and child outcomes, and then limitations of the study and directions for future research.

### *Child Outcomes*

*Communication.* The primary target of PRT is the development of child communication. In order to be as comprehensive as possible, the present study used two observational methods to measure changes in communication (i.e., functional verbal

utterances and type of utterances). Functional verbal utterance (FVUs; following R.L.Koegel et al., 2002) is a measure of verbal communication that has been used in numerous studies (e.g., Openden, 2005; Symon, 2005). In the present study, the overall amount of child FVUs increased after training and was maintained at the 2 to 4 month follow-up. This finding is consistent with previous studies that have shown increases in child communication following parent training in PRT (e.g., Laski, Charlop, & Schreibman, 1988; R.L. Koegel et al., 2002; Openden, 2005). The average increase in FVUs from pre- to post-training in the current study (25.8%) was comparable to that reported by Openden (2005) following 20 hours of group parent training (18.5%).

The gains seen in FVUs following training were maintained at follow-up, although there was some variability among the children with autism. Unlike the other children, Child 6 made minimal gains from pre- to post-training (a short period of time); however, she made large gains at follow-up. Among the remaining children, two (Child 1 and 5) continued to make gains at follow-up, while the other children (particularly Child 2 and 8) did not maintain their post-training gains at follow-up. In the case of Child 8, he was sick for one month during the follow-up period, which might account for his decrease in FVUs. In addition, for Child 8 there was a difference in the type of activities videotaped between post-training and follow-up. During the post-training videos the parent and child sang and read, both of which are activities that are highly structured and very predictable for both the child and parent. In the follow-up videos they engaged in more play with toys, which is much less predictable and may account for the decrease in child communication. For Child 2 the number of language opportunities (i.e., times when the parent creates an opportunity for the child to communicate) during the follow-up

videos was fewer compared to the post-training videos (91 vs. 206, respectively). Providing fewer language opportunities likely has a great impact on the percentage of FVUs, as all of the children were making few initiations (i.e., <22% of their utterances) and therefore were primarily communicating when a language opportunity was provided by their parents. Therefore, the decrease in FVUs seen in Child 2 and 8 may be an artifact of either different activities or a decrease in the number of language opportunities, instead of representing a 'true' decrease in communication skills. Conversely, it is important to note that increases in communication did not appear to be attributable to an increase in the number of language opportunities provided.

Changes in communication were further explored by examining whether child utterances were appropriate (i.e., functional and directed) rather than inappropriate (e.g., stereotypic, echolalic, incomprehensible) and the degree to which they were directly prompted (i.e., model prompted, indirectly prompted or self-initiated; see Appendix D for definitions). This detailed measure of child utterances is unique to this study (with the exception of responsivity – the percentage of appropriate responses). The inclusion of a detailed measure of child communication provided valuable information about the children's ability to respond to different levels of prompts and to make verbal initiations. After training and at follow-up children were more likely to provide an appropriate response to their parents' prompts (responsivity), instead of not responding or responding inappropriately. The change in responding appropriately from pre- to post-training (20.9%) was equivalent to that following a 20-hour group parent training study (21.0%; Openden, 2005).

When looking specifically at the degree to which the children were prompted to respond, there were no overall changes in model prompted responses (i.e., responses preceded by a prompt that is functionally equivalent to the response required), initiations (i.e., responses that are not preceded by a directive action from the parent), or inappropriate responses (i.e., echolalic, non-communicative, non-functional, unintelligible to his/her parent, out of context, undirected or disruptive responses). However, responding to indirect prompts (i.e., a verbal or nonverbal prompt that is not identical to the response required) increased after training and was maintained at follow-up. The finding of an overall low rate of initiations is consistent with other studies that have found that children with autism infrequently use verbal initiations (for a review, see Chiang & Carter, 2008). Some studies have demonstrated increases in initiations when they are targeted (e.g., L.K. Koegel, Camarata, Valdez-Menchaca, & R.L. Koegel, 1998); however, due to the brevity of the training, initiations were not specifically targeted in the current study. Thus, it was not surprising that there was no change in verbal initiations, although some parents did informally report that their child was making more initiations following training. Responding to an indirect prompt is a higher level response compared to model prompted responses, as the child is required to generate the answer themselves instead of simply repeating the word said by the parent. In addition, indirect prompts were very common and seem to be the most natural prompt for parents to use (e.g., a question). Consequently, an important finding from this study is that children were more likely to respond to indirect prompts after training and that this gain was maintained at follow-up.

Ultimately, it important to determine whether these improvements in child communication are clinically meaningful. In the single-subject design literature there does not appear to be a consensus on how to define clinically meaningful change. One way of assessing clinically meaningful change is to look at the effect size, or in other words the extent to which the training lead to an increase (or decrease) in behaviour. In the present study, the effect sizes for the measures of communication that increased significantly after training were large (i.e., $d$ = 1.0, 0.85, and 0.91 for changes in FVUs, responsivity, and responding to indirect prompts, respectively, from pre- to post-training). These large effect sizes suggest that brief parent training in PRT did lead to clinically meaningful improvements in child communication.

*Language.* Standardized measures, both direct assessments and a parent questionnaire, were used to evaluate changes in language comprehension and expression between pre-training and follow-up (4 to 6 month period). Overall, there were no significant differences between pre-training and follow-up on either the Preschool Language Scale 4$^{th}$ Edition (PLS-4; Zimmerman, et al., 2002) or the Peabody Picture Vocabulary Test 3$^{rd}$ Edition (PPVT-III; Dunn & Dunn, 1997). However, 2 of the 8 children made considerable gains over the 4 to 6 month period on both the Auditory Comprehension (i.e., 3 and 13 month increase in age equivalence) and Expressive Communication (i.e., 7 and 12 month increase in age equivalence) scales of the PLS-4. Furthermore, 3 out of the 5 children who were able to complete the PPVT-III demonstrated improvements in single word receptive vocabulary (i.e., 7, 12, and 23 month increase in age equivalence over a 4 to 6 month period). The gains made by these children are clinically meaningful, as they demonstrated an increase in age equivalence

that was equal to or greater than that normally expected over a 4 to 6 month period. In addition, the majority of children showed gains in word comprehension and production (e.g., average increase of 46 words produced over a 4 to 6 month period), as reported by parents on the MacArthur Communicative Development Inventory (MCDI; Fenson et al., 1993).

The present findings are similar to those of McConachie et al. (2005), who reported an average increase of 38 words produced over a 7 month period, after parents completed the More than Words program. Parent training studies with longer periods between assessments have demonstrated even larger gains on the MCDI (e.g., average increase of 90 words produced over a 1 year period; Drew et al., 2002). The findings from the present study indicate that some children made considerable gains on both receptive and expressive standardized measures of language over a relatively short period of time following training. No apparent relationship exists between gains on the standardized measures of language and gains on the observational measures of communication, although the small sample size precludes firm conclusions.

*Disruptive Behaviour.* Previous studies have demonstrated that as communication increases behaviour problems tend to decrease (e.g., Durand & Carr, 1992). However, to date no studies have measured changes in disruptive behaviour following parent training in PRT. Disruptive behaviour was assessed in the present study by coding for its occurrence during the video probes. The majority of children displayed minimal levels of disruptive behaviour throughout the study. Consequently, overall levels of disruptive behaviour did not change following training, likely due to floor effects. For the two children who did demonstrate considerable disruptive behaviour prior to training,

disruptive behaviour decreased either immediately after training or by follow-up. Whether these changes in disruptive behaviour are clinically meaningful is debatable, as there was quite a bit of variability from session to session for both children. Note, however, that disruptive behaviour was not a target of the intervention; therefore, any changes in disruptive behaviour might be a collateral effect of increases in communication skills (e.g., Durand & Carr, 1992).

*Child Affect.* Finally, child affect was rated from the videos by coders blind to study phase. Overall, child affect did not change across the study phases. A previous study demonstrated more positive child affect when parent training used a partnership versus a clinician-directed model (Brookman-Frazee, 2004). However, the present study is the first to look at differences in child affect before and after parent training in PRT. One of the PRT techniques that might have a significant impact on child affect is child choice (see Appendix G), as children are often happier when participating in an activity that they choose. Upon reviewing each parent's use of child choice, a technique that is also taught during the More than Words program, it was found that seven of the eight parents used child choice during at least 75% of the intervals prior to training. This finding indicates that parents were following their child's lead before training, which may account for the relatively high levels of positive child affect during the pre-training phase.

*Summary of Child Outcomes.* Taken together, child communication increased following 6 hours of parent training in PRT and overall the gains were maintained at follow-up, although there was some variability. Children were more likely to respond appropriately to their parents' questions after training and these gains were maintained at follow-up. During the brief follow-up period, some children made considerable gains in

both expressive and receptive language on the standardized measures of language. These gains are consistent with observational data that show enhancement of communication following training. Overall, the children presented with low levels of disruptive behaviour during the video probes, making it difficult to assess for changes in disruptive behaviour. However, disruptive behaviour decreased for the two children who had higher levels of disruptive behaviour prior to training. No positive changes were seen in child affect, which might reflect parents' incorporation of motivational strategies (notably, following their child's lead) prior to training. Overall, the critical finding from the current study is that child communication skills increased following brief parent training in PRT and remained relatively stable at follow-up.

*Parent Outcomes*

*Parent Fidelity of Implementation.* Parents' ability to use the main PRT techniques correctly (i.e., fidelity of implementation) was coded from video, by coders who were blind to the study phase. The results from this study indicate that parents' ability to implement PRT techniques increased after brief training and was maintained 2 to 4 months following training. On average, parents' fidelity of implementation score increased by 27% following only 6 hours of training. Prior to training none of the parents met the criterion for fidelity of implementation (i.e., correctly implementing the techniques during a minimum of 75% of the intervals, consistent with the criterion used by Stahmer & Gist, 2001). However, following 6 hours of training, a considerable proportion (62%) of parents met this criterion. Four out of 5 mothers (80%) compared to 1 out of 3 fathers (33%) met the criterion for fidelity of PRT implementation post-training, a difference that will be discussed later.

In comparison, Openden (2005) reported a larger average increase in parent fidelity (78% vs. 27%), following 20 hours of group parent training in PRT. This discrepancy in the magnitude of change may reflect the longer training period in the Openden study (20 vs. 6 hours in the current study). However, parents in the present study also had less opportunity to improve. That is, mean fidelity of PRT implementation scores before training was higher in the present study (48% vs. 15% in the Openden study). Pre-training fidelity scores in the present study may have been higher because the majority of parents had completed the More than Words parent training program, which covers one of the main PRT techniques (i.e., child choice). Unfortunately, Stahmer and Gist (2001) did not report pre- and post-training fidelity of implementation scores, thus precluding comparison with their brief (12 hour) parent training program in PRT.

Stahmer and Gist (2001) did report that 36% (n=11) of parents who completed 12 hours of training, without the support group, mastered the PRT techniques. Therefore, even though the present study provided half the amount of training (6 vs. 12 hours), a much larger proportion of parents demonstrated mastery of the techniques (62% vs. 36%). It is unclear why these findings are discrepant, as the characteristics of the participants in the two studies are similar. One difference is that the training provided in the present study was more concentrated (i.e., 6 hours over 2 weeks vs. 12 hours over 12 weeks), which may have enhanced parent learning. Another potential explanation is that the style of training differed between the two studies, with more suggestive versus directive feedback given during the current study. Studies that have evaluated 20-25 hours of parent training in PRT (e.g., R.L. Koegel et al., 2002; Openden, 2005; Symon, 2005) have found that by the end of training all parents are able to implement the

techniques with fidelity. However, to date no studies have investigated the optimum number of hours of training required for parents to learn the techniques or how best to teach and support parents. The current study provides preliminary data to suggest that 6 hours of individual parent training is sufficient for the majority of parents to learn the primary PRT techniques.

While there was no significant difference in skill level from post-training to the 2 to 4 month follow-up, two of the eight parents showed a noticeable increase in their skill level at follow-up. One likely explanation is that skill level increased as these two parents continued to practice the techniques. The other six parents maintained their skill level and more specifically, 50 percent of parents continued to meet criterion for fidelity of implementation at follow-up. This is the first study of brief parent training in PRT to examine maintenance of fidelity effects; furthermore, this finding is consistent with a study that demonstrated maintenance of parent skills during follow-up videos collected between 3 and 12 months following 25 hours of training in PRT (R.L. Koegel et al., 2002). Overall, the results from the current study indicate that parents either maintained or improved their skills at the short-term follow-up.

One advantage of the present study is that both mothers (n = 5) and fathers (n = 3) participated in the study, as the majority of parent training research includes only mothers (but see Rocha et al., 2007, and Seung et al., 2006, for exceptions). In the present study a greater percentage of mothers (80%) than fathers (33%) met the criterion for fidelity of PRT implementation post-training. Thus, overall, these mothers were better than fathers at acquiring the skills after 6 hours of training. This finding stands in contrast to Seung et al's (2006; N = 8) lack of difference between mothers and fathers in the acquisition of

two skills for promoting their child's social reciprocity (i.e., expectant waiting and imitating with animation). A number of factors could explain the difference found in the present study. One possibility is that mothers may have had more time to practice their PRT skills than fathers, as some of the mothers were at home with their children more often than the fathers. Of the four mothers who stayed at home with their children, three met the criterion for fidelity after training. Alternatively, fathers might have benefited from a modified style of training, such as more directive feedback (as recommended by one father). Finally, it is important to note that the sample size in the current study is small and therefore the finding that mothers were more likely to master the PRT skills than fathers may not generalize to the general population of parents.

After training, parents were asked to keep track of the amount of time they spent doing PRT with their child each day. Parents reported that they spent between 0.5 and 2 hours a day implementing PRT with their child. These figures may be an underestimate, as parents reported that they were incorporating PRT into activities throughout the day and that it was therefore difficult to provide an accurate estimate of the amount of time they spent doing PRT with their child. The amount of time parents reported spending implementing PRT with their child was not significantly related to changes in either child communication or parent skill level, although the small sample size could account for the null finding.

