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# Pilot randomized controlled trial of a Functional Behavior Skills Training program for young children with Autism Spectrum Disorder who have significant early learning skill impairments and their families

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ABSTRACT

Many children with Autism Spectrum Disorder (ASD) possess early learning skill deficits and, do not achieve significant cognitive and adaptive gains following intensive behavioral intervention. This pilot randomized controlled trial investigated the effectiveness of a Functional Behavior Skills Training (FBST) program in improving children's performance on functional skills and communication, mitigating children's problem behaviors, and improving parents' strain, sense of competence, and, knowledge of Applied Behavior Analysis (ABA). Fifteen children with ASD who demonstrated early, learning skill impairments (ages between 38 and 82 months) were recruited from a community-based, IBI program or its waitlist. Children and their parents were randomized to a treatment group who, received FBST for four months or a control group who received their treatment as usual. Children who, received FBST improved on targeted functional skills and communication and demonstrated lower, levels of disruptive behavior. Meanwhile, parents who received FBST improved in their knowledge of, ABA. Overall, preliminary findings suggest that FBST is a feasible and promising behavioral, intervention for children with ASD who have early learning skill impairments. FBST promotes the, development of functional behavior and communication which can direct children onto a path of, appropriate skill development and meaningful interactions in the real world.


## 1. Introduction

Autism Spectrum Disorders (ASDs) are a class of neurodevelopmental disorders characterized by impairments in communication, social interaction, and behavior (*Diagnostic and Statistical Manual of Mental Disorders Text Revision*, 4th ed., text rev.; *DSM-IV-TR*; American Psychiatric Association, 2000). Symptoms of ASD are heterogeneous. Many children with ASD have a co-morbid intellectual disability (Bryson, Clark, & Smith, 1988, for review, see Matson & Shoemaker, 2009) and/or

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other psychopathologies (Bradley, Summers, Wood, & Bryson, 2004; Hill & Furniss, 2006; for review, see Matson & Nebel-Schwalm, 2007), and exhibit challenging behaviors (Jang, Dixon, Tarbox, & Granpeesheh, 2011; Kozlowski & Matson, 2012; for review, see Matson, Wilkins, & Macken, 2009). Children diagnosed with ASD typically have poor prognosis and require a high level of care (Howlin, Goode, Hutton, & Rutter, 2004). Intensive behavioral intervention (IBI), based on principles of Applied Behavior Analysis (ABA), has enabled many children with ASD to achieve significant improvements in cognitive and adaptive functioning and ASD symptoms (Cohen, Amerine-Dickens, & Smith, 2006; Eikeseth, Smith, Jahr, & Eldevik, 2002; Howard, Sparkman, Cohen, Green, & Stanislaw, 2005; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993; Perry et al., 2008; Reichow, 2012; Sallows & Graupner, 2005; Smith, Groen, & Wynn, 2000).

Unfortunately, not all children with ASD make impressive gains with IBI. In fact, there appears to be tremendous variability in outcomes (e.g., Perry et al., 2008). For instance, a child's outcome tends to correlate with his or her initial ASD symptoms severity (Smith, Groen, et al., 2000; Zachor & Ben-Itzchak, 2010), intelligence (Ben-Itzchak & Zachor, 2007; Eikeseth et al., 2002; Eldevik, Eikeseth, Jahr, & Smith, 2006; Harris & Handleman, 2000; Perry et al., 2011; Szatmari, Bryson, Boyle, Streiner, & Duku, 2003), and adaptive functioning (Perry et al., 2011; Sallows & Graupner, 2005). Perry et al. (2011) recently identified characteristics of children ($n = 332$) who made little or no progress in regard to reducing their ASD symptoms severity or improving their cognitive or adaptive functioning following community-based IBI administered in Ontario. These children were characterized by lower IQ, younger mental age, lower adaptive functioning, and slower rates of development at intake. Although it was reported that these children composed 20% of those enrolled in treatment, the proportion of children who did not improve in both cognitive and adaptive functioning was nearly 40%. These values are congruent with more recent evaluations of another sample of children ($n = 103$) in Ontario (Reitzel, 2012). Overall, these findings reflect the real-world effectiveness of community-based interventions that frequently provide services to children with severe impairments. In our clinical experience, many of these children, even after years of intervention, continue to require considerable assistance and supervision to complete basic tasks of daily living, placing significant demands on time, energy, and resources of their caregivers and the community. Given the costs of IBI, these findings are troubling and clearly demonstrate that there is a need for a re-examination of current services, resource allocations, and interventions.

