Supplementary Online Content

Bearss K, Johnson C, Smith T, et al. Effect of parent training vs parent education on behavioral problems in children with autism spectrum disorder: a randomized clinical trial. *JAMA*. doi:10.1001/jama.2015.3150.

This supplementary material has been provided by the authors to give readers additional information about their work.

eMethods 1. Training Independent Evaluators

Training and Supervision of Independent Evaluators: Independent evaluators (IEs) were trained by experienced investigators (LS, MGA) on the Clinical Global Impression for Severity (CGI-S) and Improvement (CGI-I) and the Parent Target Problem list. The CGI scales (Severity and Improvement) were described in detail using case vignettes for illustration and discussion. In addition to background information on each case, the vignettes included the Parent Target Problem narratives and scores on the Aberrant Behavior Checklist and the Home Situations Questionnaire. At screening and baseline, the CGI-S was used to confirm study eligibility. The CGI-I was a key secondary outcome measure used to classify clinical response. We used the standard convention of Much Improved or Very Much Improved to define positive response. Following the training sessions, raters independently scored the CGI (Severity and Improvement) on three new vignettes (included Parent Target Problems, ABC and HSQ scores at baseline, Weeks 12 and 24). To be considered reliable, IEs had to be within one unit on the CGI-Severity without disagreement on classification (e.g., If gold standard score is 4, a score of 3 by the IE would not be acceptable because it would affect study entry). On the CGI-I, raters had to be within one unit of the gold standard, but the disagreement could not result in a different response classification from the gold standard. For example, if the expert rater assigned a score of 2 (Much Improved) and the new rater gave a score of 3 (Minimally Improved), this would affect the classification of treatment response and was regarded as unacceptable. IEs who did not meet the reliability criteria were given additional training and required to score at least two additional vignettes. The IEs also participated in monthly conference calls to review cases. The case reviews included the Parent Target Problem narratives as well as scores on the ABC and HSQ across time (e.g., baseline, Week 12 and Week 24). Raters who joined the trial in progress were trained in a similar manner (using email and telephone).

eTable 1. Parent Training Session Content

Week	SESSION	CONTENTS
1	Introduction to Behavioral Principles	Introduce overall treatment goals and concepts of behavioral functions, antecedents and consequences of behavior
2	Prevention Strategies	Discuss antecedents to behavior problems and develop preventive strategies
3	Daily Schedules	Develop a daily schedule and identify points of intervention (including use of visual schedules) to decrease behavior problems
4	HOME VISIT 1 & WEEK 4 ASSESSMENT	
5	Reinforcement I	Introduce concept of reinforcers - to promote compliance, strengthen desired behaviors and teach new behaviors
6	Reinforcement II	Introduce "catching your child being good" Teach play and social skills through child-led play
7	Planned Ignoring	Explore use of extinction (via planned ignoring) to reduce behavioral problems
8	WEEK 8 ASSESSMENT	
9	Compliance Training	Introduce effective parental requests and the use of guided compliance to enhance compliance and manage noncompliant behaviors
10	Functional Communication Training	Through systematic reinforcement, teach alternative, communicative skills to replace problematic behaviors
11	Teaching Skills I	Using task analysis and chaining, provide parents with tools on how to replace problem behaviors with appropriate behaviors and how to promote new adaptive, coping and leisure skills
12	WEEK 12 ASSESSMENT	
13	Teaching Skills II	Teach various prompting procedures to use while teaching skills
14	Generalization & Maintenance	Generate strategies to consolidate positive behavior changes and generalize newly learned skills
	OPTIONAL SESSIONS (completed by Week 16)	Provide instruction on up to two sessions from the following topics: Toileting, feeding, sleep, time out, imitation skills, token economy, crisis management
16	WEEK 16 ASSESSMENT	
18	Telephone Booster I	Review implementation of intervention strategies, troubleshoot new behaviors, develop intervention for any newly emerging behaviors
20	HOME VISIT 2 & WEEK 20 ASSESSMENT	
22	Telephone Booster II	Review implementation of intervention strategies, troubleshoot new behaviors, develop intervention for any newly emerging behaviors
24	WEEK 24 ASSESSMENT	

