

Parent Training for Parents of Children with Autism

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APPROVAL OF THE DISSERTATION

This dissertation defense (“Parent Training for Parents of Children with Autism”) has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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## **CHAPTER 1**

Linking Document: Toward Identifying and Designing Effective Training for Parents of  
Children with ASD

## Linking Document: Toward Identifying and Designing Effective Training for Parents of Children with ASD

In 2012, about 1 in 68 children in the US were diagnosed with an autism spectrum disorder (ASD), up from 1 in 150 children in 2000 (Centers for Disease Control and Prevention [CDC], 2016). Children with ASD display difficulties with communication and social interactions, repetitive behaviors, and a variety of challenging behaviors (American Psychological Association [APA], 2013; Gadow, DeVincent, Pomeroy, & Azizian, 2004). Dealing with these challenges on a daily basis has an adverse impact on parents and families of children with ASD, who experience increased stress and decreased quality of life (Dillenburger, Keenan, Doherty, Byrne, & Gallagher, 2010; Hayes & Watson, 2013).

Given the increased prevalence of ASD and challenges faced by these children and their families, interventions for children with ASD are of increasing importance, and research has shown parent training programs and parent-implemented interventions play an integral role in the treatment of children with ASD (e.g., Lovaas, 1987; Patterson, Smith, & Mirenda, 2012; Schultz, Schmidt, & Stichter, 2011). In addition to improvements in a variety of children's outcomes, such as language and communication skills (e.g., McConachie & Diggle, 2007; Meadan, Ostrosky, Zaghawan, & Yu, 2009) and problem behavior (e.g., Wacker et al., 2013), research shows interventions including or implemented by parents decrease parents' stress and improve their mental health (Keen Couzens, Muspratt, & Rodger, 2010; Minjarez, Mercier, Williams, & Hardan, 2013; Tonge et al., 2006).

### **Included Manuscripts**

Although research has demonstrated the benefits of parent training and parent-implemented interventions for children with ASD and their families, most of the existing

research has focused on young children, and no studies have evaluated the value added to interventions by including parents. Additionally, there is not a clear understanding of how to design parent training programs to yield the greatest benefits for parents and their children with ASD. Therefore, the three manuscripts described within are designed to gain a greater understanding of the effectiveness of parent training programs and parent-implemented interventions for school-age children with ASD and to explore potentially effective methods of instruction within parent training programs. Specifically, the three manuscripts aim to identify the value added to interventions for school-age children with ASD by including parents, to determine the effectiveness of parent-implemented interventions for these children, and to evaluate one parent training program which utilizes multiple instructional strategies to teach parents of children with ASD.

### **First Manuscript**

Multiple studies (Cohen, Amerine-Dickens, & Smith, 2006; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993; Vismara et al., 2009) have demonstrated the effectiveness of parent training programs for young children with ASD. However, interventions for school-age children with autism that include a parent training component have received comparatively little attention in the literature. Therefore, the purpose of the first manuscript was to explore the literature on parent training programs for school-age children with ASD and to evaluate the value added to these interventions by including a parent training component. The research questions were (a) What is the current state of the literature regarding including parent training in interventions delivered to school-age children with ASD; (b) In terms of child outcomes, what is the added benefit of including parents in interventions; and (c) Do the effects of interventions with a parent training component vary across different child skill areas or behavioral outcomes?

Following an extensive literature search, the researchers located 15 studies of interventions for school-age children that incorporated a parent training component. Across studies, interventions delivered to children were provided for a range of 10 to 24 weeks, with 1 to 25 sessions per week, for 60 to 90 minutes per session. The interventions targeted participants social/ emotional adjustment ( $n = 5$ ), social skills ( $n = 4$ ), problem behavior ( $n = 3$ ), adaptive skills ( $n = 2$ ), or emotional identification/regulation skills ( $n = 1$ ). Parent training sessions were delivered in a one-on-one setting, between 0.71 and 1 time per week, most for 60 to 90 minutes, and mirrored the purpose of the children's intervention. Studies used between 1 and 9 strategies to instruct parents, varying in level of parent involvement from less intensive lecture and discussion to more intensive in-situation coaching. Importantly, no studies included measures of parent treatment integrity.

A small positive effect ( $ES=0.33$ ) was ascertained for the studies isolating the added benefit of including parents ( $n=3$ ). The remaining studies evaluated either social skills ( $n=6$ ;  $ES=0.53$ ) or cognitive behavioral therapy ( $n=6$ ;  $ES=0.91$ ) programs for school-age children with ASD which included parents. These effects are compared to meta-analyses of similar programs that did not incorporate parent training components. Programs included in the review demonstrated slightly higher effect sizes than those presented in previous meta-analyses of programs that did not include parent training, suggesting interventions that include parents yield benefits beyond those of similar programs delivered to children alone. The present candidate was the first author on this paper published in *Remedial and Special Education*.

## **Second Manuscript**

In addition to interventions delivered to children that include parent training components, other interventions are parent-implemented, in which parents act as the sole interventionists in



their children's treatment following parent training. Similar as above, much of the research surrounding parent-implemented intervention has focused on young children with ASD. Numerous studies indicate these interventions lead to improvements in a variety of child outcomes, including language skills (Harris, Wolchik, & Weitz, 1982; Smith, Groen, & Wynn, 2000), imitation skills (Zaghlawan & Ostrosky, 2016), cognitive abilities (Sheinkopf & Siegel, 1998; Smith et al., 2000), academic skills (Smith et al., 2000), autism symptoms (Bradshaw, Koegel, & Koegel, 2017), and problem behavior (Bailey & Blair, 2015; Wacker et al., 2013). In addition, reviews of parent-implemented interventions for young children with ASD have shown improvements in children's social and communicative behavior, as well as enhanced parent-child interactions (McConachie & Diggle, 2007; Meadan et al., 2009).

Although multiple reviews have found that parents are capable of learning techniques and implementing interventions (McConachie & Diggle, 2007; Meadan et al., 2009; Patterson et al., 2012), most of the literature reviews to date focusing on parent-implemented interventions have examined effects for younger children, and no syntheses have evaluated the effectiveness of parent-implemented interventions targeting school-age children with ASD. Therefore, the purpose of the second manuscript was to describe the studies evaluating parent-implemented interventions for school-age children with ASD and to determine their effectiveness in terms of child outcomes. Specifically, the research questions were (a) In terms of parent-implemented interventions delivered to school-age children with ASD, what interventions have parents implemented, how were parents trained to implement these interventions, and what child outcomes were targeted; (b) What was the mean effect size of parent-implemented intervention on child outcomes; and (c) Do the effects of interventions vary across different behavioral domains (e.g., problem behavior, communication, adaptive skills)?

The review and meta-analysis included 13 single-case design studies and 5 experimental studies. The review described the state of the literature describing parent-implemented interventions for school-age children with ASD and presented statistics representing the effectiveness of these programs, including the percentage of non-overlapping data (PND; (Scruggs, Mastropieri, & Casto, 1987), the percentage of all non-overlapping data (PAND; Parker, Hagan- Burke, & Vannest, 2007), and a *d*-type effect size proposed by Pustejovsky, Hedges and Shadish (2014) for single-case design studies and Hedges *g* (Hedges, 1982) for experimental studies.

Across studies, the interventions delivered to children predominately targeted the reduction of problem behavior ( $n=8$ ), while others targeted the improvement of language and communication outcomes ( $n=5$ ), adaptive skills ( $n=3$ ), and social functioning ( $n=2$ ). Parent training interventions took place for between 1 and 20 weeks, for between 10 and 180 minutes, in one-on-one or group sessions, delivered about once per week. However, important differences were noted between the instruction parents received in the group design and single-case design studies in terms of individualization, intensity, and instructional components. Overall, effect sizes and non-parametric indices indicated moderately strong to strong positive effects on children's outcomes, suggesting parent-implemented intervention is a worthwhile method of treatment for school-age children with ASD. The present candidate was the first author of this manuscript, which is currently under review.

### **Third Manuscript**

Across studies, parental adherence to treatment and attendance at parent training sessions is generally low. For example, in the review by Black and Therrien (2018), across studies reporting rates of parental attendance, parents were present at about 85% of the sessions offered.

Furthermore, in two studies of parent training programs (Aman et al., 2009; Handen et al., 2015) over 20% of parents withdrew from the intervention. The instructional techniques used by parent trainers is one factor potentially influencing parents' adherence to interventions. In their article describing several contingencies that affect parental adherence, Allen and Warzak (2000) explain parent trainers' selection of different instructional techniques, such as modeling, rehearsal, reinforcement, and corrective feedback, has an impact on parents' adherence to and compliance with interventions. Additionally, the number of instructional strategies used during training potentially overwhelms parents. In Black and Therrien (2018), studies used up to nine strategies to instruct parents. Given the overwhelming demands placed on parents and the lack of continual parent participation, the design of effective parent training programs is of particular concern.

Therefore, the purpose of the third manuscript was to explore the necessary components of parent training by evaluating the use of a basic parent training program consisting of didactic instruction, with the addition of in-situation coaching for struggling parents. Specifically, the research questions were (a) What improvements do parents demonstrate in terms of ABA knowledge and strategy implementation following participation in a PT program regarding basic ABA concepts; (b) What is the impact of program participation on parent stress; (c) How do parents view the effectiveness and efficacy of individual instructional components; and (d) When basic instruction does not lead to significant improvement, what is the benefit of including a more intensive instructional component, such as in-situation coaching?

The principal researcher recruited 10 child/parent dyads from the waiting list of an outpatient clinic which provides behavior therapy to children with autism. Parents participated in five weekly group parent training sessions on ABA concepts and techniques. Instruction consisted of didactic instruction, written materials, modeling, and role-play activities. Individual

parent training sessions were designed for parents who failed to demonstrate improvement in implementation of techniques following basic parent training. Significant differences between groups on knowledge tests and observations indicated participation in the parent training program allowed parents to learn and implement ABA techniques. Although less substantial differences were observed in parents' stress, participants indicated the intervention was worthwhile and effective in helping them intervene on their children's behavior and teach them new skills. The present candidate was the sole author of this manuscript, which will soon be submitted to a journal for review.

A complete version of each manuscript is included in each corresponding chapter. Table 1.1 contains the document titles as well as the status of each manuscript. The first manuscript was submitted, accepted, and published in the *Journal of Remedial and Special Education* (Black & Therrien, 2018). The second manuscript is currently under review, and I plan to submit the third manuscript after a successful defense, revision, and submission of my dissertation.

### **Future Directions**

My future research will continue to explore the design and implementation of effective parent training interventions for parents of children with ASD. I intend to do this by developing a more systematic way of evaluating the factors related to training program effectiveness, such as the inclusion and design of specific instructional components. Additionally, I plan to explore the development of standardized measures that more systematically evaluate parent and child outcomes following parents' participation in training programs. To this end, I hope to design a comprehensive parent training curriculum that improves short- and long-term outcomes for both parents and their children with ASD.

## References

- Allen, K. D., & Warzak, W. J. (2000). The problem of parental nonadherence in clinical behavior analysis: Effective treatment is not enough. *Journal of Applied Behavior Analysis, 33*(3), 373-391.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Bailey, K. M., & Blair, K. S. C. (2015). Feasibility and potential efficacy of the family-centered Prevent-Teach-Reinforce model with families of children with developmental disorders. *Research in Developmental Disabilities, 47*, 218-233.
- Berquist, K. L., & Charlop, M. H. (2014). Teaching parents of children with autism to evaluate interventions. *Journal of Developmental and Physical Disabilities, 26*(4), 451-472.
- Black, M. E., & Therrien, W. J. (2018). Parent training programs for school age children with ASD: A systematic review. *Remedial and Special Education, 39*(4), 243-256. doi: 10.1177/0741932517730645
- Bradshaw, J., Koegel, L. K., & Koegel, R. L. (2017). Improving functional language and social motivation with a parent-mediated intervention for toddlers with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 47*(8), 2443-2458.
- Brookman-Fraee, L., & Koegel, R. L. (2004). Using parent/clinician partnerships in parent education programs for children with autism. *Journal of Positive Behavior Interventions, 6*(4), 195-213.
- Centers for Disease Control and Prevention (CDC). (2016, July 11). Autism spectrum disorder (ASD): Data and statistics. Retrieved from <https://www.cdc.gov/ncbddd/autism/data.html>

- Cohen, H., Amerine-Dickens, M., & Smith, T. (2006). Early intensive behavioral treatment: Replication of the UCLA model in a community setting. *Journal of Developmental & Behavioral Pediatrics, 27*, S145–S155. doi:10.1097/00004703-200604002-00013
- Dillenburger, K., Keenan, M., Doherty, A., Byrne, T., & Gallagher, S. (2010). Living with children diagnosed with autistic spectrum disorder: Parental and professional views. *British Journal of Special Education, 37*, 13–23. doi:10.1111/j.1467-8578.2010.00455.x
- Gadow, K. D., DeVincent, C. J., Pomeroy, J., & Azizian, A. (2004). Psychiatric symptoms in preschool children with PDD and clinic and comparison samples. *Journal of Autism and Developmental Disorders, 34*, 379–393. doi:10.1023/B:JADD.0000037415.21458.93
- Harris, S. L., Wolchik, S. A., & Weitz, S. (1982). The acquisition of language skills by autistic children: Can parents do the job?. *Journal of Autism and Developmental Disorders, 11*(4), 373-384.
- Hayes, S. A., & Watson, S. L. (2013). The impact of parenting stress: A meta-analysis of studies comparing the experience of parenting stress in parents of children with and without autism spectrum disorder. *Journal of Autism and Developmental Disorders, 43*, 629–642. doi:10.1007/s10803-012-1604-y
- Hedges, L. V. (1982). Fitting categorical models to effect sizes from a series of experiments. *Journal of Educational Statistics, 7*, 119–137. doi:10.2307/1164961
- Keen, D., Couzens, D., Muspratt, S., & Rodger, S. (2010). The effects of a parent-focused intervention for children with a recent diagnosis of autism spectrum disorder on parenting stress and competence. *Research in Autism Spectrum Disorders, 4*, 229–241. doi:10.1016/j.rasd.2009.09.009

- 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. L. Egel (Eds.), *Educating and understanding autistic children* (pp. 260–279). San Diego, CA: College-Hill Press.
- Lanovaz, M. J., Rapp, J. T., Maciw, I., Dorion, C., & Prigent-Pelletier, É. (2016). Preliminary effects of parent-implemented behavioural interventions for stereotypy. *Developmental Neurorehabilitation*, *19*(3), 193-196.
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*, *55*, 3–9.  
doi:10.1037/0022-006X.55.1.3
- McConachie, H., & Diggle, T. (2007). Parent implemented early intervention for young children with autism spectrum disorder: A systematic review. *Journal of Evaluation in Clinical Practice*, *13*, 120–129. doi:10.1111/j.1365-2753.2006.00674.x
- McEachin, J. J., Smith, T., & Lovaas, O. I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal of Mental Retardation*, *97*, 359–372.
- Meadan, H., Ostrosky, M. M., Zaghawan, H. Y., & Yu, S. (2009). Promoting the social and communicative behavior of young children with autism spectrum disorders: A review of parent-implemented intervention studies. *Topics in Early Childhood Special Education*, *29*, 90–104. doi:10.1177/0271121409337950
- Minjarez, M. B., Mercier, E. M., Williams, S. E., & Hardan, A. Y. (2013). Impact of pivotal response training group therapy on stress and empowerment in parents of children with autism. *Journal of Positive Behavior Interventions*, *15*, 71–78.

doi:10.1177/1098300712449055

Parker, R. I., Hagan-Burke, S., & Vannest, K. (2007). Percent of all non-overlapping data

(PAND): An alternative to PND. *Journal of Special Education, 40*, 194–204.

Patterson, S. Y., Smith, V., & Mirenda, P. (2012). A systematic review of training programs for

parents of children with autism spectrum disorders: Single subject contributions. *Autism, 16*, 498–522. doi:10.1177/1362361311413398

Pustejovsky, J. E., Hedges, L. V., & Shadish, W. R. (2014). Design-Comparable effect sizes in

multiple baseline designs: A general modeling framework. *Journal of Educational and Behavioral Statistics, 39*(5), 368-393. doi: 10.3102/1076998614547577

Schultz, T. R., Schmidt, C. T., & Stichter, J. P. (2011). A review of parent education programs

for parents of children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 26*, 96–104. doi:10.1177/ 1088357610397346

Scruggs, T. E., Mastropieri, M. A., & Casto, G. (1987). The quantitative synthesis of single-

subject research: Methodology and validation. *Remedial and Special Education, 8*, 24–33. doi:10.1177/07419325870080020

Sheinkopf, S. J., & Siegel, B. (1998). Home-based behavioral treatment of young children with

autism. *Journal of Autism and Developmental Disorders, 28*(1), 15-23.

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.

Solish, A., & Perry, A. (2008). Parents' involvement in their children's behavioral intervention

programs: Parent and therapist perspectives. *Research in Autism Spectrum Disorders, 2*(4), 728-738.



- Tonge, B., Brereton, A., Kiomall, M., Mackinnon, A., King, N., & Rinehart, N. (2006). Effects on parental mental health of an education and skills training program for parents of young children with autism: A randomized controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry, 45*, 561–569. doi:10.1097/01.chi.0000205701.48324.26
- Vismara, L. A., Colombi, C., & Rogers, S. J. (2009). Can one hour per week of therapy lead to lasting changes in young children with autism? *Autism, 13*, 93–115. doi:10.1177/1362361307098516
- Wacker, D. P., Lee, J. F., Padilla Dalmau, Y. C., Kopelman, T. G., Lindgren, S. D., Kuhle, J., . . . Waldron, D. B. (2013). Conducting functional communication training via tele- health to reduce the problem behavior of young children with autism. *Journal of Developmental and Physical Disabilities, 25*, 35–48. doi:10.1007/s10882-012-9314-0
- Zaghlawan, H. Y., & Ostrosky, M. M. (2016). A parent-implemented intervention to improve imitation skills by children with autism: A pilot study. *Early Childhood Education Journal, 44*(6), 671-680.

Table 1.1  
*Included Manuscripts*

Manuscript number	Title	Candidate's role	Status
1	Parent Training Programs for School-Age Children with Autism: A Systematic Review	First author	Published in <i>Remedial and Special Education</i>
2	Parent-Implemented Interventions for School-Age Children with Autism: A Systematic Review and Meta-analysis	First author	Under review with <i>Focus on Autism and Other Developmental Disabilities</i>
3	Effectiveness of a Training Program for Parents of Children with Autism	Sole author	Completed; submit for review May 2019

**CHAPTER 2**

## Parent Training Programs for School-Age Children with ASD: A Systematic Review

## Abstract

Parent training (PT) is widely used with families of children with autism spectrum disorder (ASD), and its benefits for young children and their parents have been documented. However, no reviews have examined the use of PT within interventions delivered to older children with ASD or investigated the added benefit of including a PT component in these interventions. Therefore, the purpose of this review is to explore the state of research regarding the inclusion of PT in interventions for school-age children with ASD and to determine the value added to these interventions by including a PT component. Fifteen PT studies examining 622 child participants with ASD were included. Participants, interventions, and the effects of the interventions are described. Overall, studies demonstrated moderately positive effects for interventions that included PT. Importantly, three studies isolating the added benefit of PT demonstrated an *ES* of 0.33, 95% CI [0.05, 0.61], indicating the value added to interventions by including parents. More research is needed to understand the development of effective PT, its components, and how to best design these programs to benefit school-age children with ASD.

## Parent Training Programs for School-Age Children with ASD: A Systematic Review

### **Introduction**

Autism spectrum disorder (ASD), characterized by difficulties with communication and social interactions, begins in early childhood and persists throughout an individual's life. In addition to social and communication deficits and repetitive behaviors (American Psychological Association [APA], 2013), children with ASD can exhibit a variety of challenging behaviors, including anxiety, self-injury, non-compliance, aggression, and property destruction (Gadow, DeVincent, Pomeroy, & Azizian, 2004). Maladaptive behaviors and skill deficits frequently persist into adulthood, leaving most adults with ASD unemployed, socially isolated, and dependent on their families or other support services (Howlin, Goode, Hutton, & Rutter, 2004). Because of these difficulties, many families seek treatment for their children aimed at reducing the frequency of challenging behaviors and increasing functional skills. These interventions often include a parent training (PT) component.

### **Rationale for Parent Training**

Behavior therapists often provide training to family members in order to facilitate interventions, whereby parents can become the primary interventionist or a supplement to children's therapist-driven programming. When parents are able to implement treatments with fidelity, it can result in lasting improvement for children (Vismara, Colombi, & Rogers, 2009). In addition to child outcomes, PT in behavior management and teaching strategies may also help to alleviate some of the stress experienced by family members as they attempt to engage in daily activities and access services for their children (Keen, Couzens, Muspratt, & Rodger, 2010; Minjarez, Mercier, Williams, & Hardan, 2013).