Meta-analyses performed in recent years have consistently reported the effectiveness of IBI (Eldevik et al., 2009; Howlin, Magiati, & Charman, 2009; Makrygianni & Reed, 2010, Reichow & Wolery, 2009; for review see Reichow, 2012). However, outside of a few studies (Peters-Scheffer, Didden, Mulders, & Korzilius, 2010; Smith, Eikeseth, Klevstrand, & Lovaas, 1997), most of the literature has investigated the effects of behavioral interventions on children with ASD who are "higher functioning" (i.e., those with mild to moderate intellectual impairments, e.g., IQ $> 50$). Consequently, a majority of these results may not be generalizable to children who have severe cognitive impairments or who have considerable difficulties with early learning skills (e.g., very limited imitation or communication). For instance, many studies have demonstrated that cognitive functioning is a powerful predictor of success in IBI (Ben-Itzchak & Zachor, 2007; Eikeseth et al., 2002; Harris & Handleman, 2000; Perry et al., 2011). The degree of cognitive impairment has been shown to correlate with other factors that can additionally hinder response to treatment, such as level of adaptive functioning (Bölte & Poustka, 2002), ASD symptoms severity (Ben-Itzchak, Lahat, Burgin, & Zachor, 2008; Matson, Dempsey, LoVullo, & Wilkins, 2008), co-morbid psychopathology (Bradley et al., 2004; for review, see Matson & Shoemaker, 2009), and presence of challenging behaviors, such as aggression, self-injury, and stereotypy (Emerson & Bromley, 1995; Holden & Gitlesen, 2006). Not surprisingly, Smith et al. (1997) reported that many children with ASD who have significant intellectual impairments remain considerably delayed even after IBI. Our own clinical observations consistently showed that children who failed to achieve improvements in cognitive and communication skills during IBI also appear unable to develop the early learning skills (e.g., expressive or receptive language or imitation) emphasized in treatment. These observations are congruent with the reported relationship between progress on the Early Learning Measure (ELM) and child outcomes following intervention (Sallows & Graupner, 2005; Smith, Groen, et al., 2000). Although IBI is a comprehensive intervention with programming in all developmental domains including adaptive daily living skills; it still primarily emphasizes language and social gains which may not be effective or appropriate for every child with ASD. IBI focuses on accelerating a child's developmental and learning trajectory to be more similar to their typically developing peer (Rogers & Vismara, 2008). These objectives may not be achievable for many children with ASD who have significant intellectual or early learning skill impairments. Consequently, while IBI is promising for many children, there remains a need for alternative approaches aimed at children who may require a different focus in behavioral intervention.

For children with ASD who have significant early learning skill impairments, behavioral training focused specifically on functional behavior skills may be of greater benefit than interventions, such as IBI, which are aimed at improving cognition and language. Functional behavior skills, alternatively referred to as adaptive skills, are behaviors used to engage in meaningful interactions with the environment. Development of functional behavior skills is important as these skills can instill greater independence in children and decrease the burden of care for families. Studies have demonstrated that ABA principles can be used to effectively train adaptive skills in individuals with moderate and severe intellectual impairments (Canella-Malone et al., 2006; Matson, Bamburg, Smalls, & Smiroldo, 1997; Matson, Smalls, Hampff, Smiroldo, & Anderson, 1998; Matson, Dempsey, & Fodstad, 2009; for review, see Matson, Hattier, & Belva, 2012) and children with ASD who are higher functioning (e.g., Shipley-Benamou, Lutzker, & Taubman, 2002).These same behavioral principles and teaching approaches (e.g., prompting, reinforcement, extinction, task analysis, and data collection) were adapted to develop a Functional Behavior Skills Training (FBST) program which focuses on teaching functional behavior skills to children with ASD who have early learning skill impairments.