*Parental Self-Efficacy.* Parental self-efficacy refers to parents' confidence in changing their child's behaviour. In order to assess parents' perceived self-efficacy, they were asked to complete a questionnaire (Hastings & Brown, 2002) before, immediately after, and 2 to 4 months following the training. As noted above, there was an increase in

parents' ability to implement the PRT techniques; however, there was no overall increase in parental self-efficacy following training. In fact, most of the parents had high levels of parental self-efficacy throughout the study. For the two parents who had relatively low parental self-efficacy prior to training, parental self-efficacy did increase considerably following training. This positive finding indicates that brief parent training in PRT may increase parental self-efficacy for parents who have low self-efficacy prior to training. The lack of change in parental self-efficacy for those remaining could be due to several factors, including a ceiling effect. Another factor is that the parental self-efficacy questionnaire focused specifically on parents' perceptions of their ability to handle their child's behaviour problems, which was not the focus of the intervention. Observations of the children also indicated that the majority displayed minimal disruptive behaviour, which possibly contributed to parents' perception that they were able to deal with the challenging behaviour. In addition, and as reported below, most parents reported low levels of parenting stress, which, along with low levels of child problem behaviours, have been associated with higher self-efficacy (e.g., Gross & Tucker, 1994; Scheel & Rieckmann, 1998). Moreover, the majority of parents had completed another parent training program (i.e., More than Words) before participating in the study, which may have contributed to the high levels of parental self-efficacy. In future studies it will be important to design a questionnaire that specifically addresses parents' perception of their skill level or their ability to help their child communicate.

*Parental Stress.* Parental stress was measured by having parents complete a parenting stress questionnaire (Parental Stress Scale, Berry & Jones, 1995) at the three time points. Parental stress remained relatively stable over the course of the study. This

finding is consistent with other research investigating parental stress following training for parents of children with autism (e.g., Drew et al., 2002; Jocelyn et al., 1998; McConachie et al., 2005). The surprising finding from the current study was that seven of the eight parents reported levels of stress that are considered average for parents of typically developing children. This is discrepant with many studies that have found clinically high levels of stress among parents of preschoolers with autism (e.g., Baker-Ericzen, Brookman-Frazee, & Stahmer, 2005). One explanation could be the use of different questionnaires to measure parental stress (i.e., Parental Stress Scale vs. Parenting Stress Index), although the two measures have been found to be highly correlated ($r = .75$; Berry & Jones, 1995). Another possibility is that the sample of parents who chose to volunteer to participate in this parent training study had lower levels of parental stress compared to the general population of parents of children with autism.

*Parent Affect.* In order to examine whether parent affect became more positive following training, videos were coded by coders blind to study phase. Overall, parents were rated as displaying neutral or positive affect throughout the study and no changes in parent affect were seen between the phases. This finding is inconsistent with previous studies that have shown that parent affect becomes more positive following 20-25 hours of parent training in PRT (R.L. Koegel et al., 1996; R.L. Koegel et al., 2002; Openden, 2005; Schreibman et al., 1991). A number of potential explanations could account for the inconsistent findings. First of all, when a parent is acquiring new skills it may be difficult at first to focus on both implementing the techniques and having fun. Secondly, a methodological difference between the current and previous studies could also help explain the discrepant results. In some of the previous studies (R.L. Koegel et al., 2002;

Openden, 2005) the families provided the researcher with videos of themselves, while in the current study the trainer and a research assistant videotaped the parent and child interacting. Participants' bias (i.e., parents acting in ways they believe correspond to what the trainer is looking for) may have led parents to exhibit more positive affect during all of the video probes.

*Parent Satisfaction.* Finally, parents completed a brief questionnaire about their satisfaction with various aspects of the training (i.e., whole training experience, training sessions and the manual) and whether they found the training helpful in increasing their child's language and decreasing disruptive behaviour. Parents reported that the whole training experience was very helpful, particularly in increasing their child's language. The training sessions, which included online feedback, were considered to be very helpful, while the manual was reported as being fairly helpful. In terms of thinking about conducting this training with other parents, it is very important to know that parents perceived the training, particularly the individual sessions, as being highly beneficial. In addition, it will be important for future research to measure parent satisfaction at the follow-up as well immediately after training.

*Summary of Parent Outcomes.* To summarize, parents' ability to implement PRT techniques increased considerably following 6 hours of training in PRT, with the majority of parents mastering the techniques after training. Overall, PRT implementation skills were relatively stable for the 2 to 4 month period following training, although there was some variability. Despite the overall lack of change in parental self-efficacy, this study provides preliminary evidence that parental self-efficacy may increase after training for parents who have low self-efficacy before training. Consistent with previous studies,

parental stress remained relatively stable throughout the study; however, unexpectedly, parental stress was reported as being low for the majority of parents. Contrary to previous research, parent affect did not become more positive after training, which may be attributed to the brief training or methodological differences. Parents reported that they were very satisfied with the training and that it was particularly helpful in increasing their child's communication.

*Relationship Between Parent Fidelity of Implementation and Child Communication*

Of the few studies that have assessed parent fidelity of implementation, the current study is the first to investigate the relationship between changes in parent skills and changes in child outcomes. Preliminary evidence is provided for a relationship between the extent to which parent skill level increased and the magnitude of improvement in child communication following training. This relationship was found when looking at the association between improvements in parent fidelity and increases in both child functional utterances and appropriate responding. This finding is critical, as it highlights the link between parents' skill level and enhancement of children's communication skills.

*Limitations*

The current study has limitations that warrant discussion. First of all, based on the nature of the intervention (i.e., naturalistic), the type of activities videotaped were not controlled. Some activities (e.g., reading) are very structured, making it easier for parents to create language opportunities and for children to respond. Thus, the type of activity could be a confounding variable. Future research may consider the merits of having some control over the activities used to elicit language.

Secondly, the measure of fidelity of implementation used in the present study has some limitations. First of all, the current study assessed parents' ability to use PRT skills while being observed in their home; therefore parental skills in other contexts (e.g., at home without an observer, at the playground, or during bath time) were not measured. In addition, measurement of parents' use of the PRT skills was limited; as many parents reported that they were not able to provide an accurate estimate of the amount of time they spent doing PRT with their child. Future research may try to address these issues by observing the parent and child across different contexts and by developing a more systematic way for parents to record time spent implementing PRT.

Thirdly, six of the eight parents had completed the More Than Words program prior to participating in the study. While there did not seem to be any differences in treatment effects between the families who had completed the More Than Words program and those who had not, the cumulative effect of learning these two interventions is unknown. Therefore, some of the gains seen in the present study may have been influenced by parents' participation in the More Than Words program.

Fourthly, the multiple baseline (across participants) design controls for temporal or developmental effects; however, the conclusions from the present study are limited as the design does not allow one to compare the effects of brief parent training in PRT to another intervention. Single-subject designs are more commonly used to establish treatment efficacy early in the evaluation of a treatment (Smith et al., 2007). Considering that this study was an early attempt to assess the efficacy of brief parent training in PRT, a non-concurrent multiple baseline design was chosen. An advantage of using a single subject design is that it provides detailed information on each child and parent, which can

be useful information when identifying parent and child characteristics that are associated with good outcomes. For example, evidence reported here raises the possibility that very young children (under 36 months) who are cognitively delayed, such as Child 6, may take longer to respond to treatment than older preschoolers or preschoolers at a more advanced developmental level. This could be important information to share with parents of similar children, as parents could become discouraged because of slow progress. Ultimately, now that preliminary evidence for brief parent training in PRT has been established, researchers might consider conducting a randomized clinical trial in order to provide stronger evidence for the efficacy of brief parent training in PRT.

In addition, the present study used a sample of 8 parent-child dyads, which limits the generalizability of findings. The majority of parents who volunteered to participate in this study were of middle to upper-middle socioeconomic status, had previously participated in a parent training program, reported having low levels of stress, and displayed skill in the use of some PRT techniques prior to training. Therefore, the results may not generalize to the general population of families with preschoolers with autism. However, a sample of 8 is considered large for a single subject design, and the pattern of changes in both parent and child behaviour was fairly consistent across all 8 parent-child dyads, which strengthen the conclusions drawn from the study.

Another limitation of the present study was the use of one trainer, who had expertise in the areas of autism, behaviour principles, and PRT and who was very motivated to provide excellent training. This may limit the generalizability of the findings to other trainers.

Finally, while many parent training studies have not evaluated the maintenance of treatment gains following training, the present study evaluated parent and child outcomes 2 to 4 months following training. This follow-up period is relatively short; therefore future research might investigate longer-term effects of brief parent training in PRT.

*Directions for Future Research*

In the current study, feedback from the trainer to parents focused on reinforcing correct implementation of the techniques and providing specific suggestions for improvement. Some parents, perhaps fathers in particular, may have benefited from more directive feedback. For example, after the follow-up one father reported that he would have found it helpful to have seen his progress charted, which is an example of a concrete and direct way of providing feedback. In addition, the trainer observed that two fathers had a difficult time changing their patterns of behaviour to incorporate the feedback. Providing more direct feedback may have helped them change their behaviour. To date, research studies investigating the effective components of training parents have found that modeling and feedback are critical components in allowing parents to master all of the skills (Lerman, Swietzy, Perkins-Parks, & Roane, 2000; Nay, 1975; Kaiser & Hester, 1995). However, there is a paucity of research examining the optimal fit between training styles and parent characteristics. Future research might investigate how different training styles (e.g., suggestive vs. directive feedback) might interact with specific parent characteristics (e.g., visual learning style or behavioural flexibility).

Additionally, it is important for researchers to investigate the effective qualities of trainers. In the present study, the trainer was a doctoral candidate with expertise in autism, behavioural principles, and in both implementing and training parents in PRT.

Characteristics of the trainer, such as being empathetic, positive, flexible, and confident, may have influenced parent skill acquisition. To date, very little research has evaluated or commented on the optimal skills for parent trainers. One notable exception is a study conducted by Kaiser and Hester (1995), who examined strategies for preparing parent trainers. Their working assumptions were that effective parent trainers "must (a) have strong conceptual and practical knowledge of the interventions; (b) be able to use the intervention fluently at high levels of fidelity; (c) have specific skills for training parents (e.g., using positive examples, coaching and feedback, etc.); and (d) have skills in interacting effectively, collaboratively, and respectfully with parents" (p. 386). They found that trainers (N=3) who were taught the first three skills (i.e., knowledge, skill in doing the intervention and specific skills in training parents) used the specific parent training skills more frequently, that parents learned to implement the intervention, and that the child's target behaviour increased. Future research might systematically evaluate key components of training parent trainers, as well as examining links between trainer qualities and parent skill acquisition.

Another avenue for future research is to examine various training program modifications. Specifically, researchers might develop and evaluate different training modules for children with lower and higher language levels. Basic PRT motivational and behavioural principles apply to children of all language levels; however, different skills are often warranted for children who have different language abilities. For example, some additional strategies are required to teach a child to ask the question "What's that?" when they see a novel object, compared to teaching a child to request a familiar object, such as "ball". Different training modules could help address these different needs, although it is

important to keep in mind that the goal of brief training is for parents to master the basic PRT skills, not to develop intervention programming skills.

In addition, including one or possibly more sessions in the home and/or a booster session might help ensure that all parents meet the fidelity criterion and could provide time for parents to discuss particular challenges they have encountered after the brief training. These challenges might include difficulty implementing PRT in different environments/activities or difficulty modifying their strategies based on ongoing changes in their child. Future research could systematically evaluate how much training is required for parents to master the PRT techniques.

Stahmer and Gist (2001) found that parents were more likely to master PRT techniques if they also attended a support group, which raises the issue of including an information and support group with training. In the present parent training program, the didactic portion of training, a general discussion of challenges, and informal support might be conducted in a group format; however, on-line feedback, which is likely most effective when provided individually, was a critical component of training. Future research could examine the virtues of including a group component, as well as other training program modifications.

Finally, it is critical for future studies to evaluate the effectiveness of brief parent training in PRT implemented as part of routine care delivered to families of preschoolers with autism. In addition, it will be important for future research to examine the cost-effectiveness of brief parent training in PRT.

*Conclusions and Implications for Clinical Practice*

The present findings have implications for clinical practice. Providing parents with brief training shortly after their child has been diagnosed with autism might enhance parents' confidence and self-efficacy in improving their child's communication skills, while they are waiting for more intensive intervention. Moreover, teaching parents skills that enhance their child's communication early on may improve the children's prognosis. Finally, this parent training program was not very resource or time intensive and therefore might be feasible for families living both in rural and urban areas, and for others involved in the care and education of children with autism.

The present study extends the research literature on parent training for parents of children with autism in a number of ways. As reviewed earlier, many of the parent training programs are relatively time and resource intensive and therefore may not be feasible for all families. This is the first study to systematically evaluate brief (6-hour) parent training in PRT. A major contribution of this study is the demonstration that most of the parents learned to implement PRT techniques with fidelity following only 6 hours of training. Evidence that parents can learn basic PRT strategies quickly, and that their skills either continued to improve or were maintained at follow-up, is particularly important given the limited resources in publicly-funded programs. Even more importantly, children's communication improved following brief parent training, providing further evidence that children with autism can readily learn communication skills when their parents employ the motivational and behavioural principles incorporated in PRT (e.g., R.L. Koegel et al., 2002). The present study also extends previous research by demonstrating that increases in parents' skills were associated with concomitant

improvement in their children's ability to communication. The results from this study are promising as they provide additional evidence for the efficacy of brief training for parents of children with autism.