**Impact on the family.** In families of children with ASD, parents and other family members experience high levels of isolation, stress, and psychological difficulties. In a survey of parents and caregivers of children with ASD, Dillenburger and colleagues (2010) found over 80% of parents described limitations on their families' social, community, recreation, and leisure activities. Parents also stated they spent decreased amounts of time with their partners and their other children, and 80% of parents said they worried their other children felt neglected and treated unfairly. Further supporting these findings, in a meta-analysis of parent stress, Hayes and Watson (2013) found that parents of children with ASD experience higher levels of stress than parents of typically developing children and those of children with other disabilities. Many parents of children with ASD cite difficulties managing everyday behavior and unmet needs for support and care as sources of stress (Sharpley, Bitsika, & Efremidis, 1997).

Therefore, training parents to cope with ASD symptoms and facilitate the acquisition of necessary skills is important for reducing parent level of stress and to improve treatment outcomes for children. In fact, research has shown PT interventions for parents of toddlers and young children with ASD lead to considerable improvements in parents' stress, self-efficacy, and mental health (Keen et al., 2010; Minjarez et al., 2013; Tonge et al., 2006).

**Benefit of parents as therapy support.** Using parents as therapeutic support provides several advantages for children with ASD, as well as for families and interventionists. Behavioral interventions for young children with ASD demonstrate better outcomes when implemented for more hours and over a longer duration (Reichow & Wolery, 2009). When parents are able to implement programming, either as the primary or secondary instructor, it extends the number of opportunities for children to experience an intervention beyond the scope of their contact with teachers and clinicians. Parents' use of behavioral interventions also

facilitates children's ability to generalize skills to other individuals and settings (Matson et al., 1996). In a study conducted by Koegel and colleagues (1982), children with ASD whose parents were trained to implement a behavioral intervention were compared on a series of individual target behaviors to children who received only outpatient treatment. The researchers found that only children whose parents had participated in the training program were able to generalize improvements in appropriate behavior to the home setting. With these findings in mind, PT programs have the potential to facilitate the maintenance of previously mastered skills and behavioral outcomes for children.

### **Effects of Parent Training Interventions**

Early intensive behavioral interventions for young children that include PT components have been shown to improve the communication skills, cognitive abilities, behavior, and adaptive functioning of children with ASD (Cohen, Amerine-Dickens, & Smith, 2006; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993; Vismara et al., 2009). For example, Remington et al. (2007) studied outcomes for young children with ASD and their parents following a long-term early intensive behavioral intervention including PT. They reported that the children's gains in cognitive ability, language skills, adaptive functioning, and positive social behavior demonstrated in their first year of participation maintained at the 2 year follow-up.

Similarly, McEachin, Smith, and Lovaas (1993) conducted a follow-up study of families who participated in an early intensive behavioral intervention when their children were toddlers, in which therapists instructed parents in all treatment procedures so they could continue therapy in the absence of therapists (Lovaas, 1987). The researchers discovered that the higher IQ scores and levels of adaptive functioning achieved by the children in the intervention group were maintained when children were 11.5 years old. Moreover, 47% of the experimental group had

made gains substantial enough to be considered “normal functioning” with placement in general education settings, whereas none of the children in the group receiving a less intensive intervention had achieved such gains (McEachin et al., 1993, p. 367).

In addition to interventions that include parents, other studies have evaluated parent-implemented interventions for young children with ASD, in which parents are the sole interventionists, providing individualized interventions following structured PT programs. These studies have described improvements in young children’s language skills (Harris, Wolchik, & Milch, 1982; Smith, Groen, & Wynn, 2000), cognitive abilities (Sheinkopf & Siegel, 1998; Smith et al., 2000), academic skills (Smith et al., 2000), and problem behavior (Wacker et al., 2013). Additionally, reviews of parent-implemented interventions for young children with ASD have shown improvements in children’s social and communicative behavior, as well as enhanced parent-child interactions (McConachie & Diggle, 2007; Meadan, Ostrosky, Zaghawan, & Yu, 2009). These findings highlight the efficacy of early intensive behavioral intervention programs and present favorable outcomes for children who received interventions delivered by parents.

Although multiple reviews have found that parents are capable of learning techniques and facilitating programming (McConachie & Diggle, 2007; Matson et al., 1996; Suppo & Floyd, 2012), most of the literature reviews to date have focused on programs for families of younger children, and no syntheses have evaluated the effects of PT for school-aged children with ASD. This is unfortunate because older children with ASD continue to experience difficulties, and PT may remain necessary to support families and promote positive outcomes as children age. For example, research indicates the language, behavior, and social deficits present in children with ASD persist into adolescence (Ballaban-Gil, Rapin, Tuchman, & Shinnar, 1996; Seltzer et al., 2003). Furthermore, as children progress into adolescence, caregiving challenges have



detrimental effects on parents, whose psychological well-being tends to decrease with increased age of their child (Fong, Wilgosh, & Sobsey, 1993).

Previous reviews on this topic also do not isolate the benefit of including parents in interventions delivered to children. In other words, the effects of PT are confounded because it is delivered as a component of a composite intervention and not on its own. Additionally, a wealth of literature provides guidance on including parents in interventions for young children with ASD. Studies have used a variety of methods to train parents, including education, modeling, coaching, written materials, and technology, leading to changes in a diverse set of behaviors in young children with ASD. However, the literature supporting similar programs for older children with ASD has received less attention in the literature.

### **Purpose**

As indicated above, we did not identify any systematic reviews that examine the inclusion of PT in interventions for school-age children with ASD. It is currently unclear what techniques are being used to instruct parents of older children with ASD, how parents are involved in interventions, or what child outcomes the programs target. Additionally, no reviews have attempted to isolate the benefits of including parents in interventions delivered to school-age children with ASD. Therefore, the primary purpose of this synthesis is to describe the studies in this promising area and to evaluate the added value of including parents in interventions delivered to school-aged children with ASD. Within this review, our sub-questions are: (a) What is the current state of the literature regarding including PT in interventions delivered to school-age children with ASD; (b) In terms of child outcomes, what is the added benefit of including parents in interventions; and (c) Do the effects of interventions with a PT component vary across different child skill areas or behavioral outcomes?

## Method

Following a search of two databases and reviews of PT plus an ancestral search, 16 articles reporting on 15 studies were analyzed in terms of study design, participant characteristics, purpose and characteristics of the interventions, and outcome measures. Effect sizes were calculated for each study and further collapsed into categories. Due to the small sample of studies, effects were not analyzed using inferential statistics.

### Literature Search

We first established eligibility requirements for articles that would be considered for inclusion in the review. Our selection criteria were developed based on the definition of PT described by Bearss, Burrell, Stewart, and Scahill (2015) and the inclusionary criteria used in previous reviews of PT programs for children with ASD (e.g., Brookman-Frazee, Stahmer, Baker-Ericzen, & Tsai, 2006; Schultz, Schmidt, & Stichter, 2011). Articles must have (a) been published in English, peer-reviewed journals; (b) been experimental or quasi-experimental in nature, which included both studies with a control group and single-case designs; (c) included training parents as a component of the intervention, with a description of PT program characteristics, such as degree of parental involvement, strategies used to instruct parents, and/or content of the training (e.g., studies mentioning the use of PT without describing either the topic, instructional strategies, or dosage of PT were excluded); (d) included children with ASD (diagnosed with ASD, autism, autistic disorder, pervasive developmental disorder [PDD-NOS], high-functioning autism [HFA], or Asperger's disorder, as reported by the authors) ages 6-17 as participants, with a mean age between 6 and 17 years or disaggregate findings by age and/or disability category so that only those meeting our criteria could be included in our analysis; and (e) reported quantitative child outcome data from a direct assessment or parent, child, or teacher

report. Studies including diagnostic status, disorder severity, or clinical improvement as the sole outcome variable were excluded, given the secondary nature of these clinician report measures. Additionally, studies must have been published in or after 1987, coinciding with the publication of the *Diagnostic and Statistical Manual of Mental Disorders-III, Revised (DSM-III-R*; American Psychiatric Association, 1987), which removed the *infantile ASD* diagnosis, included a more expansive definition of ASD, and established a checklist of diagnostic criteria. Studies must also have been conducted within the United States. Those carried out in other countries were excluded due to the cultural nature of parenting and perceptions of disability, and the influence of cultural differences on the success of PT (Santarelli, Koegel, Casas, & Koegel, 2001).

Studies were located in three ways. We conducted “all text” searches of two databases, ERIC ProQuest and PsycINFO, using the terms *ASD and parent training or parent-mediated or parent-implemented or parent education*. In line with our research questions and interest in the value added by including parents in interventions delivered to children, studies in which parents were the sole interventionists were excluded. Results were restricted to articles published in scholarly, peer-reviewed journals. PsycINFO search options were used to limit results to those reported in experimental articles with study participants ages 6 to 17 years. The database searches yielded a total of 377 possible studies. After examining article abstracts using our inclusion criteria and eliminating duplicate results, 82 studies remained.

Next, we reviewed the full-text articles to examine whether they met the inclusion criteria. Through this process, 67 articles were excluded for the following reasons: Twenty-nine articles were excluded because they did not describe studies conducted exclusively within the United States. Twenty-three studies included a sample with a mean age less than 6 years, and did not disaggregate their findings by age. Nine studies were excluded because researchers used

parents as the primary interventionists, rather than including parents in interventions delivered to children. One study (George, Oriel, Blatt, & Marchese, 2011) included participants with various disabilities and did not disaggregate results according to disability category, and one additional study (Elder, 1995) included individuals displaying “autistic features” rather than with ASD diagnoses. Four articles were not evaluations of interventions including PT, but rather summarized findings from studies already included in the review (Farmer et al., 2012), outlined the characteristics of children receiving community mental health services (Brookman-Fraze, Taylor, & Garland, 2010), or described the piloting of a newly developed outcome measure used in a PT program evaluation (Handen et al., 2013; Johnson et al., 2009). From the original corpus, 15 studies met the final inclusion criteria. Using the same procedures, all searches were repeated by two coders, who reviewed the potential articles to evaluate whether each study met the inclusionary criteria. Coders agreed on the inclusion and exclusion of all potential articles.

Subsequently, we examined studies within the reference lists of previous reviews that evaluated PT interventions for children with ASD (Bearss et al., 2015; Brookman-Fraze et al., 2006; Matson, Mahan, & Matson, 2009; Patterson, Smith, & Mirinda, 2012; Schultz et al., 2011; Suppo & Floyd, 2012). Last, we conducted an ancestral search by examining the reference lists of the studies to be included in the review. These searches contributed one additional study, resulting in a final corpus of 16 articles. Given that two articles reported on multiple group comparisons and three articles described additional variables from studies already included in the analysis (combined into one study for the purposes of this review), in total the review includes 15 unique comparisons. Although we had intended to include studies with single-case designs, no such studies included a PT component in an intervention delivered to children by clinicians; all reported on parent-implemented interventions and consequently do not contribute to

understanding the benefit of including PT in interventions conducted with children with ASD. Therefore, all 16 articles in this review employ designs with experimental and control groups.

### **Coding Procedures**

Articles were initially coded for nine study elements. *Design* described whether participants were randomly assigned to treatment and control groups (1=quasi-experimental design, 2=experimental design). *Child participants* included numerical descriptors such as number of participants; age range; mean age; and percentage diagnosed with autism, ASD, Asperger's disorder, high-functioning autism, and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). *Purpose of the intervention* described the treatment administered to child participants, whereas *topic of PT* indicated the purpose of the treatment given to parents (1=social functioning, 2=communication, 3=emotion identification or regulation, 4=behavior change, 5=adaptive functioning, 6=medication trial). Codes regarding *purpose* and *topic* were developed after reviewing each article, and detailed definitions of these codes are available from the primary author upon request. Each study was numerically coded using continuous variables in terms of duration (weeks), frequency (sessions per week), and intensity (minutes per session) of PT. *Format of PT* described the delivery of PT sessions (1=individually with parent or family, 2=group) and *sessions attended* indicated how many PT sessions were actually attended by parents. *Treatment integrity* described whether and how the researchers measured parents' adherence to PT when intervening with their children (0=no, 1=informally measured, 2=formally measured). *Outcome* described the variable assessed by each measure (1=social functioning, 2=communication, 3=emotion identification or regulation, 4=behavior change, 5=adaptive functioning), which was coded independently of an intervention's purpose because studies often assessed outcomes indirectly related to the principal

purpose of the intervention. These codes were developed after reviewing the outcomes measured in each study and collapsing them into categories. Definitions of each outcome category are available from the primary author upon request. *Data source* indicated the method by which information was obtained on each measure (1=direct assessment or observation of child, 2=parent report, 3=child report, 4=teacher report, 5=treatment program staff report). Studies in the final sample were coded by two raters. Initial interrater reliability across all studies was 98.6%. All discrepancies were resolved during coding sessions, with reconciled codes used in all subsequent analyses.

### **Effect Size Calculation**

Effect sizes (*ESs*) were calculated as the standardized mean difference between treatment (t) and control (c) groups. Therefore, only dependent measures presented using means and standard deviations (*SDs*) were included. We used the standard formula for Cohen's *d* by subtracting the control mean from the treatment mean and dividing by the pooled *SD*. All *ESs* were calculated using Comprehensive Meta-Analysis (CMA) software (Version 2; 2014).

### **Analysis**

First, an *ES* (Cohen's *d*) was calculated for each dependent measure. Then, *ESs* for each outcome category within each study were calculated. When studies included more than one dependent measure per outcome category, the *ESs* for all dependent measures were averaged. Next, *ESs* for outcomes within each study were collapsed to calculate an overall study *ES*. Finally, using the CMA software, all standardized mean differences were scaled to Hedges *g* to account for small sample sizes, which is the *ES* used in all subsequent analyses. *ESs* were calculated for each of the three types of intervention by averaging the overall *ESs* for each study within an intervention category. Furthermore, *ESs* for each outcome were collapsed within

intervention categories to estimate an effect of each intervention on particular outcomes. In meta-analytic research, the next step would typically be to analyze mediating variables to explain the significant variability using Hedges (1982) equivalent to the ANOVA or modified weighted regression (Hedges & Olkin, 1985). However, these analyses are not appropriate in this review given the small number of studies. Therefore, we examined our research questions via a descriptive examination of weighted means and confidence intervals, provided that each category consisted of at least two *ESs*.

### **Publication Bias**

We conducted two analyses to test for publication bias, including Orwin's (1983) fail-safe *N*, which indicates the number of unpublished studies with insignificant mean *ESs* that would need to be included in an analysis in order for the cumulative effect to become trivial. We also constructed a funnel plot and conducted Egger's test (Egger, Smith, Schneider, & Minder, 1997) to detect possible asymmetry within the group of studies included in our analysis. Orwin's (1983) fail-safe *N* indicated 28 unpublished studies with a mean *ES* of 0.00 would need to be included in the analysis to reduce the observed *ES* to 0.20. Egger's test (Egger et al., 1997) resulted in a two-tailed *p*-value of 0.16, indicating symmetry exists in the funnel plot and that there is no significant publication bias in the studies included in our analysis.

### **Results**

Results are presented in four sections. First, the participants and interventions used in each study are described. Second, the added benefit of PT is analyzed, including effects by child outcome. Last, overall effects and effects by outcome are analyzed by type of intervention. See Table 1 for detailed information regarding all studies included in the review, and see Table 2 for mean *ESs*, *SEs*, and confidence intervals.

## Participants

Collectively, the 15 studies included a total of 622 child participants ( $M=41.47$ ,  $SD=29.66$ ), all diagnosed with ASD, but sample sizes were generally small. Of the 15 studies, only 6 included samples of 40 or more participants. All studies reported including participants diagnosed with autism or ASD, Asperger's disorder, HFA, and PDD-NOS. Two studies (Frankel et al., 2010; Wood et al., 2009a) did not report the percentages of participants diagnosed with each disorder, but the remainder of the participants were mostly children diagnosed with ASD or autism (40.0%), PDD-NOS (27.5%), and HFA (27.1%). Given that studies must have included participants with a mean age between 6 and 17 years, participants across all studies ranged from 4.0 to 17.0 years old ( $M=12.5$ ).

## Interventions

Of the 15 interventions delivered to children, most were described as social skills training ( $n=6$ ) or cognitive behavioral therapy (CBT;  $n=6$ ). Social skills programs focused on behaviors such as friend-making, conversation skills, and social etiquette, whereas CBT interventions tended to focus primarily on emotional regulation, coping skills, and identification of emotions. However, CBT interventions often also included aspects of social skills training, such as perspective-taking and friendship skills. Three studies were medication trials, investigating the effectiveness of risperidone or amoxetine. Interventions were delivered for a range of 10 to 24 weeks, with 1 to 25 sessions per week, for 60 to 90 minutes per session. As described by the researchers, studies targeted participants social/emotional adjustment ( $n=5$ ), social skills ( $n=4$ ), problem behavior ( $n=3$ ), adaptive skills ( $n=2$ ), or emotional identification/regulation skills ( $n=1$ ).

The purposes of PT interventions mirrored the purposes of the interventions delivered to children and were delivered for similar durations. PT sessions took place between 0.71 and 1



time per week, most for 60 to 90 minutes. Studies used between 1 and 9 strategies to instruct parents. Where no strategies were mentioned, the PT program was coded as including only lecture and/or discussion, as this is the most general PT strategy and is routinely included in all PT programs. Strategies used to instruct parents included lecture and/or discussion ( $n=14$ ), homework assignments ( $n=7$ ), providing written materials ( $n=5$ ), data-collection instruction ( $n=5$ ), practice and/or role-play ( $n=3$ ), watching videos ( $n=3$ ), home visits ( $n=3$ ), phone calls ( $n=2$ ), and feedback and/or in-situation coaching ( $n=1$ ). PT interventions were typically provided in a one-on-one setting with the parent or family ( $n=9$ ) as compared to being offered in a group format ( $n=6$ ). Four studies included the actual number of PT sessions attended, reporting about an 85% attendance rate, on average. No studies included formal measures of treatment integrity for parent implementation of strategies learned.

### **Added Benefit of Parent Training**

The three studies that examined the added benefit of PT, in that they compared groups of children receiving an intervention plus PT to groups of children receiving the intervention without PT (Aman et al., 2009; Arnold et al., 2012; Handen et al., 2009; Scahill et al., 2012), included 252 child participants, collectively. Handen and colleagues (2009) reported two unique studies, comparing a medication and PT group to a medication only group and a placebo plus PT group to a placebo only group. Scahill and colleagues (2012) examined data on an additional variable from participants in the Aman et al. (2009) study, and Arnold and colleagues (2012) conducted a follow-up of the same participants. Therefore, the Handen et al. (2009) article was considered as containing two studies, and the Aman et al. (2009), Arnold et al. (2012), and Scahill et al. (2012) articles were considered as reporting on one study. Across the three studies, whereas child participants received either medication, placebo, or no medication, parents

participated in PT on behavior management strategies following the Research Units on Pediatric Psychopharmacology (RUPP) Autism Network model, which offered between 9 and 17 individualized sessions of PT, 60 to 90 minutes in length, over 10 to 24 weeks, including lecture and discussion, practice, role-play, written materials, coaching, data-collection instruction, video models, homework assignments, home visits, and follow-up phone calls. Studies obtained an overall *ES* of 0.33, 95% CI [0.05, 0.61] in the comparison of interventions delivered to children with and without PT components. Only one of these studies examined the impact of PT on communication skills and adaptive skills, so aggregated comparisons were not possible for these outcomes. However, all three studies reported on social skill improvement and emotional identification and regulation outcomes, demonstrating an *ES* of 0.32, 95% CI [0.04, 0.60] on social skills and an *ES* of 0.33, 95% CI [0.04, 0.61] on emotional identification/regulation skills.

### **Effects by Intervention Type**

**Social skills training programs.** Studies evaluating the effects of social skills training programs ( $n=6$ ) obtained an overall *ES* of 0.53, 95% CI [0.25, 0.82]. Effects were also estimated for each outcome area. Studies ( $n=6$ ) demonstrated an *ES* of 0.67, 95% CI [0.39, 0.96] for social skills. In the area of emotional identification/regulation, studies ( $n=5$ ) obtained an *ES* of 0.49, 95% CI [0.18, 0.80]. However, a unique effect for the PT programs in these interventions cannot be determined, given that the effects are confounded with the interventions delivered to the participants, and comparisons are made with control groups who received treatment as usual, not the intervention minus PT.

**Cognitive behavioral therapy (CBT).** Studies evaluating CBT interventions ( $n=6$ ) obtained an overall *ES* of 0.91, 95% CI [0.52, 1.30]. In the analysis of individual outcome categories, the six CBT intervention studies demonstrated an *ES* of 0.67, 95% CI [0.39, 0.96] on

social skills and five studies indicated an *ES* of 0.49, 95% CI [0.18, 0.80] on emotional identification and regulation skills. As mentioned above, effects for the PT portions of these interventions cannot be estimated.

