

A Pilot Study of Parent Training in Young Children with Autism Spectrum Disorders and Disruptive Behavior

Karen Bearss · Cynthia Johnson · Benjamin Handen ·
Tristram Smith · Lawrence Scahill

Published online: 1 September 2012
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Abstract Guidance on effective interventions for disruptive behavior in young children with autism spectrum disorders (ASDs) is limited. We present feasibility and initial efficacy data on a structured parent training program for 16 children (ages 3–6) with ASD and disruptive behavior. The 6-month intervention included 11 Core and up to 2 Optional sessions. The program was acceptable to parents as evidenced by an attendance rate of 84 % for Core sessions. Fourteen of 16 families completed the treatment. An independent clinician rated 14 of 16 subjects as much improved or very much improved at Week 24. Using last observation carried forward, the parent-rated

Aberrant Behavior Checklist-Irritability subscale decreased 54 % from 16.00 (SD = 9.21) to 7.38 (SD = 6.15).

Keywords Autism · Parent training · Disruptive behavior · Adaptive skills

Introduction

Parent training (PT) for disruptive behaviors is not new. The efficacy of PT in typically developing children with disruptive behavior from preschool through adolescence is supported by over 30 years of rigorous evaluation (Barkley 1997; Kazdin 2005; Lundahl et al. 2006; Reyno and McGrath 2006; Webster-Stratton and Reid 2010; Zisser and Eyberg 2010). PT has also been applied to children with intellectual disability (ID) uncomplicated by autism spectrum disorders (ASDs) (Wade et al. 2008.) Based on the work of Baker and others (Baker 2006; Baker and Brightman 2004), parent training is generally regarded as efficacious in this population.

The need for parent training for children with ASD is well founded as disruptive behaviors affect as many as 50–70 % of these children (Gadow et al. 2004; Lecavalier 2006). Commonly observed disruptive behavior problems in ASD include tantrums, aggression, noncompliance with routine demands, self-injury, property destruction, recklessness, and hyperactivity. These behaviors interfere with the acquisition and performance of daily living skills. Indeed, on measures of adaptive functioning, children with ASD are often a full standard deviation below their assessed cognitive ability (Carter et al. 1998; Kraijer 2000; Paul et al. 2004; Saulnier and Klin 2007; Williams et al. 2006). Disruptive behaviors also interfere with family quality of life (Allik et al. 2006; Herring et al. 2006). Compared to parents

K. Bearss (✉)
Marcus Autism Center, Children's Healthcare of Atlanta,
Department of Pediatrics, Emory University School of Medicine,
1920 Briarcliff Road NE, Atlanta, GA 30329, USA
e-mail: karen.bearss@emory.edu

C. Johnson
Department of Pediatrics, University of Pittsburgh School
of Medicine, 3420 Fifth Avenue, Pittsburgh, PA 15213, USA

B. Handen
Western Psychiatric Institute and Clinic, University of Pittsburgh
School of Medicine, 1011 Bingham Street, Pittsburgh,
PA 15203, USA

T. Smith
Department of Pediatrics, University of Rochester Medical
Center, 601 Elmwood Ave, Box 671, Rochester,
NY 14642, USA

L. Scahill
Yale University, PO Box 207900, 40 Temple Street,
Suite 7D, New Haven, CT 06510, USA

of typically developing children, parents of children with ASD report a greater sense of helplessness and are more likely to avoid conflict when facing challenges of parenting (Pisula and Kossakowska 2010). A PT intervention model to target these disruptive behaviors could be a cost effective approach that has the potential to be disseminated in areas where specialized, intensive services are not available.

While there certainly is a need for PT to address disruptive behaviors in children with ASD, most research on parent-mediated interventions in this population focuses on helping parents treat core features of autism such as socialization and communication (Aldred et al. 2004; Carter et al. 2011; Dawson et al. 2010; Drew et al. 2002; Green et al. 2010; Kasari et al. 2010; Oosterling et al. 2010). Parents have been included in treatment and taught ways to enhance their child's eye contact, joint attention and play skills. For example, Kasari et al. (2010) provided 24 caregiver-mediated sessions over 8 weeks focused on increasing joint engagement between caregivers and toddlers with autism. Parent training also has shown to be an effective adjunct to medication and school-based programs for children with ASD in large scale randomized clinical trials (RCT) (Aman et al. 2009; Dawson et al. 2010; Landa et al. 2011). For example, in Dawson et al.'s (2010) study therapists conducted twice-monthly parent training to augment intensive child-focused intervention.