Table 1

*Child Characteristics at Baseline*

| *Child* | *Age (yrs; mo)* | *Sex* | *Cognitive ability (percentile, test)* | *PLS AC*[a] *Age-equivalent* | *PLS EC*[b] *Age-equivalent* |
|---|---|---|---|---|---|
| 1 | 4;8 | M | 1st, DAS[c] | 3;10 | 2;11 |
| 2 | 3;3 | M | 2nd, WPSSI-III[d] | 2;7 | 2;9 |
| 3 | 3;8 | M | <1st,Bayley-III[e] | 1;3 | 1;5 |
| 4 | 3;9 | M | 9th, Bayley-III | 2;7 | 2;3 |
| 5 | 4;3 | M | 16th, Bayley-III | 2;5 | 1;10 |
| 6 | 2;4 | F | <1st, Bayley-III | 0;7 | 1;3 |
| 7 | 4;4 | M | <1st, Bayley-III | 1;6 | 2;0 |
| 8 | 4;1 | M | <1st, Bayley-III | 2;1 | 1;11 |

[a]Preschool Language Scale 4th Edition (Zimmerman, et al., 2002), Auditory Comprehension

[b]Preschool Language Scale 4th Edition, Expressive Communication

[c]Differential Ability Scales (Elliot, 1990)

[d]Weschler Preschool and Primary Scale of Intelligence, 3rd Edition (Wechsler, 2002)

[e]Bayley Scales of Infant and Toddler Development 3rd Edition (Bayley-III; Bayley, 2005)

Table 2

*Mean (SD) Number of Intervals out of 40 during which Children Produced a Functional Verbal Utterance, Across Each of the Three Phases*

| *Child* | *Pre- training* | *Post- training* | *Follow-up* |
|---|---|---|---|
| 1 | 27.4 (8.14) | 31.00 (8.12) | 34.33 (3.79) |
| | 68.50% | 77.50% | 85.83% |
| 2 | 26.2 (7.89) | 37.75 (3.20) | 26.00 (5.35) |
| | 65.50% | 94.38% | 65.00% |
| 3 | 2.00 (2.00) | 25.20 (4.66) | 23.40 (3.21) |
| | 5.00% | 63.00% | 58.50% |
| 4 | 21.6 (6.02) | 29.60 (3.91) | 27.33 (6.66) |
| | 54.00% | 74.00% | 68.33% |
| 5 | 17.75 (5.74) | 27.50 (3.42) | 32.00 (4.58) |
| | 44.38 | 68.75 | 80.00% |
| 6 | 6.40 (3.51) | 8.20 (3.27) | 18.50 (9.11) |
| | 16.00% | 20.50% | 46.25% |
| 7 | 8.40 (6.84) | 22.60 (7.64) | 19.00 (4.08) |
| | 21.00% | 56.50% | 47.50 |
| 8 | 22.75 (7.14) | 33.33 (4.04) | 25.33 (6.35) |
| | 56.88% | 83.33% | 63.33% |
| Mean | 16.56 (5.91) | 26.90 (4.78) | 25.74 (5.39) |
| | 41.41% | 67.24% | 64.34% |

Table 3

*Mean Responsivity (number of appropriate responses by the number of language opportunities), Across Each of the Three Phases*

| *Child* | *Pre- training* | *Post- training* | *Follow-up* |
|---|---|---|---|
| 1 | 130/224 | 181/239 | 135/148 |
| | 58.04% | 75.76% | 91.22% |
| 2 | 107/134 | 182/206 | 81/91 |
| | 79.85% | 88.35% | 89.01% |
| 3 | 8/66 | 133/169 | 90/112 |
| | 12.12% | 78.70% | 80.36% |
| 4 | 130/193 | 163/213 | 106/174 |
| | 67.36% | 76.53% | 60.92% |
| 5 | 65/135 | 88/144 | 137/165 |
| | 48.15% | 61.11% | 83.03% |
| 6 | 18/73 | 26/101 | 65/99 |
| | 24.66% | 25.74% | 65.66% |
| 7 | 25/108 | 90/129 | 39/65 |
| | 23.15% | 69.77% | 60.00% |
| 8 | 128/184 | 91/101 | 74/106 |
| | 86.49% | 90.10% | 69.81% |
| Mean | 49.98% (27.75) | 70.75% (20.44) | 75.00% (12.48) |

Table 4

*Mean (SD) Percentage of each Type of Utterance, Across Each of the Three Phases*

| *Type of Utterance* | *Pre- training* | *Post- training* | *Follow-up* |
|---|---|---|---|
| Model Prompted | 5.93 (4.11) | 7.76 (4.63) | 8.09 (4.69) |
| Indirectly Prompted | 40.21 (22.43) | 58.57 (17.43)* | 61.06 (9.37) |
| Initiation | 6.43 (6.19) | 6.19 (5.67) | 7.02 (8.58) |
| Inappropriate | 10.29 (11.48) | 8.23 (4.97) | 7.25 (4.68) |
| No Response | 38.26 (32.33) | 19.22 (18.14)* | 16.92 (10.49) |

* $p<.05$ between pre- and post-training

Table 5

*Pre-training and Follow-up Age-equivalent Scores (months) on the Preschool Language Scale, 4th Edition (PLS-4; Zimmerman et al., 2002) and Peabody Picture Vocabulary Test, 3rd Edition (PPVT-III; Dunn & Dunn, 1997)*

| *Child* | *Phase* | *PLS-4 Auditory Comprehension* | *PLS-4 Expressive Communication* | *PPVT-III* |
|---|---|---|---|---|
| 1 | Pre-training | 46 | 35 | 28 |
| | Follow-up[a] | 45 | 35 | 35 |
| 2 | Pre-training | 31 | 33 | 21 |
| | Follow-up | 44 | 45 | 44 |
| 3 | Pre-training | 15 | 17 | n/a[b] |
| | Follow-up | 13 | 17 | n/a |
| 4 | Pre-training | 31 | 27 | 21 |
| | Follow-up | 29 | 29 | 33 |
| 5 | Pre-training | 29 | 22 | 21 |
| | Follow-up | 26 | 23 | 21 |
| 6 | Pre-training | 7 | 15 | n/a |
| | Follow-up | 10 | 22 | n/a |
| 7 | Pre-training | 18 | 24 | n/a |
| | Follow-up | 15 | 24 | n/a |
| 8 | Pre-training | 25 | 23 | 21 |
| | Follow-up | 25 | 23 | 21 |

[a] Follow-up assessment ranged from 4 to 6 months after the pre-training assessment

[b] Not able to complete

Table 6

*Pre-training and Follow-up Scores on the MacArthur Communicative Development Inventory Words and Gestures (Fenson et al., 1993)*

| *Child* | *Phase* | *Phrases Understood* | *Words Understood* | *Understands and Says* |
|---|---|---|---|---|
| 3 | Pre-training | 25 | 159 | 49 |
| | Follow-up[a] | 26 | 206 | 90 |
| 6 | Pre-training | 10 | 47 | 13 |
| | Follow-up | 17 | 112 | 59 |

[a] Follow-up assessment ranged from 4 to 6 months after the pre-training assessment

Table 7

*Pre-training and Follow-up Scores on the MacArthur Communicative Development Inventory Words and Sentences (Fenson et al., 1993)*

| *Child* | *Phase* | *Words Produced* |
|---|---|---|
| 1 | Pre-training | 501 |
| | Follow-up [a] | 497 |
| 2 | Pre-training | 345 |
| | Follow-up | n/c [b] |
| 4 | Pre-training | 532 |
| | Follow-up | n/c |
| 5 | Pre-training | 94 |
| | Follow-up | 163 |
| 7 | Pre-training | 281 |
| | Follow-up | 303 |
| 8 | Pre-training | 195 |
| | Follow-up | 249 |

[a] Follow-up assessment ranged from 4 to 6 months after the pre-training assessment

[b] Not completed by parent

Table 8

*Mean (SD) Number of Intervals out of 40 during which Disruptive Behaviour Occurred, Across Each of the Three Phases*

| *Child* | *Pre- training* | *Post- training* | *Follow-up* |
|---|---|---|---|
| 1 | 10.80 (11.28) | 6.80 (2.39) | 7.67 (6.03) |
| | 27.00% | 17.00% | 19.17% |
| 2 | 2.20 (2.05) | 1.41 (1.41) | 2.50 (2.65) |
| | 5.50% | 2.50% | 6.25% |
| 3 | 0.60 (0.89) | 1.00 (1.11) | 2.20 (2.86) |
| | 1.50% | 1.00% | 5.50% |
| 4 | 0.00 (0.00) | 1.24 (1.11) | 1.33 (1.15) |
| | 0.00% | 1.50% | 3.33% |
| 5 | 0.25 (0.50) | 0.50 (0.50) | 1.00 (1.00) |
| | 0.63% | 0.63% | 2.50% |
| 6 | 5.00 (5.15) | 5.94 (6.53) | 2.75 (4.86) |
| | 12.50% | 17.00% | 6.88% |
| 7 | 2.80 (2.28) | 1.41 (1.30) | 1.25 (1.26) |
| | 7.00% | 3.00% | 3.13% |
| 8 | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) |
| | 0.00% | 0.00% | 0.00% |
| Mean | 2.71 (2.77) | 2.29 (1.77) | 2.34 (2.48) |
| | 6.77% | 5.33% | 5.84% |

Table 9

*Mean (SD) Rating of Child Affect, Across Each of the Three Phases*

| *Child* | *Pre- training* | *Post- training* | *Follow-up* |
|---|---|---|---|
| 1 | 3.16 (0.95) | 3.80 (0.79) | 3.93 (0.70) |
| 2 | 3.76 (0.43) | 3.85 (0.19) | 3.75 (0.30) |
| 3 | 4.08 (0.56) | 4.40 (0.73) | 3.76 (0.48) |
| 4 | 3.76 (0.75) | 3.80 (0.35) | 3.55 (0.53) |
| 5 | 4.25 (0.30) | 4.10 (0.48) | 3.93 (0.12) |
| 6 | 3.04 (0.48) | 2.96 (1.02) | 3.70 (0.62) |
| 7 | 3.12 (0.36) | 3.44 (0.54) | 3.65 (0.41) |
| 8 | 4.00 (0.00) | 4.00 (0.00) | 4.07 (0.12) |
| Mean | 3.65 (0.47) | 3.79 (0.44) | 3.79 (0.17) |

Table 10

*Mean (SD) Number of Intervals out of 50 during which Parents Implemented PRT Techniques, Across Each of the Three Phases*

| *Parent* | *Pre- training* | *Post- training* | *Follow-up* |
|---|---|---|---|
| 1 | 34.60 (13.89) | 41.40 (5.22) | 47.00 (5.20) |
| | 69.20% | 82.80% | 94.00% |
| 2 | 25.40 (11.01) | 37.50 (2.65) | 39.00 (9.70) |
| | 50.80% | 75.00% | 78.00% |
| 3 | 16.80 (6.46) | 34.80 (12.15) | 34.52 (4.18) |
| | 33.60% | 69.60% | 69.04% |
| 4 | 33.00 (7.42) | 47.20 (4.76) | 45.00 (4.16) |
| | 66.00% | 94.40% | 90.00% |
| 5 | 21.25 (10.31) | 27.25 (8.14) | 34.67 (8.08) |
| | 42.50% | 54.50% | 69.33% |
| 6 | 15.40 (3.13) | 37.60 (5.94) | 34.25 (6.70) |
| | 30.80% | 75.20% | 68.50% |
| 7 | 20.00 (9.11) | 41.00 (5.52) | 40.25 (8.06) |
| | 40.00% | 82.00% | 80.50% |
| 8 | 26.00 (13.29) | 34.33 (7.37) | 32.33 (1.53) |
| | 52.00% | 68.67% | 64.67% |
| Mean | 24.06 (9.33) | 37.64 (6.47) | 38.38 (5.95) |
| | 48.11% | 75.27% | 76.76% |

Table 11

*Scores on the Parental Self-Efficacy Scale, Across Each of the Three Phases*

| *Parent* | *Pre- training* | *Post- training* | *Follow-up* |
|---|---|---|---|
| 1 | 35 | 31 | 34 |
| 2 | 28 | n/c[a] | 27 |
| 3 | 23 | 29 | 29 |
| 4 | 13 | 15 | 17 |
| 5 | 13 | n/c | 23 |
| 6 | 30 | 31 | 30 |
| 7 | 30 | 27 | 30 |
| 8 | 28 | 31 | 26 |
| Mean (SD) | 25.0 (8.1) | 27.3 (6.3) | 27.0 (5.2) |

[a]Not completed by parent

Table 12

*Scores on the Parental Stress Scale, Across Each of the Three Phases*

| *Parent* | *Pre- training* | *Post- training* | *Follow-up* |
|---|---|---|---|
| 1 | 30 | 27 | 27 |
| 2 | 34 | n/c[a] | 30 |
| 3 | 36 | 35 | 34 |
| 4 | 54 | 47 | 49 |
| 5 | 45 | n/c | 42 |
| 6 | 35 | 36 | 40 |
| 7 | 35 | 32 | 30 |
| 8 | 29 | 37 | 36 |
| Mean (SD) | 37.3 (8.3) | 35.7 (6.6) | 36.0 (7.6) |