### **Discussion**

The purpose of this review was to examine the inclusion of PT within interventions for school-aged children with ASD. We identified and reviewed a total of 15 articles published between 1987 and 2016. The majority of child participants were diagnosed with autism or ASD, and the mean age of participants was 12.5 years. Interventions directed at children took place for between 5 and 24 weeks, typically in 60 to 90 minute sessions, delivered about once per week, with some interventions offering as many as 25 sessions per week. Generally, PT was part of these interventions for one 60- to 90-minute session per week. Unfortunately, not all studies included specific information regarding the extent to which parents were involved in interventions, and no studies described treatment integrity on the part of the parents. However, where reported, the degree of parental involvement varied widely across studies. For example, Lopata and colleagues (2010) asked parents to participate in only five PT sessions, and the actual instructional activities in which parents participated are not described. In contrast, Aman and colleagues (2009) offered parents 17 PT meetings involving nine different instructional activities.

PT sessions included between one and nine strategies to instruct parents. Overall, instructional strategies used were of low intensity and required little parental engagement. Across all studies, the most common instructional strategy used in PT was lecture and/or discussion. High-intensity strategies, such as feedback, in-situation coaching, and practice or role-play were used less frequently. Unfortunately, comparisons between studies including

different PT components were not possible given the small sample size. However, other research indicates strategies used to teach parents have varying effects on parents' skills and children's outcomes. For example, in a meta-analysis of PT for parents of children with behavior problems (Kaminski, Valle, Filene, & Boyle, 2008), studies of programs using different strategies to teach parents demonstrated varying ESs. In terms of improving parenting skills and behaviors, studies including manuals ( $ES=0.38$ ), homework assignments ( $ES=0.39$ ), role-playing ( $ES=0.45$ ), and practicing with one's own child ( $ES=0.91$ ) led to different results.

Most PT interventions were conducted in a one-to-one setting, and interventions were primarily aimed at changing social/emotional adjustment, social skills, problem behavior, or adaptive skills. This finding is similar to those of other reviews (Bearss et al., 2015; Patterson et al., 2012; Schultz et al., 2011), which found PT tended to focus on alleviating the core symptoms of ASD, such as communication, socialization, and behavior. Similarly, in a review of single-case design studies of PT for families of children with ASD (Patterson et al., 2012), most studies concentrated on social skill and communication outcomes. The studies included in these previous reviews focused on interventions for children younger than 5 years old, indicating that similar skills are being targeted in programs intended for both young and older children with ASD. Several studies in the current review, however, focused on children's emotional identification and regulation skills, reflecting an area in which older children's deficits may prove more critical than for younger children with ASD.

Where reported ( $n=4$ ), attendance rates at PT sessions were generally low, with parents attending about 85% of training sessions offered. Considering that parental attendance was rarely reported and bearing in mind the potential value of PT, we consider the rate of parental attendance problematic. Additionally, in the three studies isolating the effects of including

parents in interventions, described by Aman and colleagues (2009) and Handen and colleagues (2015), over twenty percent of families withdrew from treatment, many citing burden due to participation and lack of efficacy. Similarly, in a review of PT programs for families of children with ASD, Matson et al. (2009) noted significantly high dropout rates. Given that parent perceptions regarding the effectiveness of PT programs is linked to dropout rates (Forehand, Middlebrook, Rogers, & Steffe, 1983), the design of PT procedures that parents feel are efficient, effective, generalizable, and easily fit into families' lifestyles and routines is especially critical to parental participation. Furthermore, no studies in the current review included formal measures of parent treatment integrity. Previous research, however, suggests treatment integrity is widely variable, which may affect the success of PT. For example, Patterson et al. (2012) found that of the single-case design studies reviewed that included direct measures of parental treatment integrity, rates varied from 20 to 100%.

Across the studies isolating the added value of PT interventions ( $n=3$ ), a mean  $ES$  of 0.33 was obtained, indicating a small positive effect on children's outcomes. Additionally, for studies isolating the benefit of PT, effects on social skills ( $ES=0.32$ ) and emotional identification and regulation skills ( $ES=0.33$ ) were small but positive, suggesting that parental involvement in interventions continues to have the potential to change these outcomes as children age. Notably, these  $ES$ s represent the value added to effective interventions by including parents, and not a comparison between interventions with PT and no treatment. These findings suggest including a PT component in interventions for school-age children with ASD may improve children's outcomes beyond what would be expected following the same interventions without PT.

The remaining studies, which included PT as part of a multi-component intervention, were categorized as either social skills ( $n=6$ ) or CBT ( $n=6$ ) interventions. An effect for the PT

component in the social skills training and CBT intervention studies cannot be determined, given that the effects are confounded by the interventions delivered to children and comparisons are made with control groups who received treatment as usual, not the intervention minus PT. However, comparisons can be made between these studies and other studies of similar programs. A meta-analysis of 69 after-school social skills programs for children and adolescents indicated an *ES* of 0.34 for programs using recommended social skills training practices (Durlak, Weissberg, & Pachan, 2010). This effect is slightly smaller than the *ES* of 0.53 obtained from the social skills studies with PT components included in this review. The social skills program meta-analysis by Durlak et al. (2010) also indicated an *ES* of 0.19 on positive social behaviors, compared to the studies in this review, which demonstrated an *ES* of 0.67 on social skills. Additionally, a meta-analysis of psychotherapy techniques for children and adolescents (Weisz, Weiss, Han, Granger, & Morton, 1995) demonstrated an *ES* of 0.57 for CBT interventions, whereas the studies of CBT with PT in this review obtained an *ES* of 0.91. These findings suggest that including PT within these interventions may be more effective than the interventions delivered to children alone. However, the comparison meta-analyses above did not focus on children with ASD, and more research is needed to understand the benefit of including a PT component in social skill and CBT interventions for older children with ASD.

### **Limitations**

There are several limitations to this review and meta-analysis. First, only 15 studies met our criteria for review, making comparisons among and between study variables difficult. For example, comparisons of studies using different populations and various PT instructional strategies were not possible given the small sample size. The small number of articles also meant studies with differing intervention characteristics were collapsed into one category as we looked

for commonalities among studies. For example, social skills interventions employ a wide range of curricula and instructional strategies, but collapsing them into one category was the most reasonable decision for the purposes of this review. Despite the small sample of studies, however, our findings are strengthened by the fact that the combined studies included 622 participants.

Second, we did not use indicators of methodological quality as criteria for analysis. However, the small sample of studies and lack of detailed information provided regarding the characteristics of interventions would have made such an approach problematic. Additionally, no included studies measured treatment fidelity of parents' implementation of the skills and behaviors taught during PT, making interpretation of the findings difficult. Similarly, the extent to which parents were involved in interventions was widely variable and often unclear, further complicating the interpretation of our findings. It is also important to recognize ASD as a spectrum, in that the participants included in this analysis likely display a variety of characteristics and degrees of impairment. Therefore, it is inappropriate to make a generalized statement regarding the effectiveness of PT interventions for school-age children with ASD based on these findings. Additionally, we did not contact authors or experts in the field to locate articles for inclusion, nor did we include grey literature in our analysis. However, we conducted two analyses to test for publication bias, concluding there was no significant bias in our analysis.

### **Implications and Recommendations for Future Research**

There are several practical implications from this analysis. First, results indicate that PT may be a worthwhile component to include in interventions for families of school-aged children with ASD. However, given the small number of studies on the topic, additional research is needed to evaluate the effectiveness of these programs, especially in terms of the added benefit

of PT over interventions delivered only to children. Second, given the moderate rates of parental attendance at PT sessions, additional research is needed to understand factors related to the lack of adherence to treatment and how to design the most efficacious PT programs in order to encourage continued parental participation. To this end, previous PT research recommends the development of PT programs that address families' needs through providing culturally and linguistically sensitive interventions that consider parent stress and other contextual variables as barriers to parental participation and fit into families' lifestyle and daily routines (Steiner, Koegel, Koegel, & Ence, 2012). Similarly, it is currently unclear which PT components have the largest effect on child outcomes. Last, future research should incorporate measures of parent treatment integrity, as no studies in this review included such measures, and differing levels of parent treatment integrity may contribute to varying outcomes of PT interventions across studies.

Existing research has documented the value of PT for young children with ASD and their parents. However, we located relatively few studies of interventions for older children with ASD that included a PT component. Additionally, limitations in several of the included studies (e.g., small sample sizes, lack of parent treatment fidelity data, and limited descriptions of PT procedures) make it difficult to draw firm conclusions regarding the value of including a PT component in interventions for school-age children with ASD. Future researchers should design studies to more definitively address the benefits of including a PT component for this population of learners and related issues such as whether the developers of interventions perceive PT as less valuable as children age or whether parents are less willing to participate in interventions when their children reach school age.



## References

- \*Aman, M. G., McDougle, C. J., Scahill, L., Handen, B., Arnold, L. E., Johnson, C., ... & Sukhodolsky, D. D. (2009). Medication and parent training in children with pervasive developmental disorders and serious behavior problems: Results from a randomized clinical trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, 48(12), 1143-1154. <http://dx.doi.org/10.1097/CHI.0b013e3181bfd669>
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders-revised (DSM-III-R)*. Washington, D.C: American Psychiatric Association.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. Washington, D.C: American Psychiatric Association.
- \*Arnold, L. E., Aman, M. G., Li, X., Butter, E., Humphries, K., Scahill, L., ... & Wilson, K. (2012). Research Units of Pediatric Psychopharmacology (RUPP) Autism Network randomized clinical trial of parent training and medication: One-year follow-up. *Journal of the American Academy of Child & Adolescent Psychiatry*, 51(11), 1173-1184. <http://dx.doi.org/10.1016/j.jaac.2012.08.028>
- Ballaban-Gil, K., Rapin, I., Tuchman, R., & Shinnar, S. (1996). Longitudinal examination of the behavioral, language, and social changes in a population of adolescents and young adults with autistic disorder. *Pediatric neurology*, 15(3), 217-223. [https://doi.org/10.1016/S0887-8994\(96\)00219-6](https://doi.org/10.1016/S0887-8994(96)00219-6)
- Bearss, K., Burrell, T. L., Stewart, L., & Scahill, L. (2015). Parent training in autism spectrum disorder: What's in a name?. *Clinical Child and Family Psychology Review*, 18(2), 170-182. <http://dx.doi.org/10.1007/s10567-015-0179-5>

- Bearss, K., Lecavalier, L., Minshawi, N., Johnson, C., Smith, T., Handen, B., ... & Scahill, L. (2013). Toward an exportable parent training program for disruptive behaviors in autism spectrum disorder. *Neuropsychiatry*, *3*(2), 169-180. <http://doi.org/10.2217/npv.13.14>
- Brookman-Frazee, L., Stahmer, A., Baker-Ericzen, M. J., & Tsai, K. (2006). Parenting interventions for children with autism spectrum and disruptive behavior disorders: Opportunities for cross-fertilization. *Clinical Child and Family Psychology Review*, *9*, 181-200. <http://dx.doi.org/10.1007/s10567-006-0010-4>
- Brookman-Frazee, L. I., Taylor, R., & Garland, A. F. (2010). Characterizing community-based mental health services for children with autism spectrum disorders and disruptive behavior problems. *Journal of Autism and Developmental Disorders*, *40*(10), 1188-1201. <http://dx.doi.org/10.1007/s10803-010-0976-0>
- Cohen, H., Amerine-Dickens, M., & Smith, T. (2006). Early intensive behavioral treatment: Replication of the UCLA model in a community setting. *Journal of Developmental and Behavioral Pediatrics*, *27*(2), S145-S155. <http://dx.doi.org/10.1097/00004703-200604002-00013>
- Comprehensive Meta-Analysis (Version 2) [Computer software]. (2014). Englewood, NJ: Biostat. Available from <https://www.meta-analysis.com>
- Dillenburger, K., Keenan, M., Doherty, A., Byrne, T., & Gallagher, S. (2010). Living with children diagnosed with autistic spectrum disorder: Parental and professional views. *British Journal of Special Education*, *37*, 13-23. <http://dx.doi.org/10.1111/j.1467-8578.2010.00455.x>
- \*Drahota, A., Wood, J. J., Sze, K. M., & Van Dyke, M. (2011). Effects of cognitive behavioral therapy on daily living skills in children with high-functioning autism and concurrent

anxiety disorders. *Journal of Autism and Developmental Disorders*, 41(3), 257-265.

<http://dx.doi.org/10.1007/s10803-010-1037-4>

Durlak, J. A., Weissberg, R. P., & Pachan, M. (2010). A meta-analysis of after-school programs that seek to promote personal and social skills in children and adolescents. *American Journal of Community Psychology*, 45(3-4), 294-309. doi:10.1007/s10464-010-9300-6

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal*, 315(7109), 629-634.

<https://doi.org/10.1136/bmj.315.7109.629>

Elder, J. H. (1995). In-home communication intervention training for parents of multiply handicapped children. *Scholarly Inquiry for Nursing Practice*, 9(1), 71-92.

Farmer, C., Lecavalier, L., Yu, S., Arnold, L. E., McDougle, C. J., Scahill, L., ... & Swiezy, N. B. (2012). Predictors and moderators of parent training efficacy in a sample of children with autism spectrum disorders and serious behavioral problems. *Journal of Autism and Developmental Disorders*, 42(6), 1037-1044. doi: 10.1007/s10803-011-1338-2

Fong, L., Wilgosh, L., & Sobsey, D. (1993). The experience of parenting an adolescent with autism. *International Journal of Disability, Development and Education*, 40, 105-113.

<http://dx.doi.org/10.1080/0156655930400204>

Forehand, R., Middlebrook, J., Rogers, T., & Steffe, M. (1983). Dropping out of parent training. *Behavior Research and Therapy*, 21, 663-668. [http://dx.doi.org/10.1016/0005-](http://dx.doi.org/10.1016/0005-7967(83)90084-0)

[7967\(83\)90084-0](http://dx.doi.org/10.1016/0005-7967(83)90084-0)

\*Frankel, F., Myatt, R., Sugar, C., Whitham, C., Gorospe, C. M., & Laugeson, E. (2010). A randomized controlled study of parent-assisted Children's Friendship Training with children having autism spectrum disorders. *Journal of Autism and Developmental*

*Disorders*, 40(7), 827-842. doi: 10.1007/s10803-009-0932-z

Gadow, K. D., DeVincent, C. J., Pomeroy, J., & Azizian, A. (2004). Psychiatric symptoms in preschool children with PDD and clinic and comparison samples. *Journal of Autism and Developmental Disorders*, 34, 379–393.

<http://dx.doi.org/10.1023/B:JADD.0000037415.21458.93>

George, C. L., Oriel, K. N., Blatt, P. J., & Marchese, V. (2011). Impact of a community-based exercise program on children and adolescents with disabilities. *Journal of Allied Health*, 40(4), 55E-60E.

\*Handen, B. L., Aman, M. G., Arnold, L. E., Hyman, S. L., Tumuluru, R. V., Lecavalier, L., ... & Silverman, L. B. (2015). Atomoxetine, parent training, and their combination in children with autism spectrum disorder and attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 54(11), 905-915.

<http://dx.doi.org/10.1016/j.jaac.2015.08.013>

Handen, B. L., Johnson, C. R., Butter, E. M., Lecavalier, L., Scahill, L., Aman, M. G., ... & Mulick, J. A. (2013). Use of a direct observational measure in a trial of risperidone and parent training in children with pervasive developmental disorders. *Journal of Developmental and Physical Disabilities*, 25(3), 355-371.

<http://dx.doi.org/10.1007/s10882-012-9316-y>

Harris, S. L., Wolchik, S. A., & Milch, R. E. (1982). Changing the speech of autistic children and their parents. *Child & Family Behavior Therapy*, 4(2-3), 151-173.

[http://dx.doi.org/10.1300/J019v04n02\\_16](http://dx.doi.org/10.1300/J019v04n02_16)

Hayes, S. A., & Watson, S. L. (2013). The impact of parenting stress: A meta-analysis of studies comparing the experience of parenting stress in parents of children with and without

- autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 43(3), 629-642. <http://dx.doi.org/10.1007/s10803-012-1604-y>
- Hedges, L. V. (1982). Fitting categorical models to effect sizes from a series of experiments. *Journal of Educational Statistics*, 7, 119–137. <http://dx.doi.org/10.2307/1164961>
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.
- Howlin, P., Goode, S., Hutton, J., & Rutter, M. (2004). Adult outcome for children with autism. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 45(2), 212-229. doi: 10.1111/j.1469-7610.2004.00215.x
- Johnson, C. R., Butter, E. M., Handen, B. L., Sukhodolsky, D. G., Mulick, J., Lecavalier, L., ... & Sacco, K. (2009). Standardised Observation Analogue Procedure (SOAP) for assessing parent and child behaviours in clinical trials. *Journal of Intellectual and Developmental Disability*, 34(3), 230-238. doi: 10.1080/13668250903074471
- Kaminski, J. W., Valle, L. A., Filene, J. H., & Boyle, C. L. (2008). A meta-analytic review of components associated with parent training program effectiveness. *Journal of Abnormal Child Psychology*, 36(4), 567-589. <http://dx.doi.org/10.1007/s10802-007-9201-9>
- Keen, D., Couzens, D., Muspratt, S., & Rodger, S. (2010). The effects of a parent-focused intervention for children with a recent diagnosis of autism spectrum disorder on parenting stress and competence. *Research in Autism Spectrum Disorders*, 4(2), 229-241. <https://doi.org/10.1016/j.rasd.2009.09.009>
- 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. *Educating and understanding autistic children*, 260-279.

- \*Laugeson, E. A., Frankel, F., Mogil, C., & Dillon, A. R. (2009). Parent-assisted social skills training to improve friendships in teens with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 39(4), 596-606. <http://dx.doi.org/10.1007/s10803-008-0664-5>
- \*Lopata, C., Thomeer, M. L., Volker, M. A., Toomey, J. A., Nida, R. E., Lee, G. K., ... & Rodgers, J. D. (2010). RCT of a manualized social treatment for high-functioning autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 40(11), 1297-1310. <http://dx.doi.org/10.1007/s10803-010-0989-8>
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*, 55(1), 3-9. <http://dx.doi.org/10.1037/0022-006X.55.1.3>
- McConachie, H., & Diggle, T. (2007). Parent implemented early intervention for young children with autism spectrum disorder: A systematic review. *Journal of Evaluation in Clinical Practice*, 13(1), 120-129. <http://dx.doi.org/10.1111/j.1365-2753.2006.00674.x>
- McEachin, J. J., Smith, T., & Lovaas, O. I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal of Mental Retardation*, 97(4), 359-372.
- Matson, J. L., Benavidez, D. A., Compton, L. S., Paclawskyj, T., & Baglio, C. (1996). Behavioral treatment of autistic persons: A review of research from 1980 to the present. *Research in Developmental Disabilities*, 17(6), 433-465. [https://doi.org/10.1016/S0891-4222\(96\)00030-3](https://doi.org/10.1016/S0891-4222(96)00030-3)

- Matson, M. L., Mahan, S., & Matson, J. L. (2009). Parent training: A review of methods for children with ASD spectrum disorders. *Research in ASD Spectrum Disorders*, 3(4), 868-875. [http://dx.doi.org/10.1016/S0891-4222\(96\)00030-3](http://dx.doi.org/10.1016/S0891-4222(96)00030-3)
- Meadan, H., Ostrosky, M. M., Zaghlawan, H. Y., & Yu, S. (2009). Promoting the social and communicative behavior of young children with autism spectrum disorders: A review of parent-implemented intervention studies. *Topics in Early Childhood Special Education*, 29(2), 90-104. <http://dx.doi.org/10.1177/0271121409337950>
- Minjarez, M. B., Mercier, E. M., Williams, S. E., & Hardan, A. Y. (2013). Impact of pivotal response training group therapy on stress and empowerment in parents of children with autism. *Journal of Positive Behavior Interventions*, 15(2), 71-78. <http://dx.doi.org/10.1177/1098300712449055>
- Orwin, R. G. (1983). A fail-safe N for effect size in meta-analysis. *Journal of Educational Statistics*, 8(2), 157-159.
- Patterson, S. Y., Smith, V., & Mirenda, P. (2012). A systematic review of training programs for parents of children with autism spectrum disorders: Single subject contributions. *Autism*, 16(5), 498-522. <http://dx.doi.org/10.1177/1362361311413398>
- Reichow, B., & Wolery, M. (2009). Comprehensive synthesis of early intensive behavioral interventions for young children with autism based on the UCLA young autism project model. *Journal of Autism and Developmental Disorders*, 39(1), 23-41. <http://dx.doi.org/10.1007/s10803-008-0596-0>
- Remington, B., Hastings, R. P., Kovshoff, H., Espinosa, F. D., Jahr, E., Brown, T., Alsford, P., et al. (2007). Early intensive behavioral intervention: Outcomes for children with ASD and their parents after two years. *American Journal of Mental Retardation*, 112(6), 418-438.