eTable 2. Parent Education Session Content

Week	SESSION	CONTENTS
1	Autism Diagnosis	Review of diagnostic labels and prevalence data
2	Interpreting Clinical Evaluations	Review the assessment process -Roles of various professionals -Interpretation of various scores provided in clinical reports
3	Developmental Issues	Discuss lifespan issues (Childhood, Adolescence, Adulthood) -What to expect based on child age and functional level
4	WEEK 4 ASSESSMENT	
5	Home Visit	
6	Family Issues	Discuss impact of diagnosis on family members
7	Genetics, Medications, Allied Interventions	Review genetics (Current information & risk for future children), common medication therapies and the role of speech, occupational and physical therapy
8	WEEK 8 ASSESSMENT	
9	Choosing Effective Treatments	Provide an overview of the scientific method and types of studies Review red flags for alternative treatments Discuss questions to ask when choosing treatments
10	Alternative Treatments	Discuss immunizations, alternative treatments (e.g., dietary treatments, vitamin and mineral supplements) and fads (e.g., Secretin, Hyperbaric O^2, Facilitated Communication)
11	Advocacy & Support Services	Discuss the role of parent organizations, advocacy groups and professional resources (legal, educational advocates)
12	WEEK 12 ASSESSMENT	
14	Educational Planning	Introduce IDEA/Section 504 (inclusion vs. special education placement) and the IEP Process Review National Research Council recommendations
16	WEEK 16 ASSESSMENT	
18	Play Activities	Discuss how to choose appropriate toys/activities Review how to encourage appropriate play
20	WEEK 20 ASSESSMENT	
	Treatment Options	Review of Evidence-based/best practices: -Applied Behavior Analysis -Developmental/Behavioral and Educational Models
22	Treatment Planning	Review materials learned in Parent Education -application to treatment planning Discuss progress, current concerns, treatment options
24	WEEK 24 ASSESSMENT	

eMethods 2. Training Therapists

Training and Supervision of Parent Training and Parent Education Therapists: To ensure that therapists delivered the Parent Training and Parent Education programs in a competent manner in line with pre-established standards of adherence to the treatment manuals, we developed a systematic method to train and supervise therapists at each site. Training for each study intervention began with the therapist reviewing the treatment manuals. Because delivery of Parent Training requires a greater degree of problem-solving (e.g., developing homework assignments; reviewing parent implementation of strategies), training also involved watching a video of a completed Parent Training case. Once familiar with the programs, therapists were assigned cases for training on the Parent Education and Parent Training programs. Training cases included subjects who were not enrolled in the formal randomized study because they were screened but deemed ineligible (e.g., > 7 years of age) or subjects who completed either Parent Education or Parent Training and elected to cross-over to the other treatment. During the conduct of the training cases, therapists received weekly on-site supervision. In addition, all sessions were video-recorded. Dr. Johnson at Pittsburgh or Dr. Bearss at Emory reviewed all Parent Training sessions. Dr. Swiezy at Indiana reviewed all recorded Parent Education sessions. Therapists received written feedback by Drs. Johnson, Bearss, or Swiezy for each session viewed. This review was designed to ensure that the new therapist delivered each Parent Training and Parent Education session in accordance with the manual with a minimum benchmark of 80% reliability for each session. Therapists who did not achieve 80% reliability were assigned another training case.

eTable 3. Unadjusted Mean Values and 95% Confidence Intervals at Baseline, Week 24, Week 36 and Week 48 on Primary Outcome Measures for Protocol-Defined Groups[a]

