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Early intensive behavioral intervention for autism: Is it actually more "intensive" than a typical child's day?

Caitlyn B. Sorensen

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Running head: EIBI AUTISM

Early Intensive Behavioral Intervention for Autism: Is It Actually More "Intensive" Than a
Typical Child's Day?

by

Caitlyn B. Sorensen

Thesis

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Thesis Committee:

James Todd, Ph.D., Chair

Renee Lajiness-O'Neill, Ph.D.

Thomas Waltz, Ph.D.

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Abstract

Autism Spectrum Disorder (ASD) is a pervasive developmental disorder characterized by deficits in social interaction, communication, and excessive ritualistic and repetitive behavior. Numerous treatments for autism devised over the last half-century have proven ineffective, or have never been scientifically evaluated. Despite the state of the research, the most demonstrably effective treatment, Early Intensive Behavioral Intervention (EIBI), has been a target of much criticism, including accusations of being too intense. A large number of learning trials in relatively short periods of time supposedly induce children to have disordered stress responses. To explore the intensity of EIBI, behavior samples from children engaging in EIBI and typical children engaging in everyday activities were gathered and coded for rates of behavior. Operational definitions of what constituted a single behavioral interaction were developed, and those samples were used to calculate behavior rates. The results suggest that the rate of behavior exhibited by typical children exceeds the rate of behaviors in early intensive behavioral therapy, by a factor of two to three. Simply put, EIBI is generally not nearly as behaviorally intense as are ordinary child activities, and thus this dimension of EIBI is unlikely to be a precipitant for disordered stress responses.

Keywords: Early Intensive Behavioral Intervention (EIBI), PTSD, Stress, Autism Spectrum Disorders (ASD)

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Introduction

Autism spectrum disorder (ASD) is characterized by deficits in social functioning and communication, and includes the presence of excessive restricted, repetitive behaviors (RRB; American Psychiatric Association, 2013). It is particularly difficult to treat, and many treatments have surfaced to address this disorder. Criticisms of treatments, specifically the efficacious behavioral therapy, have also surfaced. To understand the criticisms, a review of ASD and the treatments is indicated.

Autism Spectrum Disorder

Although references to the behavior characteristics of autism have appeared for centuries, in 1943 Kanner was the first to formally describe autism as a distinct disorder, particularly its differences from schizophrenia. As noted by Kanner, the diagnostic characteristics of autism invariably appear early in life. Specifically, the person with autism exhibits moderate to severe limitations in the ability to relate to others, limited ability and motivation to communicate, a persistent need for sameness, and preference for specific objects (Kanner, 1943). Kanner noted that some children with ASD had typical levels of intellectual functioning but had become limited in their ability to interact socially by a “maternal lack of genuine warmth” (1973, p. 57). Thus, through the 1950s and up until the 1970s, autism was primarily of interest to the psychiatric community, which characterized the condition as a psychogenic disorder of emotionality and attachment (Bettelheim, 1959; Bettelheim, 1967; Tinbergen, 1974). According to this view, the child supposedly rejects the world and becomes severely self-absorbed, even self-destructive, as a symptom of his or her parents’ inability to form appropriate attachments. Essentially, the child reflects the mother’s rejection and turns it inward.

Throughout the 1980s and 1990s, the definition of autism was increasingly formalized, primarily due to the expanded influence of the Diagnostic and Statistical Manual (DSM) in clinical psychology and psychiatry, the creation of reliable and useful diagnostic measures (i.e., Autism Diagnostic Observation Schedule, ADOS; Lord et al., 2000), and, more recently, efforts to legislate funding for autism treatments. Currently, the definition of ASD in the DSM-5 is based on a two-factor model, with social interaction/communication and restricted, repetitive behaviors as the core deficit areas (APA, 2013; Frazier et al., 2012; Mandy, Charman, & Skuse, 2012). ASD under the DSM-IV-TR was defined in terms of three factors, with social interaction and social communication as separate factors, rather than combined as they are in the DSM-5 (APA, 2000; 2013). According to the developers of the DSM-5 definition, meaningfully separating the two domains, social interaction and communication, was difficult due to the overlap in the behaviors that comprise them (i.e., eye contact use and directing speech; APA, 2000, 2013). Collapsing the domains allows these interactive behaviors to be considered together when making a diagnosis.

Additionally, the DSM-IV-TR recognized three distinct types of ASD: Autism, Asperger's Syndrome, and PDD-NOS. In the DSM-5 there is only one diagnosis, Autism Spectrum Disorder, and severity ratings are used to identify level of need for services, which adds a dimensional perspective to this once categorical diagnosis (APA, 2000, 2013; Gotham, Pickles, & Lord, 2009; Lord & Jones, 2012). The diagnosis also now requires a notation of "with or without expressive or receptive language delay" and "with or without intellectual disability." The downside of this spectrum approach is potentially collapsing distinctly different aspects of the disorder into a single category.

Expanding on the basic definitional features, individuals affected by ASD typically exhibit varying combinations and intensities of significant impairments in behaviors fundamental to social communication such as use of eye contact, communicative gestures, and facial expressions (APA, 2013). Not only do individuals with ASD often fail to learn typical social behaviors, they may also have difficulty reliably integrating the social behaviors they can perform into ordinary social interactions, and may have particular difficulty responding to other people's social initiations and behaviors (L. Koegel, Koegel, Hurley, & Frea, 1992). In addition to social communication and interaction deficits, most individuals with ASD often show deficits in language and in motivation to communicate. Some do not have functional language at all (APA, 2000; Fernell et al., 2010). Those that do speak often exhibit deficits that are distinct from those seen in other types of communication disorders (Ferrari, 1982). For example, individuals with ASD will demonstrate deviations in pronunciation, tone, variation of speech, or they will lack a variety of pragmatic use of language.

As noted above, another fundamental aspect of ASD not seen in most other developmental disabilities is that those who do not speak functionally typically do not attempt to communicate in a spontaneous, generalized manner by alternative means, such as using gestures. That is, children with ASD are less likely than their non-affected peers to use gestures to initiate joint attention and other social referencing behaviors (e.g., Mundy, 1995). Gesture use, when it does occur, is usually limited in pragmatic use compared to other developmental disabilities and typically developing children (Loveland, Landry, Hughes, Hall, & McEvoy, 1988; Watson, Crais, & Baranek, 2013). Gesture use is a natural aspect of language development, and is generally present even in children with other cognitive or developmental deficits that lead to language delays. Another example of gestures use or alternative communicative means is also

demonstrated in deaf babies or babies born to deaf parents; they will babble in sign language (Petitto, Holowka, Sergio, & Ostry, 2001; Petitto & Marentette, 1991).

Some individuals with ASD speak articulately, but non-functionally, repeating things others have said or making other stereotyped vocalizations, behavior described generally by terms such as “stereotyped speech” or “echolalia.” Individuals with ASD who have seemingly normal language may have limited or altered pragmatics or vocal inflection (Sundberg & Michael, 2001). For example, an individual can engage in a back and forth conversation, but the person may speak in pronounced monotone, show clear insensitivity to conversational nuances such as sarcasm, and fail to ask for items or personal information. These problems increase the difficulty in relating, communicating, and learning from other people.

In addition to the language and social aspects, individuals with ASD often exhibit other developmental delays and behavioral excesses. Many individuals with ASD are cognitively impaired (APA, 2013), or present with other skill deficits in multiple areas of developmental functioning beyond language and social communication (Fernell et al., 2010), such as memory (e.g. Lind, 2010), theory of mind (e.g. Tager-Flusberg, 2007), and motor delays (APA, 2013). These problems further limit their ability to learn not just from interactions with other individuals, but from their interactions with and observations of the world.

Additionally, the cognitive and developmental profiles of children with ASD commonly display irregular patterns or a mixture of areas with apparently normal and delayed development (APA, 2013). That is, people with ASD sometimes display what are commonly called “splinter skills” (Newsom & Hovanitz, 2006). These may be reasonably normal in character or execution, or sometimes even advanced. But, in a person with pronounced deficits in many other areas, even ordinary skills can appear to be savant-like, especially if the activity is well practiced. Thus,

savantism is commonly associated with ASD, even though it is rare and not a defining characteristic of the disorder. Additionally, compared to typical peers and people with most other cognitive disabilities, children and adults with ASD demonstrate a relatively high rate of self-injurious behaviors (SIB; APA, 2000, 2013). These range in severity from light biting, scratching, and hitting, to severe head banging that can cause permanent damage. Such behavior is not unique to ASD, and often seen in other conditions such as Lesch-Nyhan (e.g., Anderson & Ernst, 1994), or may be entirely absent.

These cognitive and developmental issues make it particularly difficult for individuals with ASD to learn in ordinary ways, both incidentally and when instructed as in school. Implicit in the developmental difficulties and symptoms, individuals with ASD struggle with learning from social models since they may not pick up social cues, or may have trouble processing those cues to which they do attend (L. Koegel et al., 1992). This creates a challenge to teaching children with ASD since regular education teaching techniques are typically not effective. This has prompted a proliferation of research, and numerous strategies for teaching children with ASD (Matson & LoVullo, 2009; Matson & Smith, 2008; Smith, 2008). Of these many strategies, only those that are based on behavioral principles meet the definition of empirically supported treatments, which are treatments that have undergone randomized controlled trials with different research teams (EST; Chambless & Hollon, 1998; Matson & Konst, 2013; Matson & Smith, 2008; Smith, 2008). Other treatments include experiential and developmental approaches that emphasize environmental or social enhancement. These may have benefit to the extent that the treatments enrich the behavioral environment of the person with ASD, and usually feature incidental learning contingencies. However, there is little research to suggest that these other approaches actually have significant beneficial effects, or are superior to behavioral approaches

(Umbarger, 2007). Similar to the definition of ASD, the treatments for the disorder also have a long history.