- Santarelli, G., Koegel, R. L., Casas, J. M., & Koegel, L. K. (2001). Culturally diverse families participating in behavior therapy parent education programs for children with developmental disabilities. *Journal of Positive Behavior Interventions*, 3(2), 120.  
<http://dx.doi.org/10.1177/109830070100300209>
- \*Scahill, L., McDougle, C. J., Aman, M. G., Johnson, C., Handen, B., Bearss, K., ... & Stigler, K. A. (2012). Effects of risperidone and parent training on adaptive functioning in children with pervasive developmental disorders and serious behavioral problems. *Journal of the American Academy of Child & Adolescent Psychiatry*, 51(2), 136-146.  
<http://dx.doi.org/10.1016/j.jaac.2011.11.010>
- Schultz, T. R., Schmidt, C. T., & Stichter, J. P. (2011). A review of parent education programs for parents of children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, 26(2), 96-104. <http://dx.doi.org/10.1177/1088357610397346>
- Seltzer, M. M., Krauss, M. W., Shattuck, P. T., Orsmond, G., Swe, A., & Lord, C. (2003). The symptoms of autism spectrum disorders in adolescence and adulthood. *Journal of Autism and Developmental Disorders*, 33(6), 565-581.
- Sharpley, C. F., Bitsika, V., & Efremidis, B. (1997). Influence of gender, parental health, and perceived expertise of assistance upon stress, anxiety, and depression among parents of children with autism. *Journal of Intellectual and Developmental Disability*, 22(1), 19-28.  
<http://dx.doi.org/10.1080/13668259700033261>
- Sheinkopf, S. J., & Siegel, B. (1998). Home-based behavioral treatment of young children with autism. *Journal of Autism and Developmental Disorders*, 28, 15-23.



- 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*, 269-285. <http://dx.doi.org/10.1002/9780470755778.ch6>
- \*Solomon, M., Goodlin-Jones, B. L., & Anders, T. F. (2004). A social adjustment enhancement intervention for high functioning autism, Asperger's syndrome, and pervasive developmental disorder NOS. *Journal of Autism and Developmental Disorders*, *34*(6), 649-668.
- Steiner, A. M., Koegel, L. K., Koegel, R. L., & Ence, W. A. (2012). Issues and theoretical constructs regarding parent education for autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *42*(6), 1218-1227. <http://dx.doi.org/10.1007/s10803-011-1194-0>
- \*Storch, E. A., Arnold, E. B., Lewin, A. B., Nadeau, J. M., Jones, A. M., De Nadai, A. S., ... & Murphy, T. K. (2013). The effect of cognitive-behavioral therapy versus treatment as usual for anxiety in children with autism spectrum disorders: A randomized, controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, *52*(2), 132-142. <http://dx.doi.org/10.1016/j.jaac.2012.11.007>
- Suppo, J., & Floyd, K. (2012). Parent training for families who have children with autism: A review of the literature. *Rural Special Education Quarterly*, *31*(2), 12-26. doi: 10.1177/875687051203100203
- \*Thomeer, M. L., Lopata, C., Volker, M. A., Toomey, J. A., Lee, G. K., Smerbeck, A. M., ... & Smith, R. A. (2012). Randomized clinical trial replication of a psychosocial treatment for children with high-functioning autism spectrum disorders. *Psychology in the Schools*, *49*(10), 942-954. <http://dx.doi.org/10.1002/pits.21647>

- Tonge, B., Brereton, A., Kiomall, M., Mackinnon, A., King, N., & Rinehart, N. (2006). Effects on parental mental health of an education and skills training program for parents of young children with autism: A randomized controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, 45(5), 561-569.  
<http://dx.doi.org/10.1097/01.chi.0000205701.48324.26>
- Vismara, L. A., Colombi, C., & Rogers, S. J. (2009). Can one hour per week of therapy lead to lasting changes in young children with autism?. *Autism*, 13, 93-115.  
<http://dx.doi.org/10.1177/1362361307098516>
- Wacker, D. P., Lee, J. F., Padilla Dalmau, Y. C., Kopelman, T. G., Lindgren, S. D., Kuhle, J., Pelzel, K. E., et al. (2013). Conducting Functional Communication Training via telehealth to reduce the problem behavior of young children with autism. *Journal of Developmental and Physical Disabilities*, 25(1), 35-48. <http://dx.doi.org/10.1007/s10882-012-9314-0>
- Weisz, J. R., Weiss, B., Han, S. S., Granger, D. A., & Morton, T. (1995). Effects of psychotherapy with children and adolescents revisited: A meta-analysis of treatment outcome studies. *Psychological Bulletin*, 117(3), 450-468.  
<http://dx.doi.org/10.1037/0033-2909.117.3.450>
- \*White, S. W., Ollendick, T., Albano, A. M., Oswald, D., Johnson, C., Southam-Gerow, M. A., ... & Scahill, L. (2013). Randomized controlled trial: Multimodal anxiety and social skill intervention for adolescents with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 43(2), 382-394. <http://dx.doi.org/10.1007/s10803-012-1577-x>
- \*Wood, J. J., Drahota, A., Sze, K., Har, K., Chiu, A., & Langer, D. A. (2009b). Cognitive behavioral therapy for anxiety in children with autism spectrum disorders: A randomized,

controlled trial. *Journal of Child Psychology and Psychiatry*, 50(3), 224-234.

<http://dx.doi.org/10.1111/j.1469-7610.2008.01948.x>

\*Wood, J. J., Drahota, A., Sze, K., Van Dyke, M., Decker, K., Fujii, C., ... & Spiker, M. (2009a).

Brief report: Effects of cognitive behavioral therapy on parent-reported autism symptoms

in school-age children with high-functioning autism. *Journal of Autism and*

*Developmental Disorders*, 39(11), 1608-1612. <http://dx.doi.org/10.1007/s10803-009->

0791-7

\*Wood, J. J., Ehrenreich-May, J., Alessandri, M., Fujii, C., Renno, P., Laugeson, E., ... &

Murphy, T. K. (2015). Cognitive behavioral therapy for early adolescents with autism

spectrum disorders and clinical anxiety: A randomized, controlled trial. *Behavior*

*Therapy*, 46(1), 7-19. <http://dx.doi.org/10.1016/j.beth.2014.01.002>

\*Wood, J. J., Fujii, C., Renno, P., & Van Dyke, M. (2014). Impact of cognitive behavioral

therapy on observed autism symptom severity during school recess: A preliminary

randomized, controlled trial. *Journal of Autism and Developmental Disorders*, 44(9),

2264-2276. <http://dx.doi.org/10.1007/s10803-014-2097-7>

\*Indicates study included in review

Table 1  
*Studies including parent training interventions for school-age children with ASD*

Article	Participants			Intervention Delivered to Children	PT	
	<i>n</i>	Age	Diagnoses		Description	Dosage
Aman et al. (2009); Arnold et al. (2012); Scahill et al. (2012)	124 with ASD	4.0-13.9 ( <i>M</i> =7.4)	ASD (65.3%) AS (6.5%) PDD-NOS (28.2%)	Risperidone vs. Risperidone+PT (RUPP Parent Training Manual)	Behavior management training, including: (a) homework; (b) lecture and discussion; (c) practice and/or role-play; (d) written materials; (e) coaching; (f) data-collection; (g) videos; (h) home visits; (i) phone calls	14-17 sessions ( <i>M</i> attended=10.82), 60-90 minutes in length, offered over 24 weeks in a 1:1 format
Frankel et al. (2010)	68 with ASD	7.0-11.0 ( <i>M</i> =8.5)	NR	Social skills training (Children's Friendship Training)	Parents taught to coach children in social situations, using: (a) homework; (b) lecture and discussion; (c) written materials	12 sessions, 60 minutes in length, offered over 12 weeks in a group format
Handen et al. (2015)	64 with ASD and ADHD symptoms	5.0-14.11 ( <i>M</i> =8.3)	ASD (40.6%) AS (18.8%) PDD-NOS (40.6%)	Atomoxetine vs. Atomoxetine+PT (RUPP Parent Training Manual)	Behavior management training, including: (a) homework; (b) lecture and discussion; (c) practice and/or role-play; (d) data-collection; (e) videos; (f) home visits	9 sessions ( <i>M</i> attended=7), 60-90 minutes in length, offered over 10 weeks in a 1:1 format
	64 with ASD and ADHD symptoms	5.0-14.11 ( <i>M</i> =8.0)	ASD (48.4%) AS (14.1%) PDD-NOS (37.5%)	Placebo vs. Placebo+PT (RUPP Parent Training Manual)		9 sessions ( <i>M</i> attended=6.9), 60-90 minutes in length, offered

Laugeson, Frankel, Mogil, & Dillon (2009)	33 with ASD	13.0-17.0 ( <i>M</i> =14.6)	AS (27.3%) HFA (69.7%) PDD-NOS (3.0%)	Social skills training (Program for the Education and Enrichment of Relational Skills [PEERS])	Parents taught to supervise the implementation of skills learned in the program, using: (a) homework; (b) lecture and discussion; (c) written materials	over 10 weeks in a 1:1 format 12 sessions, 90 minutes in length, offered over 12 weeks in a group format
Lopata et al. (2010)	36 with HFASDs	7.0-12.0 ( <i>M</i> =9.5)	AS (77.8%) HFA (2.8%) PDD-NOS (19.4%)	Social skills training	Parents taught information about HFASDs, instructional techniques for HFASDs, and strategies to teach and promote generalization of skills learned, using lecture and discussion	5 sessions, 90 minutes in length, offered over 5 weeks in a group format
Solomon, Goodlin-Jones, & Anders (2004)	10 with HFA, AS, or PDD-NOS	8.0-10.0 ( <i>M</i> =8.6)	AS (80.0%) HFA (10.0%) PDD-NOS (10.0%)	Social adjustment enhancement curriculum to address emotion recognition and understanding, theory of mind, and problem solving	Parents instructed on strategies to teach social skills in daily activities, including: (a) behavior data-collection; (b) lecture and discussion; (c) written materials	20 sessions, 90 minutes in length, offered over 20 weeks in a group format
	8 with HFA, AS, or PDD-NOS	10.0-12.0 ( <i>M</i> =10.8)	AS (50.0%) HFA (50.0%)			
Storch et al. (2013)	45 with HFASDs and	7.0-11.0 ( <i>M</i> =8.89)	ASD (28.9%) AS (31.1%)	Modular cognitive behavior therapy to treat anxiety	Parents instructed on strategies to manage anxiety and other clinically significant issues,	20 sessions offered over 20

Thomeer et al. (2012)	clinically significant anxiety 35 with HFASDs	7.0-12.0 ( <i>M</i> =9.31)	PDD-NOS (40.0%) AS (71.4%) HFA (2.9%) PDD-NOS (25.7%)	Social skills training	using: (a) behavior data-collection; (b) lecture and discussion; (c) written materials Parents taught information about HFASDs, instructional techniques for HFASDs, and strategies to teach and promote generalization of skills learned, using lecture and discussion	weeks in a 1:1 format 5 sessions, 90 minutes in length, offered over 5 weeks in a group format
White et al. (2013)	30 with ASD and anxiety symptoms	12.0-17.0 ( <i>M</i> =14.58)	ASD (33.0%) AS (53.0%) PDD-NOS (13.0%)	Multimodal Anxiety and Social Skills Intervention (MASSI)	Parents included at the conclusion of therapy sessions, using: (a) lecture and discussion; (b) homework	13 sessions, 15 minutes in length, offered over 14 weeks in a 1:1 format
Wood et al. (2009a)	19 with ASD and anxiety disorder	7.0-11.0 ( <i>M</i> =9.37)	NR	Modular cognitive behavior therapy (Behavioral Interventions for Anxiety in Children with ASD [BIACA])	Parents taught to supervise the implementation of skills learned in the program, using: (a) follow-up phone calls; (b) lecture and discussion	16 sessions, 60 minutes in length, offered over 16 weeks in a 1:1 format
Wood et al. (2009b); Drahotá, Wood, Sze, & Dyke (2011)	40 with ASD and anxiety disorder	7.0-11.0 ( <i>M</i> =9.20)	ASD (50.0%) AS (7.5%) PDD-NOS (42.5%)	Modular cognitive behavior therapy (BIACA)	Parents taught to supervise the implementation of skills learned in the program, using lecture and discussion	16 sessions, 60 minutes in length, offered over 16 weeks in a 1:1 format

Wood et al. (2015)	33 with ASD and clinical anxiety	11.0-15.0 ( <i>M</i> =12.30)	ASD (66.7%) AS (26.7%) PDD-NOS (9.0%)	Modular cognitive behavior therapy (BIACA)	Parents taught to supervise the implementation of skills learned in the program, using lecture and discussion	16 sessions, 60 minutes in length, offered over 16 weeks in a 1:1 format
Wood, Fujii, Renno, & Van Dyke (2014)	13 with ASD and clinical anxiety	7.0-11.0 ( <i>M</i> =8.77)	ASD (84.6%) PDD-NOS (15.4%)	Cognitive behavioral therapy aimed at improving social communication-related ASD symptom severity	Parents instructed on strategies to conduct social coaching and promote generalization of skills, including lecture and discussion	32 sessions ( <i>M</i> attended=32), 60 minutes in length, offered over 16 weeks in a 1:1 format

*Note.* ADHD=attention-deficit/hyperactivity disorder; AS=Asperger's syndrome; ASD=autism spectrum disorder; HFA=high-functioning autism; HFASD=high-functioning autism spectrum disorder; NR=not reported; PDD-NOS=pervasive developmental disorder-not otherwise specified; PT=parent training; RUPP=Research Units on Pediatric Psychopharmacology

Table 2  
*Effect sizes by dependent variable category and overall*

Article	Outcome Category	Effect by category				Effect overall			
		ES	SE	95% CI		ES	SE	95% CI	
				Low	High			Low	High
Aman et al. (2009); Arnold et al. (2012); Scahill et al. (2012)	Adaptive	0.523	0.142	0.496	0.550	0.457	0.062	0.445	0.469
	Behavior	0.461	0.094	0.442	0.480				
	Communication	0.475	0.201	0.437	0.513				
	Social	0.399	0.119	0.376	0.422				
Frankel et al. (2010)	Behavior	0.428	0.145	0.393	0.463	0.525	0.093	0.502	0.548
	Emotional	0.634	0.249	0.575	0.693				
	Social	0.581	0.139	0.547	0.615				
Handen et al. (2015)	Behavior	0.146	0.073	0.126	0.166	0.162	0.065	0.145	0.179
	Social	0.222	0.139	0.185	0.259				
	Behavior	0.281	0.075	0.259	0.303				
	Social	0.285	0.155	0.240	0.330				
Laugeson, Frankel, Mogil, & Dillon (2009)	Social	0.696	0.302	0.596	0.796	0.696	0.302	0.596	0.796
Lopata et al. (2010)	Communication	0.053	0.344	-0.067	0.173	0.562	0.307	0.462	0.662
	Emotional	0.451	0.338	0.341	0.561				
	Social	1.004	0.159	0.952	1.056				
Solomon, Goodlin-Jones, & Anders (2004)	Adaptive	1.074	0.676	0.654	1.494	0.971	0.299	0.781	1.161
	Emotional	1.071	0.478	0.771	1.371				
	Social	0.827	0.466	0.537	1.117				
	Adaptive	-0.453	0.716	-0.953	0.047				
	Emotional	0.278	0.411	-0.002	0.558				
	Social	-0.101	0.501	-0.451	0.249				
Storch et al. (2013)	Adaptive	0.962	0.322	0.866	1.058	0.577	0.106	0.545	0.609
	Behavior	0.713	0.182	0.659	0.767				
	Communication	0.747	0.316	0.653	0.841				
	Emotional	0.336	0.145	0.293	0.379				
	Social	0.550	0.207	0.488	0.612				



Thomeer et al. (2012)	Communication	0.101	0.343	-0.019	0.221	0.447	0.244	0.365	0.529
	Emotional	0.216	0.339	0.106	0.326				
	Social	0.785	0.159	0.732	0.838				
White et al. (2013)	Emotional	0.376	0.368	0.246	0.506	0.602	0.265	0.513	0.691
	Social	0.844	0.381	0.704	0.984				
Wood et al. (2009a)	Social	0.763	0.476	0.553	0.973	0.763	0.476	0.553	0.973
Wood et al. (2009b); Drahota, Wood, Sze, & Dyke (2011)	Adaptive	3.046	0.351	2.936	3.156	1.876	1.225	1.476	2.276
	Emotional	0.594	0.630	0.384	0.804				
Wood et al. (2015)	Emotional	0.315	0.408	0.175	0.455	0.951	0.634	0.731	1.171
	Social	1.584	0.403	1.444	1.724				
Wood, Fujii, Renno, & Van Dyke (2014)	Behavior	0.500	0.565	0.190	0.810	1.090	0.457	0.840	1.340
	Social	1.444	0.312	1.274	1.614				

## **CHAPTER 3**

### **Parent-Implemented Interventions for School-Age Children with ASD: A Systematic Review and Meta-Analysis**

### Abstract

Parent-implemented interventions are commonly used with children with autism spectrum disorder (ASD), and their effectiveness for young children has been documented. However, no reviews have examined the use of parent-implemented interventions with older children with ASD. Therefore, the purpose of this review is to investigate the state of the literature regarding parent-implemented interventions for school-age children with ASD, and to evaluate their effectiveness across behavioral domains. Eighteen studies of parent-implemented interventions examining 170 child participants with ASD were included. Participants, interventions, and the effects of the interventions are described. Overall, studies demonstrated moderately positive effects for parent-implemented interventions for school-age children with ASD. More research is needed to understand the differential effectiveness of parent training components, and future research should focus on including measures of parent treatment integrity, to aid in the understanding of program efficacy.

## Parent-Implemented Interventions for School-Age Children with ASD: A Systematic Review and Meta-Analysis

In order to address the language, social, and behavioral deficits displayed by young children with autism spectrum disorder (ASD), many parents participate in training programs, allowing them to implement interventions at home. Research indicates these programs have lasting effects for parents and their young children with ASD. However, the deficits present in young children with ASD often persist into adolescence (Ballaban-Gil, Rapin, Tuchman, & Shinnar, 1996; Seltzer et al., 2003) suggesting parent-implemented intervention may continue to be important as children with ASD age.

### **Importance of Parent-Implemented Intervention**

Parent-implemented interventions for children with autism, in which parents are the sole interventionists in their children's treatment, lead to improvement in a variety of children's outcomes (McConachie & Diggle, 2007; Meadan, Ostrosky, Zaghawan, & Yu, 2009; Patterson, Smith & Mirenda, 2012). In addition, participation in parent training may reduce child-related parenting stress and increase parents' level of empowerment as they attempt to navigate daily activities and access services for their children with autism (Keen, Couzens, Muspratt, & Rodger, 2010; Minjarez, Mercier, Williams, & Hardan, 2013).

### **Impact of ASD on Family**

Having a child with ASD undoubtedly has a profound impact on a family. Parents of children with ASD experience significant levels of stress, isolation, and psychological difficulty. In fact, parents of children with ASD experience higher levels of stress than parents of typically developing children and parents of children with other disabilities (Hayes & Watson, 2003). Moreover, in a survey of parents of children with ASD, about 75 percent of parents felt their

time with their partners, friends, and other children was restricted, while over 80 percent reported limitations placed on their family's ability to participate in social, community, recreation, and leisure activities (Dillenburger, Keenan, Dogherty, Byrne, & Gallagher, 2010). Importantly, research indicates participation in parent training leads to improvements in stress, self-efficacy, and mental health for parents of children with disabilities (e.g., Hand, et al., 2013; Minjarez et al., 2013; Singer, Ethridge, & Aldana, 2007; Todd et al., 2010; Zwi et al., 2011).

### **Benefits of Parent-Implemented Intervention**

Although research suggests parent-implemented interventions have extensive benefits for both children with ASD and their families, much of the research surrounding such interventions has focused on young children with ASD. Numerous studies indicate these interventions lead to improvements in a variety of child outcomes, including language skills (Harris, Wolchik, & Milch, 1982; Smith, Groen, & Wynn, 2000), imitation skills (Zaghlawan & Ostrosky, 2016), cognitive abilities (Sheinkopf & Siegel, 1998; Smith et al., 2000), academic skills (Smith et al., 2000), autism symptoms (Bradshaw, Koegel, & Koegel, 2017), and problem behavior (Bailey & Blair, 2015; Wacker et al., 2013). In addition, reviews of parent-implemented interventions for young children with ASD have shown improvements in children's social and communicative behavior, as well as enhanced parent-child interactions (McConachie & Diggle, 2007; Meadan et al., 2009).

Studies also suggest these improvements are maintained over time. For example, Lanovaz and colleagues trained parents to implement an intervention targeting stereotypy in young children with ASD, concluding reductions in stereotypy and increases in appropriate behavior were maintained at 24-week follow-up. Similarly, parent-implemented intervention facilitates generalization of children's skills. Koegel and colleagues (1982) compared young

children with ASD whose parents were trained to implement a behavioral intervention to those who received only outpatient treatment and found only those children whose parents implemented the intervention were able to generalize improvements in behavior to additional settings.

Conducting parent-implemented intervention also yields several benefits for participating parents. In addition to reduced stress, improved psychological well-being, and increased empowerment, parent-implemented interventions have been shown to increase parents' knowledge of autism (Solish & Perry, 2008), as well as their ability to evaluate children's interventions and make empirical decisions regarding their children's treatment (Berquist & Charlop, 2014). Importantly, parents receiving training to implement interventions demonstrate greater gains than parents whose children receive clinician-directed treatment. For example, in a study conducted by Brookman-Frazer (2004), parents of young children with ASD who collaborated with clinicians to deliver Pivotal Response Training exhibited lower levels of stress and higher levels of parenting confidence than parents whose children received the same clinician-directed intervention without parent involvement.