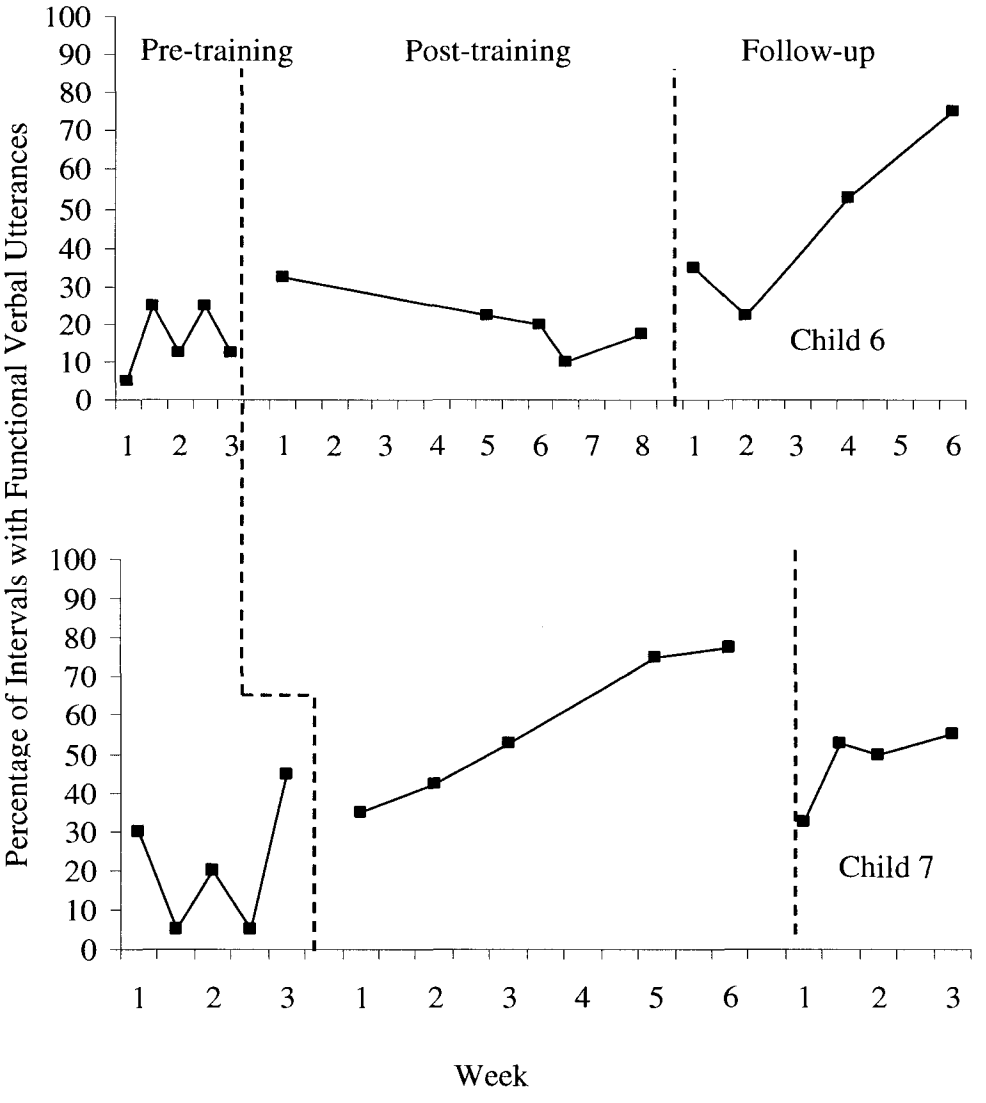
[a]Not completed by parent

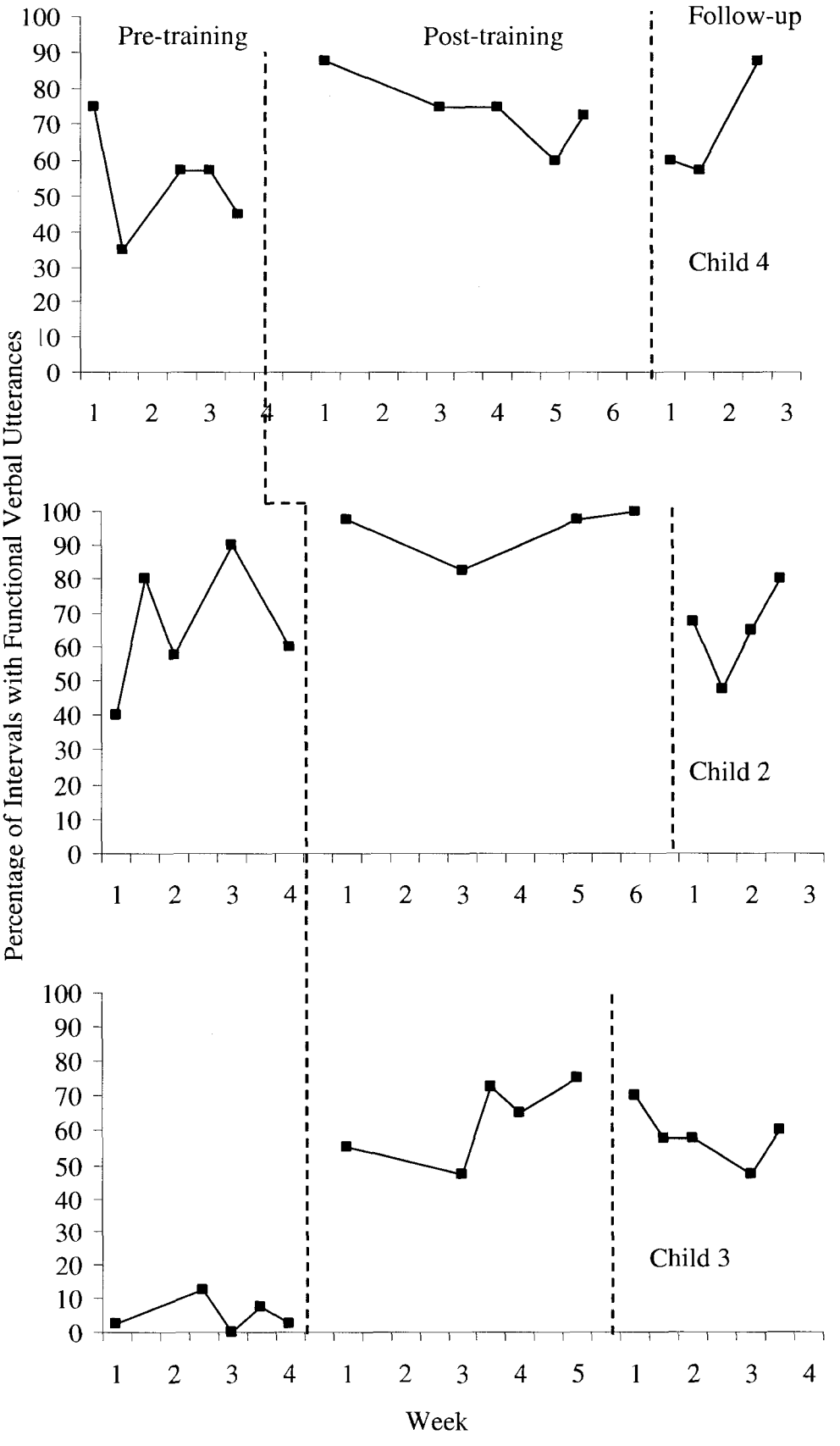
Table 13

*Mean (SD) Rating of Parent Affect, Across Each of the Three Phases*

| *Parent* | *Pre- training* | *Post- training* | *Follow-up* |
|---|---|---|---|
| 1 | 3.48 (0.58) | 3.68 (0.84) | 3.67 (0.42) |
| 2 | 3.92 (0.30) | 3.75 (0.50) | 3.80 (0.16) |
| 3 | 4.32 (0.18) | 3.96 (0.33) | 3.92 (0.23) |
| 4 | 4.16 (0.26) | 3.84 (0.22) | 3.60 (0.43) |
| 5 | 3.30 (0.26) | 3.40 (0.28) | 3.60 (0.20) |
| 6 | 3.00 (0.00) | 3.20 (0.28) | 3.30 (0.26) |
| 7 | 3.00 (0.00) | 3.44 (0.52) | 3.65 (0.41) |
| 8 | 4.00 (0.00) | 4.00 (0.00) | 4.07 (0.12) |
| Mean | 3.65 (0.52) | 3.66 (0.29) | 3.70 (0.23) |

Figure 1. Percentages of intervals during which children produced functional verbal utterances (FVUs) during each video probe, by week of participation in the study. Three to five video probes were taken during each phase (i.e., pre-training, post-training, and follow-up). The order of presentation is based on the length (i.e., 3 to 7 weeks) of the pre-training phase.




Pre-training
Post-training
Follow-up
Child 4
Child 2
Child 3
Percentage of Intervals with Functional Verbal Utterances
Week

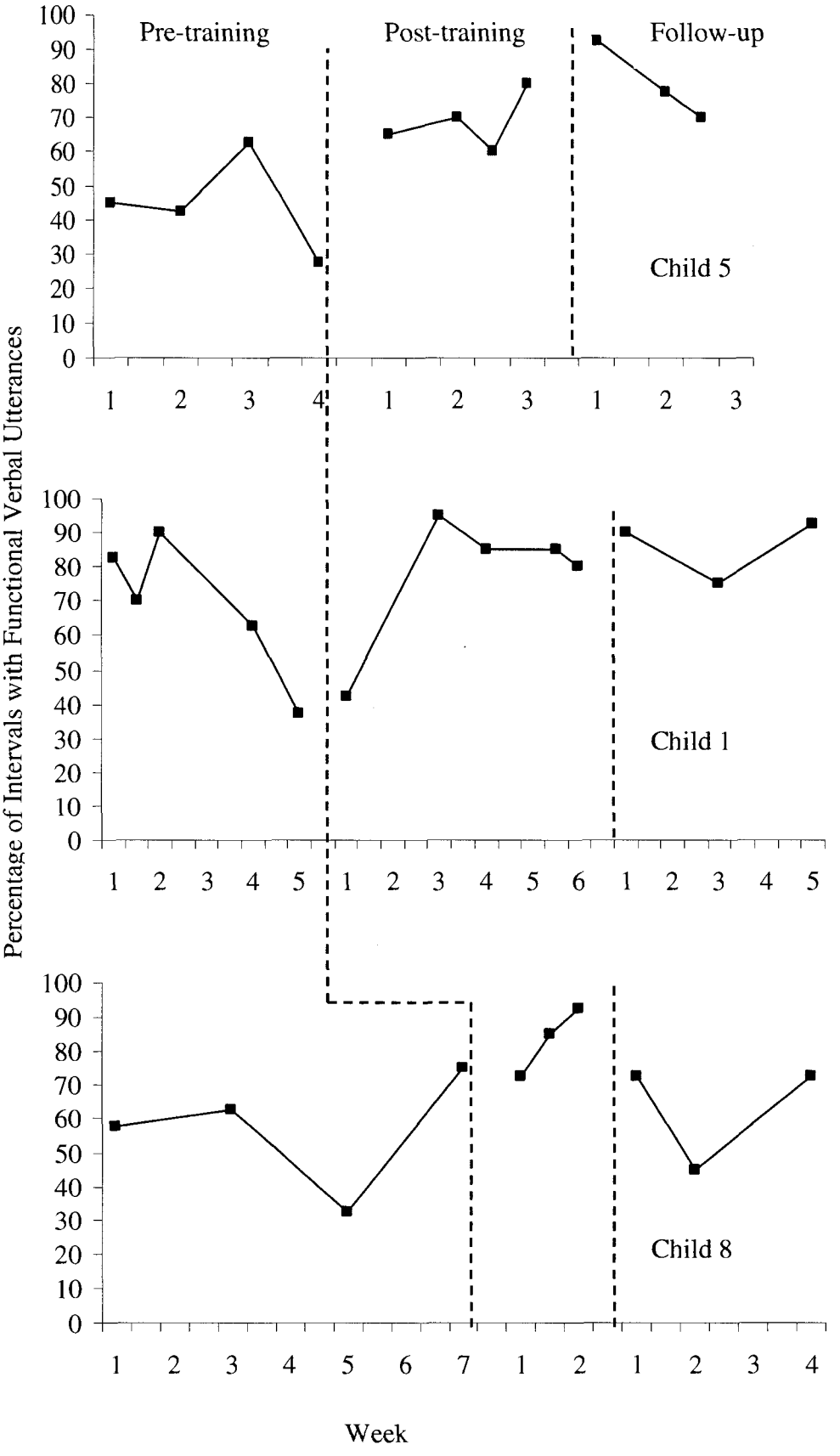
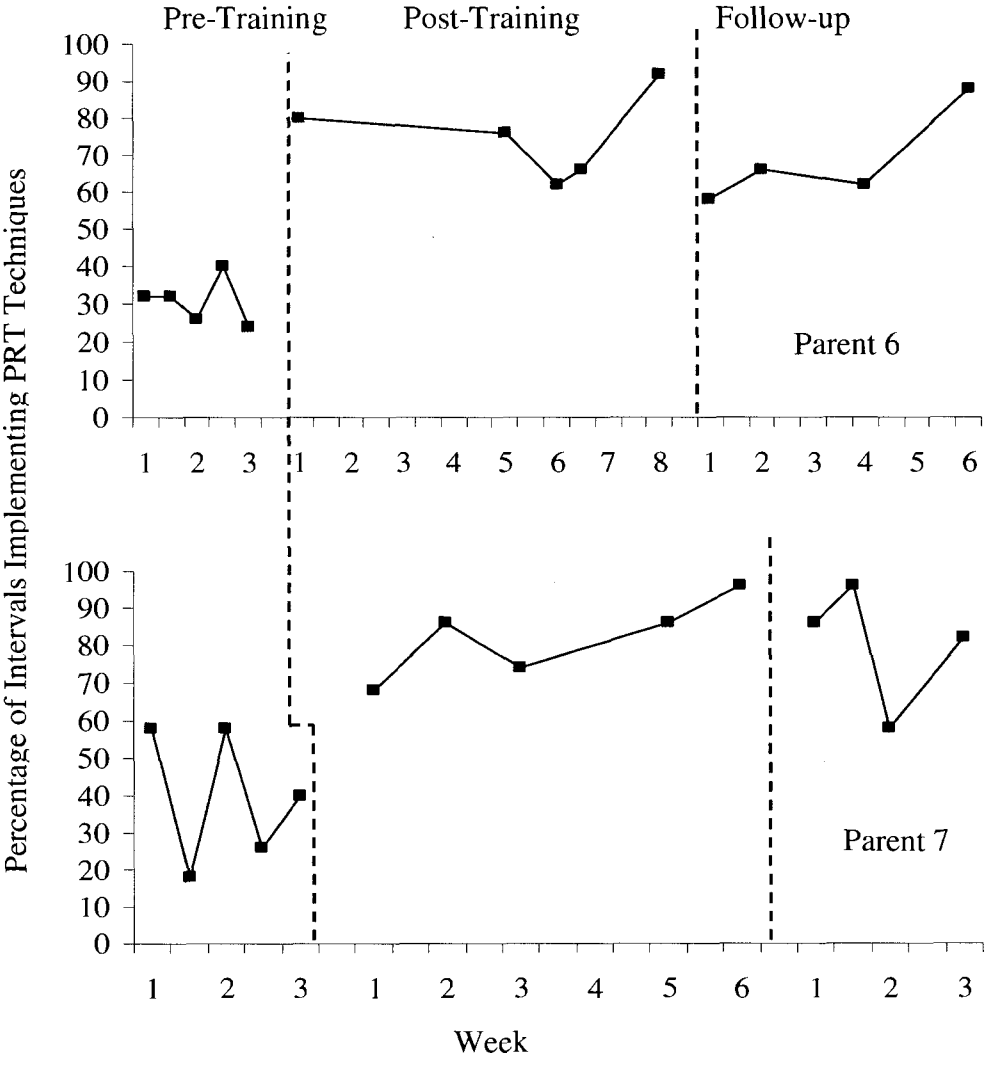
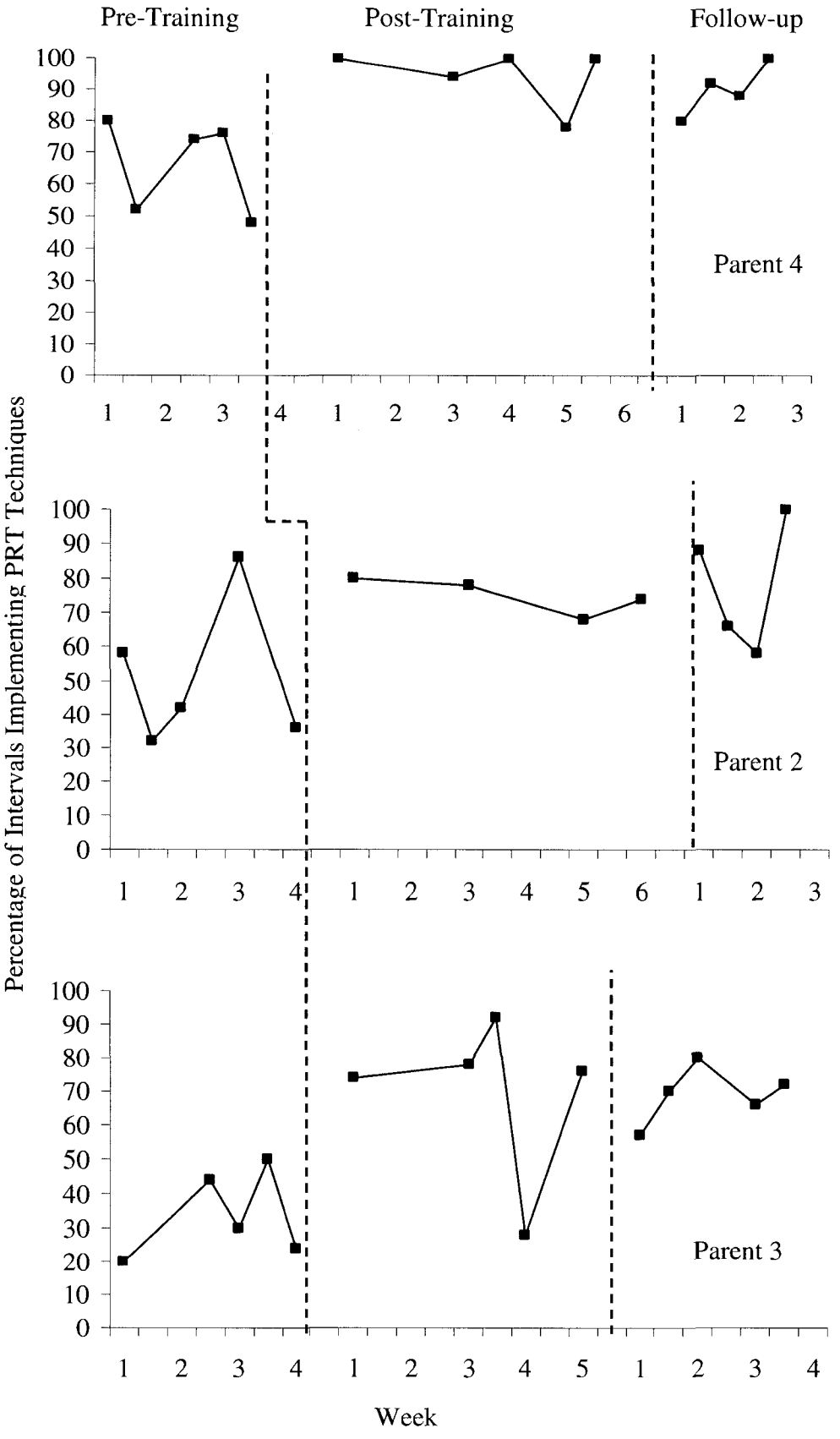