In comparison, PT for disruptive behavior focuses on teaching parents strategies to prevent or respond to such behavior. Examples of strategies include the use of visual schedules, environmental manipulations, differential reinforcement, and techniques for delivering instructions designed to increase the child's compliance. Empirical evidence for the use of these strategies as tools to reduce disruptive behavior in children and adolescents with ASD comes mainly from single-subject design trials (Horner et al. 2002; Odom et al. 2003; Smith et al. 2007) and a handful of small sample RCTs (Laugesen et al. 2008; see McConachie and Diggle 2007 review; Sofronoff et al. 2004; Whittingham et al. 2009). These programs also vary in "dose of PT"—from many small group sessions to several individual sessions with the parent and trainer. Programs also have varied in their level of adherence to a behavior analytic orientation versus a social learning theory model or other parent-child interactional approach. While these studies offer proof of concept, drawbacks include implementation at specialized centers, highly individualized delivery with expert clinicians, small sample sizes, and idiosyncratic target behaviors and outcome measurement. The study of PT as a stand-alone intervention for disruptive behavior in children with ASD using rigorous study methods—blinded independent ratings of change, random assignment to treatment and large sample sizes—continues to remain surprisingly limited (Frohna 2005; Scahill and Lord 2004; Smith et al. 2007).

An emerging development is the need for structured manuals that facilitate accurate and consistent implementation of parent training by different clinicians across settings (Johnson et al. 2007). The Research Units on Pediatric Psychopharmacology (RUPP) Autism Network developed and tested a structured PT program in combination with medication in 124 children ages 4–13 with ASD and serious behavioral problems (Johnson et al. 2007; Scahill et al. 2009; Aman et al. 2009). This program consisted of 11 individually administered sessions based on a behavior analytic orientation. The first session introduced the ABC (Antecedent, Behavior, Consequence) model for assessing the possible functions and motivations of disruptive behaviors. Subsequent sessions presented strategies for antecedent management (e.g., visual schedules), reinforcement, planned ignoring, and compliance training. The final sessions focused on strategies for teaching new skills (e.g., functional communication, independent completion of self-help tasks) and generalizing and maintaining gains over time. This sequence was intended to make children's disruptive behaviors more manageable so that, by the later sessions, they would be more amenable to learning new skills (and parents would be more willing to teach them). The strategies in the PT program have been tested in single subject studies but not packaged in this manner as a way to systematically teach parents the skills (Johnson et al. 2007). This PT program, in combination with medication (risperidone), produced larger reductions in problem behavior and greater gains in some domains of adaptive functioning than risperidone alone in a randomized clinical trial of 124 children with autism and severe problem behavior (Aman et al. 2009; Scahill et al. 2012).

An ad hoc committee convened by the National Institute of Mental Health (NIMH) (Lord et al. 2005; Smith et al. 2007) cited two prerequisites for conducting a large-scale RCT in autism: the development of a treatment manual and a pilot study showing that the intervention is feasible (Smith et al. 2007). The treatment manual assembles validated techniques into a standardized format that can be evaluated in an RCT. The feasibility study demonstrates that the treatment is acceptable to families and can be delivered uniformly by different clinicians at different sites.

The RUPP Autism Network PT program was designed as an *adjunct* to medication in children 4–13 years of age. The current study describes the feasibility and initial efficacy of a modified downward extension of the RUPP Autism Network PT manual as a stand-alone treatment for younger children with ASD accompanied by disruptive and noncompliant behavior. We define feasibility as evidence that the treatment is acceptable to families of young children with ASD accompanied by disruptive behavior and that the structured manual can be delivered in a consistent manner across families. Efficacy is defined as a reduction

in parent-reported disruptive behavior problems and an increase in adaptive functioning. This study is preliminary in nature as the successful downward extension of this PT manual for younger children is a necessary prerequisite for launching a multisite randomized trial of PT in young children with ASD.

Methods

Design

This study was approved by the study site Human Investigation Committee and all participating parents provided written informed consent prior to inclusion in the study. This was a 6-month open trial of a PT program that included 11 core sessions, up to two optional sessions, 2 home visits, and 3 booster sessions (two by phone, one in person). The intervention was carried out by two therapists with independent treatment fidelity evaluation and independent rating of overall treatment impact. Outcome measures were administered at Baseline, Week 8, 16, and 24. Measures included parent and teacher questionnaires, as well as clinician-administered interviews (see “Measures” section).

Subjects

To be eligible for this trial, children needed to have an autism spectrum diagnosis (based on the Autism Diagnostic Observation Schedule (ADOS) and clinical evaluation), be between 3 years and 6 years, 11 months at screening and have a receptive language age equivalent of ≥ 18 months. The purpose of the receptive language cutoff was to ensure that children could comprehend simple one-step demands, as was necessary for the PT sessions on compliance training and teaching skills. Subjects were also required to be in a stable behavioral or educational program and either on no medication or on a stable dose for at least 6 weeks prior to baseline with no anticipated changes for the duration of the trial. This criterion was intended to ensure that changes in child behavior were due to the study intervention and not to a new medication or service that the child was receiving outside of the study. Although there was no required cut-off score on measures of disruptive behavior, all subjects had to have at least one parent-nominated target problem reflecting disruptive or non-compliant behavior. No child was excluded based on ABC-I severity score. Families were excluded if they were currently participating in another parent-focused intervention. Based on the judgment of the clinical research team, children whose behavior was severe enough to warrant more aggressive treatment than could be offered through the study (e.g., inpatient/residential; medication) also were excluded. While PT was provided at no charge, families did not otherwise

receive compensation other than validation of parking for participation in the various assessments or treatment.