Although multiple reviews have found that parents are capable of learning techniques and implementing interventions (McConachie & Diggle, 2007; Meadan et al., 2009; Patterson et al., 2012), most of the literature reviews to date focusing on parent-implemented interventions have examined effects for younger children. In a review by Wong et al. (2015), the authors evaluated evidence-based practices for children, youth, and young adults with ASD and concluded there is sufficient evidence to include parent-implemented intervention as an evidence-based practice for young and elementary-age children with ASD. However, Wong and colleagues included only 3 articles that reported exclusively on children with ASD older than 6 years.

There is extensive support for parent-implemented interventions for young children with ASD, but the evidence to support this practice for school-age children is still rather inconclusive. No syntheses to date have evaluated the effectiveness of parent-implemented interventions targeting school-age children with ASD by focusing exclusively on this age group. However, older children with ASD continue to experience communication, social, and behavioral challenges, suggesting parent-implemented intervention may maintain its importance as children age. Moreover, as children with ASD progress into adolescence, parenting challenges have an increasingly detrimental effect on parents, whose psychological well-being tends to decrease as their children age.

### **Purpose**

As indicated above, we did not identify any systematic reviews that exclusively examine parent-implemented interventions for school-age children with ASD. It is currently unclear what techniques are being used within these interventions to instruct parents and to what degree parent-implemented intervention results in gains for school-age children with ASD. Therefore, the primary purpose of this synthesis and meta-analysis is to describe the studies evaluating parent-implemented interventions for school-age children with ASD and to determine their effectiveness in terms of child outcomes. Within this review, our sub-questions are (a) In terms of parent-implemented interventions delivered to school-age children with ASD, what interventions have parents implemented, how were parents trained to implement these interventions, and what child outcomes were targeted; (b) What was the mean effect size of parent-implemented intervention on child outcomes; and (c) Do the effects of interventions vary across different behavioral domains (e.g., problem behavior, communication, adaptive skills)?

## Method

Following a search of two databases and reviews of parent-implemented interventions plus an ancestral search, 15 articles reporting on 18 studies were analyzed in terms of study design, participant characteristics, purpose and characteristics of the interventions, and outcome measures. Effect sizes (ESs) were calculated for each study and further collapsed into outcome categories.

### Literature Search

We first developed requirements for articles that would be considered for inclusion in the review. Inclusion criteria were established based on those used in a previous review of parent-implemented interventions for young children with ASD by Meadan and colleagues (2009). Articles must have (a) been published in English in peer-reviewed journals; (b) been experimental or quasi-experimental in nature, which included both studies with a control group and single-case designs; (c) described a study in which parents worked directly with their children with ASD as the sole interventionists (e.g., parent, not interventionist/therapist, directly delivered intervention to child); (d) included children with ASD (diagnosed with ASD, autism, autistic disorder, pervasive developmental disorder—not otherwise specified [PDD-NOS], high-functioning autism [HFA], or Asperger disorder, as reported by the authors) aged 6 to 18 years as participants, with a mean age between 6 and 18 years or disaggregate their findings by age and/or disability category; and (e) presented quantitative child outcome data. Additionally, outcome data must have resulted in sufficient within study comparisons to be considered a valid study on its own. That is, a parent-implemented intervention condition must have been contrasted to a control or treatment as usual condition; comparisons with other treatments were excluded. For example, one study (Cavkaytar & Pollard, 2009) was excluded because it



compared treatments delivered by a parent, a therapist, and a parent-therapist team, but the parent-implemented portion of the study did not provide sufficient outcome data with a counterfactual from which to calculate an effect size.

Searches were conducted in three ways. First, we conducted “all text” searches of two databases, ERIC ProQuest and PsycINFO, using the terms *autism* or *pervasive developmental disorder* and *parent-implemented*, *parent-mediated*, *parent-directed*, *caregiver-mediated*, *caregiver-directed*, *parent training*, or *parent education*. Results were restricted to articles published in scholarly, peer-reviewed journals. The database searches yielded a total of 1743 possible studies. After examining article abstracts using our inclusion criteria and eliminating duplicate results, 54 studies remained.

Next, we reviewed the full-text articles to ensure they met the inclusion criteria. Through this process, 41 articles were excluded for the following reasons: Nineteen studies included a sample with a mean age less than 6 years and did not include a sufficient number of participants meeting our age criteria from which to calculate effect sizes. Ten studies lacked a control group, and three articles presented case studies, preventing the combination of effect sizes with those from the other studies in the corpus. Four studies were excluded because the described interventions were not implemented solely by parents, in that a therapist implemented part of the interventions with the children. Five studies were excluded because their participants did not include individuals with ASD diagnoses, or the articles did not include sufficient data from school-age participants with ASD from which effect sizes could be calculated. For example, Elder (1995) included individuals displaying “autistic features” rather than with ASD diagnoses, one study (Laski, Charlop, & Schreibman, 1988) included one “autistic-like” participant, and another study (Stuttard et al., 2014) included children with multiple disabilities and did not

disaggregate their results. One study (Lequia, Machalicek, & Lyons, 2013) included only one participant with ASD, and an additional study (Koppenhaver, Erickson, & Skotko, 2001) included only participants with Rett syndrome, preventing the calculation of effect sizes regarding our target population. From the original corpus, 13 studies met the final inclusion criteria. Using the same procedures, all searches were repeated by two coders, who reviewed the potential articles to evaluate whether each study met the inclusionary criteria. Coders agreed on the inclusion and exclusion of all potential articles.

Subsequently, we examined entries within the reference lists of six previous literature reviews that evaluated parent training programs and parent-implemented interventions for children with ASD (Bearss et al., 2015; Lang, Machalicek, Rispoli, & Regester, 2009; Patterson, Smith, & Mirenda, 2012; Postorino et al., 2017; Schultz et al., 2011; Suppo & Floyd, 2012). These searches contributed one additional article. Last, we conducted an ancestral search by examining the reference lists of the studies to be included in the review. These searches yielded one additional study, resulting in a final corpus of 15 articles. Given that some articles reported on more than one study, the 15 articles represent the effects of 18 unique studies. References for articles included in the review are provided in the supplemental materials.

### **Coding Procedures**

Articles were initially coded for nine study elements. *Design* described the research design used to conduct the study (1=quasi-experimental design, 2=experimental design, 3=alternating treatment, 4=multiple baseline). *Child participants* included numerical descriptors such as number of participants; age range; mean age; and percentage diagnosed with autism, ASD, Asperger's disorder, high-functioning autism, and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). *Purpose of the intervention* described the treatment parents

administered to their children (1=social functioning, 2=communication, 3=emotion identification or regulation, 4=behavior change, 5=adaptive functioning, 6=academic, 7=autism education). Codes regarding *purpose* were developed based on codes used in a previous review of parent training interventions (Black & Therrien, 2018), and detailed definitions of these codes are available from the primary author upon request. Each study was numerically coded using continuous variables in terms of duration (weeks), frequency (sessions per week), and intensity (minutes per session) of parent training sessions. *Format of parent training* described the delivery of training sessions (1=individually with parent or family, 2=group). *Treatment integrity* described whether and how the researchers measured parents' adherence to training when delivering the interventions (0=no, 1=informally measured, 2=formally measured). *Outcome* described the variable assessed by each measure (1=social functioning, 2=communication, 3=emotion identification or regulation, 4=behavior change, 5=adaptive functioning, 6=academic), which was coded separate from the intervention's purpose because studies occasionally assessed outcomes indirectly related to the primary purpose of the intervention. Similar as above, these codes were developed based on codes used in a previous review. Definitions of each outcome category are available from the primary author upon request. *Data source* indicated the method by which information was obtained on each measure (1=direct assessment or observation of child, 2=parent report). Two raters coded 60% of the group studies and 58% of the single-case design studies, and initial interrater reliability was 95% for group studies and 99% for single-case design studies. All discrepancies were resolved during coding sessions, with the reconciled codes used in subsequent analyses.

### **ES Calculation**

**Group studies.** ESs for the 5 group design studies were calculated as the standardized

mean difference between treatment and control groups. Therefore, only dependent measures reported using means and standardized deviations were included. We used the standard formula for Cohen's  $d$  by subtracting the control mean from the treatment mean and dividing by the pooled standard deviation. All ESs were calculated using Comprehensive Meta-Analysis (CMA) software (Version 3; 2014). ESs were calculated by two raters, who agreed on 94% of values. All discrepancies were resolved, with the reconciled values used in subsequent analyses.

**Single-case design studies.** Two indices were calculated for the 13 single-case design studies: the percentage of non-overlapping data (PND) and the percentage of all non-overlapping data (PAND). PND signifies the percent of the intervention data points that exceed the highest baseline data point (Scruggs, Mastropieri, & Casto, 1987). In order to calculate PND, one must determine the most extreme data point in the baseline phase and how many data points in the intervention phase surpass this point. Scruggs et al. (1987) recommend that the most effective interventions have a PND greater than 70, mildly effective interventions have a PND between 50 and 70, and interventions with no apparent differences have a PND less than 50.

The percent of all non-overlapping data (PAND) represents the percent of all data remaining after removing the minimum number of data points that would eliminate all overlap between the baseline and intervention phase (Parker, Hagan-Burke, & Vannest, 2007). Both PND and PAND reflect data non-overlap between phases, but as Parker and colleagues indicate, PAND “uses all data from both phases, avoiding the criticism leveled at PND for wastefulness and for overemphasis on one unreliable data point” (p. 196). To calculate PAND, the number of overlapping data points is divided by the total number of data points across both phases. The criteria for PAND are similar to those for PND, with numbers greater than 50 suggesting moderate effects and numbers closer to 100 demonstrating the most effective interventions. To

calculate the above study indices, we calculated PND and PAND for each subject within each study. Then, we summed the numerators and denominators of all subjects within each study, dividing to calculate the ESs for the study. We conducted interrater reliability for PND and PAND for 62% of the single-case design studies, including 50% of the 52 panels across studies. Interrater reliability was 88% for PND and 100% for PAND, and at the panel level, interrater reliability was 96% and 100%, respectively.

The application of non-parametric summary statistics such as PND and PAND to single-case data introduces numerous threats related to systematic bias and misrepresentation of data phenomena (Allison & Gorman, 1994; White, 1987). Therefore, we chose to augment the calculation of these statistics by computing Pustejovsky's measurement-comparable log-ratio ES measure to quantify intervention effects (Pustejovsky, 2015). In contrast to PND and PAND, Pustejovsky's ES is not subject to biases related to sample size or baseline levels of behavior, and aggregates are not impacted by differences in outcome metrics across studies. First, we extracted dependent measure data from each study using Engauge Digitizer software (Version 10.4; Mitchell, 2014) to pinpoint coordinates of data points. Afterward, we confirmed the accuracy of the generated coordinate values by visually checking them against graphical displays and transferred data into a spreadsheet. Finally, ESs were estimated using the following equation:

$$\omega = \ln\left(\frac{M_T}{M_B}\right)$$

where  $M_B$  and  $M_T$  are means for the baseline and treatment phases, respectively. To simplify interpretation and increase accessibility of our results, as recommended by Pustejovsky (2015), we transformed ESs to percent reduction values by converting log-ratios into exponentiation figures and multiplying by 100.

## Analysis

For group studies, we first calculated an ES (Cohen's  $d$ ) for each dependent measure. Then, ESs for each outcome category within each study were calculated. When studies included more than one dependent measure per outcome category, the ESs for all dependent measures were averaged. We then collapsed the ESs for outcomes within each study to calculate an overall study ES. Finally, using the CMA software, all standardized mean differences were scaled to Hedges  $g$ , which is the ES used in all subsequent analyses of group studies.

In meta-analytic research, the next step would typically be to analyze mediating variables to explain the significant variability using Hedges (1982) equivalent to the ANOVA or modified weighted regression (Hedges & Olkin, 1985). However, these analyses are not appropriate in this review given the small number of studies. Therefore, we examined our research questions via a descriptive examination of weighted means and confidence intervals (CIs), provided that each category consisted of at least two ESs.

For single-case design studies, after calculating subject PNDs and PANDs, we averaged these metrics to obtain overall study PND and PAND indices. Then, study dependent variables were collapsed into categories based on type of outcome (i.e., social functioning, communication, problem behavior), and subject PNDs and PANDs in each category were averaged to calculate indices for each outcome category. To calculate the  $d$ -type ESs for the single-case design studies, we first computed Pustejovsky's measurement-comparable log-ratio ES measure for each outcome for each participant in all studies. Second, we used CMA software to combine all  $d$ -type ESs within each study to calculate an overall study ES. When studies included dependent measures from more than one outcome category, the  $d$ -type ESs for each similar dependent measure were averaged to obtain an ES for the outcome category.

Furthermore, ESs for each outcome category were collapsed to estimate an effect of the interventions on particular outcomes. Last, to obtain unbiased estimates, all *d*-type ESs were scaled to Hedges *g* using the recommended correction factor *J* (Hedges & Olkin, 1985). Similar to above, given the small sample of studies, we evaluated our research questions through a descriptive examination of weighted means and CIs. Furthermore, given the differences in how parent training was conducted between single-case and group design studies, we chose not to combine the ESs for the two groups of studies.

### **Publication Bias**

We conducted Orwin's (1983) fail-safe *N* analysis to test for publication bias, which indicates the number of unpublished studies with insignificant mean ESs that would need to be included in an analysis in order for the cumulative effect to become trivial. Orwin's fail-safe *N* indicated 436 unpublished single-case design studies or 15 unpublished group design studies with a mean ES of 0.00 would need to be included in this analysis to reduce the observed ES to 0.20. The results of this analysis should be interpreted with caution, however, because Orwin's fail-safe *N* is designed for use in the meta-analysis of group design studies, rather than those with single-case designs (Orwin, 1983).

### **Results**

The purpose of this article was to examine parent implemented interventions for school-age children with autism. A total of 15 articles, representing 18 studies, were reviewed. Results are presented in three sections. First, the participants and interventions used in the studies are described. Second, the effects of interventions used in group design studies are presented, including effects by child outcome. Last, similar effects are analyzed for the single-case design studies. See Table 1 for detailed information regarding all studies included in the review. See

Table 2 for mean ESs, standard errors, and CIs pertaining to group design studies and Table 3 for non-parametric indices, *d*-type ESs, standard errors, and CIs related to single-case design studies. All tables are provided in the article's supplemental materials.

### **Participants**

Collectively, the 18 studies included a total of 170 child participants. The group design studies ( $n=5$ ) included a total of 133 participants ( $M=44.3$ ,  $SD=19.6$ ), diagnosed with either Asperger's syndrome or ASD, while the single-case design studies ( $n=13$ ) included a total of 37 participants ( $M=3.1$ ,  $SD=0.8$ ), diagnosed with either ASD or PDD-NOS. Overall, studies reported including participants diagnosed with ASD (84.1%), Asperger's syndrome (38.8%), or PDD-NOS (2.4%). Given that studies must have included participants with a mean age between 6 and 18 years, participants across all studies ranged from 3.3 to 23.0 years old ( $M=11.7$ ).

### **Interventions**

Of the 18 interventions delivered to children, most targeted the reduction of problem behavior ( $n=8$ ), while others targeted the improvement of language and communication outcomes ( $n=5$ ), adaptive skills ( $n=3$ ), and social functioning ( $n=2$ ). PT interventions delivered in the group design studies were conducted weekly, for 1 to 8 weeks, in 60- to 180-minute individual or group sessions. In addition to didactic instruction, parents most often received written materials. In contrast, PT interventions delivered in the single-case design studies were conducted weekly, for 4 to 20 weeks, in 10- to 120-minute individual sessions. In addition to joining in lecture and discussion, parents most often received feedback or modeling or participated in practice and role-play activities. Overall, PT in the single-case design studies took place over longer periods of time in shorter individualized sessions, while training in the group design studies tended to take place over fewer weeks for longer sessions that were offered in a



group format and generally included instructional strategies that were of low intensity and required little parent engagement. Furthermore, none of the group design studies reported levels of treatment integrity, compared to 10 of the 13 single-case design studies. Due to the significant differences in structure between group and single-case design studies, the results for the two are presented separately.

### **Effects for Group Design Studies**

The 5 group design studies (Kuravackel et al., 2018; Sofronoff, Leslie, & Brown, 2004; Stuttard, Beresford, Clarke, Beecham, & Morris, 2016) all targeted reducing child problem behaviors. Kuravackel and colleagues (2018) reported on two unique studies, comparing a parent group receiving the COMPASS for Hope (C-HOPE) intervention through face-to-face training to a control group and to those receiving the same intervention through telehealth. Both groups received the intervention over four 2-hour group sessions and four 1-hour one-on-one sessions offered over 8 weeks. Sofronoff and colleagues (2004) also reported on two unique studies, comparing parent groups who were taught through either one 1-hour group session or 4 weekly hour-long sessions in a one-on-one format to parents in a control group. Stuttard and colleagues examined the effects of training parents using the Cygnet intervention, which provided autism education and aimed to reduce child problem behaviors through 6 weekly group training sessions. Studies obtained an overall ES of 0.79, 95% CI [0.50, 1.09] in the comparison of parents participating in training and those in control groups. Two studies examined social outcomes, demonstrating an ES of 0.95, 95% CI [0.45, 1.45], and all studies evaluated behavioral outcomes, demonstrating an ES of 0.80, 95% CI [0.32, 1.28].

### **Effects for Single-Case Design Studies**

Overall, the 13 single-case design studies demonstrated an ES of 1.84, 95% CI [1.08,

2.60]. Most targeted communication ( $n=5$ ) and behavioral ( $n=5$ ) outcomes. Studies focusing on communication (Casey, 1978; Charlop & Trasowech, 1991; Charlop-Christy & Carpenter, 2000; Hsieh, Wilder, & Abellon, 2011) demonstrated an ES of 2.40, 95% CI [2.00, 3.88] on child communication outcomes. Outcome PNDs ranged from 51 to 100% ( $M=60\%$ ), while study PANDs ranged from 65 to 100% ( $M=75\%$ ). These indices suggest the interventions were moderately to highly effective, while the  $g$  ES indicates the interventions were highly effective in changing children's communication skills.

Casey (1978) taught mothers to use manual signs with verbalizations to increase the development of communication skills and decrease problem behavior in their 6- and 7-year old children with ASD. The intervention was implemented in a laboratory setting, and data on communicative behavior and inappropriate behavior was collected in both the classroom and during mother-child sessions. Results indicated that the manual signs intervention was effective in increasing child's communicative behaviors across environments.

Charlop and Trasowech (1991) taught the parents of 3 children with ASD to use a time delay procedure to increase appropriate spontaneous speech across multiple settings that were part of each child's daily routine. Similarly, Charlop-Christy and Carpenter (2000) taught 3 parents of children with ASD to deliver modified incidental teaching (MITS), traditional incidental teaching, and discrete trial training to improve their children's speech. Following training in both studies, researchers collected data on children's spontaneous speech, imitation, or incorrect speech, which included inappropriate verbalizations or verbalizations that were not spontaneous. Hsieh and colleagues (2011) also taught parents to implement incidental teaching to improve the communication skills of their children with ASD, but collected data only on correct, independent responses. Across these 3 studies, results indicated parents were able to

implement intervention procedures to enhance their children's speech in multiple settings.

Studies targeting behavioral outcomes (Casey, 1978; Crone & Mehta, 2016; Marroquin, Alvero, & Sturmey, 2014; Robertson, 2016) demonstrated an ES of 0.93, 95% CI [0.35, 1.51] on child behaviors, including problem behavior and compliance. Outcome PNDs ranged from 38 to 100% ( $M=70%$ ), while study PANDs ranged from 76 to 100% ( $M=90%$ ). These indices demonstrate wide variability, with 38% indicating no apparent difference following the intervention and 100% indicating the intervention was highly effective. The  $g$  ES, however, indicates the interventions were highly effective in improving children's behavior.

Crone and Mehta (2016) instructed parents in the use of applied behavior analytic strategies through clinic- and home-based training, demonstrating their intervention was effective in decreasing problem behavior during meal-time in children with ASD. Marroquin and colleagues (2014) evaluated 3 parents' use of compliance training and children's compliant behavior after the parents watched video clips of other parents completing compliance training with their children with ASD. Results indicated that behavioral observation was an efficient method of training parents, and if ineffective, could be supplemented by feedback to assist struggling parents. Robertson (2016) taught 3 parents of children with ASD to implement a differential reinforcement intervention incorporating visual supports in order to teach appropriate alternatives to child problem behaviors. This intervention, which demonstrated the lowest ESs, was effective for 2 of the 3 dyads but exhibited varying degrees of treatment integrity.