Pre-training
Post-training
Follow-up
Child 5
Child 1
Child 8
Percentage of Intervals with Functional Verbal Utterances
Week

Figure 2. Percentage of intervals during which parents implemented PRT techniques during each video probe, by week of participation in the study. Three to five video probes were taken during each phase (i.e., pre-training, post-training, and follow-up). The order of presentation is based on the length (i.e., 3 to 7 weeks) of the pre-training phase.




Pre-Training
Post-Training
Follow-up
Parent 4
Parent 2
Parent 3
Percentage of Intervals Implementing PRT Techniques
Week

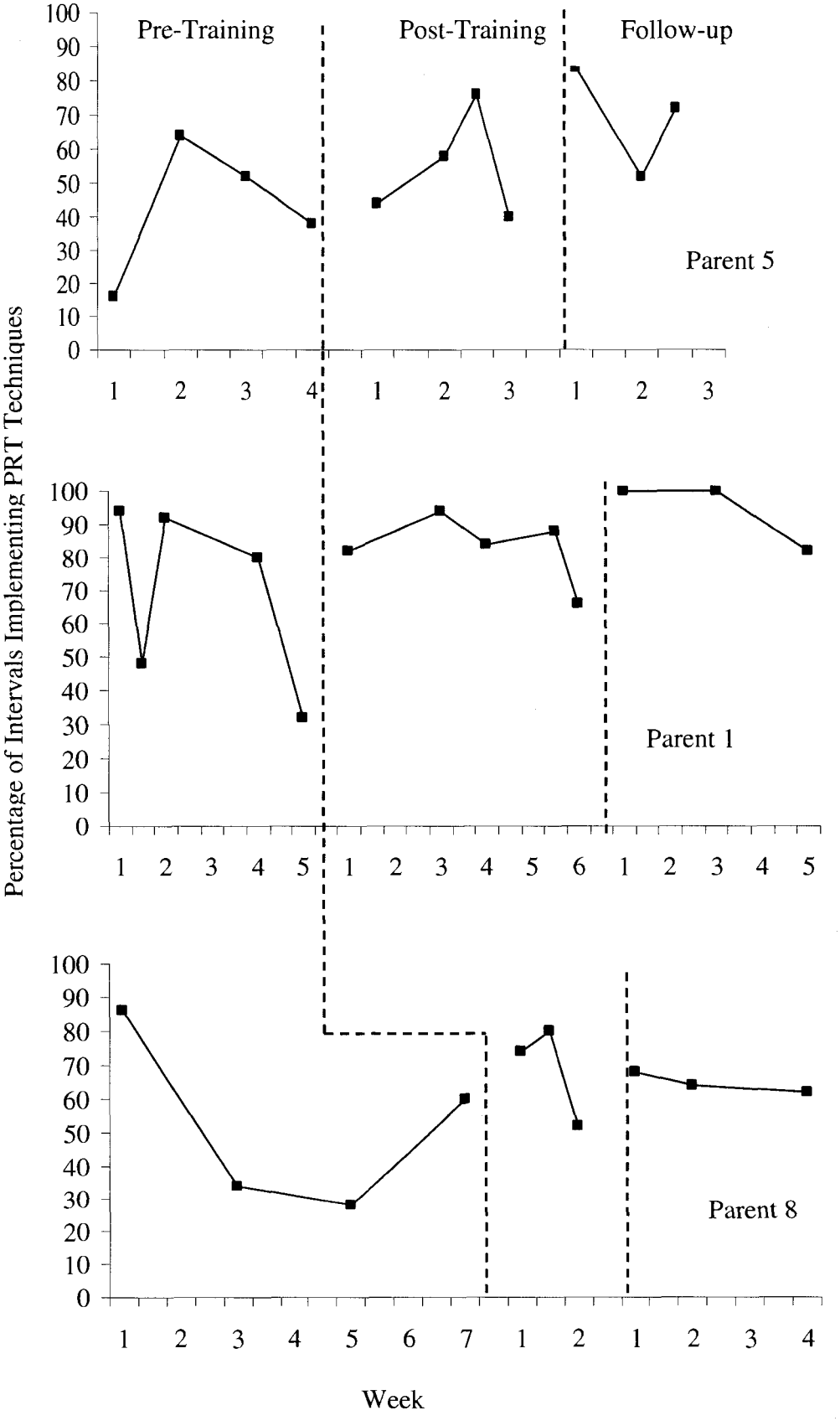

Pre-Training
Post-Training
Follow-up
Parent 5
Parent 1
Parent 8
Percentage of Intervals Implementing PRT Techniques
Week

Figure 3. Mean percentage of intervals during which parents implemented PRT techniques (bars) and mean percentage of intervals during which the child produced functional verbal utterances (points).

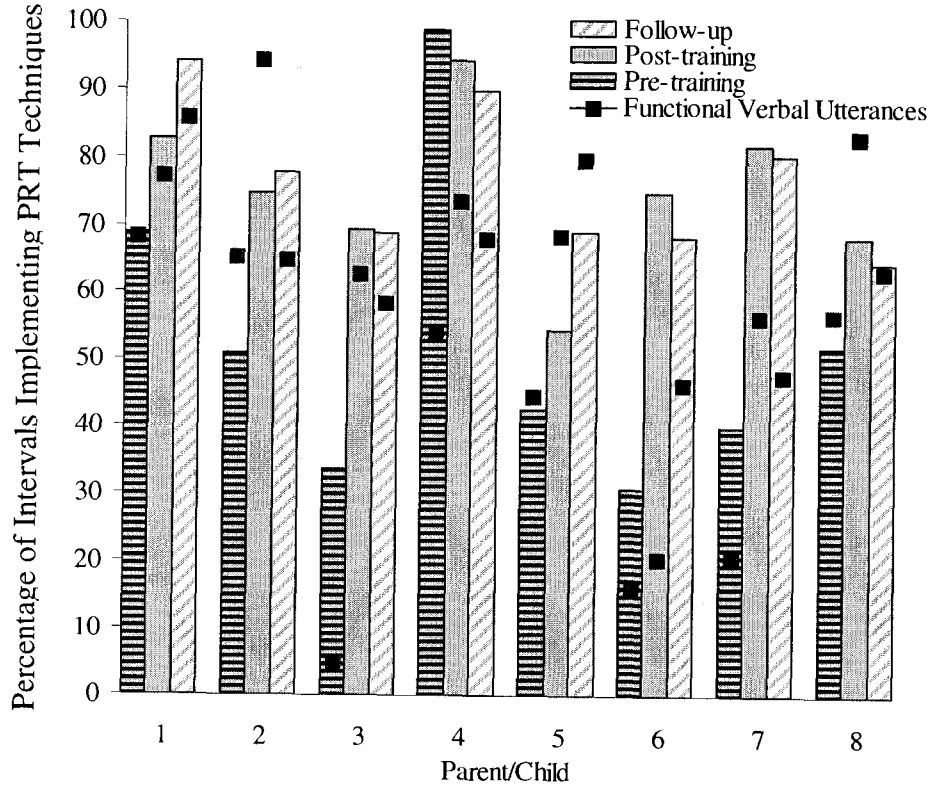


Figure 4. Relationship between change in mean percentages of intervals during which parents implemented PRT techniques (fidelity) and in mean percentages of intervals during which the child produced functional verbal utterances (FVUs), from pre-training to follow-up.

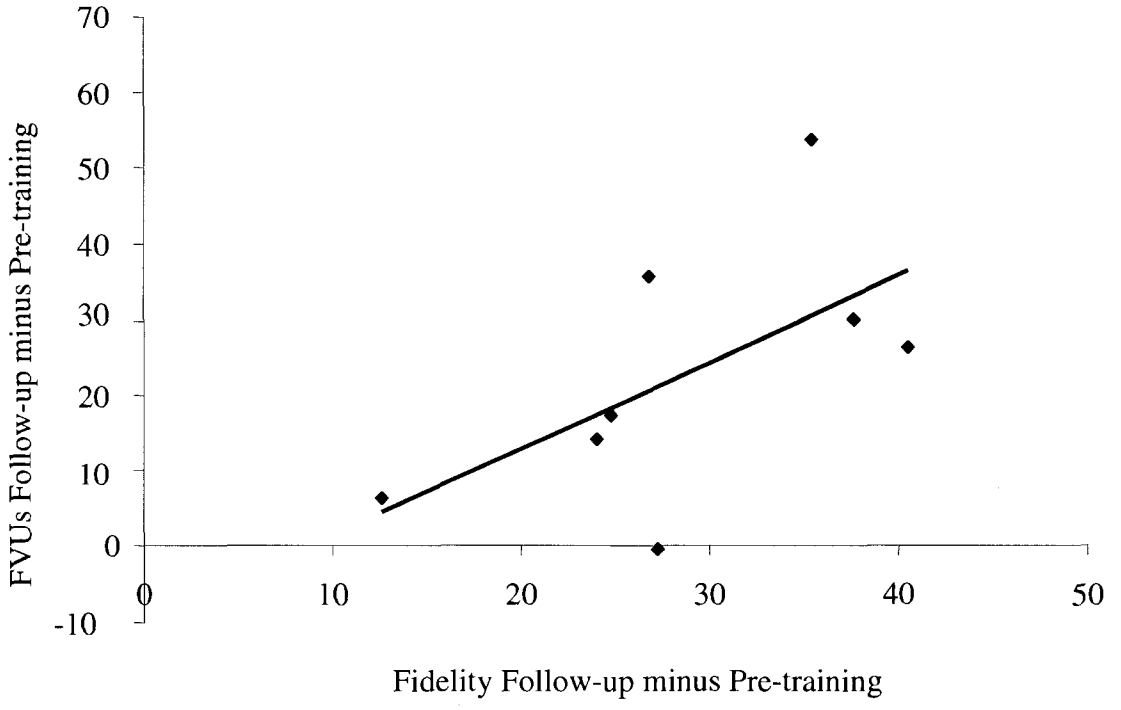
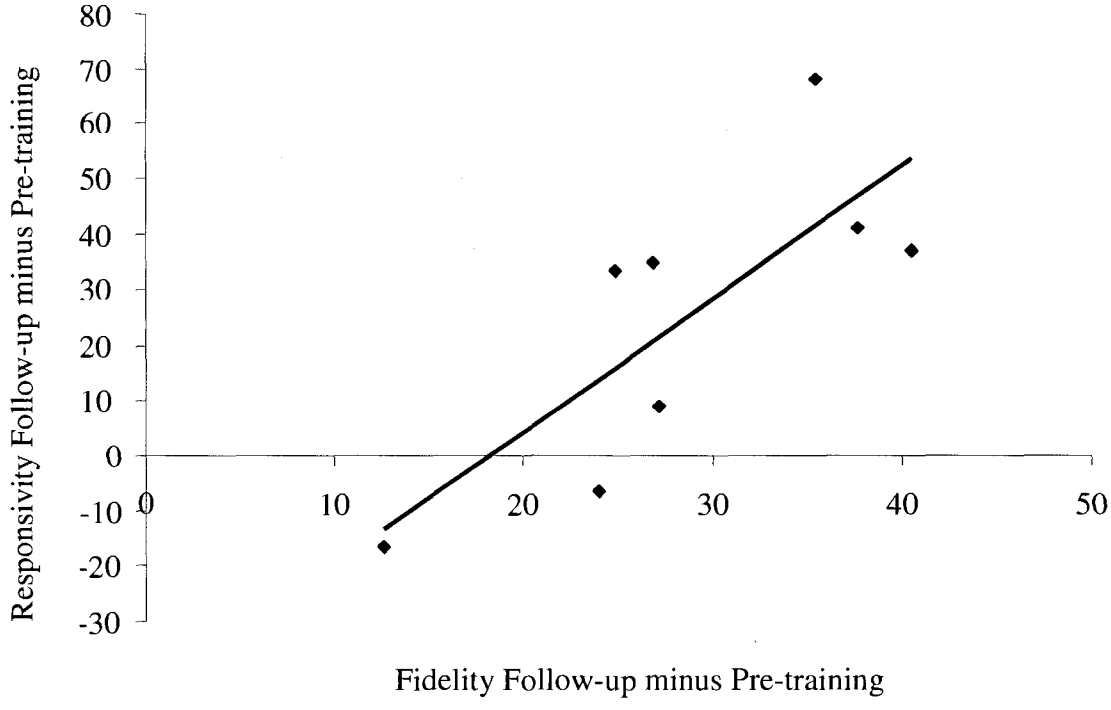