Measures

Subject Characterization

Demographic Data Form This form was developed for the trial to collect information on the child’s sex, age, ethnicity, and school placement, as well as parent age, education and employment, family living arrangement, and income.

Autism Diagnostic Observation Schedule (ADOS; Lord et al. 2002) The ADOS is a well-established diagnostic instrument that places the child in naturalistic social situations designed to evoke communication and interaction with the examiner. Behaviors are coded in the areas of social communication, social relatedness, play and imagination, and repetitive behaviors. The ADOS was administered by research-reliable masters- or doctoral-level clinicians and was used in combination with clinical judgment to make the diagnosis of an autism spectrum disorder. ADOS administrations in the 6 months prior to study enrollment were allowed for subject characterization.

Cognitive Testing Twelve of 16 children completed the *Mullen Scales of Early Learning* (Mullen 1995) as part of their screening evaluation. The Mullen is an individually-administered comprehensive measure of developmental functioning for infants and preschool children from birth through 68 months. The remaining 4 children had recently completed a private clinical evaluation which included either the *Kaufman Assessment Battery for Children, 2nd Edition (KABC-II)* (Kaufman and Kaufman 2004) ($n = 2$) or the *Wechsler Preschool and Primary Scales—3rd Edition (WPPSI-III)* (Wechsler, 2002) ($n = 2$), both of which are individually administered tests of processing and cognitive abilities for children. The Early Learning Composite (ELC) from the Mullen, the Full Scale IQ from the WPPSI-III or the Mental Processing Index from the KABC-II were used to classify the children’s early cognitive functioning.

Intensity of Intervention Form This form was used to document concomitant treatments (including medication, educational, and behavioral) received by the children during the course of their participation in the study.

Outcome Measures

Aberrant Behavior Checklist (ABC; Aman et al. 1985a, b) The ABC is a parent- and teacher-report measure with 58

items, each rated on a four-point Likert scale (with higher scores being more severe) on five subscales: *Irritability* (tantrums, aggression and self-injury, 15 items); *Social Withdrawal* (16 items); *Stereotypies* (7 items); *Hyperactivity* (16 items); and *Inappropriate Speech* (4 items), (Aman et al. 1985a; Brown et al. 2002). The primary outcome measure for this pilot study was the parent-report ABC Irritability subscale, which has been commonly used in clinical trials in children with ASDs (RUPP Autism Network 2002). Because the Hyperactivity subscale also includes noncompliant behavior, it served as an important secondary outcome measure. The teacher-report ABC Irritability and Hyperactivity scales were also secondary outcome measures.

Home Situations Questionnaire (HSQ) (Barkley and Murphy 1998) The HSQ is a parent-rated scale for child noncompliance across 25 everyday situations. Each item is rated as a problem: “yes” or “no”; “yes” items are then scored from 1 (mild) to 9 (severe). The total severity score is divided by 25 to obtain a per item mean. The slightly modified version of the HSQ for children with ASDs used in this pilot study was also used in the RUPP Autism Network trial (Aman et al. 2009) and found to be reliable (Chowdhury et al. 2010).

Clinical Global Impression: Improvement Scale (CGI-I; Guy 1976) The CGI-I is a 7-point scale designed to measure overall improvement from baseline. Scores range from 1 (Very Much Improved) to 4 (Unchanged) to 7 (Very Much Worse). The CGI-I was used by the study independent evaluator who was uninvolved in PT and did not discuss cases with the therapist. His role is to assess overall response to treatment based on all available information (HSQ, ABC, and Parent Target Problems). Subjects who received CGI-I scores of 1 (Very Much Improved) or 2 (Much Improved) at Week 24 were classified as *positive responders*; all other subjects were classified as *non-responders*.

Parent Target Problems (Arnold et al. 2003) This is an individualized description of the child’s two most pressing problems nominated by the primary caregiver. After the parent identifies the two problems, the independent evaluator asks about the frequency (for episodic behaviors) or constancy (for problems such as hyperactivity that reflect more enduring patterns), intensity and impact of the behavior on the family. The descriptions are recorded in brief narratives. The target problem narrative at baseline is reviewed and revised at specific time points during the study. The independent evaluator uses this description along with all other available information to make the CGI-I rating.