	Baseline			Week 24				Week 36				Week 48			
	N	Mean	95% CI	N	Mean	95% CI	P[b]	N	Mean	95% CI	P	N	Mean	95% CI	P
Positive Response to Parent Training															
ABC Irritability	61	23.5	(21.8;25.1)	61	10.3	(8.8;11.8)	<0.0001	56	10.6	(9.0;12.2)	<0.0001	55	11.3	(9.5;13.1)	<0.0001
HSQ Demand-Specific	61	3.5	(3.0;3.9)	61	1.2	(0.9;1.4)	<0.0001	56	1.3	(1.0;1.6)	<0.0001	55	1.4	(1.1;1.7)	<0.0001
HSQ Socially Inflexible	61	4.1	(3.7;4.5)	61	1.5	(1.2;1.8)	<0.0001	56	1.6	(1.2;2.0)	<0.0001	55	1.6	(1.3;2.0)	<0.0001
HSQ Total	61	3.8	(3.4;4.2)	61	1.3	(1.1;1.6)	<0.0001	56	1.5	(1.11;1.8)	<0.0001	55	1.5	(1.2;1.8)	<0.0001
Negative Response to Parent Training															
ABC Irritability	28	24.1	(21.7;26.6)	21	16.3	(13.4;19.2)	<0.0001	18	17.9	(13.2;22.7)	0.0022	17	19.4	(15.7;23.0)	0.0129
HSQ Demand-Specific	28	3.9	(3.2;4.6)	21	2.7	(1.9;3.5)	0.0003	18	2.4	(1.5;3.2)	0.0001	17	2.6	(1.8;3.5)	0.0024
HSQ Socially Inflexible	28	4.8	(4.1;5.5)	21	3.7	(3.0;4.4)	0.0011	18	3.4	(2.6;4.3)	0.0008	17	3.8	(2.9;4.8)	0.0045
HSQ Total	28	4.4	(3.7;5.0)	21	3.2	(2.5;3.9)	0.0003	18	2.9	(2.1;3.7)	0.0001	17	3.2	(2.4;4.1)	0.0014
Positive Response to Parent Education[c]															
ABC Irritability	23	24.9	(21.8;28.1)	23	9.6	(7.4;11.9)	<0.0001	19	9.6	(6.0;13.3)	<0.0001	17	9.2	(5.9;12.4)	<0.0001
HSQ Demand-Specific	23	3.3	(2.4;4.1)	23	1.0	(0.6;1.3)	<0.0001	18	0.8	(0.6;1.0)	0.0002	17	0.6	(0.4;0.8)	0.0002
HSQ Socially Inflexible	23	4.4	(3.6;5.2)	23	1.7	(1.1;2.3)	<0.0001	18	1.6	(1.1;2.1)	<0.0001	17	1.2	(0.7;1.7)	<0.0001
HSQ Total	23	3.9	(3.1;4.6)	23	1.3	(0.9;1.8)	<0.0001	18	1.2	(0.9;1.5)	<0.0001	17	0.9	(0.6;1.2)	<0.0001

[a] Data are presented as raw mean scores at baseline, Week 24, Week 36 and 48 with 95% confidence intervals for each assessment point.
[b] P value was generated by comparing Week 24, Week 36 and Week 48 to baseline (paired t-test).
[c] Per protocol, 13 of 36 Positive Responders to Parent Education crossed over to Parent Training at Week 24 and were not included in follow-up

eTable 4. CGI Status at Week 24, Week 36 and Week 48 by Protocol-Defined Groups

Group	Week 24	Week 36		Week48	
		Positive Response	Negative Response[a]	Positive Response	Negative Response[a]
Positive Response to Parent Training	N=61	N=50 (50/61=82%)	N=11	N=48 (48/61=79%)	N=13
Negative Response to Parent Training	N=28	N=10 (10/28=36%)	N=18	N=9 (9/28=32%)	N=19
Positive Response to Parent Education	N=23[b]	N=15 (15/23=65%)	N=8	N=16 (16/23=70%)	N=7

[a]Negative Response = CGI $\underline{\geq}$ 3 or failure to return for follow-up

[b]Per protocol, 13 of 36 Positive Responders to Parent Education crossed over to Parent Training at Week 24 and were not included in follow-up