Figure 5. Relationship between change in mean percentages of intervals during which parents implemented PRT techniques (fidelity) and in mean percentages of appropriate child responses (responsivity), from pre-training to follow-up.



References

Aldred, C., Green, J., & Adams, C. (2004). A new social communication intervention for children with autism: Pilot randomized controlled treatment study suggesting effectiveness. *Journal of Child Psychology and Psychiatry, 45,* 1420–1430.

American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders,* 4th edition text revised DSM-IV-TR. Washington, DC: APA

Anastopoulos, A.D., Shelton, T.L., DuPaul, G.J., & Guevremont, D.C. (1993). Parent training for attention-deficit hyperactivity disorder: Its impact on parent functioning. *Journal of Abnormal Child Psychology, 21,* 581-596.

Ardelt, M. & Eccles, J.S. (2001). Beliefs and promotive parenting strategies on inner-city youth. *Journal of Family Issues, 22,* 944-972.

Baker, B.L., Landen, S.J., & Kashima, K.J. (1984). Effects of parent training on families of children with mental retardation: Increased burden or generalized benefit? *American Journal on Mental Retardation, 96,* 127-136.

Baker-Ericzen, M. J., Brookman-Frazee, L., & Stahmer, A. C. (2005). Stress levels and adaptability in parents of toddlers with and without autism spectrum disorders. *Research and Practice for Persons with Severe Disabilities, 30,* 194-204.

Baker-Ericzen, M. J., Stahmer, A. C., & Burns, A. (2007). Child demographics associated with outcomes in a community-based pivotal response training program. *Journal of Positive Behavior Interventions,* 9, 52–60.

Bandura, A. (1997). *Self-Efficacy. The Exercise of Control.* New York, NY: W.H. Freeman and Company.

Bayley, N. (2005). *Bayley Scales of Infant Development 2nd Edition.* San Antonio, TX: Psychological Corporation.

Berry, J.O. & Jones, W.H. (1995). The Parental Stress Scale: Initial psychometric evidence. *Journal of Social and Personal Relationships, 12,* 463-472.

Bettelheim, B. (1967). *The Empty Fortress: Infantile Autism and the Birth of the Self.* New York, NY: The Free Press.

Bibby, P., Eikeseth, S., Martin, N.T., Mudford, O.C., & Reeves, D. (2002). Progress and outcomes for children with autism receiving parent-managed intensive interventions. *Research in Developmental Disabilities, 23,* 81-104.

Boyd, B.A. (2002). Examining the relationship between stress and lack of social support in mothers of children with autism. *Focus on Autism and Other Developmental Disabilities, 17,* 208-215.

Bristol, M.M., Gallagher, J.J., & Holt, K.D. (1993). Maternal depressive symptoms in autism: Response to psychoeducational intervention. *Rehabilitation Psychology, 38,* 3-10.

Brookman-Frazee, L. (2004). Using parent/clinician partnerships in parent education programs for children with autism. *Journal of Positive Behavior Interventions, 6,* 195-213.

Browning, R.M. (1971). Treatment effects of a total behaviour modification program with five autistic children. *Behaviour Research and Therapy, 9,* 319-327.

Bryson, S.E., Koegel, L.K., Koegel, R.L., Openden, D., Smith, I.M., & Nefdt, N. (2007). Large scale dissemination and community implementation of pivotal response treatment: program description and preliminary data. *Research and Practice for Persons with Severe Disabilities, 32,* 142-153.

Bryson, S.E., Rogers, S.J. & Fombonne, E. (2003). Autism spectrum disorders: Early detection, intervention, education, and psychoparmacological management. *Canadian Journal of Psychiatry, 48,* 506-516.

Carr, J.E. (2005). Recommendations for reporting multiple-baseline designs across participants. *Behavioral Interventions, 20,* 219-224.

Centers for Disease Control (2007). *Autism Information Center: Prevalence of ASDs.* Retrieved November 29, 2007 from http://www.cdc.gov/ncbddd/autism/faq_prevalence.htm#whatisprevalence.

Chakrabarti, S. & Fombonne, E. (2001). Pervasive developmental disorders in preschool children. *Journal of the American Medical Association, 285,* 3093-3099.

Chambless, D. L, Baker, M. J., Baucom, D. H., Beutler, L. E., Calhoun, K. S., Crits-Christoph, P., et al.(1998). Update on empirically validated therapies, II. *The Clinical Psychologist, 51,* 3-16.

Charlop-Christy, M. H., & Carpenter, M. H. (2000). Modified incidental teaching sessions: A procedure for parents to increase spontaneous speech in their children with autism. *Journal of Positive Behavior Interventions,* 2, 98-112.

Chiang, H.M. & Carter, M. (2008). Spontaneity of communication in individuals with autism. *Journal of Autism and Developmental Disorders, 38,* 693-705.

Cohen, H., Amerine-Dickens, M., & Smith, T. (2006). Early intensive behavioural treatment: Replication of the UCLA model in a community setting. *Developmental and Behavioral Pediatrics, 27,* S145-S155.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20,* 37-46.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112,* 155-159.

Crockett, J. L., Fleming R. K., Doepke K. J., & Stevens J. S. (2007). Parent training: Acquisition and generalization of discrete trials teaching skills with parents of children with autism. *Research in Developmental Disabilities*, 28, 23–36.

Dretzke, J., Frew, E., Davenport, C., Barlow, J., Stewart-Brown, S., Sandercock, J., et al. (2005). The effectiveness and cost-effectiveness of parent training/education programmes for the treatment of conduct disorder, including oppositional defiant disorder, in children. *Health Technology Assessment, 9,* 1-250.

Drew, A., Baird, G., Baron-Cohen, S., Cox, A., Slonims, V., Wheelwright, S. et al., (2002). A pilot randomised control trial of a parent training intervention for pre-school children with autism. *European Child and Adolescent Psychiatry, 11,* 266-272.

Dunn, L.M. & Dunn, L.M. (1997). *Peabody Picture Vocabulary Test Third Edition Examiner's Manual.* American Guidance Service. Circle Pines, MN, US.

Durand, V.M. & Carr, E.G. (1992). An analysis of maintenance following functional communication training. *Journal of Applied Behavior Analysis, 25,* 777-794.

Edwards, R.T., Ceilleachair, A., Bywater, T., Hughes, D.A., & Hutchings, J. (2007). Parenting programme for parents of children at risk of developing conduct disorder: cost-effectiveness analysis. *British Medical Journal, 334,* 682-687.

Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2002). Intensive behavioral treatment at school for 4- to 7-year-old children with autism. *Behavior Modification, 26,* 49-68.

Elliot, C.D. (1990). *Differential ability scales: Introductory and technical handbook.* New York, NY: The Psychological Corporation.

Evans, M.E., Boothroyd, R.A., Armstrong, M.I., Greenbaum, P.E., Brown, E.C., & Kuppinger, A.D. (2003). An experimental study of the effectiveness of intensive in-home crisis services for children and their families: program outcomes. *Journal of Emotional and Behavioral Disorders, 11,* 92-102.

Fenson, L., Dale, P.S., Reznick, J.S., Thal, D., Bates, E., Hartung, J.P., et al. (1993). MacArthur Communicative Development Inventories: User's guide and technical manual. San Diego, CA: Singular Publishing Group.

Filipek, P. A., Accardo, P. J., Ashwal, S., Baranek, G. T., Cook, E. H., Dawson, G., et al. (2000). Practice parameter: Screening and diagnosis of autism: Report of the quality standards subcommittee of the American Academy of Neurology and the Child. *Neurology Society American Academy of Neurology, 55,* 468-479.

Frea, W. D. & Hepburn, S. L. (1999). Teaching parents of children with autism to perform functional assessments to plan interventions for extremely disruptive behaviours. *Journal of Positive Behavior Interventions, 1,* 112-122.

Gresham, F.M. & MacMillan, D.L. (1998). Early intervention project: Can its claims be substantiated and its effects replicated? *Journal of Autism and Developmental Disorders, 28,* 5-13.

Gross, D. & Tucker, S. (1994). Parenting confidence during toddlerhood: A comparison of mothers and fathers. *Nurse Practitioner, 19,* 25-34.

Harris, S.L., Handleman, J.S., Gordon, R., Kristoff, B., & Fuentes, F. (1991). Changes in cognitive and language functioning of preschool children with autism. *Journal of Autism and Developmental Disorders, 21,* 281-290.

Hastings, R.P. & Beck, A. (2004). Practitioner review: Stress intervention for parents of children with intellectual disabilities. *Journal of Child Psychology and Psychiatry, 45,* 1338-1349.

Hastings, R.P. & Brown, T. (2002). Behavior problems of children with autism, parental self-efficacy, and mental health. *American Journal on Mental Retardation, 107,* 222-232.

Hemsley, R., Howlin, R., Berger, L., Hersov, D., Holbrook, M., Rutter, M. (1978). Treating autistic children in a family context. In M. Rutter and E. Schopler (Eds.), *Autism: Reappraisal of Concepts and Treatment* (pp. 379-411). New York, NY: Plenum.

Howlin, P. (1981). The results of a home-based language training programme with autistic children. *British Journal of Disorders of Communication, 16,* 73-87.

Howlin, P. (1998). Practitioner review: Psychological and educational treatments for autism. *Journal of Child Psychology and Psychiatry, 39,* 307-322.

Ingersoll, B. & Gergans, S. (2007). The effect of a parent-implemented imitation intervention on spontaneous imitation skills in young children with autism. *Research in Developmental Disabilities, 28,* 163-175.

Jacobson, J.W., Mulick, J.A., & Green, G. (1998). Cost-benefit estimates for early intensive behavioural intervention for young children with autism – general model and single state case. *Behavioral Interventions, 13,* 201-226.

Jocelyn, L.J., Casiro, O.G., Beattie, D., Bow, J., & Kneisz, J. (1998). Treatment of children with autism: A randomized controlled trial to evaluate a caregiver-based intervention program in community day-care centers. *Developmental and Behavioral Pediatrics, 19,* 326-334.

Kaiser, A.P., Hancock, T.B., & Nietfeld, J.P. (2000). The effects of parent-implemented enhanced milieu teaching on the social-communication of children with autism. *Early Education & Development, 11,* 423-446.

Kaiser, A.P., Hemmeter, M.L., Ostrosky, M.M., Fischer, R., Yoder, P., & Keefer, M. (1996). The Effects of Teaching Parents to Use Responsive Interaction Strategies. *Topics in Early Childhood Special Education, 16,* 375-406.

Kaiser, A.P. & Hester, P.P. (1995). Preparing parent trainers: An experimental analysis of effects on trainers, parents, and children. *Topics in Early Childhood Special Education, 15,* 385-414.

Kazdin, A.E. (1982). *Single-case research designs: Methods for clinical and applied settings.* New York: Oxford University Press.

Koegel, L.K., Camarata, S.M., Valdez-Menchaca, M., & Koegel (1998). Setting generalization of question-asking by children with autism. *American Journal on Mental Retardation, 102,* 346-357.

Koegel, L.K., Koegel, R.L. & Hurley, C. (1992). Improving social skills and disruptive behaviour in children with autism through self-management. *Journal of Applied Behavior Analysis, 25,* 341-353.

Koegel, R.L., Bimbela, A., & Schreibman, L. (1996). Collateral effects of parent training on family interactions. *Journal of Autism and Developmental Disorders, 26,* 347-359.

Koegel, R.L., Dyer, K., & Bell, L.K. (1987). The influence of child-preferred activities on autistic children's social behavior. *Journal of Applied Behavior Analysis, 20,* 243-252.

Koegel, R.L. & Egel, A.L. (1979). Motivating autistic children. *Journal of Abnormal Psychology, 88,* 418-426.