Treating ASD

Beginning in the 1960s, most theorists gradually abandoned the psychogenic view of autism, and thus treating it as such was abandoned as well. By the 1970s, autism came to be seen as a disorder of neurology—but of uncertain origin. Something was amiss neurologically, although the physiology remains insufficiently understood to guide treatment. In the absence of any definitive biochemical or medical intervention, treatments shifted from the psychodynamic analysis of the child's supposed intrapsychic conflicts to behaviorally based attempts to establish, through explicit instruction, the missing behaviors and similarly eliminate troublesome behavioral excesses (Feinstein, 2010; Wolff, 2004). These approaches grew in sophistication and acceptance, mostly through the work of researcher-clinicians working with clients in the large state institutions that existed at the time. As of the present, behavioral treatments for ASD are the only empirically validated means of effectively treating autism (Eldevik et al., 2009; Peters-Scheffer, Didden, Korzilius, & Sturmey, 2011; Rogers & Vismara, 2008). Despite this demonstrated success, dozens of other forms of treatment remain in use (Green et al., 2006).

Empirically supported treatments. Early Intensive Behavioral Intervention (EIBI) is a well-established, empirically supported applied behavior analysis (ABA) intervention strategy for children with ASD (Lovaas, Koegel, Simmons, & Long, 1973; Matson & Konst, 2013; Matson & Smith, 2008; Peters-Scheffer et al., 2011; Smith, 2008). EIBI is characterized by the systematic application of combinations of basic behavioral principles, one-on-one instruction, objective recording of performance data, functional analysis of the specific behavioral issues to be addressed, high rate of instruction, and a high number of programmed therapy hours,

sometimes up to 40 per week (Love, Carr, Almason, & Petursdottir, 2009). EIBI comes in several varieties, each characterized by an emphasis on different kinds of behavior, favored treatment settings, and modes of interaction with the client. These include Applied Behavior Analysis (ABA), Verbal Behavior Analysis (VBA), Natural Environment Training, Discrete Trial Training (DTT), Pivotal Response Training (PRT; R. Koegel & Koegel, 2006), and the Early Start Denver Model (Dawson et al., 2010; Rogers & Dawson, 2010). VBA is predicated on the view that critical behaviors will develop through incidental contingencies embedded within the social context of communication (Sundberg & Michael, 2001). Pivotal Response Therapy attempts to determine and teach behaviors that are critical to the development of broad sets of important behavior, and avoid contrived reinforcement, if possible (R. Koegel & Koegel, 2006). Natural Environment Training emphasizes teaching in ordinary settings to promote generalization of learning. The natural environment, or everyday items and toys are used to set up behavioral contingencies for learning. Typically the treatment setting is in the home or classroom, and behavioral contingencies guide the child's learning while engaging in everyday activities with these everyday materials. The contrived environment is minimized as much as possible. Fundamentally, however, all of these are different types of contingency management programs, and the relative superiority of one over another has not yet been established.

Delprato (2001) compared natural learning environments for learning language to Discrete Trial Training (DTT). DTT is usually, but not always, table work with massed practice of broken down skills presented in discrete trials to eliminate extraneous stimuli. Overall the comparison, conducted from the literature review of treatments, found that normalized teaching strategies, such as PRT, were more effective than DTT. However, it was also noted that upon further analysis DTT and naturalized methods might complement each other in teaching

language. For example, DTT focuses on structure and acquisition and laying the foundation of language, whereas naturalized treatments are superior in application and generalization (Delprato, 2001).

Development of EIBI. The initial development of behavioral interventions for ASD occurred in the early 1960s. In contrast to interventions not based on a behavior science, such as “fad” interventions, the widespread adoption of behavioral interventions was slow, requiring decades. Perhaps this was because behavioral scientists, whose training emphasized being conservative about making claims, initially did behavioral interventions as extensions of basic research. Their work was not promoted aggressively to the media and through other popular avenues. While there were some focused behavioral interventions for specific childhood behavior problems being done in the 1950s-60s, there were no large-scale systematic efforts applied to ASD. Large-scale systematic contingency management efforts at this time focused on institutionalized adults with schizophrenia and related psychosis (Ayllon & Azrin, 1964, 1965; Salzinger & Pisoni, 1961; Salzinger, Portnoy, & Feldman, 1964). As noted above, at this time ASD was seen as an acquired psychiatric disorder, and if the individual was not institutionalized, psychoanalytic methods were used in treatment—if treatment occurred at all (Wolff, 2004). Children were sometimes removed from their parents’ care based on the belief that the emotionally distant “refrigerator” mother caused the ASD by actually or symbolically displaying rejection and emotional distance (Bettelheim, 1967; Kanner, 1949). The thought was that the child reacted to this by internalizing the rejection, and displaying a severe disconnection from the world, sometimes even expressing this in the form of self-injurious behavior. This self-imposed isolation from the social world suggested similar self-isolation behavior in some kinds of schizophrenia—which continues to be seen as a psychiatric disorder even if an organic cause is

acknowledged. It seems likely that people such as Bettelheim might have mistaken symptoms of what is now known as Reactive Attachment Disorder, as possibly seen in concentration camps in World War II, for autism (e.g., Zimmerman, 1993). Hence, ASD earned the label “childhood schizophrenia,” even though it is quite different than authentic schizophrenia occurring in childhood (Feinstein, 2010; Smith, 2008). There are also still those who believe ASD is related to or a form of schizophrenia (e.g., Fitzgerald, 2012; King & Lord, 2011).

As noted earlier, for a variety of reasons, mainly due to the lack of credible scientific evidence and the generally diminishing influence of psychodynamic thinking, the psychogenic view of ASD lost popularity in the 1960s. It was replaced by the belief that ASD had neurobiological or genetic underpinnings still under investigation. Because it has not been scientifically established, it left a theoretical opening, and other treatments started appearing, particularly treatments associated with the behavioral model. Much of the early work focused on eliminating or increasing one or a small number of specific and operationally defined behaviors (Matson & Smith, 2008). Charles Ferster, a colleague of B.F. Skinner’s was the first psychologist to specifically describe and use behavioral principles in treating the symptoms of ASD (Ferster & DeMyer, 1962; Ferster, 1961). One such approach was more complex, but only targeted one behavior; Ferster used operant reinforcement and stimulus control procedures in a contrived environment. Putting coins in a slot or key press operated items such as pinball machines, vending machines, and toy trains, and these were used to increase the general interest level and engagement of three children with ASD in their setting (Ferster & DeMyer, 1962). However, Ferster’s program neither broadened into a systematic approach nor saw widespread adoption. We might now describe it as a “proof of concept.” Indeed, these early works remain largely unknown even within the behavioral community.

Later, in 1964, Wolf, Risley, and Mees demonstrated a broader application of behavioral methods with a young boy with autism using contingent reinforcement to get him to wear his glasses to avoid blindness, have fewer tantrums, develop social interaction skills, and eventually to speak. While the work of Wolf et al. (1964) was not a systematic, manualized effort, it did show that a combination of well-implemented behavioral strategies could remediate severe behavior problems much more effectively and quickly than anything reported in the psychoanalytic literature. Regardless of what might cause ASD, it was becoming clear that ASD could be treated by regarding it as a set of behavioral excesses and deficits, and operating accordingly.

The work of Wolf, Risley, and Mees (1964) was a case study, albeit an empirical and systematic one. More subjects were needed, especially if psychologists were to be convinced of the generality of the behavior approach. Any particular individual might have just been a highly receptive learner for unknown reasons. Thus, the more large-scale behavioral programmatic efforts to address ASD familiar to us today arose primarily from the work Ivar Lovaas (Feinstein, 2010). Lovaas, beginning in the 1960s, but working in earnest in the 1970s and 1980s, intensively and highly systematically applied the behavioral principles of reinforcement and punishment, then including electric shock and slaps, to establish and eliminate behavior as needed. For example, Lovaas' 1981 *Teaching Developmentally Disabled Children: The Me Book*, describes how to use aversive stimuli when modifying behavior. Lovaas was careful to note that the aversive techniques were to be a last resort (Lovaas, 1981; Lovaas, 1987). Although the treatments were generally effective, and primarily employed reinforcement, they had the effect of associating applied behavior analysis with aversive methods, despite the use of aversive methods used in other treatment of psychopathology (i.e., electroconvulsive or electroshock

therapy for disorders such as severe depression by psychiatrists). However, it is important to note that in the 1960s and 1970s, more nuanced and powerful reinforcement-based techniques had not been developed, especially for dramatically serious self-injurious behavior. Punishment was known to be an effective method for rapidly reducing the rate of problem behavior; the theory being that once quickly eliminated, new, more desirable behavior could be established in its place. Additionally, much of the behavior Lovaas was dealing with was especially severe, arising at a time when children with ASD were routinely institutionalized with essentially no hope of living independently, and subjected to significant seclusion and restraint if aggressive or self-injurious.

In the 30 years since Lovaas's early work, the use of aversive stimuli such as shock has been almost entirely abandoned by applied behavior analysts. It is confined to rare instances of very severe cases of head banging, and to one effectively marginalized segment of the behavioral treatment community (Iwata, 1988; Williams, Kirkpatrick-Sanchez, & Crocker, 1994). The vast majority of applied behavior analysts are in fact taught to avoid use of these strategies. Moreover, with increasing professionalization, the ethical standards (American Psychological Association, 2002), and the Behavior Analysis Certification Board dictate standards that the most effective, but least restrictive methods should be used in treating individuals (e.g., Van Houten et al., 1988). This serves to limit the use of any treatment that involves even mild and symbolic forms of punishment.