The remaining studies targeted social functioning ( $n=2$ ) and adaptive behavior ( $n=3$ ). Studies focusing on improving children's social functioning (Dogan et al., 2017; Lui, Moore, & Anderson, 2015) demonstrated an ES of 0.66, 95% CI [0.45, 0.86] on children's conversational skills after parents were taught to become social skills trainers. Study PNDs ranged from 56 to

94% ( $M=74%$ ), while study PANDs ranged from 84 to 97% ( $M=90%$ ). Studies targeting adaptive behavior (Cosbey & Muldoon, 2017; Harriage, Blair, & Miltenberger, 2016; Klett & Turan, 2012) demonstrated an ES of 0.64, 95% CI [0.46, 0.83] on children's adaptive behaviors, including feeding, pedestrian safety, and menstrual care. Study PNDs ranged from 50 to 100% ( $M=93%$ ), while study PANDs ranged from 92 to 100% ( $M=97%$ ). The non-parametric statistics suggest the interventions were moderately to highly effective, while the  $g$  ESs indicate a moderately strong effect of the interventions on children's social and adaptive functioning.

### Discussion

The purpose of this review and meta-analysis was to examine parent-implemented interventions for school-age children with ASD. We identified and reviewed a total of 15 articles published between in or before 2018. The majority of child participants were diagnosed with ASD, and the mean age of participants was 11.7 years. Parent training interventions took place for between 1 and 20 weeks, for between 10 and 180 minutes, in one-on-one or group sessions, delivered about once per week. Generally, single-case design studies described parent training that was provided in individualized sessions over a shorter duration at a greater intensity than those described in the group design studies. Parent training sessions used between one and seven strategies to instruct parents. The most widely used instructional strategy in parent training was didactic instruction. However, parents in single-case design studies tended to receive instruction that included higher-intensity strategies, such as feedback, modeling, practice, and role-play than parents in the group design studies, who tended to receive didactic instruction paired with written materials.

There was considerable variability between the effects demonstrated by the single-case and group design studies. For example, ESs for social skills were greatest within the group

design studies and smallest within single-case design studies. Differences in the intensity of the interventions and instructional strategies used may have impacted the effectiveness of the interventions. For example, behavioral interventions delivered at higher intensities over greater periods of time demonstrate greater effects (Reichow & Wolery, 2009). Furthermore, other research indicates strategies used to teach parents have varying effects on parents' skills and children's outcomes. For example, in a meta-analysis of parent training for parents of children with behavior problems (Kaminski, Valle, Filene, & Boyle, 2008), studies of interventions using different instructional strategies to teach parents demonstrated varying ESs. In terms of improving parenting skills and behaviors, interventions including manuals (ES = 0.38), homework assignments (ES = 0.39), role-playing (ES = 0.45), and practicing with one's own child (ES = 0.91) had differing effects.

Parents' treatment integrity may also play a part in the differences in results reported between single-case and group design studies. Treatment integrity on the part of the parents was reported in most single-case design studies, and was generally high, whereas treatment integrity was not reported in any of the group design studies. This is especially important to consider when interpreting the effects of the group design studies, as research indicates experimental results can be confounded when an intervention is not implemented as designed, making it challenging to discern a functional relationship between an intervention and behavior change (Cooper, Heron, & Heward, 2007). The data-collection methods used in the studies is another difference between the group and single-case design studies that could potentially explain the variability in outcomes between the two sets of studies. All of the outcomes in the group design studies were obtained through parent report, while all outcomes in the single-case design studies were obtained through direct observation.

Interventions included in this review were primarily aimed at improving communication outcomes, social skills, problem behavior, or adaptive functioning. This finding is similar to those of other reviews of programs for younger children (Bearss et al., 2015; Patterson et al., 2012; Schultz et al., 2011), which found PT tended to focus on alleviating the core symptoms of ASD and to Black & Therrien (2018), which found parent training interventions for school-age children tended to focus on communication, social/emotional functioning, and behavior.

Across group design studies ( $n=5$ ), a mean ES of 0.79 was obtained, indicating a moderately strong positive effect on children's outcomes. Similarly, single-case design studies demonstrated an overall ES of 1.84, suggesting a strong positive effect of parent-implemented intervention on outcomes for school-age children with ASD. While some single-case design studies examined communication and adaptive outcomes, no group design studies evaluated those same variables from which overall conclusions can be drawn. However, single-case design and group design studies examining social functioning demonstrated ESs of 0.66 and 0.95, respectively, indicating a moderately strong effect on children's social skills. Single-case design and group design studies examining behavioral outcomes demonstrated ESs of 0.93 and 0.80, respectively, indicating a strong effect on children's behavior.

Meta-analyses of parent-implemented interventions for younger children have reported comparable or smaller ESs. For example, Nevill and colleagues (2018) conducted a meta-analysis of parent-implemented interventions for children with ASD between 1 and 6 years of age, calculating ESs of 0.16 for communication and language and 0.22 for socialization. Similarly, Oono and colleagues (2013) conducted a meta-analysis of parent-implemented early intervention programs for children with ASD, concluding that children in treatment groups exhibited language outcomes that were 0.14 to 0.45 standard deviations higher than those in

comparison groups. Combined with our results, these findings indicate parent-implemented intervention maintains, and may even increase, in importance as children with ASD age.

### **Limitations**

There are several limitations to this review and meta-analysis. First, only 18 studies met our criteria for review, making comparisons among and between study variables difficult. For example, comparisons of interventions including different populations and instructional strategies were not possible given the small sample size. Second, we did not use indicators of methodological quality as criteria for analysis. However, most studies did not include detailed descriptions of the characteristics of their parent training or interventions implemented by parents. Therefore, the lack of information regarding characteristics of the interventions and the small sample of studies would have made such an approach problematic. In addition, we did not contact authors or experts in the field to locate articles for inclusion in our review, nor did we include gray literature in our analysis. However, we conducted an analysis to test for publication bias, which suggested there was not significant bias in our analysis.

### **Implications and Recommendations for Further Research**

There are several practical implications from this analysis. First, results indicate that parent-implemented interventions may be effective in improving outcomes for school-age children with ASD. Parent-implemented interventions targeting problem behavior and communication skills are most likely to have the greatest impact on child outcomes. Furthermore, the individualized instruction and intensity of single-case design interventions is likely needed to make a significant difference in child outcomes.

However, given the small number of studies on the topic, additional research is needed to evaluate the effectiveness of these interventions. Second, future research should focus on

analyzing the effectiveness of core components of parent training used in parent-implemented interventions. For example, the most intensive instructional components, such as individualized coaching, may have a greater impact on parent implementation and child outcomes than less intensive teaching methods, such as didactic instruction. Additionally, given that many studies did not include measures of treatment integrity, future research should measure parents' adherence to interventions, as this may contribute to varying outcomes across studies of parent-implemented interventions.



## References

- Allison, D. B., & Gorman, B. S. (1994). “Make things as simple as possible, but no simpler.” A rejoinder to Scruggs and Mastropieri. *Behaviour Research and Therapy*, 32, 885–890.
- Bailey, K. M., & Blair, K. S. C. (2015). Feasibility and potential efficacy of the family-centered Prevent-Teach-Reinforce model with families of children with developmental disorders. *Research in Developmental Disabilities*, 47, 218-233. doi: 10.1016/j.ridd.2015.09.019
- Ballaban-Gil, K., Rapin, I., Tuchman, R., & Shinnar, S. (1996). Longitudinal examination of the behavioral, language, and social changes in a population of adolescents and young adults with autistic disorder. *Pediatric Neurology*, 15(3), 217-223. doi: 10.1016/S0887-8994(96)00219-6
- Bearss, K., Burrell, T. L., Stewart, L., & Scahill, L. (2015). Parent training in autism spectrum disorder: What’s in a name?. *Clinical Child and Family Psychology Review*, 18(2), 170-182. doi: 10.1007/s10567-015-0179-5
- Berquist, K. L., & Charlop, M. H. (2014). Teaching parents of children with autism to evaluate interventions. *Journal of Developmental and Physical Disabilities*, 26(4), 451-472. doi: 10.1007/s10882-014-9374-4
- Black, M. E., & Therrien, W. J. (2018). Parent training programs for school age children with ASD: A systematic review. *Remedial and Special Education*, 39(4), 243-256. doi: 10.1177/0741932517730645
- Bradshaw, J., Koegel, L. K., & Koegel, R. L. (2017). Improving functional language and social motivation with a parent-mediated intervention for toddlers with autism spectrum

disorder. *Journal of Autism and Developmental Disorders*, 47(8), 2443-2458. doi:

10.1007/s10803-017-3155-8

Brookman-Frazee, L., & Koegel, R. L. (2004). Using parent/clinician partnerships in parent education programs for children with autism. *Journal of Positive Behavior Interventions*, 6(4), 195-213. doi: 10.1177/10983007040060040201

\*Casey, L. O. (1978). Development of communicative behavior in autistic children: A parent program using manual signs. *Journal of Autism and Childhood Schizophrenia*, 8(1), 45-59.

Cavkaytar, A., & Pollard, E. (2009). Effectiveness of parent and therapist collaboration program (PTCP) for teaching self-care and domestic skills to individuals with autism. *Education and Training in Developmental Disabilities*, 381-395.

\* Charlop, M. H., & Trasowech, J. E. (1991). Increasing autistic children's daily spontaneous speech. *Journal of Applied Behavior Analysis*, 24(4), 747-761.

\* 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(2), 98-112.

Comprehensive Meta-Analysis (Version 3) [Computer software]. (2014). Englewood, NJ:

Biostat. Available from <https://www.meta-analysis.com>

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

\* Cosbey, J., & Muldoon, D. (2017). EAT-UP™ family-centered feeding intervention to promote food acceptance and decrease challenging behaviors: A single-case experimental design replicated across three families of children with autism spectrum disorder. *Journal*

*of Autism and Developmental Disorders*, 47(3), 564-578. doi: 10.1007/s10803-016-2977-0

\*Crone, R. M., & Mehta, S. S. (2016). Parent training on generalized use of behavior analytic strategies for decreasing the problem behavior of children with autism spectrum disorder: A data-based case study. *Education and Treatment of Children*, 39(1), 64-94.

Dillenburger, K., Keenan, M., Doherty, A., Byrne, T., & Gallagher, S. (2010). Living with children diagnosed with autistic spectrum disorder: Parental and professional views. *British Journal of Special Education*, 37,13-23. doi: 10.1111/j.1467-8578.2010.00455.x

\*Dogan, R. K., King, M. L., Fischetti, A. T., Lake, C. M., Mathews, T. L., & Warzak, W. J. (2017). Parent-implemented behavioral skills training of social skills. *Journal of Applied Behavior Analysis*, 50(4), 805-818. doi: 10.1002/jaba.411

Elder, J. H. (1995). In-home communication intervention training for parents of multiply handicapped children. *Scholarly Inquiry for Nursing Practice*, 9(1), 71-92.

Hand, A., Raghallaigh, C. N., Cuppage, J., Coyle, S., & Sharry, J. (2013). A controlled clinical evaluation of the parents plus children's programme for parents of children aged 6-12 with mild intellectual disability in a school setting. *Clinical Child Psychology and Psychiatry*, 18(4), 536-555. doi: 10.1177/1359104512460861

\*Harriage, B., Blair, K. S. C., & Miltenberger, R. (2016). An evaluation of a parent implemented in situ pedestrian safety skills intervention for individuals with autism. *Journal of Autism and Developmental Disorders*, 46(6), 2017-2027. doi: 10.1007/s10803-016-2730-8

Harris, S. L., Wolchik, S. A., & Milch, R. E. (1982). Changing the speech of autistic children and their parents. *Child & Family Behavior Therapy*, 4(2-3), 151-173. doi:

10.1300/J019v04n02\_16

- Hayes, S. A., & Watson, S. L. (2013). The impact of parenting stress: A meta-analysis of studies comparing the experience of parenting stress in parents of children with and without autism spectrum disorder. *Journal of Autism and Developmental Disorders, 43*(3), 629-642. doi: 10.1007/s10803-012-1604-y
- Hedges, L. V. (1982). Fitting categorical models to effect sizes from a series of experiments. *Journal of Educational Statistics, 7*, 119–137. doi:10.2307/1164961
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.
- \*Hsieh, H. H., Wilder, D. A., & Abellon, O. E. (2011). The effects of training on caregiver implementation of incidental teaching. *Journal of Applied Behavior Analysis, 44*(1), 199-203. doi: 10.1901/jaba.2011.44-199
- Kaminski, J. W., Valle, L. A., Filene, J. H., & Boyle, C. L. (2008). A meta-analytic review of components associated with parent training program effectiveness. *Journal of Abnormal Child Psychology, 36*(4), 567-589. doi:10.1007/s10802-007-9201-9
- Keen, D., Couzens, D., Muspratt, S., & Rodger, S. (2010). The effects of a parent-focused intervention for children with a recent diagnosis of autism spectrum disorder on parenting stress and competence. *Research in Autism Spectrum Disorders, 4*(2), 229-241. doi: 10.1016/j.rasd.2009.09.009
- \*Klett, L. S., & Turan, Y. (2012). Generalized effects of social stories with task analysis for teaching menstrual care to three young girls with autism. *Sexuality and Disability, 30*(3), 319-336. doi: 10.1007/s11195-011-9244-2

- 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. *Educating and Understanding Autistic Children*. San Diego, CA: College-Hill Press.
- Koppenhaver, D. A., Erickson, K. A., & Skotko, B. G. (2001). Supporting communication of girls with Rett syndrome and their mothers in storybook reading. *International Journal of Disability, Development and Education*, 48(4), 395-410.
- \*Kuravackel, G. M., Ruble, L. A., Reese, R. J., Ables, A. P., Rodgers, A. D., & Toland, M. D. (2018). COMPASS for Hope: Evaluating the effectiveness of a parent training and support program for children with ASD. *Journal of Autism and Developmental Disorders*, 48(2), 404-416. doi: 10.1007/s10803-017-3333-8
- Lang, R., Machalicek, W., Rispoli, M., & Regeher, A. (2009). Training parents to implement communication interventions for children with autism spectrum disorders (ASD): A systematic review. *Evidence-Based Communication Assessment and Intervention*, 3(3), 174-190. doi: 10.1080/17489530903338861
- Lanovaz, M. J., Rapp, J. T., Maciw, I., Dorion, C., & Prigent-Pelletier, É. (2016). Preliminary effects of parent-implemented behavioural interventions for stereotypy. *Developmental Neurorehabilitation*, 19(3), 193-196. doi: 10.3109/17518423.2014.986821
- 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(4), 391-400.
- Lequia, J., Machalicek, W., & Lyons, G. (2013). Parent education intervention results in decreased challenging behavior and improved task engagement for students with

- disabilities during academic tasks. *Behavioral Interventions*, 28(4), 322-343. doi: 10.1002/bin.1369
- \*Liu, Y., Moore, D. W., & Anderson, A. (2015). Improving social skills in a child with autism spectrum disorder through self-management training. *Behaviour Change*, 32(4), 273-284. doi: 10.1017/bec.2015.14
- McConachie, H., & Diggle, T. (2007). Parent implemented early intervention for young children with autism spectrum disorder: A systematic review. *Journal of Evaluation in Clinical Practice*, 13(1), 120-129. doi: 10.1111/j.1365-2753.2006.00674.x
- \*Marroquin, M., Alvero, A., & Sturmey, P. (2014). Evaluation of the observer effect on compliance training in adolescents with autism. *Research in Developmental Disabilities*, 35(2), 537-540. doi: 10.1016/j.ridd.2013.11.008
- Meadan, H., Ostrosky, M. M., Zaghlawan, H. Y., & Yu, S. (2009). Promoting the social and communicative behavior of young children with autism spectrum disorders: A review of parent-implemented intervention studies. *Topics in Early Childhood Special Education*, 29(2), 90-104. doi: 10.1177/0271121409337950
- Minjarez, M. B., Mercier, E. M., Williams, S. E., & Hardan, A. Y. (2013). Impact of pivotal response training group therapy on stress and empowerment in parents of children with autism. *Journal of Positive Behavior Interventions*, 15(2), 71-78. doi: 10.1177/1098300712449055
- Mitchell, M. (2014). Engauge Digitizer (Version 10.4) [Computer software]. Available from <https://github.com/markumitchell/engauge-digitizer>

- Nevill, R. E., Lecavalier, L., & Stratis, E. A. (2018). Meta-analysis of parent-mediated interventions for young children with autism spectrum disorder. *Autism*, 22(2), 84-98. doi: 10.1177/1362361316677838
- Oono, I. P., Honey, E. J., & McConachie, H. (2013). Parent-mediated early intervention for young children with autism spectrum disorders (ASD). *Evidence-Based Child Health: A Cochrane Review Journal*, 8(6), 2380-2479. doi: 10.1002/ebch.1952
- Orwin, R. G. (1983). A fail-safe N for effect size in meta-analysis. *Journal of Educational Statistics*, 8, 157-159.
- Parker, R. I., Hagan-Burke, S., & Vannest, K. (2007). Percent of all non-overlapping data (PAND): An alternative to PND. *Journal of Special Education*, 40, 194-204. doi: 10.1177/00224669070400040101
- Patterson, S. Y., Smith, V., & Miranda, P. (2012). A systematic review of training programs for parents of children with autism spectrum disorders: Single subject contributions. *Autism*, 16(5), 498-522. doi: 10.1177/1362361311413398
- Postorino, V., Sharp, W. G., McCracken, C. E., Bearss, K., Burrell, T. L., Evans, A. N., & Scahill, L. (2017). A systematic review and meta-analysis of parent training for disruptive behavior in children with autism spectrum disorder. *Clinical Child and Family Psychology Review*, 20(4), 391-402. doi: 10.1007/s10567-017-0237-2
- Pustejovsky, J. E. (2015). Measurement-comparable effect sizes for single-case studies of free-operant behavior. *Psychological Methods*, 20, 342-359. doi: 10.1037/met0000019
- Reichow, B., & Wolery, M. (2009). Comprehensive synthesis of early intensive behavioral interventions for young children with autism based on the UCLA young autism project

- model. *Journal of Autism and Developmental Disorders*, 39, 23–41. doi:10.1007/s10803-008-0596-0
- \*Robertson, R. E. (2016). Effectiveness and Acceptability of Parent-Implemented Behavior Interventions for Children with Autism in Three African American Families. *Education and Training in Autism and Developmental Disabilities*, 51(2), 107.
- Schultz, T. R., Schmidt, C. T., & Stichter, J. P. (2011). A review of parent education programs for parents of children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, 26(2), 96-104. doi: 10.1177/1088357610397346
- Scruggs, T. E., Mastropieri, M. A., & Casto, G. (1987). The quantitative synthesis of single-subject research: Methodology and validation. *Remedial and Special Education*, 8, 24–33. doi:10.1177/07419325870080020
- Seltzer, M. M., Krauss, M. W., Shattuck, P. T., Orsmond, G., Swe, A., & Lord, C. (2003). The symptoms of autism spectrum disorders in adolescence and adulthood. *Journal of Autism and Developmental Disorders*, 33(6), 565-581.
- Sheinkopf, S. J., & Siegel, B. (1998). Home-based behavioral treatment of young children with autism. *Journal of Autism and Developmental Disorders*, 28, 15-23.
- Singer, G. H.S., Ethridge, B. L. and Aldana, S. I. (2007), Primary and secondary effects of parenting and stress management interventions for parents of children with developmental disabilities: A meta-analysis. *Mental Retardation & Developmental Disabilities Research Reviews*, 13, 357-369. doi:10.1002/mrdd.20175
- 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.



- \*Sofronoff, K., Leslie, A., & Brown, W. (2004). Parent management training and Asperger syndrome: a randomized controlled trial to evaluate a parent based intervention. *Autism*, 8(3), 301-317. doi: 10.1177/1362361304045215
- Solomon, M., Ono, M., Timmer, S., & Goodlin-Jones, B. (2008). The effectiveness of parent-child interaction therapy for families of children on the autism spectrum. *Journal of Autism and Developmental Disorders*, 38(9), 1767-1776. doi: 10.1007/s10803-008-0567-5
- Solish, A., & Perry, A. (2008). Parents' involvement in their children's behavioral intervention programs: Parent and therapist perspectives. *Research in Autism Spectrum Disorders*, 2(4), 728-738. doi: 10.1016/j.rasd.2008.03.001
- \*Stuttard, L., Beresford, B., Clarke, S., Beecham, J., & Morris, A. (2016). An evaluation of the Cygnet parenting support programme for parents of children with autism spectrum conditions. *Research in Autism Spectrum Disorders*, 23, 166-178. doi: 10.1016/j.rasd.2015.12.004
- Stuttard, L., Beresford, B., Clarke, S., Beecham, J., Todd, S., & Bromley, J. (2014). Riding the Rapids: Living with Autism or Disability—An evaluation of a parenting support intervention for parents of disabled children. *Research in Developmental Disabilities*, 35(10), 2371-2383. doi: 10.1016/j.ridd.2014.05.021
- Suppo, J., & Floyd, K. (2012). Parent training for families who have children with autism: A review of the literature. *Rural Special Education Quarterly*, 31(2), 12-26. doi: 10.1177/875687051203100203
- Todd, S., Bromley, J., Ioannou, K., Harrison, J., Mellor, C., Taylor, E., & Crabtree, E. (2010). Using group-based parent training interventions with parents of children with disabilities:

A description of process, content and outcomes in clinical practice. *Child and Adolescent Mental Health*, 15(3), 171-175. doi: [10.1111/j.1475-3588.2009.00553.x](https://doi.org/10.1111/j.1475-3588.2009.00553.x)

Wacker, D. P., Lee, J. F., Dalmau, Y. C. P., Kopelman, T. G., Lindgren, S. D., Kuhle, J., ... & Waldron, D. B. (2013). Conducting functional communication training via telehealth to reduce the problem behavior of young children with autism. *Journal of Developmental and Physical Disabilities*, 25(1), 35-48. doi: 10.1007/s10882-012-9314-0

White, O. R. (1987). Some comments concerning “The quantitative synthesis of single-subject research.” *Remedial and Special Education*, 8, 34–39.