Koegel, R.L. & Koegel, L.K. (2006). *Pivotal Response Treatments for Autism: Communication, social & academic development*. Baltimore, MD: Paul H. Brookes Publishing Co.

Koegel, R.L., Koegel, L.K., & McNerney, E.K. (2001). Pivotal areas in intervention for autism. *Journal of Clinical Child Psychology, 30,* 19-32.

Koegel, R.L. & Mentis, M. (1985). Motivation in childhood autism: Can they or won't they? *Journal of Child Psychology and Psychiatry, 26,* 185-191.

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., Openden, D., Fredeen, R., & Koegel, L.K. (2006). Basics of pivotal response treatment. In R.L. Koegel & L.K. Koegel (Eds.), *Pivotal Response Treatments for Autism: Communication, social & academic development* (pp. 3-30). Baltimore, MD: Paul H. Brookes Publishing Co.

Koegel, R.L., Schreibman, L., Britten, K.R., Burke, J.C., & O'Neill, R.E. (1982). A comparison of parent training to direct child treatment. In R.L. Koegel, A. Rincover, & A.I. Egel (Eds.). *Educating and Understanding Autistic Children* (pp. 260-279). Housten, TX: College Hill Press.

Koegel, R.L., Schreibman, L., Good, A., Cerniglia, L., Murphy, C., & Koegel, L.K. (1989). How to Teach Pivotal Behaviors to Children with Autism: A Training Manual. Santa Barbara, CA: University of California.

Koegel, R.L., Symon, J.B. & Koegel, L.K. (2002). Parent education for families of children with autism living in geographically distant areas. *Journal of Positive Behavior Interventions, 4,* 88-103.

Landa, R. (2007). Early communication development and intervention for children with autism. *Mental Retardation and Developmental Disabilities Research Reviews, 13,* 16-25.

Landa, R. & Garrett-Mayer, E. (2006). Development in infants with autism spectrum disorders: A prospective study. *Journal of Child Psychology and Psychiatry, 47,* 629-638.

Laski, K.E., Charlop, M.H., & Schreibman, L. (1988). Training parents to use the natural language paradigm to increase their autistic children's speech. *Journal of Applied Behavior Analysis, 21,* 391-400.

Lecavalier, L., Leone, S., & Wiltz, J. (2006). The impact of behaviour problems on caregiver stress in young people with autism spectrum disorders. *Journal of Intellectual Disability Research, 50,* 172-183.

Lerman, D.C., Swiezy, N., Perkins-Parks, S., & Roane, H.S. (2000). Skill acquisition in parents of children with developmental disabilities: interaction between skill type and instructional format. *Research in Developmental Disabilities, 21,* 183-196.

Lord, C., Rutter, M., & DiLavore, P. (1999). *Autism Diagnostic Observation Schedule-Generic (ADOS-G).* The Western Psychological Corporation.

Lord, C., Rutter, M., & LeCouteur, A. (1994). Autism diagnostic interview-revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 24,* 659-685.

Lord, C., Wagner, A., Rogers, S., Szatmari, P., Aman, M., Charman, T. et al. (2005). Challenges in evaluating psychosocial interventions for autistic spectrum disorders. *Journal of Autism and Developmental Disorders, 35,* 695-708.

Lovaas, O.I. (1987). Behavioral treatment and normal educational and intellectual functioning of young autistic children. *Journal of Consulting and Clinical Psychology, 55,* 3-9.

Lovaas, O.I., Koegel, R. L., Simmons, J.Q., & Long, J.S. (1973). Some generalization and follow-up measures on autistic children in behaviour therapy. *Journal of Applied Behavior Analysis, 6,* 131-166.

Magiati, I., Charman, T., & Howlin, P. (2007). A two-year prospective follow-up study of community-based early intensive behavioural intervention and specialist nursery provision for children with autism spectrum disorders. *Journal of Child Psychologyg and Psychiatry, 48,* 803-812.

Mahoney, G., Kaiser, A., Girolametto, L., MacDonald, J., Robinson, C., Safford, P., et al., (1999). Parent education in early intervention: A call for a renewed focus. *Topics in Early Childhood Special Education, 19,* 131-140.

Mahoney, G. & Perales, F. (2005). Relationship-focused early intervention with children with pervasive developmental disorders and other disabilities: A comparative study. *Developmental and Behavioral Pediatrics*, 26 (2), 77-85.

Malmberg, D.B. (2007). Assessment of a collaborative parent education program targeting the rigid and ritualistic behaviours of children with autism. (Doctoral dissertation, Claremont Graduate University, 2007). *Dissertation Abstracts International: Section B: The Sciences and Engineering, 68,* 4866.

Marans, W.D., Rubin, E., & Laurent, A. (2005). Addressing social communication skills in individuals with high-functioning autism and asperger syndrome: Critical priorities in educational programming. In F.R. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds), *Handbook of Autism and Pervasive Developmental Disorders* (pp. 977-1002). New Jersey, US: John Wiley & Sons, Inc.

McConachie, H., Randle, V., Hammal, D., & LeCouteur, A. (2005). A controlled trial of a training course for parents of children with suspected autism spectrum disorder. *The Journal of Pediatrics, 147,* 335-341.

Mesibov, G.B. (1997). Formal and informal measures on the effectiveness of the TEACCH programme. *Autism, 1,* 25-35.

Miller, D.C. (1983). *Handbook of Research Design and Social Measurement: A Text and Reference Book for the Social and Behavioral Sciences, 4th Edition.* New York, NY: Longman.

National Research Council (2001). *Educating children with autism.* Lord, C., & McGee, J., Washington DC: National Academy Press.

Nay, W.R. (1975). A systematic comparison of instructional techniques for parents. *Behavior Therapy, 6,* 14-21.

Openden, D.A. (2005). Pivotal Response Treatment for multiple families of children with autism: Probable efficacy and effectiveness of a group parent workshop. Unpublished doctoral dissertation, University of California at Santa Barbara.

Ozonoff, S. & Cathcart, K. (1998). Effectiveness of a home program intervention for young children with autism. *Journal of Autism and Developmental Disorders, 28,* 25-32.

Panerai, S., Ferrante, L., & Zingale, M. Benefits of the treatment and education of autistic and communication handicapped children (TEACCH) programme as compared with a non-specific approach. *Journal of Intellectual Disability Research, 46,* 318-327.

Pisterman, S., Firestone, P., McGrath, P., Goodman, J.T., Webster, I., Mallory, R., et al. (1992). The effects of parent training on parenting stress and sense of competence. *Canadian Journal of Behavioural Science, 24,* 41-58.

Richard, N. & Graham, P. (1971). A behavioural screening questionnaire for use with three-year-old children. Preliminary findings. *Journal of Child Psychology and Psychiatry, 12,* 5-33.

Risi, S., Lord, C., Gotham, K., Corsello, C., Chrysler, C., Szatmari, P. et al. (2006). Combining information from multiple sources in the diagnosis of autism spectrum disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 45,* 1094-1103.

Rocha, M.L., Schreibman, L., & Stahmer, A.C. (2007). Effectiveness of training parents to teach joint attention children with autism. *Journal of Early Intervention, 29,* 154-172.

Rogers, S. (1998). Empirically supported comprehensive treatments for young children with autism. *Journal of Clinical Child Psychology, 27,* 168-179.

Rogers, S.J. & Vismara, L.A. (2008). Evidence-based comprehensive treatements for early autism. *Journal of Clinical Child and Adolescent Psychology, 37,* 8-38.

RUPP (2007). Parent training for children with pervasive developmental disorders: a multi-site feasibility trial. Behavioral Interventions, 22, 179-199.

Sallows, G.O., & Graupner, T.D. (2005). Intensive behavioural treatment for children with autism: Four-year outcome and predictors. *American Journal on Mental Retardation, 110,* 417-438.

Scheel, M.J. & Rieckmann, T. (1998). An empirically derived description of self-efficacy and empowerment for parents of children identified as psychologically disordered. *The American Journal of Family Therapy, 26,* 15-27.

Schertz, H. H. & Odom, S. L. (2007). Promoting joint attention in toddlers with autism: A parent-mediated developmental model. *Journal of Autism and Developmental Disorders*, 37, 1562–1575.

Schopler, E. (2005). Comments on 'Challenges in evaluating psychosocial intervention for autistic spectrum disorders' by Lord et al. *Journal of Autism and Developmental Disorders, 35,* 709-711.

Schopler, E. & Reichler, R. J. (1971). Parents as Cotherapists in the treatment of psychotic children 1. *Journal of Autism and Childhood Schizophrenia*, 1 (1), 87-102.

Schreibman, L. (1983). Are we forgetting the parent in parent training? *The Behaviour Therapist, 6,* 107-109.

Schreibman, L., Kaneko, W.M., & Koegel, R.L. (1991). Positive affect of parents of autistic children: A comparison across two teaching techniques. *Behavior Therapy,* 22, 479-490.

Schreibman, L. & Koegel, R.L. (2005). Training for parents of children with autism: Pivotal responses, generalization, and individualization of interventions. In E.D. Hibbs & P.S. Jensen (Eds), *Psychosocial Treatments for Child and Adolescent Disorders: Empirically Based Strategies for Clinical Practice 2nd Edition (pp. 605-631).* Washington, DC: American Psychological Association.

Seung, H. K., Ashwell, S., Elder, J. H., & Valcante, G. (2006). Verbal communication outcomes in children with autism after in-home father training. *Journal of Intellectual Disability Research*, 50 (2), 139-150.

Sheskin, D.J. (2007). *Handbook of Parametric and Nonparametric Statistical Procedures Fourth Edition.* Boca Raton, FL: Chapman & Hall/CRC.

Smith, I.M., McCleave, C., Putnam, L., Smith, L., Landry, R, Chitty, D. et al. (2008, May). *Novel community-based early intervention program for autism: One-year outcomes.* Poster session presented at the International Meeting for Autism Research.

Smith, T., Groen, A. D., & Wynn, J. W. (2000). Randomized trial of intensive early intervention for children with pervasive developmental disorder. *American Journal on Mental Retardation*, 105 (4), 269-285.

Smith, T., Scahill, L., Dawson, G., Guthrie, D., Lord, C., Odom, S., et al. (2007). Designing research studies on psychosocial interventions in autism. *Journal of Autism and Developmental Disorders, 37,* 354-366.

Sofronoff, K., Leslie, A., & Brown, W. (2004). Parent management training and Asperger syndrome. *Autism, 8,* 301-317.

Solomon, M., Necheles, J., Ferch, C., & Bruckman, D. (2007). Pilot study of a parent training program for young children with autism. *Autism, 11,* 205-224.

Sparrow, S.A., Balla, D.A., & Cicchetti, D.V. (1984). *Vineland Adaptive Behavior Scales.* Circle Pines, Minn: American Guidance Services.

Stahmer, A. C. & Gist, K. (2001). The effects of an accelerated parent education program on technique mastery and child outcome. *Journal of Positive Behaviour Interventions*, 3 (2), 75-82.

Strain, P.S. & Hoyson, M. (2000). The need for longitudinal, intensive social skill intervention: LEAP follow-up outcomes for children with autism. *Topics in Early Childhood Special Education, 20*, 116-122.

Sussman, F. (1999). *More Than Words: Helping Parents Promote Communication and Social Skills in Children with Autism Spectrum Disorder.* Toronto, ON: Hanen Centre.

Symon, J. B. (2005). Expanding interventions for children with autism: Parents as trainers. *Journal of Positive Behavior Interventions,* 7 (3), 159-173.

Tucker, S., Gross, D., Fogg, L., Delaney, K., & Lapporte, R. (1998). The long-term efficacy of a behavioral parent training intervention for families with 2-year-olds. *Research in Nursing and Health, 21,* 1999-210.

Turnbull, A.P., Blue-Banning, M., Turbiville, V., & Park, J. (1999). From parent education to partnership education: A call for a transformed focus. *Topics in Early Childhood Special Education, 19,* 165-172.

Wacker, D.P., Berg, W.K., Harding, J.W., Anjali, B., Rankin, B., & Ganzer, J. (2005). Treatment effectiveness, stimulus generalization, and acceptability to parents of functional communication training. *Educational Psychology, 25,* 233-256.

Watkins, M.W. & Pacheco, M. (2000). Interobserver agreement in behavioural research: Importance and calculation. *Journal of Behavioral Education, 10,* 205-212.

Wechsler, D. (2002). *Wechsler Preschool and Primary Scale of Intelligence, 3rd edition (WPPSI-III).* San Antonion, TX: Psychological Corporation.

Weisz, J.R. (1979). Perceived control and learned helplessness among mentally retarded and nonretarded children: A developmental analysis. *Developmental Psychology, 15,* 311-319.

Wilcoxon, F. (1945). Individual comparisons by ranking methods. *Biometrics Bulletin, 1,* 80-83.

Woods, J.J. & Wetherby, A.M. (2003). Early identification of and intervention for infants and toddlers who are at risk for autism spectrum disorder. *Language, Speech, and Hearing Services in Schools, 34,* 180-193.

Zimmerman, I.L., Steiner, V.G., & Pond, R.E. (2002). *Preschool Language Scale-Fourth Edition Examiner's Manual.* The Psychological Corporation. San Antonio, TX, US.

Appendix A. Recruitment Letter to Parents

Theresa Milligan
IWK Autism Team Coordinator
IWK Health Centre
5850 University Ave.
Halifax, NS B3J 6R8

Date of Letter Sent, 2006

Dear Parents,

I am writing to tell you about a research study being conducted at the IWK Health Centre by Jamesie Coolican (PhD Candidate) and Dr. Susan Bryson (Professor and Craig Chair of Autism Research). These researchers are looking for families who have a child with autistic spectrum disorder (ASD) to participate in their research study. In this study, they are looking at the effects of brief training for parents of children recently diagnosed with ASD. Parents will be trained in Pivotal Response Treatment (PRT), the type of treatment used in the provincial Early Intensive Behavioural Intervention (EIBI) program. However, unlike the EIBI program, which is much more intensive and involves various specialists, this study focuses specifically on training parents in PRT. The researchers' hope is that this work will contribute to the development of immediate ways of assisting children with ASD and their parents.