Work continues in the field to advance the behavioral techniques used with children and adults to follow ethical guidelines and provide the most effective, but least restrictive care. For example, Skinner (1938) introduced errorless learning principles, which is considered a procedure introducing the most supportive prompt to avoid a learner from making mistakes. In

this case, the subject was a rat and the target response was putting a marble in a raised tube. Later, Skinner would apply these methods to Programmed Instruction, in which the learning steps were small enough that the student would be expected to easily produce the answers due to the immediately previous experience. More specifically, Terrace (1963) was the direct progenitor of modern errorless techniques used in ASD therapies. Based on this research, the use of “least-to-most” prompting was more likely, which is sometimes said to be more effective for promoting generalization. However, research still continues to explore these techniques. Fentress and Lerman (2012) evaluated the use of most-to-least (MTL or errorless) techniques compared to least-to-most (LTM or sometimes call “no-no prompting”). The authors demonstrated strengths for both methods. Surprisingly children gained skills faster with no-no prompting, however, MTL procedures produced few errors in learning and skills were stronger at maintenance. One explanation the authors offered for the lack of research on no-no prompting is a lack of a well-defined procedure (Fentress & Lerman, 2012). Generally, the use of MTL and errorless procedures are favored in behavioral programs for children with ASD. The reality might be that the variability of application situations masks most differences in the effectiveness of the techniques. These techniques continue to be evaluated, but need additional work to clarify the advantages and disadvantages that can divide practitioners in advocating the use of each technique.

Despite continued refinement of applied techniques since the introduction, including the very strong emphasis on the use of reinforcement, there are lingering concerns. What cannot be discounted from Lovaas’ work, however, are the results obtained by the children receiving behavioral interventions in these early years. Even if the methods used were not what would be tolerated in modern-day treatment plans, the fact that these supposedly intractable behaviors seen

in children with ASD could be changed so quickly and effectively was a radical departure from anything seen before. The demonstration that 47% of the treatment group receiving 40 hours a week of EIBI achieved normal functioning according to standardized measures, while only 2% of the control group receiving 10 hours did, suggested significant optimism. In other words, nearly half of the participants, young children diagnosed with ASD and cognitive impairment, achieved intellectual and educational functioning within the normal limits after enrollment in intensive behavioral therapy for two years (Lovaas, 1987). Intensive, in this case, was defined by the number of hours in treatment, up to about 40 hours a week of direct, one-on-one instruction. The rate of behavioral instruction was not measured by defined as intense.

Unfortunately the study fell short of being a “true” experimental design (Shadish, Cook, & Campbell, 2002). The participants were not randomly assigned to groups. Rather, the group assignment relied more on the participants’ travel distance to the center and other staffing considerations (Lovaas, 1987). It is unclear whether or how these factors influenced the treatment outcomes. But, they have led to lingering questions about the validity of the results (Gresham & MacMillan, 1998). Regardless, Lovaas’ work was revolutionary in the field of ASD and the behavioral treatment showed great potential for continued study.

In contrast to the early, exploratory days of applied behavior analysis for ASD, there have been significant advances made in manualizing and experimentally documenting the efficacy of EIBI. Generally speaking, the use of aversives have been eliminated from standard therapies, and the reduction of problem behavior is generally preceded by a functional analysis or assessment to try to determine the causes of the problem. An individual’s troublesome means of gaining acceptable reinforcers (e.g., tantrums for a snacks; aggression for attention) can be replaced with more functional or acceptable behavior. Functionally, inappropriate behavior, such as biting for

amusement or screaming in public places, can be eliminated by differential reinforcement for other types of behavior. Missing behavior may be shaped. Situationally inappropriate behavior can be remediated by standard methods of establishing stimulus control. Currently, behavioral treatments have expanded beyond direct contingency management for obvious behavioral excesses and deficits to using other behavioral theoretical and empirical findings such as Skinner's *Verbal Behavior* (Skinner, 1957; Sundberg & Michael, 2001) and expanded in to treatment programs that incorporate developmental aspects (e.g., ESDM; Dawson et al., 2010; Rogers & Dawson, 2010) and the natural environment (e.g., Delprato, 2001; R. Koegel & Koegel, 2006). Behavioral interventions for children with ASD have come a long way, however, there is still a need for continued research, specifically randomized control trials and symptom specific outcome measures (Matson & Smith, 2008). The authors specify that using research designs such as multiple baseline with single participants would also suffice for establishing EST status.

Methodological issues. The problems of doing these kinds of studies with a rare condition like ASD are, of course, noted. Matson and Smith (2008) suggest a number of deficits in the EIBI literature that if remedied could help clarify EIBI's usefulness. Specifically, due to the intensity of the intervention, both high rates of behavior and hours in therapy, training of staff, funding, and recruitment issues, much of the published literature involves small numbers of subjects, sometimes individuals, and does not include a control group. When a control group is included, there is often a situationally induced lack of randomization of group assignment and matching of participants. The authors suggest that multiple baselines should be used if a control group is not feasible, considering the number of constraints and the usefulness of multiple baseline design (Matson & Smith, 2008). Single-subject type research designs more generally

can, of course, produce convincing demonstrations that a treatment was effective for an individual. However, there remains resistance to using these in place of so-called “gold-standard” methodologies. Even so, despite these research deficiencies, the aggregated results of single-subject, quasi-experimental, and randomized research, plus the close association of the procedures with proven laboratory models, clearly indicates that EIBI leads to improvement in the lives of those affected by ASD.

Early Start Denver Model. One recently introduced, evidence-based intervention (e.g. Matson & Smith, 2008) is the Early Start Denver Model (ESDM). Dawson and colleagues (2010) did a multi-site randomized study with some of the participants entering the ESDM intervention and others only receiving community treatments – the latter being state funded programs or any treatments parents could access with their resources. The ESDM model is a manualized treatment for very young children with ASD that integrates PRT (R. Koegel & Koegel, 2006) and ABA principles for teaching in the natural environment. There is a standardized, developmentally constructed program curriculum used to set individualized objectives and review progress quarterly. Children in the Dawson et al. study were observed for 2.25 years, and the treatment group received on average 20 hours a week of one-on-one intervention from a trained therapist well versed in behavioral principles. Control participants were also enrolled for 2.25 years, but were assigned to community treatments. (Parents could select any treatment feasible to the family offered in the community). The participants were matched by age, gender, and severity of ASD diagnosis (Dawson et al., 2010; Rogers & Dawson, 2010).

All participants were assessed pre, post, and during bi-monthly assessments. Trainees were required to reach treatment fidelity before starting independently with participants, and they

had to maintain fidelity, which was checked randomly during quarterly fidelity checks (Dawson et al., 2010; Rogers & Dawson, 2010). It was found that, on average, the children receiving EIBI in the context of ESDM made gains over one standard deviation in cognitive functioning - similar to Lovaas' (1987) findings. The general severity of the condition was also altered. Children enrolled in the treatment group were also more likely to receive a diagnosis of Pervasive Developmental Disorder –Not Otherwise Specified (PDD-NOS) at the end of two years after entering the study with a specific diagnosis of Autism (Dawson et al., 2010). PDD-NOS was considered to be a less severe diagnosis on the spectrum (APA, 2000), indicating improved functioning in skills and behaviors particularly relevant to the diagnostic criteria. According to the new DSM-5 criteria, this change would map onto the severity ratings that accompany the Autism Spectrum Disorder criteria (APA, 2013).

Relevant to the current investigation, the ESDM manual stipulates the intensity of teaching on two levels. The authors of the ESDM stipulated 20 hours per week of therapy, and the manual also specifies that teaching trials happen every 10 seconds or at least six times per minute in a two hour session (Rogers & Dawson, 2010). In other words, the teaching trials are to occur at a pace consistent with typical child behavior and each lasting a short amount of time. Rapid teaching trials is a hallmark of EIBI, however, these authors have quantified the number of trials per minute based on documented typical child interactions.

Rate of exposure is important in the acquisition, specifically, of language. As Moerk (1980, 1983) describes, typical language development is highly related to the parents' input and frequency of language, which demonstrates that programmed arbitrary reinforcement is not necessary for language development of typical children. This supports or is consistent with Bandura's (1971) social learning theory. However, as stated, children with ASD are not learning

through ordinary means, and thus require additional measures for language development and for other skills. EIBI not only employs reinforcement for use of targeted skills, but also increases the frequency of exposure to stimuli necessary for learning, as Moerk (1980) asserts is significant. These kinds of rates of behaviors are also noted by Hart and Risley (2004), and have led to the concept of the “Thirty-Million Word Gap” between high and low SES children.

Behaviorally based EIBI. In EIBI applications, reinforcement is the primary agent of change for behavior modification (Lovaas, 1987; Lovaas, 1981; Love et al., 2009; Peters-Scheffer et al., 2011). Reinforcement both selects the target behavior (or behavior component) from the ongoing behavior stream and is motivating for ongoing behavior. Reinforcers in treatment are typically chosen based on the child’s preferences, through formal preference assessments or at least close observation of what the child reliably interacts with (Cooper, Heron, & Heward, 2007). Because reinforcers are things the children would self-select and engage with at high rates, it aims to keep the learning environment rewarding and motivating. Preference assessments, an experimental method used to rank a child’s preference for items, are commonly used in treatment to ensure the items being used for reinforcement are reinforcing (e.g., access to a preferred activity or toy). Therapists conduct reinforcement preference assessments to determine what a child will find enjoyable during a session, and are aware that these preferences can change, sometimes quite suddenly and radically. Thus, it is important to understand that preferences can change from moment to moment, so it is common to offer a range of reinforcement options during teaching, rather than a single one. There are different types of preference assessments such as forced choice and multiple stimulus array (Lanner, Nichols, Field, Hanson, & Zane, 2009). The use and implementation of these strategies to increase the

effectiveness (and enjoyment) for children with ASD is documented (Hagopian, Long, & Rush, 2004; Lanner et al., 2009; Pitts & Dymond, 2012).

Theories of reinforcement. There are other theories about the potential side effects of reinforcement. Popular commentators, such as Alfie Kohn's (1999) *Punished by Reward* and according to the Deci/Ryan theory of intrinsic motivation (Deci, Koestner, & Ryan, 1999; Deci, 1971), suggest that reinforcement on the form of extrinsic rewards might be a problem. The theory suggests that external reinforcement reduces self-efficacy and therefore the motivation to act because the person receiving the reinforcement recognizes the external control. How this might affect children with serious anomalies of language and social functioning is unclear, as self-efficacy seems to be a construct that must be derived from typical social interactions. For a more in-depth discussion of whether reinforcement is problematic in the manner described by Kohn, refer to Dickinson (1989), Eisenberger and Cameron (1996), and Reitman's review (1998).