Zaghlawan, H. Y., & Ostrosky, M. M. (2016). A parent-implemented intervention to improve imitation skills by children with autism: A pilot study. *Early Childhood Education Journal*, 44(6), 671-680. doi: 10.1007/s10643-015-0753-y

Zwi, M., Jones, H., Thorgaard, C., York, A., & Dennis, J. A. (2011). Parent Training Interventions for Attention Deficity Hyperactivity Disorder (ADHD) in Children Aged 5 to 18 Years. Campbell Systematic Reviews. 2012: 2. *Campbell Collaboration*.

\*Indicates study included in review

Table 1

*Parent-implemented interventions for school-age children with ASD*

Article	Design	<i>n</i> (parents)	Child participants		Dependent variable		Parent TI
			Age	Diagnoses	Description	Dosage	
Casey (1978)	MB	4	6.0-7.0 ( <i>M</i> =NR)	ASD (100.0%)	Parents taught to implement a manual signs intervention to increase communication skills and decrease problem behavior, using lecture/discussion	Maximum 4 weeks, including 20 sessions of 45 minutes in length, in 1:1 format	No
Charlop & Trasowech (1991)	MB	3	7.8-8.6 ( <i>M</i> =8.1)	ASD (100.0%)	Parents trained to use a time delay procedure to increase communicative behavior, using (a) lecture/discussion; (b) modeling; (c) feedback	Dosage NR; 1:1 format	Yes
Charlop- Christy & Carpenter (2000)	Alternating treatment with MB	3	6.0-9.8 ( <i>M</i> =7.3)	ASD (100.0%)	Trained parents to conduct incidental teaching, modified incidental teaching, and discrete trial teaching sessions <sup>a</sup> to increase communication through lecture/discussion	Dosage NR; 1:1 format	Yes
Chrono & Mehta (2016)	MB	4	6.0-8.0 ( <i>M</i> =7.0)	ASD (100.0%)	Parents trained to use behavior analytic strategies for decreasing problem behavior, using: (a) lecture/discussion; (b) practice/role-play; (c) written materials; (d) coaching; (e) modeling; (f) feedback; (g) parent-created videos	8 sessions, 50-95 minutes in length, in a 1:1 format	Yes

Cosbey & Muldoon (2017)	MB	3	6.0-8.0 ( <i>M</i> =7.0)	ASD (100.0%)	Parents taught a feeding intervention to promote food acceptance and decrease challenging behaviors, using: (a) lecture/discussion; (b) written materials; (c) coaching; (d) videos/visuals; (e) modeling; (f) feedback	Dosage NR; 1:1 format	Yes
Dogan et al. (2017)	MB	4	9.0-12.0 (10.0)	ASD (75.0%) PDD-NOS (25.0%)	Parents trained to implement basic skills training to improve social skills, using (a) lecture/discussion; (b) practice/role-play; (c) written materials; (d) coaching; (e) modeling; (f) home visits; (g) feedback	20- to 120-minute sessions in a 1:1 format	Yes
Harriage, Blair, & Miltenberger (2016)	MB	3	14.0-23.0 ( <i>M</i> =17.3)	ASD (100.0%)	Parents taught to implement in situ pedestrian skills training, using: (a) lecture/discussion; (b) practice/role-play; (c) feedback	10- to 15- minute sessions in a 1:1 format	Yes
Hsieh, Wilder, & Abellon (2011)	MB	3	8.0-10.0 ( <i>M</i> =8.7)	ASD (100.0%)	Parents/caregivers trained to use incidental teaching to increase communicative behavior, using (a) lecture/discussion; (b) practice/role-play; (c) modeling; (d) feedback	Dosage NR; 1:1 format	Yes
Klett & Turan (2012)	MB	3	9.0-12.0 ( <i>M</i> =10.6)	ASD (100.0%)	Parents trained to use a social story intervention with embedded visual task analysis to teach menstrual care skills, using (a) lecture/discussion; (b) practice/role-play; (c) written materials; (d) data-collection instruction	30 minute sessions in a 1:1 format	Yes

Kuravackel et al. (2018)	RCT	23	3.3-12.8 ( <i>M</i> =8.6)	ASD (100.0%)	Parents received C-HOPE intervention, aimed at reducing child problem behaviors, through face-to-face training, including lecture/discussion	Four 2-hour group sessions and four 1-hour 1:1 sessions offered over 8 weeks	No
		20	3.3-12.8 ( <i>M</i> =7.7)	ASD (100.0%)	Parents received C-HOPE intervention, aimed at reducing child problem behaviors, through telehealth, including (a) lecture/discussion; (b) videoconferencing	Four 2-hour group sessions and four 1-hour 1:1 sessions offered over 8 weeks	No
Lui, Moore, & Anderson (2015)	MB	1	9.0	ASD	Parents taught to implement self-management intervention to improve social skills, using lecture/discussion	Dosage NR; 1:1 format	Yes
Marroquin, Alvero, & Sturme (2014)	MB	3	6.0-8.0 ( <i>M</i> =6.7)	ASD (33.3%) PDD-NOS (66.7%)	Parents taught to implement compliance training, using (a) written materials; (b) videos/visuals; (c) feedback	Dosage NR; 1:1 format	No
Robertson (2016)	MB	3	7.0-17.0 ( <i>M</i> =13.3)	ASD (66.7%) PDD-NOS (33.3%)	Parents trained to implement an intervention to decrease problem behavior, using (a) lecture/discussion; (b) practice/role-play; (c) feedback	Once weekly sessions in 1:1 format	Yes
Sofronoff, Leslie, & Brown (2004)	RCT	33	6.0-12.0 ( <i>M</i> =9.3)	AS (100%)	Parents taught to implement intervention targeting problem behaviors, using (a) lecture discussion; (b) written materials	One 1-hour group session	No

		33	6.0-12.0 ( <i>M</i> =9.3)	AS (100%)	Parents taught to implement intervention targeting problem behaviors, using (a) lecture discussion; (b) written materials	4 weekly sessions, 1 hour in length, in a 1:1 format	No
Stuttard, Beresford, Clarke, Beecham, & Morris (2016)	QED	67	5.0-17.0 ( <i>M</i> =10.2)	ASD (100%)	Parents received Cygnet intervention, aimed at providing autism education and reducing child problem behaviors, through (a) homework; (b) lecture/discussion; (c) practice/role-play; (d) written materials; (e) videos/visuals	6 weekly sessions, 180 minutes in length, in a group format	No

*Note.* AS=Asperger's syndrome; ASD=autism spectrum disorder; MB=multiple baseline; NR=not reported; PDD-NOS=pervasive developmental disorder-not otherwise specified; QED=quasi-experimental design; RCT=randomized controlled trial; TI=treatment integrity

<sup>a</sup>Analysis includes only modified incidental teaching as this was the researchers' primary variable of interest

Table 2  
*Effect sizes for group studies by outcome variable and overall*

Article	Outcome Category	Data-Collection	Effect by outcome				Effect overall			
			ES	SE	95% CI		ES	SE	95% CI	
					Low	High			Low	High
Kuravackel et al. (2018)	Behavior	P	0.55	0.35	-0.13	1.24	0.55	0.35	-0.13	1.24
	Behavior	P	0.99	0.35	0.28	1.70	0.99	0.35	0.28	1.70
Sofronoff et al. (2004)	Behavior	P	0.97	0.36	0.26	1.68	0.80	0.21	0.39	1.21
	Behavior	P	0.60	0.35	-0.08	1.29				
	Social	P	0.79	0.36	0.09	1.48				
	Behavior	P	1.54	0.39	0.77	2.30				
	Behavior	P	1.41	0.38	0.66	1.24				
	Social	P	1.12	0.37	0.40	1.84				
Stuttard et al. (2016)	Behavior	P	0.10	0.30	-0.45	0.68	0.22	0.20	-0.18	0.62
	Behavior	P	0.31	0.27	-0.23	0.84				

*Note.* P=parent reported data

Table 3  
*Effect sizes for single-case design studies outcome variable and overall*

Article	Outcome Category	Data-Collection	Non-Parametric Indices		Effect Size			
			PND	PAND	ES	SE	95% CI	
							Low	High
Casey (1978)	Behavior	D	65	94	1.18	0.23	0.74	1.62
	Communication	D	85	93	0.63	0.10	0.44	0.83
	Behavior	D	80	95	1.05	0.21	0.63	1.47
	Communication	D	100	100	0.62	0.10	0.42	0.82
Charlop & Trasowech (1991)	Communication	D	51	65	0.60	0.87	-1.11	2.30
Charlop-Christy & Carpenter (2000)	Communication	D	62	88	6.38	0.00	6.37	6.38
Cosbey & Muldoon (2017)	Adaptive	D	100	100	2.78	1.79	-0.72	6.29
Crone & Mehta (2016)	Behavior	D	100	100	2.54	1.64	-0.66	5.75
Dogan et al. (2017)	Social	D	56	84	0.52	0.20	0.12	0.92
Harriage et al. (2016)	Adaptive	D	96	98	0.68	0.00	0.51	0.85
Hsieh et al. (2011)	Communication	D	82	96	5.46	0.01	5.43	5.49
Klett & Turan (2012)	Adaptive	D	80	92	0.50	0.18	0.15	0.86
Lui et al. (2015)	Social	D	94	97	0.70	0.12	0.46	0.95
Marroquin et al. (2014)	Behavior	D	64	77	2.73	1.62	-0.46	5.91
Robertson (2016)	Behavior	D	38	76	0.25	0.19	-0.13	0.63

*Note.* D=direct observation data



**CHAPTER 4**

Effectiveness of a Training Program for Parents of Children with Autism

### Abstract

This study evaluated the effectiveness of a brief parent training program for parents of children with ASD. Participants were 7 parents of children with ASD ages 2 to 8 years. Parents participated in five 60-minute weekly group parent training sessions. Instructional components included written materials, didactic instruction, modeling, and role-play activities. Parents in the intervention condition demonstrated significantly different gain scores in terms of their knowledge of ABA topics and implementation of ABA techniques when compared to parents in the waitlist control condition. Parents in the intervention group also reported decreased parenting stress. Parents expressed satisfaction with the program and rated written materials and didactic instruction as the most accessible and effective components of instruction. Further investigation of parent training with larger samples and standardized measures is needed.

## Effectiveness of a Training Program for Parents of Children with Autism

Autism spectrum disorder (ASD) is characterized by persistent deficits in social communication and social interaction and restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, 2013). Additionally, children with ASD often exhibit challenging behaviors, such as anxiety, self-injury, noncompliance, aggression, and property destruction (Gadow, DeVincent, Pomeroy, & Azizian, 2004). These difficulties typically persist into adulthood, and outcomes for adults with ASD are generally poor (Howlin, Goode, Hutton, & Rutter, 2004). Given that individuals with ASD who demonstrate lower levels of core ASD symptoms have better overall prognoses than those with higher levels of similar characteristics (Szatmari, 2009), developing treatments to reduce core symptom severity in children with ASD is paramount. To ameliorate the challenges associated with ASD, the National Research Council has recommended interventions for children with ASD include parent training (PT), and the National Professional Development Center has identified PT intervention as evidence-based practice for early learners and elementary-age children with ASD (Stansberry-Brusnahan & Collet-Klingenberg, 2010).

### **Rationale for Parent Training**

PT programs have the potential to improve outcomes for children with ASD, their parents, and other family members. In a survey of parents whose children received early intervention services, PT was believed to be the most effective service in contributing to children's growth (Hume, Bellini, & Pratt, 2005). Moreover, behavioral interventions that are implemented for more hours and over a longer duration demonstrate better outcomes (Reichow and Wolery, 2009). When parents are able to implement behavioral programming, it extends the number of opportunities for children to experience an intervention and results in the maintenance

of parents' behavior modification skills and lasting behavioral improvement for children (Vismara, Colombi, & Rogers, 2009).

PT interventions also provide an opportunity to improve outcomes for the parents of children with ASD. In a meta-analysis of parent stress, Hayes and Watson (2013) showed that parents of children with ASD experience higher levels of stress than parents of typically developing children and those of children with other disabilities. Furthermore, many parents cite difficulties managing everyday behavior and unmet needs for support and care as a source of stress (Bromley, Hare, Davison, & Emerson, 2004; Sharpley, Bitsika, & Efremidis, 1997). Similarly, in a survey conducted by Sharpley et al. (1997), about 82% of parents indicated they felt "stretched beyond their limits" when asked about their ability to cope with their child's behavior.

Several studies report decreased levels of stress in parents of children with ASD following PT interventions (Schultz, Schmidt, & Stichter, 2011). Similarly, PT for those of children with developmental disabilities has been shown to improve family quality of life, reduce limits on family opportunities, and increase parents' feelings of self-efficacy for up to 5 years after program completion (Feldman & Werner, 2002). Additionally, as Koegel, Bimbela, and Schreibman (1996) demonstrate, PT programs reduce parents' expressions of negativity and lead to parent-child interactions that are characterized by increased happiness and interest, decreased stress, and a more positive style of communication.

### **Parent Training Interventions**

PT programs have employed a variety of instructional strategies to teach parents, but it is currently unclear which components of PT lead to significant outcomes for children and their parents (Wainer & Ingersoll, 2013). A review of PT interventions for parents of young children

with autism (Beaudoin, Sébire, & Couture, 2014) showed across 15 studies, an average of 4.4 strategies were used to instruct parents. Similarly, in a review of interventions for school-age children with ASD that include PT, Black and Therrien (2018) found PT sessions incorporated between 1 and 9 instructional components, including written materials, discussion, homework assignments, modeling, role-play, and in-situation coaching with feedback. However, across studies included in the review, strategies requiring more parental involvement, such as role-play, were used less frequently than those involving limited parental engagement.

Few studies have explored the differential impact of PT program components. However, Lerman, Swiezy, Perkins–Parks, and Roane (2000) investigated whether parents of children with ASD and intellectual disabilities could implement behavioral techniques with their children after being given written instructions. They found some parents required the addition of corrective feedback in order to carry out the procedures correctly. Additionally, Marroquin, Alvero, and Sturmey (2014) evaluated the effectiveness of using video observation to teach compliance training to parents of children with ASD, concluding video observation was generally sufficient, but occasionally required the addition of feedback for parents to achieve mastery. Combined, the findings of these two studies suggest feedback may be a particularly valuable component of PT, especially for parents who demonstrate less proficiency with the strategies being taught.

Interventions using Applied Behavior Analysis (ABA) principles, including many early intensive behavioral intervention (EIBI) and intensive behavioral intervention (IBI) programs that include PT components, have been shown to improve the communication skills, cognitive abilities, behavior, and adaptive functioning of children with ASD (Lovaas, 1987; McEachin, Smith, & Lovaas, 1993; Reichow & Wolery, 2009; Remington et al., 2007). However, few studies have examined changes to parents' knowledge or implementation of strategies taught

during PT, and few studies have evaluated the effectiveness and efficacy of individual instructional components. Therefore, the present study was intended to answer the following research questions (a) What improvements do parents demonstrate in terms of ABA knowledge and strategy implementation following participation in a PT program regarding basic ABA concepts; (b) What is the impact of program participation on parent stress; (c) How do parents view the effectiveness and efficacy of individual instructional components; and (d) When basic instruction does not lead to significant improvement, what is the benefit of including a more intensive instructional component, such as in-situation coaching?

## **Method**

### **Participants**

Ten participants were recruited from the waiting list of an outpatient behavioral services clinic in the southeastern United States. Eligibility criteria included being the parent or guardian of a child diagnosed with ASD and not having participated in a formal PT program through any agency. One participant dropped out of the study prior to randomization because they obtained services from another agency. Therefore, nine participants were randomly assigned to intervention and waitlist control conditions. An additional two participants dropped out of the study prior to completion (one due to a scheduling conflict and one due to a language barrier). The parents of 7 children diagnosed with ASD ages 2 to 8 years ( $M=4.83$ ,  $SD=1.74$ ) participated in and completed this study. Table 1 shows demographic information regarding the parent participants and their children with ASD.

### **Measures**

**Parent ABA knowledge.** Pre- and post-intervention, parents were administered a researcher-created 20-question, multiple-choice test of ABA knowledge to provide an indication

of their understanding of ABA topics and techniques. Questions were derived from the topics of instruction described in Procedures. Parents read and completed the assessment independently. Total percent correct scores were obtained for parents in both groups pre- and post-intervention.

**Observation checklist.** Pre- and post-intervention, three 60-minute videos were collected in each family's home, recording parents' interactions with their children. During each observation, parents were instructed to interact with their children and address their behavior as they typically would. Researchers used a checklist to evaluate parents' implementation of the ABA techniques taught during PT sessions. Two scores, an average total observation score and an average behavioral strategies score, were obtained from each participant pre- and post-intervention. The observation checklist is provided in Appendix A.

The principal researcher, a doctoral student in special education and a Registered Behavior Technician (RBT) with the Behavior Analysis Certification Board (BACB) experienced in teaching and intervention for children with ASD, coded all recordings. One additional coder independently scored 25% of the recordings. The additional coder, who was blind to treatment condition, was an RBT with the BACB and had several years of experience in instruction for children with ASD. For each checklist, inter-rater reliability was calculated for each item and averaged to obtain a mean inter-rater reliability score for the checklist. Total agreement was 96 percent (range=83 to 100 percent) for the overall procedures section and 81 percent (range=69 to 97 percent) for the remainder of the checklist.

**Observation score.** This portion of the checklist measured parents' use of specific techniques taught during PT sessions. It captured parent behaviors in the areas of (a) overall procedures, (b) environmental adjustments, (c) reinforcement, (d) teaching language, and (e) teaching new behaviors. The frequency of each parent behavior, such as contriving a request

from the child, reinforcing appropriate behavior, or prompting a response, was recorded and summed for a total observation score.

***Behavioral strategies.*** This portion of the checklist measured parents' use of specific strategies in response to child problem behavior. The frequency of problem behavior, including (a) screaming, crying, and inappropriate vocalizations, (b) verbal or physical refusal, (c) property destruction, (d) aggression, (e) self-injury, and (f) elopement, was recorded along with the strategy used by the parent to address the behavior. Parent strategies were categorized as (a) ignore, (b) neutrally redirect or block, (c) provide choices, (d) explain natural consequences, (e) follow through, or (f) use behavioral momentum. More than one strategy could be recorded for each occurrence of problem behavior (e.g., parent used behavioral momentum and provided choices in response to child noncompliance). This score was expressed as a ratio of parent strategies per occurrence of child problem behavior.

***Parenting Stress Index, Fourth Edition (PSI-4).*** The PSI-4 (Abidin, 2012) is a 120-item measure designed to evaluate the magnitude of stress in the parent/child system. It measures stress in the areas of child characteristics, parent characteristics, and situational/demographic life stress. The PSI-4 has been empirically validated and used in several studies of parent training programs. Parents in both groups completed the PSI-4 at study inception and upon study completion.

***Social validity questionnaire.*** Upon completion of the study, parents in the intervention group completed a researcher-created social validity questionnaire regarding their perspectives on the efficacy and efficiency of the PT program in order to understand barriers to parent participation, perceived effectiveness and accessibility of instructional components, and overall satisfaction with the program. The questionnaire contained seven 5-point Likert-scale items in



which parents were asked to rate their level of agreeance with statements such as “Participating in the parent training program was worth the time and effort it required,” two 4-point rating scales in which parents were asked to rank each instructional component in terms of its accessibility (e.g., the degree to which one was able to physically access and understand the material) and its effectiveness (e.g., the degree to which one was able to use and apply what was learned), and 3 open-ended questions which asked parents to discuss the impact of program participation on themselves and their families and to make recommendations for changes to the program. The social validity questionnaire is provided in Appendix B.

### **Intervention**

During 5 weekly PT sessions, parents in the intervention group received 60 minutes of group instruction on ABA concepts and techniques provided by the primary researcher. Instruction occurred in the following areas, one topic per session: (a) reinforcement, punishment, and extinction, (b) functions of behavior, (c) behavior reduction and replacement behaviors, (d) prompting and fading, and (e) shaping and chaining. PT consisted of didactic instruction, written materials, modeling, and role-play activities. An optional homework assignment was given at the conclusion of each session and included activities such as reading a parent-friendly article or taking data.