For the purpose of this study, the researchers are looking for families with a child who is under 5 years of age, is not attending school, and is not already receiving some form of Applied Behaviour Analysis (ABA; including EIBI) treatment. Enrolment in the study is limited to the first 10 families who volunteer to participate. If you participate, you and your child will be asked to attend three 2-hour training sessions (two at the IWK and one at your home) scheduled at your convenience. You will also be provided with a PRT manual. In order to see how you and your child are doing, the researchers will videotape you playing with your child on a number of occasions before, immediately and 3-months after the training. You will also be asked to fill out brief questionnaires about yourself and your child before, immediately and 3-months after the training. Regardless of whether you decide to participate in the study or not, your child will still be eligible to receive EIBI at some point. If you are interested in finding out more about this research study, please contact Jamesie Coolican by phone at (902) 470-7275 or by e-mail at Jamesie.Coolican@iwk.nshealth.ca.

Thank you for your time and consideration,

Theresa Milligan
IWK Autism Team Coordinator

Appendix B. PRT Checklist Provided to Parents

Pivotal Response Checklist

- Do I have the child's attention?
- Am I using clear, short, direct instructions?
- Am I following my child's lead or choice of activity?
- Am I giving a mixture of already learned and still to be learned tasks?
- Am I reinforcing/rewarding good trying?
- Am I reinforcing/rewarding with a built in reward – one that my child is asking for?
- Am I reinforcing/rewarding right away?

Appendix C. Functional Verbal Utterance Coding Sheet

| INTERVAL | CODE | INTERVAL | CODE |
|---|---|---|---|
| 00:00-00:15 | | 05:01-05:15 | |
| 00:16-00:30 | | 05:16-05:30 | |
| 00:31-00:45 | | 05:31-05:45 | |
| 00:46-01:00 | | 05:46-06:00 | |
| 01:01-01:15 | | 06:01-06:15 | |
| 01:16-01:30 | | 06:16-06:30 | |
| 01:31-01:45 | | 06:31-06:45 | |
| 01:46-02:00 | | 06:46-07:00 | |
| 02:01-02:15 | | 07:01-07:15 | |
| 02:16-02:30 | | 07:16-07:30 | |
| 02:31-02:45 | | 07:31-07:45 | |
| 02:46-03:00 | | 07:46-08:00 | |
| 03:01-03:15 | | 08:01-08:15 | |
| 03:16-03:30 | | 08:16-08:30 | |
| 03:31-03:45 | | 08:31-08:45 | |
| 03:46-04:00 | | 08:46-09:00 | |
| 04:01-04:15 | | 09:01-09:15 | |
| 04:16-04:30 | | 09:16-09:30 | |
| 04:31-04:45 | | 09:31-09:45 | |
| 04:46-05:00 | | 09:46-10:00 | |

**Ratio:**

**Percentage:**

Feedback/Notes:

Operational Definition

A verbalization that includes the following: (a) the use of at least normal vocal loudness; (b) body and facial orientation towards the adult and/or relevant stimulus materials; (c) the vocalization appears functional or task-directed and purposeful. Although the utterance needs to be meaningful to the communicative partner, it does not need to be phonetically correct. Functional verbal utterances include requests, refusals, comments, responses, initiations, and questions. Immediate or delayed echolalic responses, out of context responses, and verbalizations that are stereotypic and repetitive are not included as functional verbal utterances. Reading does not count as a functional verbal utterance. Finally, if the child engages in disruptive behaviors (e.g. screaming, whining, hitting) or does not attempt to communicate verbally, the interval is not scored as containing a functional verbal utterance.

Appendix D. Definitions and Coding Guidelines for the Nature of Child Utterances

Model Prompted: A response (by the child) that is preceded by a parental prompt that is functionally equivalent to the response (e.g., A: "bubbles?" C: "babo"). Model prompts often consist of one- or few-word statements that are repeated exactly or approximated by the child.

Indirectly Prompted: A response that is not preceded by a model prompt, but is preceded by some other parental action. This can include an open-ended question (e.g., What do you want?), a choice question (A: "Do you want the red car or the blue car?" C: "red car"), a leading prompt (e.g., A: "1, 2, 3, ..." C: "go"), or a time delay (e.g. holding up a toy and waiting for the child to ask for it).

Initiation: The child communicates when there is no directive action from the parent (e.g., the parent has not said anything and/or is not using a time delay). The verbalization must be functional and appropriate to the situation (i.e., delayed echolalia and stereotypic responses are not considered an initiation).

Inappropriate Response: If the child makes a response that is echolalic, non-communicative, non-functional, unintelligible to his/her parent, out of context, inappropriate, undirected, or disruptive.

No Response: If the child did not verbally respond to the adult's question or prompt.

Overall Responsivity: The proportion of times the child responds appropriately, following either a model prompt or an indirect prompt.

Guidelines for Coding:

1. Code 5 minutes of video, starting at 1 minute
2. Language opportunities:
   a. A new opportunity for language is coded if either the child gives a verbal response or at least 2 seconds elapse without a verbal response from the child.
   b. A physical command is not coded as a language opportunity (e.g., get the car, point to the duck), unless the adult is expecting the child to complete the sentence (e.g., point to the ....)
3. Responses (Model Prompted, Indirectly Prompted, Initiation):
   a. Responses must be communicative, functional, and appropriate.
      i. Body and facial orientation towards the parent and/or relevant stimulus materials.
      ii. The vocalization appeared functional or related to the task.
      iii. The vocalization should be meaningful to the parent.
   b. Reading is not coded as a response.

Appendix E. Disruptive Behaviour Coding Sheet

| INTERVAL | CODE | INTERVAL | CODE |
|---|---|---|---|
| 00:00-00:15 | | 05:01-05:15 | |
| 00:16-00:30 | | 05:16-05:30 | |
| 00:31-00:45 | | 05:31-05:45 | |
| 00:46-01:00 | | 05:46-06:00 | |
| 01:01-01:15 | | 06:01-06:15 | |
| 01:16-01:30 | | 06:16-06:30 | |
| 01:31-01:45 | | 06:31-06:45 | |
| 01:46-02:00 | | 06:46-07:00 | |
| 02:01-02:15 | | 07:01-07:15 | |
| 02:16-02:30 | | 07:16-07:30 | |
| 02:31-02:45 | | 07:31-07:45 | |
| 02:46-03:00 | | 07:46-08:00 | |
| 03:01-03:15 | | 08:01-08:15 | |
| 03:16-03:30 | | 08:16-08:30 | |
| 03:31-03:45 | | 08:31-08:45 | |
| 03:46-04:00 | | 08:46-09:00 | |
| 04:01-04:15 | | 09:01-09:15 | |
| 04:16-04:30 | | 09:16-09:30 | |
| 04:31-04:45 | | 09:31-09:45 | |
| 04:46-05:00 | | 09:46-10:00 | |

**Ratio:**

**Percentage:**

Feedback/Notes:

Operational Definition

A disruptive behaviour includes the following: (a) vocal (i.e. screaming, crying, intentional whining (body and facial orientation towards the parent and/or relevant stimulus materials) or whining in response to a language opportunity (within 2 seconds)); (b) physical (i.e. hitting self or other, kicking, throwing, pushing); or (c) oral (i.e. biting self or other, spitting).

Appendix F. Child Affect Coding Sheet

Coded every 2 minutes within 10 minute video segment.

| Interval | Child Affect |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| Mean | |

Comments:

| ***Expressions of Child Affect*** | |
|---|---|
| ***Highly Negative*** **1** | Child does not appear to be enjoying himself/herself. There are clear signs of distress, anger, fear, sadness or frustration. |
| ***Mildly Negative*** **2** | No clear signs of negative affect, but some indication of irritation, impatience, boredom, apprehension. An impression that "he or she would rather be elsewhere". |
| ***Neutral*** **3** | Child does not display overall signs of positive or negative affect. May smile or frown occasionally, yet displays an overall neutral aura. |
| ***Mildly Positive*** **4** | No clear "full-blown" joy, but the mood is nevertheless pleasant. |
| ***Highly Positive*** **5** | Child enjoys himself/herself- may smile, laugh happily out loud, or jump with joy. Must be jumping with the purpose of expressing joy, and not to display repetitive behaviour or to express discontent. |

Appendix G. Fidelity of Implementation Scoring Sheet

| 1-Min Intervals | Clear | Choice | Contingent (Appropriate & Immediate) | Natural | Attempts |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| % | | | | | |

**TOTAL: _____**

**Score each category as + or –.
**Watch the whole 10-minute sequence, then score each 1-minute interval.
**Score entire 1-minute interval as – if no opportunities for language are provided.
**Parents' performance should be independent of child's response.
Feedback/Notes:

Operational Definitions

1. Clear. Parent provides concise commands, clear opportunities for verbal responses, or clear instructions to the child (e.g., showing a toy, asking a clear question, labeling an object) and is able to maintain the child's attention either to the task or to the adult while presenting the instructions during the entire 2-minute interval.
2. Choice. Parent does any of the following: (a) provides two or more alternatives from which the child could choose (b) allows the child to accept or reject an activity (c) prompts the child to select an activity from an open-ended question (d) follows the child's lead in selecting activities by responding to the child's verbal or nonverbal initiations of choosing an activity.
3. Contingent. Parent provides a reward immediately following the child's correct verbal response or attempt. Parent does not provide a reward if the child does not respond or responds inappropriately (i.e. disruptive).
4. Natural. Parent provides a contingent reward that is directly related to the child's expressive verbalizations rather than providing a reward that is unrelated to the child's expressive verbalization.
5. Attempts. Parent provides contingent rewards that are delivered following both the child's functional expressive verbal attempts and correct verbal responses.

Appendix H. Parental Self-Efficacy Questionnaire (Hastings & Brown, 2002)

Below are several questions that ask about your responses to challenging/difficult behaviours displayed by your child with an Autism Spectrum Disorder (ASD). Please read each question, and place a circle around the number on the scale that reflects your own views. If your views are described best by the end points of the scale, please circle either number 1 or number 7. If your views are somewhere in between the two end points, please select a position on the scale that reflects where you feel your views should be placed. Please select a response for each of the questions.

**How confident are you in dealing with the challenging behaviours of your child with ASD?**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Not at all confident | | | | | Very confident | |

**How difficult do you personally find it to deal with the challenging behaviours of your child with ASD?**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Very difficult | | | | | Not at all difficult | |

**To what extent do you feel that the way you deal with the challenging behaviours of your child with ASD has a positive effect?**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Has no positive effect at all | | | | | Has a very positive effect | |

**How satisfied are you with the way in which you deal with the challenging behaviours of your child with ASD?**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Not satisfied at all | | | | | Very satisfied | |

**To what extent do you feel in control of the challenging behaviours of your child with ASD?**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Not in control at all | | | | | Very much in control | |

Appendix I. Parental Stress Scale (Berry & Jones, 1998)

The following statements describe feelings and perceptions about the experience of being a parent. Think of each of the items in terms of how your relationship with your child or children typically is. Please indicate the degree to which you agree or disagree with the following items by placing the appropriate number in the space provided.

1 = Strongly disagree 2 = Disagree 3 = Undecided 4 = Agree 5 = Strongly agree

____ 1. I am happy in my role as a parent.

____ 2. There is little or nothing I wouldn't do for my child(ren) if it was necessary.

____ 3. Caring for my child(ren) sometimes takes more time and energy than I have to give.

____ 4. I sometimes worry whether I am doing enough for my child(ren).

____ 5. I feel close to my child(ren).

____ 6. I enjoy spending time with my child(ren).

____ 7. My child(ren) is an important source of affection for me.

____ 8. Having child(ren) gives me a more certain and optimistic view for the future.

____ 9. The major source of stress in my life is my child(ren).

____ 10. Having child(ren) leaves little time and flexibility in my life.

____ 11. Having child(ren) has been a financial burden.

____ 12. It is difficult to balance different responsibilities because of my child(ren).

____ 13. The behavior of my child(ren) is often embarrassing or stressful to me.

____ 14. If I had it to do over again, I might decide not to have child(ren).

____ 15. I feel overwhelmed by the responsibility of being a parent.

____ 16. Having child(ren) has meant having too few choices and too little control over my life.

____ 17. I am satisfied as a parent.

____ 18. I find my child(ren) enjoyable.

Appendix J. Parent Affect Coding Sheet

Coded every 2 minutes within 10 minute video segment.

| Interval | Parent Affect |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| Mean | |

Comments:

| ***Expressions of Parent Affect*** | |
|---|---|
| ***Highly Negative*** **1** | Adult does not appear to be enjoying himself/herself. Adult appears discontent with the ongoing activities. |
| ***Mildly Negative*** **2** | No clear signs of negative affect, but some indication of irritation, impatience, boredom, apprehension. An impression that "he or she would rather be elsewhere". |
| ***Neutral*** **3** | Adult does not display overall signs of positive or negative affect. May smile or frown occasionally, yet displays an overall neutral aura. |
| ***Mildly Positive*** **4** | No clear "full-blown" joy, but the mood is nevertheless pleasant. |
| ***Highly Positive*** **5** | Adult enjoys himself/herself- may smile, or laugh. |

Appendix K. Parent Satisfaction Questionnaire

**Please circle your response:**

1. How helpful were the training sessions in teaching you the PRT principles?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Not Helpful At All | | | | | Somewhat Helpful | | | | Extremely Helpful | |

2. How helpful was it to review the video of the training session at home?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Not Helpful At All | | | | | Somewhat Helpful | | | | Extremely Helpful | |

3. How helpful was the training manual?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Not Helpful At All | | | | | Somewhat Helpful | | | | Extremely Helpful | |

4. Overall, how helpful was the training in PRT for increasing your child's language?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Not Helpful At All | | | | | Somewhat Helpful | | | | Extremely Helpful | |

5. Overall, how helpful was the training in PRT for decreasing your child's disruptive behaviour (e.g., crying, tantrums)?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Not Helpful At All | | | | | Somewhat Helpful | | | | Extremely Helpful | |

6. Overall, how would you rate the whole training experience?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Not Helpful At All | | | | | Somewhat Helpful | | | | Extremely Helpful | |

Please feel free to add any other additional comments below.