Long-term effects of EIBI. Outcomes after treatment have also been explored. A study identifying the outcomes of behavioral programs determined that there were no diminishing returns to number of hours of EIBI and objectives mastered (Granpeesheh, Dixon, Tarbox, Kaplan, & Wilke, 2009). In other words, the more hours a child received the more skills the child was able to obtain, without subject "burn-out." In terms of burnout, participants in any activity including parties, games, social interactions, and dates can experience something, which might be usefully labeled "burn-out." The reasons for such reactions are highly varied and not likely to be content specific. This would be due to the continued availability of salient reinforcers relative to factors such as fatigue and the availability of competing reinforcing activities. There is no good reason to assume that EIBI should be especially prone to inducing "burn out" more or less

than typical activities, such as less structured engagement seen in preschools. If burnout were to occur, it may be more likely to affect the teacher in any case. The teacher, under strong instructional control, with weak reinforcement, might find teaching aversive but inescapable, because of the thin reinforcement schedule of the work hours and demands.

Another important finding from the Granpeesheh et al. (2009) study was the relationship between intensity of treatment and age of the child, with younger children gaining more skills at higher intensities. This was true for children under the age of seven years of age. Older children did not show the same relationship; older children in both high and low intensity treatments gained a steady amount of skills that did not vary between groups (Granpeesheh et al., 2009). Kovshoff, Hastings, & Remington (2011) evaluated the long-term effects of EIBI in a two-year follow up after completion. The authors found that the children enrolled in EIBI were more likely to be in mainstream classrooms than the control children (Kovshoff, Hastings, & Remington, 2011). Both findings identify significant gains for children after EIBI, with no reports of burnout or detrimental effects.

Other Treatments

In the years since ASD was defined, a proliferation of therapies has surfaced based on untested theories of autism etiology, such as pharmacological, nutritional, supplements, and other biomedical interventions (Jacobson et al., 2005). For example, there is a theory about heavy metals causing brain damage in those affected by ASD, therefore chelation should alleviate symptoms (Jacobson et al., 2005; Smith, 2008). Other known harmful or ineffective treatments include facilitated communication, auditory integration therapy, sensory integration therapy, and secretin (Jacobson et al., 2005; Smith, 2008). Facilitated communication is one alternative that has been subjected to much research, all of it failing to show effectiveness

(Mostert, 2001, 2010). There are also psychosocial treatments that bare little-to-no empirical support such as Floortime and TEACCH (Jacobson et al., 2005; Virues-Ortega et al., 2013). TEACH (Treatment and Education of Autistic and Related Communication Handicapped Children) provides structured and predictable teaching environments based on the philosophy that children with ASD have different but not unequal characteristics (Feinstein, 2010). Despite Schoplar's work moving ASD away from the psychogenic view and including parents in treatment, it lacks some of the specificity of behavioral interventions, and has not demonstrated significant gains in the areas of functioning specific to ASD (Virues-Ortega et al., 2013).

Additional therapies in use that have not been empirically tested include animal therapy, vitamin therapy, the Son-Rise program, Gentle Teaching, and many others. There are many clearly ineffective and potentially harmful alternative interventions including a wide variety of dietary modifications based on the notion that ASD is somehow a "gut disorder," biochemical interventions, uncounted varieties of drug and drug-like treatments involving everything from recognized pharmaceuticals to homeopathic concoctions, manipulative therapies including chiropractic manipulation, acupuncture, and various "energy"-based practices (Jacobson, Foxx, & Mulick, 2005; Lilienfeld, 2005; Smith, 2008).

Although the majority of the scientific community acknowledges the lack of scientific evidence, or in some cases the clear evidence against (Mostert, 2001, 2010), these alternative treatments, many professionals, even some with impressive academic and professional credentials, recommend and offer them. Of course, many parents of children with ASD use these treatments with or without professional advice (McDonald, Pace, Blue, & Schwartz, 2012). In some cases, the decisions to use these unsupported and ineffective treatments are based on misinformation about the more effective ones, including false claims that they are dangerous or

ineffective. The questionable reasons why certain empirically supported treatments are rejected are the subject of this analysis.

Criticism of Behavioral and Empirically Supported Treatments

There are criticisms of EIBI circulating in popular media. Particularly, critics blame the fast pace of teaching trials for causing immediate or long-term stress (or supposed PTSD) in children with ASD. However, typically developing children are accessing and interacting with the environment at a fast pace and learning from their interactions (Rogers & Dawson, 2010). The intensity of teaching trials defined in this way was derived from observing young children interacting with the environment. Dawson and colleagues (2010) actually addressed this, writing that typically developing children are afforded new learning opportunities at a rate of six times per minute. If typically developing children were interacting with the environment independently at this rate, it would not be contraindicated to expect a similar rate in the teaching of children with special needs, such as children with ASD. Rate is not the only definition in the treatment, but the use of reinforcement is also pivotal in the ESDM and all behavioral treatments. The high rate of teaching trials as reported in the ESDM, may not be as high in typical EIBI.

Despite the overwhelming evidence suggesting EIBI is efficacious, alternative treatments are in use (Jacobson, Foxx, & Mulick, 2005; Matson & Smith, 2008; Smith, 2008). Having multiple treatment options is certainly not discouraged. Not every treatment is compatible with differing cultures or individual preferences. So, it is important to have options. However, the fact remains that none of the alternative treatments for ASD have been adequately experimentally tested, and those that have been tested failed to show benefits, or may be harmful (Smith, 2008; Umbarger, 2007). Without empirical support, most of these ineffective or dangerous treatments are found by parents through the internet, popular media, support groups, and direct marketing

(McDonald et al., 2012). In some cases, lacking clear evidence of effectiveness, the purveyors of alternatives make exaggerated claims in favor of their methods that include unjust comparisons with other treatments, particularly ABA. For instance, a popular website advocating the “PLAY Project” features a chart comparing Floortime to ABA, which seems to be designed to leave the impression that Floortime is a gentler, more child-friendly approach than the allegedly procedurally inflexible and data-driven ABA (see Table 1; Learning Connections Unlimited, 2013).

Table 1

Comparison of Developmental and Behavioral Approaches (2013)

Comparison of Developmental and Behavioral Approaches		
Area	Developmental, The P.L.A.Y. Project	Behavioral, ABA
Parent Role	Parents as PLAY Partners	Parents as Program Facilitators
Emphasis	Affect Emphasized	Behavior Emphasized
Initiation	Child Initiated	Program Initiated
Philosophy	Follow Child's Lead	Program Goals Dominant
Structure	Strategic and Flexible	More Highly Prescribed
Intensity	Flexible Intensity	Intensity Prescribed
Interaction	PLAYful Interaction	Teaching Drills & Skills
Repetitive Behaviors	Perseverations Seen as Useful Guides	Perseverations Extinguished
Environment	More Naturalistic	More Controlled
Generalization to Other Settings	Early Generalization Common	Later Generalization Typical
Outcome	Relationship, Social Skills Language and Feelings	Competence in Varied Skill Areas

Note. Adapted from Learning Connections Unlimited. (2013). [Comparison chart explaining differences between ABA and PLAY Project December 11, 2013]. *Families Considering Enrolling in PLAY Project Home Consultation Program*. Retrieved from <http://learningconnectionsunlimited.com/families-considering-enrolling-in-the-play-project-home-consultation-program/>

Similarly, the advocates of the Son-Rise program are strong critics of behavioral approaches. Their group has created series of webpages dedicated to comparing behavioral treatment techniques with their program, which includes at least seven short videos exemplifying the supposed differences (Kaufman, 2013). The videos are a parody of the popular Mac vs. PC commercials in which an actor symbolizes the type of computer, although here it is either Son-

Rise or ABA therapy. In the Son-Rise clips, the person representing Son-Rise program claims that there is extensive training required for his program but not for therapists conducting EIBI. This is quite obviously false, as indicated by the practical and sometimes legal requirement that EIBI be designed and supervised by Board Certified Behavior Analysts, Licensed Psychologists, or other appropriately credentialed professionals. Another video makes the unsubstantiated claim that motivation is not used in behavioral treatments; behavioral interventions are guided by motivation and clearly these advocates have not heard of the behavioral terms “motivating operations,” “establishing operations,” or “setting factors” (Cooper et al., 2007). The videos suggest several additional unsubstantiated claims, such as the lack of social skills training in behavioral interventions (Kaufman, 2013). These concepts that the Son-Rise program claim are missing from EIBI (or ABA) are woven into the fabric that is EIBI (i.e. training, motivation through use of reinforcement, and teaching skills such as social skills). As noted previously, the Son-Rise program has not been empirically tested.

In some cases, the presentations suggest significant, and empirically undemonstrated, detrimental effects from ABA. Again, the Son-Rise approach, like Floortime, claims that the child is left with robot-like behavior as a result of ABA--without providing a single reference to a scientific report to back up this claim. Likewise, a feature on ASD in *Time Magazine* by Claudia Wallace (2006) explained that ABA could also result in children with robotic behavior. The purpose of Wallace’s article appeared to be to give parents seeking treatment for their child with ASD a clear and unbiased look at behavioral intervention compared to other interventions. However, it was very clear that despite having toured an excellent ABA provider, Alpine Learning Systems, Wallace was strongly biased against science-based interventions, and had an equally strong affinity for alternatives, especially facilitated communication. In the end, ABA

was characterized as limited in its ability to engender social functioning, with robotic children being a common outcome. Again, no research was cited to support the main contentions. Moreover, there was nothing in the article to suggest that other treatments modes were more effective, nor was there any acknowledgement that children with ASD might seem robotic during and after treatment because their behavior has some of those characteristics (Wallis, 2006). A child who previously could not go to school because of fundamental deficits in skills, but now can as a result of therapy, is better off, even if some aspects of ASD might remain. Indeed, an ethical issue facing any successful ASD practitioner is the degree to which the behavior of a person with ASD is normalized.