Vineland Adaptive Behavior Scales: Interview Format (VABS; Sparrow et al. 1984) The VABS assesses adaptive functioning across several domains and relies on the primary caretaker to describe what the child actually *does* in the course of daily living. The Vineland provides standard scores (against population norms of 100 ± 15) on four Core domains (Communication, Daily Living Skills, Socialization, Motor Skills) as well as an Adaptive Behavior Composite. Since its reintroduction in 1984, the VABS has become the most commonly used measure of adaptive functioning in the developmental disabilities field (Sparrow et al. 1984). The clinician-administered interview format was utilized in this study.

Parent Satisfaction Questionnaire (RUPP Autism Network 2007) This questionnaire, originally developed by the RUPP Autism Network (RUPP Autism Network 2007), was modified for use in the current study. The 20-item scale was administered at the end of the PT program. It includes items concerning parent approval with various facets of the PT program such as session content, the number and length of sessions, the teaching tools such as videotape vignettes, in-session worksheets and homework, and their level of confidence in handling future behavioral problems. Parents indicate how often they applied the behavior management principles in daily life, which aspects of the PT program were particularly valuable and which aspects were less useful.

Treatment Fidelity Checklist (Johnson et al. 2007) Checklists, which included two components: *Therapist Goals* and *Parent Objectives*, were created for each Core and Optional Session. The therapist is rated on adherence to each of the session’s goals as well as the parent’s attainment of a range of session objectives using a scale of 0–2 (0 = Therapist Goal/Parent Objective was not achieved; 1 = Therapist Goal/Parent Objective was partially achieved; 2 = Therapist Goal/Parent Objective was fully achieved). Therapist fidelity to session goals and parent attainment of session objectives was then calculated in percentages (e.g., therapist received 2’s on all 4 session goals scored 100 % fidelity to the session.) These scales were developed for the RUPP parent training program to assist in assessing treatment fidelity (RUPP Autism Network 2007). For clinical purposes, therapists completed fidelity and adherence checklists after each session. For data analysis, independent observers completed these checklists for a random selection of 10 % of these sessions.

PT Intervention

The original RUPP-PT manual contained 11 “Core” and 7 “Optional” sessions, two home visits, and three booster

sessions (two telephone, one face-to-face). Core sessions cover behavioral skills such as conducting a functional analysis, implementing planned ignoring, and the use of reinforcement strategies. Optional sessions were issue-specific and included topics such as toileting, feeding, sleep issues, and time out. To adapt the RUPP-PT manual for this pilot trial, study investigators modified each session to ensure that materials and activities were developmentally appropriate for young children with ASD. The piloted version of the manual preserved the 11 core sessions, 2 home visits, and 3 booster sessions. Core and any optional sessions were delivered individually to the child's primary caregiver(s) over the course of 16 weeks. This period of time allowed for session cancellations and rescheduling in order to insure that the full "dose" of the PT program could be provided in the allotted 16 weeks. It also offered parents the needed time to practice the various skills provided in each session. Each face-to-face session was 1–1.5 h in duration and employed direct instruction, practice activities, behavior rehearsal with feedback, and role-playing to accomplish skill acquisition. In addition, sessions had accompanying video vignettes that were utilized to further illustrate skill implementation (e.g., demonstrating proper use of guided compliance) or to test parent knowledge of materials covered in the session (e.g., having parents identify which steps of 'planned ignoring' the video model was (in)correctly implementing). Parents also were given homework assignments to complete between sessions. Two home visits also were conducted—one by Week 4 and the other at Week 22—in order to observe the child's behavior in the home environment. Finally, two telephone and one face-to-face booster sessions then occurred at Weeks 18, 20, and 22, focusing on generalization and maintenance of skills.

Results

Analytic Methods

Parent acceptance of the treatment was evaluated by computing session attendance, parent adherence to session objectives (as rated by independent observers) and ratings of parent satisfaction. We set a goal of 80 % therapist fidelity to the session content (i.e., 80 % of the total possible score) to support the claim that the manual can be delivered in a uniform manner (Johnson et al. 2007).

The effect of the parent training program on challenging behaviors was evaluated with a mixed model of repeated measures analysis of variance, including data from the Baseline and Weeks 8, 16, and 24 on the primary outcome measure (ABC Irritability subscale). Exploratory analyses evaluated the ABC Hyperactivity subscale and the per-item

mean score on the Home Situations Questionnaire. The effect of PT on adaptive skills was assessed with paired t-tests using pre and post treatment Vineland domain scores.

Enrollment

Eighteen families were screened for participation in the study. One family declined participation after screening and one child did not meet diagnostic criteria for an ASD and was excluded. No children required exclusion for a more intensive treatment based on behavior severity. Fourteen of 16 families completed the 6-month trial. Baseline data for the two drop-outs (both of whom dropped out prior to the Week 8 Assessment) were carried forward and included in the analysis.