Each session began with a review of the previous week’s homework assignment and a brief check-in regarding progress and challenges in the home. Next, the instructor provided approximately 30 minutes of didactic instruction accompanied by parent handouts. Following the lecture, the instructor modeled a few of the strategies introduced, such as providing reinforcement using a token board or prompting correct responses. Finally, parents engaged in similar role-play activities with one another, during which one parent pretended to be the child

while the other played the role of the parent. Each session ended with an explanation of the optional homework and an opportunity for parents to ask questions. If a PT session was missed, the instructor and parent met individually within a week to discuss the material, so that all sessions were completed by all participants. Three parents needed to reschedule a session; the attendance rate at initially scheduled training sessions was 85 percent.

Children of the participants in both conditions continued to receive their typical educational and supplementary services (e.g., speech/language, occupational, and/or physical therapy) during the intervention period. However, no children in the waitlist control condition received ABA services, and no parents in the group participated in PT from any agency. One child of a parent in the intervention group began receiving ABA services at the clinic during the intervention period, but the child's parent did not receive any PT from the agency as part of the child's instruction.

## Results

Normalized gain scores were calculated for each participant's scores on each outcome measure. After calculating the average of gains within groups for each measure, means for each outcome were compared by t-test. Table 2 shows the results of these analyses, including means and standard deviations for scores by condition.

**Parent ABA knowledge.** An independent t-test indicated the mean gain scores on the ABA knowledge test were statistically different between groups ( $t=4.29$ ,  $df=5$ ,  $p=.008$ ), with a large effect size (Hedges'  $g= 1.40$ ), suggesting that parents in the intervention group significantly improved their knowledge of ABA topics and techniques after participating in the PT intervention when compared to parents in the waitlist control group.

**Parent use of ABA techniques.** Parents in the intervention group demonstrated significantly different gains in terms of observation scores ( $t=3.45$ ,  $df=5$ ,  $p=.018$ , Hedges'  $g=2.77$ ) and behavioral strategies scores ( $t=5.96$ ,  $df=5$ ,  $p=.002$ , Hedges'  $g=2.31$ ) from the parents in the waitlist control condition. We had intended to add individual PT sessions for parents in the intervention group who failed to demonstrate improvement in their implementation of ABA techniques following PT (as evidenced by less than 25 percent improvement on the observation score and/or a behavioral strategies score of less than 80 percent on the post-intervention observation checklist). However, all parents in the intervention group met the above criteria during their post-intervention observations. Therefore, no individual PT sessions were added, and we were not able to evaluate the benefit of adding in-situation coaching for parents who did not substantially improve their use of ABA techniques.

**Parent stress.** An independent t-test indicated the mean gain scores on the PSI-4 were statistically different between groups ( $t=3.40$ ,  $df=5$ ,  $p=.019$ , Hedges'  $g=2.40$ ). This suggests a difference in self-reported parent stress as a result of participating in the PT program. However, all parents in both conditions, with the exception of one parent in the control group, began the study with scores within the “normal range” (i.e., 16th to 84th percentiles).

**Social validity.** Feedback received on the social validity questionnaire was generally positive. One parent wrote, “Every parent should do this. I learned so much about positive interactions and discipline/rewards. I feel that I understand my child's needs more after this training and how to fulfill/react to them. We most certainly still have many challenges but this program has helped tremendously!” The only change parents recommended was to extend the training to give parents the opportunity to observe strategies being used in the home.

Parents responded that they “agreed” or “strongly agreed” with all statements on the questionnaire, such as “The current training procedures helped me increase my ability to teach my child new skills,” “The current training procedures helped me increase my ability to prevent and manage my child’s problem behavior,” and “Participating in the parent training program was worth the time and effort it required.” Parents rated written materials as the most accessible instructional component and instructor modeling as the least accessible component. In terms of instructional component effectiveness, parents rated lecture/discussion as allowing for the most understanding and application of material, while instructor modeling and role-play activities received the lowest ratings in this area.

### **Discussion**

The present study evaluated the effectiveness of a PT program for parents of children with ASD based on the basics of ABA. The PT program was examined in terms of whether it was effective in increasing parents’ knowledge of ABA topics, improving parents’ implementation of ABA techniques and behavioral strategies, and decreasing parenting stress. The results suggest the PT program was effective in achieving the intended objectives, and that opinions of the parents participating in the intervention were generally positive.

Parents in the intervention group significantly increased their knowledge of ABA topics and techniques when compared to those in the waitlist control group as evidenced by their scores on the ABA knowledge test. A closer examination of the assessments revealed that while all parents were able to respond correctly to questions regarding basic concepts, such as types and schedules of reinforcement, they demonstrated less success with questions related to functions of behavior and methods of differential reinforcement. This finding indicates parents may need additional, explicitly designed instruction to demonstrate understanding of more complex topics.

Results also suggest an increase in parents' knowledge allowed them to improve their implementation of ABA techniques and behavior management strategies during observations. Parents who participated in PT significantly improved their implementation of ABA techniques and strategies used to manage their children's problem behavior when compared to parents in the waitlist control condition. Parents demonstrated the greatest gains in their use of positive reinforcement and prompting children's responses, while few parents were observed implementing complex teaching procedures, such as differential reinforcement and chaining of multistep tasks. These findings suggest additional instruction may be required to encourage parents' use of advanced techniques.

Previous research has suggested the components used to instruct parents may have some influence on parents' acquisition of skills. In a meta-analysis of PT programs aimed at improving children's behavior (Kaminski, Valle, Filene, & Boyle, 2008), researchers found that in terms of parenting behaviors and skills, practice with one's own child demonstrated the highest effect size when compared to other instructional components. Similarly, research has demonstrated a variable course of acquisition across skills and indicates there may be an interaction between instructional method and type of skill taught to parents (Lerman et al., 2000). Combined, these findings suggest instruction may need to involve more intensive instructional strategies, such as in-situation coaching, in order to improve parents' use of complex techniques. Unfortunately, no participants in the present study met our criteria to receive in-situation coaching, so we were unable to evaluate the benefit of including a more intensive instructional component for our participants.

Although not focused on children with ASD, in their meta-analysis of PT programs, Kaminski and colleagues (2008) found interventions using different strategies to teach parents

demonstrated varying effect sizes (*ESs*). However, no studies to date have evaluated parents' perceptions of the accessibility or effectiveness of instructional components used in PT. Parents in the current study rated each instructional component at the conclusion of training. Parents rated instructor modeling as the least accessible and the least effective instructional component. Similarly, Kaminski and colleagues (2008) found studies of PT programs that did not incorporate modeling were more effective in changing parents' skills and behaviors ( $ES=0.41$ ) than interventions including the component ( $ES=0.36$ ). Combined, these findings suggest instructor modeling may not be a worthwhile component of PT instruction. Parents in the current study also reported low rates of effectiveness for role-play activities. Interestingly, Kaminski and colleagues (2008) found role-play demonstrated moderate effects ( $ES=0.45$ ) on parents' skills and behaviors, suggesting the design of role-play activities may have a differential impact on the effectiveness and parents' perceptions of the activities.

In the present study, parents in the intervention condition reported decreased stress when compared to parents in the waitlist control condition. This result did not reach statistical significance. However, it is important to note that parents' degree of reported stress at outset was substantially lower than the clinical cutoff established by Abidin (2012; above the 84th percentile) and lower than levels previously reported in populations of parents of children with ASD. For example, a study of 104 mothers of children with ASD and 342 mothers of typically developing children (Hoffman, Sweeney, Hodge, Lopez-Wagner, & Looney, 2009) revealed mothers of children with ASD scored at the 99th percentile on the Child Domain subscale of the PSI.

### **Limitations**

This study had several limitations. First, the sample was relatively small, which limited the power of analysis and made it impossible to examine outcomes by subgroup (e.g., ASD severity, race/ethnicity, income). The small sample size also contributed to sizeable variability in participant characteristics and scores on outcome measures. The parent participants were overwhelmingly Caucasian and female. Additionally, parents varied widely in their scores on the ABA knowledge test and the observation checklist. Second, the observational measure did not take into account the function of children's behavior, which may have affected the appropriateness of strategies parents chose to use in given situations. Last, two outcome measures used in this study, the observation checklist and parent ABA knowledge test, were researcher-created measures. However, options existing in the literature were limited, and the measures were designed based on topics and techniques that are agreed upon within behavior-analytic literature.

### **Implications for Practice and Future Research**

These findings yield several practical implications for the design and implementation of PT interventions. Parents of children with ASD may be able to understand and implement the most straightforward of ABA techniques following basic PT that includes only didactic instruction and simulated practice. However, in order to demonstrate the knowledge and skill necessary to implement more advanced techniques, parents should receive explicitly designed PT that includes more intensive instructional components, such as in-situation coaching. Findings also suggest interventionists carefully structure modeling and practice activities in order to increase their accessibility to parents and the likelihood that parents will generalize concepts to their interactions with children.

Additional studies of PT programs for parents of children with ASD are needed. Future studies should include substantial sample sizes in order to evaluate the impact of demographic variables on outcomes for parents. Inclusion of more formal measures of parent knowledge and behavior would improve the methodology of future studies. Additionally, studies should systematically evaluate the effectiveness of instructional components in order to encourage the design of worthwhile PT programs.



## References

- Abidin, R. R. (2012). *Parenting Stress Index–Fourth Edition (PSI-4)*. Lutz, FL: Psychological Assessment Resources.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5<sup>th</sup> ed.). Washington, DC: Author.
- Beaudoin, A. J., Sébire, G., & Couture, M. (2014). Parent training interventions for toddlers with autism spectrum disorder. *Autism Research and Treatment*, 2014. <http://dx.doi.org/10.1155/2014/839890>
- Black, M. E., & Therrien, W. J. (2018). Parent training programs for school age children with ASD: A systematic review. *Remedial and Special Education*, 39(4), 243-256. doi: 10.1177/0741932517730645
- Bromley, J., Hare, D. J., Davison, K., & Emerson, E. (2004). Mothers supporting children with autistic spectrum disorders: Social support, mental health status and satisfaction with services. *Autism: The International Journal of Research and Practice*, 8(4), 409-423. doi: 10.1177/1362361304047224
- Feldman, M. A., & Werner, S. E. (2002). Collateral effects of behavioral parent training on families of children with developmental disabilities and behavior disorders. *Behavioral Interventions*, 17(2), 75-83. doi:10.1002/bin.111
- Gadow, K. D., DeVincent, C. J., Pomeroy, J., & Azizian, A. (2004). Psychiatric symptoms in preschool children with PDD and clinic and comparison samples. *Journal of Autism and Developmental Disorders*, 34, 379–393. doi:10.1023/ B:JADD.0000037415.21458.93
- Hayes, S. A., & Watson, S. L. (2013). The impact of parenting stress: A meta-analysis of studies comparing the experience of parenting stress in parents of children with and without

autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 43, 629–642.  
doi:10.1007/s10803-012-1604-y

- Hoffman, C. D., Sweeney, D. P., Hodge, D., Lopez-Wagner, M. C., & Looney, L. (2009). Parenting stress and closeness: Mothers of typically developing children and mothers of children with autism. *Focus on Autism and Other Developmental Disabilities*, 24(3), 178–187. doi: 10.1177/1088357609338715
- Howlin, P., Goode, S., Hutton, J., & Rutter, M. (2004). Adult outcome for children with autism. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 45, 212–229. doi:10.1111/j.1469-7610.2004.00215.x
- Hume, K., Bellini, S., & Pratt, C. (2005). The usage and perceived outcomes of early intervention and early childhood programs for young children with autism spectrum disorder. *Topics in Early Childhood Special Education*, 25(4), 195. <https://doi.org/10.1177/02711214050250040101>
- Kaminski, J. W., Valle, L. A., Filene, J. H., & Boyle, C. L. (2008). A meta-analytic review of components associated with parent training program effectiveness. *Journal of Abnormal Child Psychology*, 36, 567–589. doi:10.1007/s10802-007-9201-9
- Koegel, R. L., Bimbela, A., & Schreibman, L. (1996). Collateral effects of parent training on family interactions. *Journal of Autism and Developmental Disorders*, 26(3), 347–359.
- 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(3), 183–196. [https://doi.org/10.1016/S0891-4222\(00\)00033-0](https://doi.org/10.1016/S0891-4222(00)00033-0)

- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*, 3–9.  
doi:10.1037/0022-006X.55.1.3
- McEachin, J. J., Smith, T., & Lovaas, O. I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal of Mental Retardation, 97*, 359–372.
- Marroquin, M., Alvero, A., & Sturmey, P. (2014). Evaluation of the observer effect on compliance training in adolescents with autism. *Research in Developmental Disabilities, 35*(2), 537–540. <https://doi.org/10.1016/j.ridd.2013.11.008>
- Reichow, B., & Wolery, M. (2009). Comprehensive synthesis of early intensive behavioral interventions for young children with autism based on the UCLA young autism project model. *Journal of Autism and Developmental Disorders, 39*, 23–41. doi:10.1007/s10803-008-0596-0
- Remington, B., Hastings, R. P., Kovshoff, H., Espinosa, F. D., Jahr, E., Brown, T., . . . Ward, N. (2007). Early intensive behavioral intervention: Outcomes for children with ASD and their parents after two years. *American Journal of Mental Retardation, 112*, 418–438.
- Schultz, T. R., Schmidt, C. T., & Stichter, J. P. (2011). A review of parent education programs for parents of children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 26*, 96–104. doi:10.1177/1088357610397346
- Sharpley, C. F., Bitsika, V., & Efremidis, B. (1997). Influence of gender, parental health, and perceived expertise of assistance upon stress, anxiety, and depression among parents of children with autism. *Journal of Intellectual & Developmental Disability, 22*, 19–28.  
doi:10.1080/13668259700033261

- Stansberry-Brusnahan, L. L., & Collet-Klingenberg, L. L. (2010). Evidence-based Practices for Young Children with Autism Spectrum Disorders: Guidelines and Recommendations from the National Resource Council and National Professional Development Center on Autism Spectrum Disorders. *International Journal of Early Childhood Special Education*, 2(1).
- Szatmari, P., Bryson, S., Duku, E., Vaccarella, L., Zwaigenbaum, L., Bennett, T., et al. (2009). Similar developmental trajectories in autism and Asperger syndrome: From early childhood to adolescence. *Journal of Child Psychology and Psychiatry*, 50(12), 1459–1467. doi:10.1111/j.1469-7610.2009.02123.x.
- Vismara, L. A., Colombi, C., & Rogers, S. J. (2009). Can one hour per week of therapy lead to lasting changes in young children with autism? *Autism*, 13, 93–115. doi:10.1177/1362361307098516
- Wainer, A. L., & Ingersoll, B. R. (2013). Disseminating ASD interventions: A pilot study of a distance learning program for parents and professionals. *Journal of Autism and Developmental Disorders*, 43(1), 11-24. <https://doi.org/10.1007/s10803-012-1538-4>

Table 1  
Demographic information by group

	PT ( <i>n</i> =4) <i>n</i> (%)	WL ( <i>n</i> =3) <i>n</i> (%)	Full ( <i>n</i> =7) <i>n</i> (%)
Parent participants			
Sex (female)	4 (100%)	2 (67%)	6 (86%)
Age	33.50 (SD=2.52)	39.00 (SD=10.00)	35.86 (SD=6.72)
Race/Ethnicity			
Caucasian	4 (100%)	2 (67%)	6 (86%)
African American	0 (0%)	1 (33%)	1 (14%)
Graduated from college	2 (50%)	3 (100%)	5 (71%)
Employed full-time	2 (50%)	1 (33%)	3 (43%)
Married	4 (100%)	3 (100%)	7 (100%)
Household size	5.25 (SD=1.50)	4.00 (SD=1.00)	4.71 (SD=1.38)
Children			
Sex (male)	3 (75%)	1 (33%)	4 (57%)
Age	4.11 (SD=1.22)	5.80 (SD=2.10)	4.83 (SD=1.74)

Table 2  
Comparison of parent training (PT) to waitlist control (WL)

	Pre-intervention		Post-intervention		Hedges' <i>g</i>
	PT ( <i>n</i> =4) <i>M</i> (SD)	WL ( <i>n</i> =3) <i>M</i> (SD)	PT ( <i>n</i> =4) <i>M</i> (SD)	WL ( <i>n</i> =3) <i>M</i> (SD)	
ABA knowledge test	55.00 (7.07)	61.67 (18.93)	88.75 (14.36)	61.67 (18.93)	1.40
Observation score	40.25 (20.48)	26.22 (2.41)	84.09 (23.24)	23.89 (5.39)	2.77
Behavioral strategies (%)	44.92 (19.07)	65.56 (15.57)	87.71 (12.74)	52.72 (12.80)	2.31
PSI-4	55.50 (3.11)	60.67 (5.51)	50.25 (4.99)	65.67 (6.03)	2.40

## Appendix A

## Observation Checklist

INSTRUCTIONS: Circle Y (yes) or N (no) in the right-hand column to indicate whether the parent behavior was observed at least once during the session.

Adjusted schedule (e.g., thick vs. thin) of reinforcement according to child behavior	<b>Y</b>	<b>N</b>
Faded prompts within session	<b>Y</b>	<b>N</b>
Used shaping (reinforced successive approximations of target response)	<b>Y</b>	<b>N</b>
Used DRA procedures (reinforcement given when another more appropriate behavior was used rather than targeted inappropriate behavior)	<b>Y</b>	<b>N</b>
Used DRI procedures (reinforcement given when another behavior— one that is incompatible with the inappropriate behavior— was used)	<b>Y</b>	<b>N</b>
Used DRO procedures (reinforcement given when targeted inappropriate behavior did not occur)	<b>Y</b>	<b>N</b>
Part 1 Score = /6		

INSTRUCTIONS: Place a tally in the right-hand column each time the parent behavior was observed during the session. A tally may be placed in more than one row.

<b>Environment</b>	<b>Observed</b>
Informed of transitions or expectations through timers, warnings, and/or references to a schedule	
Used visuals (pictures or text) other than a schedule or token board	
<b>Reinforcement</b>	
Provided reinforcement (e.g., verbal praise, high-fives, edibles, tangibles, tokens) for desired behavior, use of language, etc. *Record each occurrence (“You did it!” + token = 2 tallies)	
<b>Increasing Language</b>	
Contrived opportunities for spontaneous manding (blocking desired activity, modeling the request, etc.) *Record each novel item/activity	
Prompted the use of echoics (“Say...”) and waited for response (2 sec) *Record each novel echoic prompted	
Used intraverbal ( <i>wh</i> question, fill-in) and waited for response (2 sec) *Record each novel occurrence; do not count <i>yes/no</i> questions	
<b>Teaching New Behaviors</b>	
Provided prompts (full physical, partial physical, modeling, visual/text, gestural) <b>when child did not respond independently to a given direction</b> *Record each prompt given	

Used errorless learning (e.g., most-to-least prompting to prevent incorrect response)	
Used least-to-most prompting (progressed through hierarchy from least intrusive prompt— independent response— to most intrusive prompt— full physical prompt)	
Used forward chaining to teach task-analyses (refers to teaching a behavioral chain beginning with the first step; had the child complete the first step independently and then prompted all remaining steps)	
Used backward chaining to teach task-analyses (refers to teaching a behavioral chain beginning with the last step; completely prompted the entire chain of behaviors except the last step)	
Part 2 Score =	
Part 1 + Part 2 Score=	

INSTRUCTIONS: Place a tally mark in the left-hand column for each time the parent behavior was observed, and place a tally mark in the right-hand column for each opportunity (each occurrence of or attempt at undesirable behavior)

Undesirable Behaviors	Observed	Opportunity					
		Screaming, crying/whining, inapprop. noise (offset 5 sec)	Verbal /physical refusal (“No, “don’t”, taking item, flopping, etc.); not in response to question	Property destruction (throwing, swiping, breaking, etc.)	Aggression (hit, bite, throw item at, head-butt, etc.)	Self-injury (head bang, bite self, etc.)	Elopement (leaving parent area; 6ft away)
Ignored							
Neutrally redirected or blocked							
Gave choices							
Explained natural consequences							
Followed through with most recent direction or natural expectation (e.g., sharing toys)							
Used behavioral momentum to increase compliance							
Part 3 Score= # Observed / # Opportunities = /							

## Appendix B

## Social Validity Questionnaire

**Part 1. Please indicate the extent to which you agree with the following statements by circling the option that most closely reflects your opinion.**

1. I understand concepts related to applied behavior analysis (ABA).

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

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2. The current training procedures helped me increase my ability to prevent and manage my child's problem behavior.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

---

3. The current training procedures helped me increase my ability to teach my child new skills.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

---

4. I would be more likely to select the strategies learned during training than those I previously used when interacting with my child.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

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5. Using the strategies I learned during training has led to an improvement in my child's behavior, communication, and/or other skill.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

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6. Participating in the parent training program was worth the time and effort it required.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

---

7. I felt supported and respected by the therapist who conducted the parent training sessions.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

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**Part 2. The next two questions will ask you about the degree to which you felt the methods and materials used in the program were accessible and effective.**

1. Please rank the following methods in order of most accessible to least accessible (1=most accessible; 4=least accessible). This refers to the degree to which you feel you were able to physically access and understand each component.