Critics have taken complaints about EIBI a step further, suggesting that EIBI or ABA causes extreme stress in children with ASD simply due to the intensity of the treatments (see e.g., King, n. d.). An open letter, which has surfaced over many years in the popular media in several different formats, explicitly accuses ABA of causing Posttraumatic Stress Disorder (PTSD). The letter is clearly designed to discredit ABA and its practitioners by suggesting that even positive treatments contain hidden dangers--and that ABA practitioners are oblivious to the dangers. Since PTSD symptom onset can be delayed, the discovery of this terrible problem lies with others sometime in the future. The contents of the letter and various derivatives reveal them to be based on popular misconceptions of ABA and a very poor understanding of what PTSD actually is. Nevertheless, since the statements in them continue to be spread, including in classrooms, they must be addressed.

Despite the lack of any findings of support of its claims about stress and PTSD resulting from EIBI, the letter and the various similar claims have circulated into other domains. The current study aims to assert that EIBI is not more intense than a typical child's rate of behaviors.

Claims of stress or increased symptomology due to excessive intensity are unfounded. These claims are problematic when distributed in the popular media; parents and families getting this information avoid EIBI as a treatment for their children (McDonald et al., 2012). All in all, there is support for EIBI programs as an effective treatment for people with developmental disabilities in the literature, especially those with ASD (Dawson et al., 2010; Lovaas, 1987; Lovaas et al., 1973; Matson & Smith, 2008; Peters-Scheffer, Didden, Korzilius, & Matson, 2012; Peters-Scheffer et al., 2011; Smith, 2008). However, the word of mouth that has spread these claims has also started to penetrate the academic and professional spheres, and again, there is an absence of literature or support for these claims.

The following examples should suffice to illustrate the kind of anti-ABA rhetoric that is being directed at parents, particularly as it relates to induced stress and anxiety.

In a blog in response to the state of Georgia passing legislation to cover ABA services:

However, ABA is a special problem. It is notorious. I never had this therapy, but those who did tell me I am lucky. In the autistic community, childhood memories of ABA go hand-in-hand with Post-Traumatic Stress Disorder. Breaking down children, rebuilding them in the image of what some of us wish they were tends to damage them (Taylor-Parker, 2013, August 22).

An unidentified parent-written letter about ABA:

Currently, many people claim that ABA intervention is an appropriate cure. They claim that there are dramatic improvements to behavior and that the majority of children see almost a full recovery with intense and time-consuming therapy. Although this therapy is based on behavioral psychology, something I believe has significant uses, I think that in this case, it is sorely misused. Based on the extreme measures that are needed to make

this therapy apparently affective, it blurs the line between abuse and intervention....This can be very emotionally traumatizing for the child. This treatment can sometimes result in long lasting problems such as PTSD or Post Traumatic Stress Disorder, which could itself need treatment (“The Truth,” n.d.).

Electronic mailing list response about the gratefulness of individuals that received ABA:

“Some are grateful, some said it didn't help much, some think back on it with horror, and some still have PTSD and can't talk about it because it'll put them straight into flashbacks” (Callista, 2012, January 28).

From a blog “The Caffeinated Autistic” (2013, January 17) stated, “ABA has caused severe PTSD in many autistic individuals.”

According to Dr. James Todd, the belief that “ABA causes PTSD” is apparently taught by some professors in the Special Education Department courses at Eastern Michigan University. In a meeting, a Special Education administrator explained to him that people with autism are “better off” with no treatment at all than with ABA, precisely because ABA produces PTSD. The administrator’s approach to those who called with questions about ASD treatment was to discuss treatments besides ABA. If callers specifically asked for ABA, they were directed to talk specifically about it to the Psychology Department (J. Todd, personal communication, November 18th, 2013). Some of these beliefs have also been expressed in a presentation by another Special Education faculty member at the 2006 convention of the Behavior Analysis Association of Michigan (Smith, 2006).

Disorders of stress. A discussion of actual characteristics of PTSD is warranted. PTSD is a trauma and stress related disorder brought on by “exposure to actual or threatened death, serious injury or sexual violation” (APA, 2013, p.271). The symptoms of PTSD include

intrusive thoughts, avoidance, negative mood/cognitions, and changes in arousal. The situations that generate these symptoms have become more generally defined since previous versions of the DSM-IV-TR (APA, 2000) that listed specific situations. The new more inclusive criteria for PTSD are still not general enough to include situations such as the implementation of EIBI or therapies. One study has been done with comorbid ASD and Post-Traumatic Stress Disorder (PTSD) children; however, the traumatic events and related stress were based on the strict DSM-IV-TR definitions of trauma (i.e. sexual abuse, witnessing/victim of violence or disaster; APA, 2000; Mehtar & Mukaddes, 2011). There was no mention of EIBI's causing stress or being a traumatic event for children with ASD (Mehtar & Mukaddes, 2011).

Stress, much like ASD, is conceptualized on a gradient, with PTSD an extreme. Adjustment Disorders, defined in the current DSM-5 (APA, 2013), are disorders of stress, and invoking them would have made for a more nuanced or plausible attack on EIBI. Adjustment disorders manifest from either non-traumatic or traumatic events and cause dysfunction in sleep, mood, and reactions (APA, 2013). However, any trained individual would caution that some of these symptoms are also frequently present in children with ASD—including those who have had no treatment or credible stressors. Therefore, this project considers adjustment disorders to be a more realistic consequence of the supposedly stressful therapies, and will frame the results in the context of whether treatment intensities could reasonably produce disordered stress.

Considering the issues more broadly, a literature search of peer-reviewed, empirically based studies did not populate any indicating that EIBI's intensity is related to stress. Specifically, keyword searches on PsycINFO and Google Scholar relating to variants of ASD, behavioral treatment (e.g., EIBI, ABA, etc.), and variants of PTSD/stress did not surface any articles. These issues also were not found in meta-analysis. The closest indication of behavioral

treatments related to stress was found in an article by Matson and Smith (2008). The authors cautioned the potential for “client ‘burn-out’ ...if the intervention is overdone early-on” (p. 69). However, the warning was presented in a speculative manner, not referencing any actual incidents. The article only mentions burn-out as a way for the field to continue to evaluate procedures and continue a high standard of care.

Purpose of the Study

The main purpose of this study was to provide preliminary comparative data on the rate of behavior in typical children and EIBI instructional sessions. It is anticipated that the rates of behavior in the EIBI instructional context is not likely to be normatively extreme. Specifically, this study demonstrates that the rate of trials and the number of activities encountered in standard EIBI does not exceed that of which a typical child might encounter going about his/her everyday activities. In doing so, it will attempt to find a metric for defining intensiveness. The intensity described in the EIBI literature points to either the number of hours a child is engaged in EIBI (Lovaas, 1987; Love et al., 2009) or the set number of teaching trials per minute (Rogers & Dawson, 2010). Critics target these numbers, suggesting that while the activities might be reinforcing, there are simply too many of them, potentially overwhelming the child. Simply taking the issue at face value, children with and without ASD ordinarily encounter numerous stimuli and experiences for learning in and outside the classroom. Yet, these sorts of experiences are not generally attributed to stress, even if the events within them occur at relatively high rates. Commonly, children with ASD may self-administer high rates of behaviors through highly repetitive interactions, possibly with the same item or object for long periods (APA, 2013). Of course, typically developing children will seek and independently engage in a wide variety of activities, sometimes in a highly repetitive manner and at high rates, but distinctly lower than

demonstrated in ASD (MacDonald et al., 2007). In typical children, repetitive behavior does not interfere with learning and social engagement.

Justification and Significance

Meta-analyses have demonstrated the efficacy of EIBI for children with ASD (Peters-Scheffer et al., 2011; Virués-Ortega, 2010). However, the claim that behavioral treatments are too intensive undermines one of EIBI's fundamental pillars. The intervention simply cannot work in a reasonable amount of time unless there are many treatment trials of specific kinds. This study helps clarify the specifics of this complaint and determines the extent to which it might have validity. It is also a preliminary step toward a general measure of intensity. Having a clear definition of intensity allows for clear communication among the practitioners in the field providing services to children with ASD and communicates to the consumers of the interventions (i.e. parents). Intensity is important to understand when comparing interventions and determining if there is a diminishing return, where it becomes so intense that stress is found. It is certainly possible that if two different approaches achieve the same result with different intensities (e.g., Kovshoff et al., 2011), it would probably be appropriate to choose the most efficient therapy—if not for the sake of the client alone, but especially the therapist. Indeed, we might consider that a client who is receiving a high rate of reinforcement is likely to be enjoying the experience, while the therapist might have no such built-in reinforcement, and therefore be more likely to be the sufferer of stress. In any case, based on Rogers and Dawson (2010), EIBI is likely to be no more intense than what a typical child would encounter during the day. This has implications for whether there are reasonable grounds for concern regarding EIBI producing disordered stress.

Research Questions and Hypotheses

Research Question 1

How intensive is Early Intensive Behavioral Intervention (EIBI) compared to typical child behavior? In other words how many functional behaviors are emitted from children with ASD engaging in EIBI compared to typical children?

Hypothesis 1. The number of behaviors emitted by typical children going about everyday activities will be the same as, or more than, of that of a child with ASD in EIBI. The rate of behaviors in both conditions will also show variation, such as an ebb and flow that would be expected to happen in the natural environment.

Research Question 2

How many activities does a child with ASD in EIBI engage in compared to a typical child in a semi-structured preschool environment?

Hypothesis 2. The number of activities independently performed by a typical child will be the same as, or more than, that of a child with ASD in standard EIBI.

Research Question 3

Exploratory analysis of the types of consequences observed in the 2 groups of children. Types of consequences of interest include arbitrary reinforcement and non-arbitrary reinforcement.