Demographic Data

Tables 1 and 2 summarize demographic, clinical, and educational information for the 16 study subjects and Table 3 summarizes the parent-nominated Target Problems at baseline. As shown in Table 1, all children were boys; 7 subjects were diagnosed with autism; 9 with Pervasive Developmental Disorder Not Otherwise Specified. ADOS Communication + Social Interaction Total scores ranged from 8 to 17. Although IQs ranged from <49 to 114 ($X = 77.7$, $SD = 23.42$), 10 subjects (62.5 %) achieved an IQ above 70. None of the children were on medication at the start of the trial. All subjects had at least one parent-nominated target problem of disruptive behavior (tantrums, aggression, defiance, noncompliance). As shown in Table 3, 75 % of the sample (12/16) identified Defiance/Noncompliance as one of their primary Target Problems.

Therapist Fidelity and Parent Adherence

Video recordings of the 10 % randomly selected sessions (14 of 148 available core PT sessions) were sent for independent review by two experts that led the development of the original RUPP parent training manual. Reviewers scored the session-corresponding Treatment Fidelity Checklist, which included the session goals (therapist fidelity) (e.g., Session A—Therapist Goal 2: "Therapist introduced parents to the concept of behavior, antecedents, and consequences.") as well as the parent's attainment of session objectives (e.g., Session A—Parent Objective 2: "Parent will discriminate between behavioral and nonbehavioral terms as determined from the activity sheets.") Based on the independent review of the 10 % random sample of therapy sessions, the therapist fidelity to the manual was 92.6 % and parent attainment of session objectives was 87.3 %.

Table 1 Demographic data for the 16 enrolled families

Child mean age (in months)	59.1 (SD = 9)	
Child age range (in months)	43–83	
Mother mean age	38.6 (SD = 5.0)	
Father mean age	40.4 (SD = 5.5)	
Mean distance from clinic (in miles)	18.0 (SD = 13.6)	
Mean baseline teacher ratings		
ABC-I	5.5 (6.5)	
ABC-H	13.7 (12.4)	
Mean total ADOS scores*	10.23 (2.8)	
ADOS total score range	8–17	
	N (%)	
Male	16 (100)	
Child ethnicity		
Caucasian	13 (81)	
Latino	2 (13)	
Other	1 (6)	
Diagnosis (%)		
Autistic disorder	7 (44)	
PDD-NOS	9 (56)	
Cognitive functioning (%)		
Average (≥ 85)	8 (50)	
Borderline (70–84)	2 (13)	
Mild ID (55–69)	1 (6)	
Moderate ID (40–54)	5 (31)	
Overall range	49–114	
Two parent family (%)	14 (88)	
Income		
20–40,000	3 (19)	
40–60,000	3 (19)	
60–90,000	2 (12)	
>90,000	8 (50)	
	Fathers	Mothers
Parent education		
High school	1 (6)	2 (13)
Associates	5 (31)	3 (19)
College	7 (44)	4 (25)
Advanced degree	3 (19)	7 (44)

* ADOS module 1 N = 4; module 2 N = 11; module 3 N = 1

Parent Acceptability

The 16 families attended 84 % or 148 of the possible 176 (11 Core sessions \times 16 families) Core sessions. Fourteen of 16 families (88 %) completed the 6-month intervention. Twelve (75 %) families completed at least one optional session for an overall average of 11.9 ± 3.6 core and optional sessions. All 14 families who completed the treatment filled out the Parent Satisfaction Questionnaire and all indicated that they would

Table 2 Description of school services

In school services (%)	75.0
Speech therapy	68.8
Occupational therapy	50.0
Social skills training	56.3
Physical therapy	6.0
Private services (%)	56.3
Speech therapy	25.0
Occupational therapy	31.3
Private ABA therapy	12.5
Physical therapy	6.0
Alternative treatments (%)	18.8
School programming (%)	
Special education classroom	25.0
Regular Ed PreK	18.8
Special education school	18.8
Regular Ed K-1st grade	18.8
Integrated PreK ^a	12.5
½ Special education; ½ mainstream	6.3

^a Mixed classroom of special education and regular education children

Table 3 Parent-nominated target problems at baseline

Target symptom	N = 32 (2 per subject)
Defiance/noncompliance	12
Explosive behavior/aggression	5
Rigidity	3
Feeding/toileting	3
Social deficits/shyness	3
Impulsiveness	2
Repetitive behavior	2
Lack of speech	1
Separation anxiety	1

recommend the program to other parents who have children with similar problems. Most (72 %) felt the number of sessions was appropriate and each of the sessions was rated as ‘Very Helpful’ by at least 78 % of parents. Primary concerns of the program involved the helpfulness of the video examples (only 28 % found them ‘Very Helpful’), with feedback indicating a need for a broader range of impairment illustrated in the examples (the child actor in the videos was a verbal school-age child). All (100 %) families endorsed feeling more confident in managing both present and future problem behaviors since participating in the program.

Efficacy Outcomes

Table 4 displays mean ABC and HSQ scores from the Baseline, Week 8, 16, and 24 assessments. Statistically

Table 4 Parent ratings on the Aberrant Behavior Checklist and Home Situations Questionnaire (N = 16)

Measure	Baseline		Week 8		Week 16		Week 24		F	ES ^a
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)		
ABC										
Irritability	16.00	9.21	13.00	9.91	9.75	7.29	7.38	6.15	12.48**	0.94
Hyperactivity	21.50	10.15	19.00	11.75	16.75	11.53	13.31	10.85	6.35**	0.81
Stereotypy	4.19	4.87	3.38	4.91	2.69	3.42	2.38	4.49	3.04*	0.37
Social withdrawal	7.81	6.57	6.25	8.47	5.44	8.86	2.94	3.87	4.14*	0.74
Inappropriate speech	3.75	2.41	3.25	2.21	2.81	1.97	2.19	1.80	3.04*	0.65
HSQ	2.95	1.06	2.47	1.68	2.03	1.66	1.42	1.24	8.10**	1.44

Baseline data from two drop outs carried forward

ABC data were missing for one family at Week 16 so Week 8 data was carried forward to Week 16

^a ES = (Mean at Baseline – Mean at Endpoint)/Baseline SD

** $p < 0.001$

* $p < 0.05$

Table 5 Vineland standard scores at baseline and endpoint (N = 16)

Domain standard scores	Baseline		Week 24		t	ES ^a
	X	(SD)	X	(SD)		
Communication	87.38	21.68	96.31	27.39	-2.48*	0.41
Daily living skills	67.19	9.69	67.25	11.25	-0.03	0.01
Socialization	75.81	14.78	82.19	15.95	-2.92*	0.43
Motor	72.50	10.17	82.31	13.75	-3.29**	0.96
Composite	70.94	10.69	77.25	13.76	-3.18**	0.59

Baseline data from two drop outs carried forward

^a ES = absolute change from baseline to endpoint/Baseline SD

** $p < 0.01$

* $p < 0.05$

significant changes from baseline were found on the primary and secondary outcomes with effect sizes ranging from 0.81 to 1.44. The mean parent ABC Irritability subscale declined from 16.00 ± 9.21 at Baseline to 7.38 ± 6.15 at Week 24 ($p < 0.001$; Effect size = 0.94). Similarly, the parent ABC Hyperactivity subscale fell from 21.5 ± 10.15 at Baseline to 13.31 ± 10.85 at Week 24 ($p < 0.002$; Effect size = 0.81) and the per item mean score on the HSQ declined from 2.95 ± 1.06 at Baseline to 1.42 ± 1.24 at Week 24 ($p < 0.001$; Effect size = 1.44). Table 4 also shows scores on the other parent ABC subscales, all of which showed significant improvement.

We were able to obtain teacher ABC ratings at baseline. However, due to classroom and teacher transitions (n = 6), drop outs (n = 2), and parent refusal to allow school data collection (n = 2), we did not have enough data at Week 24 for meaningful analysis. Hence, Table 4 presents parent ABC data only.

Two subjects had completed the VABS-II (Sparrow et al. 2005) within 2 weeks from enrolling in the study so

standard scores from that administration were used for baseline data. All other Baseline and Week 24 assessments utilized the VABS (Sparrow et al. 1984). Standard Scores from the Baseline and Week 24 assessments on the Vineland are presented in Table 5. Standard scores improved significantly on most domains, the exception being Daily Living Skills (effect size = 0.01; $p < 0.975$). Although Daily Living standard scores did not improve during the 6-month intervention, the similar scores at endpoint indicate that children were keeping pace with the passage of time.

On the CGI-I, fourteen of 16 subjects (88 %) were rated Much Improved (n = 8) or Very Much Improved (n = 6) by the independent evaluator. The two subjects who dropped out were rated as *non-responders*.