Hypothesis 3. It is anticipated that ASD children in EIBI instruction will encounter higher rates of arbitrary reinforcement given that this is embedded in EIBI instructional procedures.

Methods

Multiple sources of materials about child behavior rates were used to perform this comparative study. Specifically, preexisting data of a typical child and children engaging in EIBI were employed. After an initial exploratory analysis of the written material comparison, additional data derived from video recordings of typical children in an ordinary preschool was gathered and analyzed for statistical testing.

Participants

Source materials. Pre-existing materials were gathered to analyze and extract the behavioral data necessary for answering the research questions. For the behavior of the EIBI subjects, training videos obtained from a large Midwestern Lovaas based training center were used. Measures of a typical child's behavior were obtained from two sources: video recordings taken at a local preschool and a narrative recording of a typical small town boy's day in the late 1940s, and later obtained from video recordings taken at a local preschool. These sources were used due to their accessibility and presumed representativeness--or at least reasonableness as samples of relevant behavior. No standard repositories of standard child behavior could be identified as alternative sources of comparative data. The researchers did not create the EIBI materials and one sample of the typical behavior for the purposes of this study. The typical behavior of the preschool children was obtained unobtrusively, and there seemed to be no issue of reactivity of the children.

The book *One Boy's Day*, by Barker and Wright (1951/1966), was selected as an exemplar of typical child behavior because the child was specifically selected by the authors to be highly representative of children of his age and time. It also provides an ecologically familiar frame of reference. This was a child behaving normally under no strong atypical artificial

constraints, for the length of the observation. Much of the observation was taken during the ordinary school day, but included considerable activity before and after school as well. The book itself consists of seven chapters, each defined by the time of day and place (e.g., morning at home). Each chapter is a setting/scene that documented the behavior within a particular activity or event (breakfast) and time stamp. There were a total of 25 scenes, starting in the morning before school and ending after dinner. Of these, nine were used for this study. They were selected from the table of contents in a way that allowed at least one scene per chapter to be included in analysis since behavioral services can also happen during any time of the day and place (school or home). The selection occurred before the chapters were read, at random, and within the constraints described above.

One attractive feature of *One Boy's Day* (Barker & Wright, 1951/1966) for this analysis was that it is a very highly detailed but highly atheoretical recording of the child's objectively measurable everyday activities. It was designed to lend itself to the quantitative and conceptual categorization of ordinary human activity emitted under ordinary conditions (e.g., Barker 1968; Wright, 1967). Oddly enough some reviews of the book criticized it for being exactly what it was supposed to be: an atheoretical sample of the behavior of an ordinary child doing ordinary things (Stendler, 1952; Strong, 1952). Nonetheless, the lack of theoretical bias is particularly useful for the current study. Another criticism of the book referenced its representativeness. It was that the record of only a single day. Obviously, it is possible that any one day might not be representative of the behavior of anyone, including the subject of the book. However, there was good reason to believe that the account was at least within the range of normal behavior of young children of the time. It is also the case that the sample in *One Boy's Day* (Barker & Wright, 1955/1966) was recorded before the availability of electronic entertainment, particularly television, computers,

and video games. It takes only a few minutes of observation of a video or computer game to understand that the rate of behavioral interaction between the child and the game can easily exceed dozens, even hundreds, of events per minute for long periods of time. EIBI would be seen to be positively leisurely. But this study aimed for a sample of typical behavior that was not necessarily shaped to extreme levels through the graduated application of variable ratio reinforcement, as seems to be the case with video and computer games. The production of the single day of data required thousands of hours of preparation such as training and execution.

EIBI participants. The participants for the EIBI data were two male and one female Caucasian children aged from 3 years 6 months to 4 years 6 months old, diagnosed with Autism Spectrum Disorder and being treated for behaviors associated with ASD with contemporary Lovaas-based EIBI. The videos were collected for being exemplary models of EIBI. The children varied in their degree of independent functioning, and the curriculum was individualized to the child's current level of skill (i.e., more advanced students received higher order skills training). The children lived in the Midwest, within an hour of the Lovaas center providing in-home EIBI. Child 1 was 4 years 6 months old male at the time of filming. He was a low-functioning male, demonstrating no functional language skills and having low muscle tone. His evaluation was noted for both motor and language delays. He received a diagnosis of Autistic Disorder at the age of 2 years 6 months. He was not toilet trained at the time of taping and was noted for a high rate of stereotyped behavior, both in language and motor behavior. Child 2 was a 4 year 6 month old male with some language and moderately affected. He received a diagnosis of Pervasive Developmental Disorder at three years old. His main behavioral concerns were behavioral stereotypies, repetitive behaviors, and articulation. He was enrolled on average 35 hours of behavioral therapy a week. Child 3 was a 3 year 6 month old female that had a limited

range of functional language and skill level. She was moderately affected; she received a diagnosis of Autism Spectrum Disorder at three years old. She was receiving, on average, 30 hours of behavioral therapy a week to address social skills, vocal stereotypy, and expressive and receptive language delay.

A child's level of functioning is based on intelligence, spontaneous language and severity of ASD specific symptoms, with higher functioning characteristically considered for children with average-above average intelligence and functional language. Severe presentations suggest little-to-absent spontaneous language and high rates of stereotyped and repetitive behavior.

Therapists implementing EIBI. Each child was paired with one of four female, certified Lovaas therapists, approximately 20-40 year of age, specially trained in the implementation of EIBI.

Content of EIBI. The videos showed typical teacher-child and parent-child sessions of EIBI of three different children. The sessions generally consisted of presenting stimuli to the child, the child responding to stimuli followed by reinforcement. Stimuli included questions or instructions pertaining to educational materials such as object identification, verb identification, vocal imitation, matching, and similar tasks. The length of each session was approximately two hours. However, the length of the video training clips provided for the study ranged from five minutes to 20 minutes, with an average of 11.4 minutes. The length of the video received determined the sample. If a video was nine minutes in duration, the entire video was coded. If a video was five minutes and 20 seconds, only five minutes of the video was coded to keep data at exact minute recording intervals.

Setting of EIBI. The therapy took place in the children's homes, which were typical single-family Midwestern middle-class homes that included multiple rooms for living space.

Each child's home varied, and the space used for therapy also varied. For example, Child 1, a low functioning child, spent the therapy time in one room organized with different stations of educational materials and reinforcers. He would move from station to station engaging in learning trials with the therapist. Other children, Child 2 and 3 would move from room to room (i.e., from the living room, dining room, bedroom, or kitchen), in which each room had different activities set up. In all cases, the children were presented with different segregated environments within their respective homes that provided learning opportunities through different stimuli, toys, and reinforcing objects.

Typical children. There are two sets of data collected to represent typically developing comparisons to the children with ASD in EIBI. The first described is the seminal work of Barker and Wright (1951/1966), featuring the written behavioral account of a typically developing boy going about his day. The second set of observations were collected after determining the limitations of the first preliminary analysis. Present day video data of typical preschool children interacting with their learning environment was collected.

One Boy's Day. The behavioral account of a typically developing child is from *One Boy's Day* by Barker and Wright (1951/1966). Raymond, the subject of the book, is a Caucasian male, in the first grade, at 7 years old. Raymond, also referred to as Child 7, lived with his mother and father, and they were described as middle-class by the standards of the time. According to the book, Raymond was a psychologically and behaviorally typical child not notable for any unusual behaviors or interests. "Raymond's behavior when alone with an observer can be compared with his behavior when others were present as well" (Barker & Wright, 1951/1966, p. 7). Since the data were collected in the late 1940's, Raymond would not have had access to age-relevant television programs during the day, cell-phones, or other

electronic entertainment. Radio would have been the primary mode of electronic entertainment, but Raymond seemed uninterested, evidenced by his choice in other activities. Thus, he spent the majority of his time outdoors and in school. He would often move from activity to activity in his school environment and would move from his backyard to interesting areas of town to play. The observation took place on April 26, 1949.

Observers. The behavior recorders were employees at the University of Kansas, and were affiliated with the Midwest Field Station (Barker & Wright, 1954). There were eight observers, trained in observational recording and interested in the study of children's behavior. Raymond knew many of the adult observers because the observers were actively observing Raymond and his classmates over a six-month period before embarking on his observational account that took place on April 26, 1949. Raymond's account was one record in a larger study of child behavior that was supported by the National Institute of Mental Health through the University of Kansas. The observers took shifts following and documenting Raymond's behavior in one-minute intervals over the course of his 14-hour day. The written account of the behavior is of a child in the natural environment (i.e. school, home, park, etc.) and detailed observations of the child's descriptive behaviors, including his physical movements and verbalizations.

The authors noted potential observer interference, but explained that Raymond was familiar with the observers and his behavior was not likely different from his regular day-to-day activities. People tend to habituate to stimuli, especially being observed (e.g., Jack et al., 2008; Zebiob, Forehand, & Resick, 1979).

Setting. The typical child, Raymond, lives with his family in a small Midwestern town. The town is referred to as "Midwest," but has been subsequently identified as Oskaloosa, Kansas, a small town several miles from Lawrence, Kansas. Oskaloosa was the site of the

Midwest Field Station, the center of a large research enterprise that investigated behavior as it occurred in ordinary community settings (Barker & Wright, 1954). Oskaloosa was chosen as a research site because it characterized elements of rural, urban, and suburban communities in a relatively compact space and a small population, thus permitting direct examination of a wider range of common behavior that might be seen in a more homogenous setting. There were five major cities within an hour's travel of the town despite no passenger railroad or highway that penetrated the area. The chapters in the book outline the locations of the observations. Raymond spent time at home engaging in typical daily living activities (i.e., dressing, eating breakfast, playing). He was also observed in his school. He attended a typical elementary school in his town in Kansas. The children of grades one and two, sat at individual desks in the classroom, and the class was lead by a single teacher.