Final Manual Modifications

Based on clinician and parent feedback from the pilot trial, additional modifications to the manual were made. For

Table 6 Description of final version of the parent training program

11 Core sessions (Week 1 to 16)	Skills/activities
Session A: Introduction to behavioral principles	Introduce overall treatment goals and concepts of behavioral functions, antecedents and consequences of behavior
Session B: Prevention strategies	Discuss antecedents to behavior problems and develop preventive strategies
<i>Home visit 1 (between prevention strategies and daily schedules sessions)</i>	
Session C: Daily schedules	Develop a daily schedule and identify points of intervention (including use of visual schedules) to decrease behavior problems
Session D: Reinforcement I	Introduce concept of reinforcers—to promote compliance, strengthen desired behaviors and teach new behaviors
Session E: Reinforcement II	Teach play and social skills through child-led play
Session F: Planned ignoring	Explore systematic use of extinction (via planned ignoring) to reduce behavioral problems
Session G: Compliance training	Introduce elements of effective parental requests and the use of guided compliance in order to enhance compliance and manage non-compliance
Session H: Functional communication skills	Through systematic reinforcement, teach alternative, communicative skills to replace problematic behaviors
Session I & J: Teaching skills I & II	Using task analysis, chaining, and prompting, provide parents with tools on how to replace problem behaviors with appropriate behaviors, and promote new adaptive, coping and leisure skills
Session K: Generalization & maintenance	Generate strategies to consolidate positive behavior changes and establish new additional skills
Optional sessions (up to 2)	Review session material or provide instruction on the following optional topics: Toileting, feeding, sleep, time out, imitation skills, contingency contracting
Week 18: Telephone booster I	Review implementation of intervention strategies and troubleshoot new behaviors
<i>Week 20: Home visit 2</i>	
Week 22: Telephone booster II	Review implementation of intervention strategies and troubleshoot new behaviors

example, to promote the child's social and play skills, a 'play skills' session was added to the treatment manual (Reinforcement II). The two Generalization and Maintenance sessions from the original RUPP-PT manual were merged into one session. Thus, this PT program maintained the "11 Core Sessions" format. Parent-child observation and coaching sessions (two by Week 16; three by Week 24) were added in order to provide the parent with the opportunity to practice the skills under observation of the therapist. Finally, the video vignettes accompanying the original RUPP parent training program were remade with exemplars of younger children with a broader range of impairment. For example, one RUPP-PT video modeled the correct use of reinforcers while a child is doing homework; the new video vignette illustrates correct use of reinforcers during toy clean-up. Table 6 summarizes the major components of the modified parent training program.

Discussion

Results from this pilot trial support the feasibility and preliminary efficacy of this manualized 24-week parent training program for young children with ASDs and

disruptive behavior. Findings suggest that parents found the intervention acceptable, with attendance of 84 % of Core sessions, an overall average of 11.9 ± 3.6 sessions attended per family and 88 % of families completing the 6 month intervention. Parents appeared to comprehend session content as noted by their high rate of attainment of session objectives (87 %). Finally, the therapists were able to deliver the manual in a consistent fashion as evidenced by a high degree of fidelity on a random sample of sessions viewed by independent reviewers (93 % adherence). Given that previous studies have relied on highly individualized interventions delivered by expert practitioners over an extended period of time, the present study may represent an important step toward developing a service delivery model that can be implemented more efficiently and on a larger scale than existing interventions.

Although the study was not designed to provide a rigorous test of the efficacy of the PT program, the results suggest that the program may produce reductions in disruptive and noncompliant behaviors as well as gains in adaptive functioning. This initial finding is promising as it was attained in a time-limited intervention. If more rigorous testing confirms this finding, the intervention may be suitable for use in a wide range of clinical settings, thereby increasing accessibility of services to families.

A successful downward extension of this PT manual for younger children may also prevent the development of more severe behaviors in school-age children and avert the need for medication. The mean baseline ABC-I score in the current study was 10–13 points lower than in the two RUPP trials of risperidone (Aman et al. 2009; RUPP Autism Network 2002). Further evidence that we treated a less severe expression of disruptive behavior in the current study is the low rate of self-injury (SI) in our sample (i.e. only one parent in sixteen endorsed SI as a serious problem on both the ABC-I and Target Symptom ratings). Additional research is needed to determine whether early administration of PT wards off more severe behavioral issues (e.g., aggression, self-injury) and postpones or even eliminates the need for medication as the child ages. Additional research is also needed on whether this program as a standalone intervention would be feasible or sufficient for children exhibiting a greater level of severity in their disruptive behaviors. A future focus of investigation could thus be on a potential cut-point, or range, where parent training alone versus parent training plus medication is warranted.

In addition to positive changes in scores on standardized ratings, several families reported achieving specific goals for their children. For example, three children were toilet trained, one child was taught to fall and stay asleep in his own bed, three children were taught to remain at the dinner table during the course of an entire meal, and feeding problems (i.e., increased variety of food types and reduced resistance to the introduction of new foods) improved in two children. These improvements highlight the potential utility of the “Optional” sessions in this pilot trial. In the prior RUPP-PT trial, only 27 % (20 of 75) of families participated in the optional sessions compared to 75 % (12 of 16) families in this pilot trial. This difference may be due to the more frequent complaints of problems with toileting, sleep, and feeding in this younger age group (Boutot 2009; Goodlin-Jones et al. 2008; Ledford and Gast 2006; Richdale and Prior 1995; Williams and Seiverling 2010).