Preschool children. Preschool children in a local preschool were video recorded to match the gender of the children with ASD as a comparison of typical behavior. Children in the classroom were between the ages of four and five years old, and were 6 to 20 months younger than their gender matched comparisons in EIBI. The classroom was recruited for a sample of typical behavior during free play in an enriched educational setting to compare to the children with ASD in EIBI. The preschool was a university-based preschool, catering to families in the community. The preschool had approximately 16 children enrolled and 12 present the day of taping in the classroom with two classroom teachers. There were one to three teaching assistants that were in and out of the room. The classroom was video taped for a total of 90 minutes during free play, when the children were able to independently play with the toys in the classroom without direct instruction to allow a baseline rate of behavior. However, the teachers would intermittently interact with the children imitating, directing, or teaching. Directed instructed was

not captured because instruction was one to 12. During free play, the children were more likely to have one-on-one interaction similar to EIBI sessions, whether it was with other children or teachers. The videographer did not interact with the children.

The classroom consisted of five boys and seven girls that were present on the day of taping. The children were identified as typically developing, with no known developmental or psychological difficulties. Children are from the greater community, however, many of the parents of the children are staff, faculty, or students of the university in which it was situated. The majority of the children in the classroom were Caucasian and middle-class. The children had been in the classroom from the beginning of the school year.

The three children selected for observation were two male students and one female. Child 4 was a 5 year old male, Child 5 was a 5 year 1 month old male, and Child 6 was a 5 year 2 month old female. Selection was based on the amount of recorded video of each child and gender match to the ASD sample. By teacher report, the students were typically developing with no individualized education programs or no known psychological or behavioral difficulties.

Classroom teachers. There were two appointed, certified teachers working in the classroom. The teachers were one male and one female between the ages of 30-70 years old. There were an additional one to three teaching assistants in the classroom during the taping at a time. The teaching assistants were college students enrolled in the education program. The teaching assistants were three females between the ages of 18-24 years old.

Content. The video footage captured the preschool children engaged in a number of activities. The children were free to move between different activities or stations set up in the room. The video starts with one preschooler that entered the classroom in the morning and as the taping progressed, more children arrived. The video captured one to five children at a time

interacting with classroom activities or objects and with the classroom teachers. The children had conversations with each other and with the classroom teachers.

Preschool setting. The preschool classroom was in the back of a school. The room was set up with a variety of activities, such as blocks, dolls, drawing, playdoh, sensory activities, and games. The teachers rotated some of the activities during the classroom time. Children were also able to obtain a snack from the kitchen area. Toy shelves, with about five areas, subdivided the room. One area was for the children to hang up their belongings. Tables and chairs were set up for choice activities. There was an imaginative play area with a play kitchen, dress up, and other child-sized household items. An area was reserved for eating, with a table, chairs, and mini kitchen area for storing and serving food. A final area was designed for group instruction with a white board and sitting area for the children. The teachers set up the open table and chairs with different activities to promote developmentally appropriate learning opportunities.

The majority of the classroom activity was videotaped. However, three children based on ease of gaining a behavior count were followed and used in the data analysis. There were six video clips captured ranging in length from three minutes to 48 minutes and average length was 15 minutes. Multiple children were depicted in multiple clips. Clip lengths were determined the result of starting and stopping filming to accommodate classroom activities and following the children's activities. Three children, one female and two males, were followed and a behavior count and activity change count were obtained through coding, similar to the EIBI videos. The same operational definition will be used to quantify behaviors.

Measures of Behavior

The main measures were the rates of behavioral interactions of each of the children as viewed on the video records and as described in the book. The materials were not altered in

format. Instead, two different operational definitions were created and tested for reliability: one for the written material and an addition definition was required for the videos.

Operational definition of video material. Operational definitions of the occurrence of behavior were generated and tested for reliability and validity. The operational definitions went through three drafts. The original definitions were revised after consulting a peer with experience in ABA. An expert in the field of ABA again revised the definitions. Interrater reliability was established with a second coder and a blind coder was recruited for ease and accuracy of use of the operational definitions. One episode of behavior consists of motor actions or verbalizations related to task completion that are not interrupted by another motor action or verbalization. Motor actions or verbalizations that occur while engaging in reinforcement are also counted as a separate coded episode. New tasks or discriminative stimuli indicate the beginning of a new episode. Each episode will count as one. Stereotypic behavior, non-responding, or passive engagement in a reinforcer is not considered a code-able behavior (i.e. child lying on the ground while a therapist drops a pillow or sitting in front of the TV).

Activity counts were defined as the number of activities a child engages in during a session. Activities were counted as a type of activity, such as using Playdoh®, drawing, or by objectives, such as matching, or engagement in reinforcing activities. For example, a child that started playing with building blocks, and then switched to drawing and returned to building blocks was counted as engaging in two different activities.

Contrived reinforcement was defined as any delivery of observable reinforcement. Reinforcement is any tangible item or verbalization provided immediately after a task for the perceived purpose of reinforcing or rewarding the task. This would be the opposite of intrinsic

reinforcement; an individual's behavior is reinforced by other unforeseeable or intrinsic reinforcers (i.e., feeling proud, accomplished, or some later reward).

Operational definition of written material. One episode of behavior consists of motor actions or verbalizations that are not interrupted by another motor action or verbalization.

Paragraph breaks also indicate the beginning of a new episode. Each episode will count as one.

Reliability. Operational definitions were tested for interrater reliability. Materials were viewed and coded by the author. Second and third coders were recruited for reliability analysis. Graduate students trained in Applied Behavior Analysis coded the written and video materials. The additional coders helped obtain interrater reliability. Interrater reliability using percent agreement for the material between coders ranged from 92% to 98% for the sessions for all media, as each session or segment fell within this range. Cohen's Kappa was used to calculate chance agreement for 80% of the coded materials with a $k = 0.55$, which demonstrates a moderate agreement. Due to the nature of the data, continuous, it is assumed that Cohen's Kappa is a gross underestimate of the raters' agreement. There are an infinite number of options to select and not ordinary chance is sufficient. An outside coder (third coder, Masters level psychologist working in the field and Board Certified Behavior Analyst) was used to check randomly selected segments for reliability of the operational definitions. This third coder, blind to the study's purpose was asked to apply the operational definition, without further instruction, to the material. The outside coder's percent agreement reliability with the first two coders was 92%.

Validity. Expert opinion was queried upon completion of the written definitions. Threats to validity are a concern. According to Shadish, Cook, and Campbell (2002) threats to descriptive validity include describing phenomenon that did not occur or not describing what did

occur, and errors of frequency. The materials are different media and pose a threat to validity.

Recruiting a second coder (and additional coders) impede threats to validity. Interrater disagreement can be a threat to validity; in this case the raters have high reliability (92-98%) in applying the operational definitions to the material.

Design

This study aimed to observe and compare two phenomena through the representation of graphical data and statistical methods. Specifically, the study aimed to observe and compare the rate of behaviors between children in EIBI and typical children and the number of activities engaged in for each group. Randomization is not implicated because the nature of the study design (retrospective observations) and comparisons of unknown phenomena. Observational data is underappreciated in the field, yet is a first step for understanding the world. Observational data has strengths, such as the current studies aim to understand the details of how an intervention was implemented compared to the activities of typical children (Shadish et al., 2002).

Observational data is important to the advancement of science because phenomena must be observed in some form before further exploration. The intensity of EIBI has been stipulated by different factors (time or rate; Lovaas 1987; Rogers & Dawson, 2010), but rate, although typically described as intense, has not been observed and described based on standard EIBI sessions. Rogers and Dawson use the benchmark of six behaviors or 10 teaching trials a minute as intensive teaching, since typical children have been observed reaching this level in learning settings. Comparing the observational data of typical children's behaviors to behaviors emitted in EIBI highlights differences in rate of behavior. Again, the thought is that EIBI is intense in order to allow ample opportunities for children with ASD to contact stimuli and provide learning opportunities at the rate typical children are contacting stimuli in analogous, age appropriate

instructional settings. Children with ASD receive EIBI to increase intensity of teaching (number of behaviors emitted in response to teaching trials by time) and typical children engage in regular education experiences (teacher presentation or typical self learning behaviors by time).

Additional hypotheses may be generated based on the results of this data – another strength of observational and qualitative studies (Shadish et al., 2002).

Procedure

With Institutional Review Board (IRB) approval from Eastern Michigan University, permission was granted by the Lovaas EIBI center to view videotaped sessions of EIBI for the purposes of this study. Three videotapes were received from a Midwestern EIBI Lovaas center, depicting three children diagnosed with ASD engaging in EIBI with a trained therapist. IRB approval also allowed for the collection of the typical behavior captured in a local preschool, with the informed consent of the parents. Approximately 90 minutes of video was captured of the preschool children, with six different segments. The researcher consented the preschool children's parents and videotaped the preschool children on a single day. The book *One Boy's Day* (Barker & Wright, 1951/1966) was borrowed from the Eastern Michigan University library for use, and was complete.

In order to successfully carry out the research, operational definitions of the occurrence behavior were generated and tested for reliability and validity. The operational definitions went through three drafts. The original definitions were revised after consulting a peer with experience in ABA. An expert in the field of ABA again revised the definitions. Interrater reliability was established with a second coder and a blind coder was recruited for ease and accuracy of use of the operational definitions.

Once the materials were gathered and the operational definitions met psychometric standards, the materials were coded. The operational definitions were applied to the material to produce data sets, consisting of frequency counts from all forms of media. The rates of behaviors produced by typically developing children, going about their daily activities or in preschool were compared to the behaviors of children with ASD that are usually observed in standard EIBI sessions. Operational definitions describing what constitutes one “behavior count” were applied. The EIBI videotapes of three children with ASD provided 148 one-minute intervals of behavioral data for coding. The three preschool children provided a total of 90 one-minute intervals of behavioral data. Sampling was conducted on one-minute intervals for the length of the session, and a total number of behaviors per minute were calculated. Of the 238 minutes collected of the video taped children, 184 of the minutes were double coded for randomly selected reliability checks. For the typical child from *One Boy’s Day*, nine chapters were coded or 272 minutes, and three chapters were double coded for reliability.