Considering the emphasis of this PT program on teaching parents how to promote daily living skills in their children, the lack of improvement on the Vineland Daily Living Skills domain was surprising. It was, in fact, the one domain where standard scores did not significantly improve across time. One possible explanation for the null finding is that the two Teaching Skills sessions fall at the end of the program (typically between Weeks 12 and 16) and focus on teaching one skill at a time (e.g., zipping zippers, brushing teeth). Thus, the full impact of teaching various daily living skills, based on systematic instructional techniques such as task analysis and chaining, may not become evident until after the 24-week assessment. Future studies should

examine whether more notable change can be detected at a later point in time post-treatment. Future studies might also expand skills training in the intervention and place some teaching skills sessions earlier in the treatment program. Significant gains were obtained on other Vineland Domains (Motor, Socialization, Communication), which are direct targets of intervention in this parent training program. This finding requires replication but is consistent with the results of other studies on short-term treatments for disruptive behavior in children with ASD (Scahill et al. 2012; Williams et al. 2006). A possible explanation is that the removal of noncompliance increases the child’s performance of activities of daily living and facilitates the teaching of new adaptive skills (Scahill et al., 2012).

Although promising, this pilot study has several limitations. The most obvious limitation is the lack of a control group, making it impossible to separate the effects of treatment from the effect of time or attention on disruptive and noncompliant behavior. Another major limitation is the reliance on unblinded parent- and clinician-ratings to measure change in child behavior. A related concern is that we were unable to obtain follow-up teacher ratings for 10 of the 16 children. Thus, although teacher ratings are likely to be an important source of information, they may be difficult to gather over the course of a 24-week study period. Confidence in the outcome data is bolstered somewhat by the availability of data from three groups of clinicians who were independent of one another and uninvolved in the treatment of the child: the examiner who administered the interview version of the Vineland with the parent, the independent evaluator who completed ratings of child progress over time, and the raters of treatment fidelity. All clinicians, nonetheless, were aware of the child’s treatment status. Also, only a subsample of therapy tapes (10 %) were independently reviewed due to the high cost in time and funds. Without a control group and blinded outcome evaluations, results at this time may provide proof-of-concept but not certainty in outcomes. More rigorous trials of the intervention, utilizing a randomized control design with multiple means of measuring outcome, will provide a more rigorous test of efficacy of the PT intervention.

While parent attainment of in-session objectives (based on therapist rating) and overall program adherence (via session attendance) was evaluated, we did not directly assess, through direct observation, parent proficiency in implementing all of the various techniques. Parent knowledge of skills is a necessary first step, with the understanding that it is the ‘doing’ not just ‘knowing’ the skills that is paramount to successful (and long-term) behavioral change. Future studies should include an evaluation of parent skill implementation and how it relates to observed behavior change and long-term outcomes.

Additionally, while the sample included children with a range of developmental delays as well as severity in autism symptomatology, this was in other respects a small and relatively homogenous sample of all boys, most of whom were in families with higher socioeconomic status. Thus, whether the feasibility and benefits observed in this study apply to girls with ASDs or families of lower socioeconomic status is not clear. Finally, because our pilot study was focused on testing feasibility rather than providing a definitive test of efficacy, we did not correct for family wise error rate. Because of this, findings should be interpreted with caution.

Future studies should evaluate this program using a large scale randomized control trial (RCT) in a more diverse sample. To this end, a large scale, multi-site, RCT in children 3–7 years of age with ASD and disruptive behavior is currently underway at five centers (Indiana University, Ohio State University, University of Pittsburgh, University of Rochester, Yale University). The PT program will be compared to a parent psychoeducation program. Families are being followed over a 48-week time period. Other possible adaptations such as the use of a group format rather than sessions with individual parents also merit consideration.

Finally, while this program was successful in enrolling most families who expressed interest in participation (16 of 18 families), this program, and many others like it, exclude lower functioning children (our study did not enroll children with receptive language skills lower than 18 months). Unfortunately, these are the children whose parents most often need support to help their children live productive lives in the home and community. We recognize that, just as we had to revise our parent training program to fit preschool-age children, we also need to modify the program to serve low-functioning, nonverbal children. Thus, another future direction involves designing and evaluating a program for the specific needs of these families.

Acknowledgments This publication was made possible by Clinical and Translational Scholar Award (CTSA) Grant Number UL1 RR024139 and 5KL2RR024138 from the National Center for Research Resources (NCRR), a component of the National Institutes of Health (NIH), and NIH roadmap for Medical Research. Its contents are solely the responsibility of the authors and do not necessarily represent the official view of NCRR or NIH. We acknowledge the efforts of Sherin Stahl for assistance with therapy cases and Breanne Bears and Kathryn Bradbury for data management.

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