Graphic representations of the data were visually examined to identify trends between the typical children and the children in EIBI. Descriptive statistics were calculated and the means of rates of the typical preschool sample were compared to that of the EIBI sample using standard statistical software.

Analysis

The data from all the children were graphed and visually examined for trends. The rates of behavior between the children in EIBI and the children in the preschool were compared and tested for statistically significant differences. The hypotheses were tested using a t-test to compare the means of the data sessions of the typical children’s preschool observations and the three children with ASD. The power analysis for a sample of 238 video observations, Cohen’s *d*

at .5, at a probability of 0.05 yields a power of $\beta = 0.97$. For the hypotheses, a non-significant difference between the groups indicates a failure to find different rates of responding between the two video groups. If a significant difference is found between the groups, the direction of that experience will be discussed in terms of the relative differential between the groups.

Results

Graphic Representations

The first analysis involved visually examining the graphical data of the rate of behavior of the typical children, Children 4, 5, 6, and Child 7 from *One Boy's Day* (Barker & Wright, 1951/1966) in relation to that of the children with ASD in EIBI. As illustrated in Figure 1, the typical children reliably engaged in higher rates of behavior.

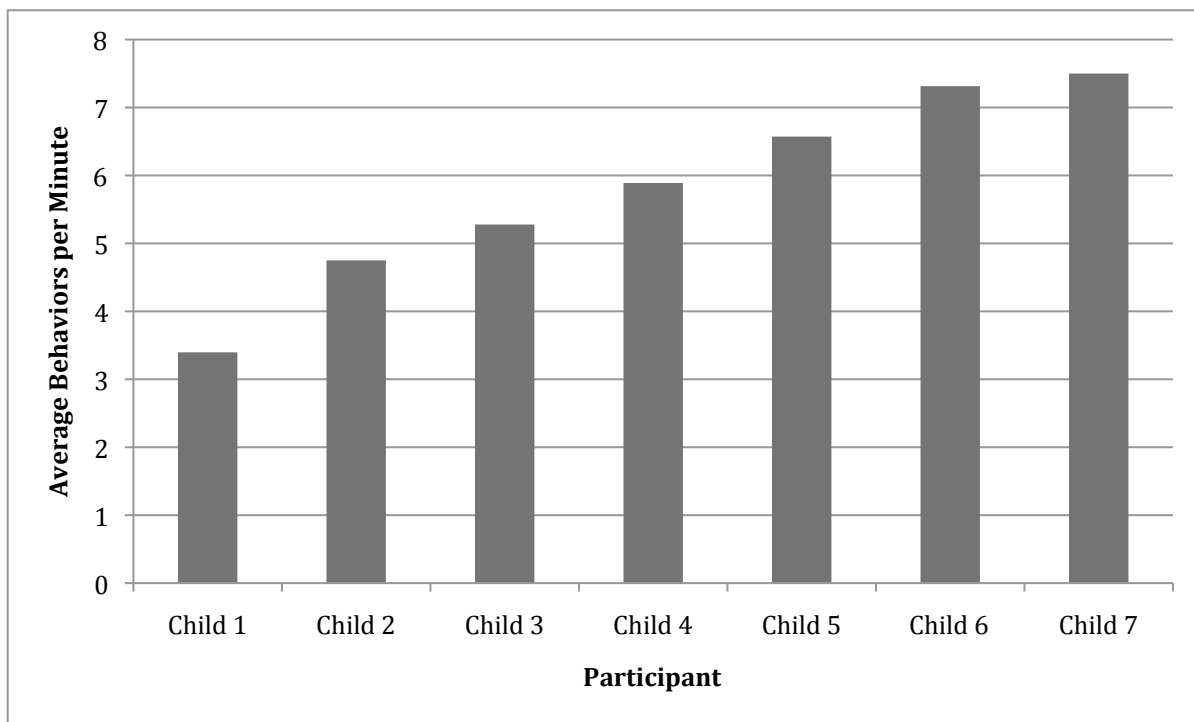


Figure 1. Bar graph of average behaviors per minute.

The first three bars represent children with ASD engaging in EIBI, with the child 4-6 bars representing typical preschool children at school. Child 7 is Raymond from *One Boy's Day*

(Barker & Wright, 1951/66). The figure shows that compared to the matched EIBI children, the typical children are engaging in about 2.5 more behaviors per minute.

Figure 2 shows the range and average rate of behaviors for each child. In relation to the hypotheses, the typical children's average number of behaviors per session is at or above the rate at which the three EIBI children are performing.

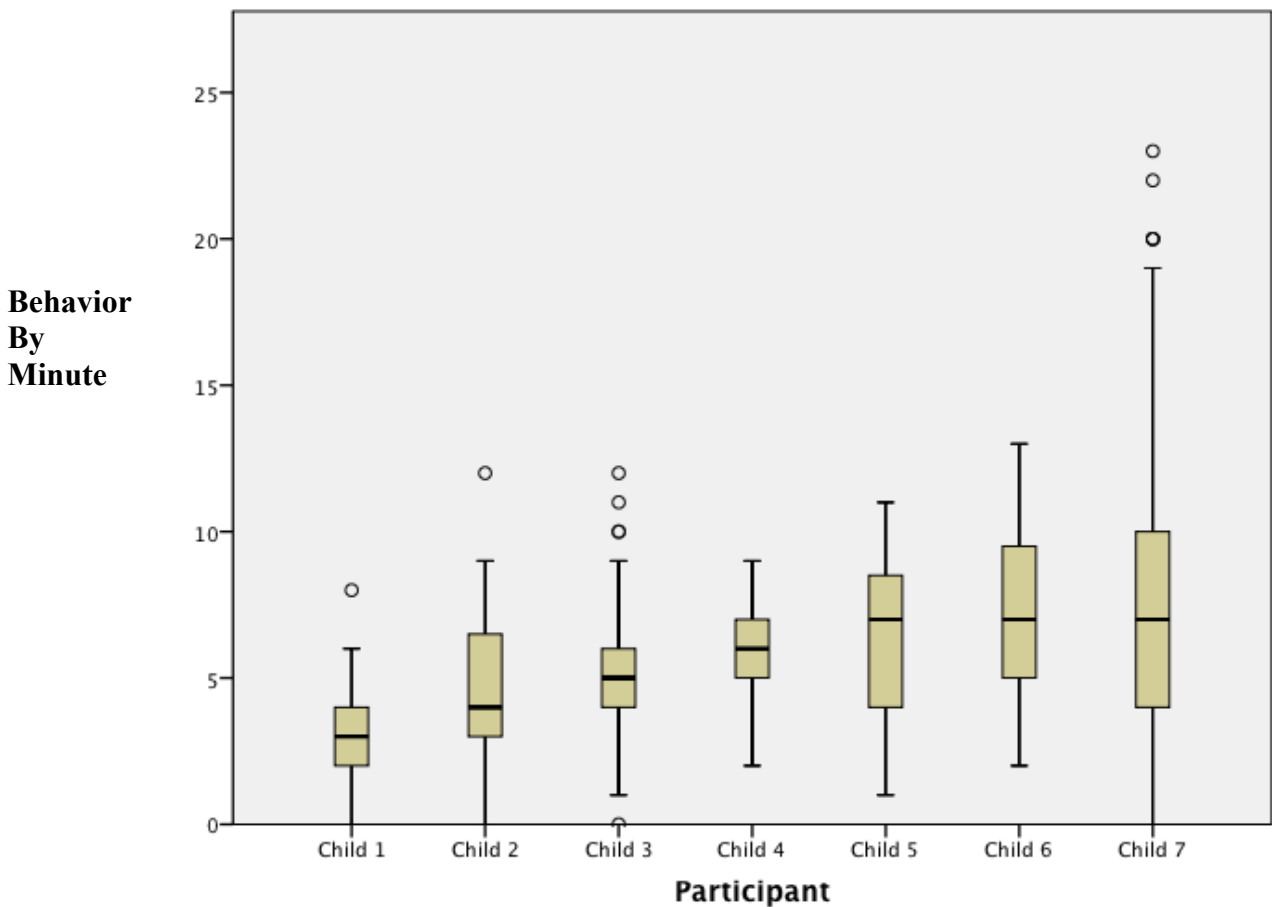


Figure 2. Box and whisker plots depicting the range and means of rate of behaviors for each child.

Children 1 through 3 had ASD diagnoses and were in at home EIBI active instruction settings. Children 4 through 6 are typically developing children in a free play preschool setting. Child 7 was typically developing, and was observed over the course of one day. The image

demonstrates that children with ASD in EIBI are engaging in similar or lower rates of behavior than typical children.

The typical child, Child 7, from *One Boy's Day* (Barker & Wright, 1951/1966) engaged in an average of 7.5 behaviors per minute across the coded data. The children with ASD engaged in an average of 4.84 behaviors per minute across the coded data. As mentioned, the children with ASD varied in their clinical presentation of symptoms. Child 1, a low functioning severely affected male, engaged in an average of 3.43 behaviors per minute. Child 2, a male with severe presentation of symptomology, engaged in an average of 4.75 behaviors per minute, and child 3, a moderate functioning female, engaged in an average of 5.35 behaviors per minute. The rates of behavior between the typical child and the children with ASD were discrepant by 2 to 3 behaviors per minute, suggesting the typical child going about his day was engaging in a much higher number of behaviors per minute than children being directed in EIBI. In sum, the typical child is engaging in much higher rates of behavior than children with ASD in EIBI, which negates the condition of EIBI has children engaging in higher rates of behavior than typical children.

Preschool Comparison

Rate of behaviors. The analysis of the children with ASD and preschool children also supports the main hypotheses that the number of behaviors emitted by typical children going about everyday activities are the same as, or more than, of that of a child with ASD in EIBI. The analysis of the behavior of the children with ASD yielded 148 of coded minutes. Within this sample, the children with ASD engaged in an average of 4.41 behaviors per minute, with a standard deviation of 2.36. The range was 0-12 behaviors per minute. The analysis of the behavior of the typical children yielded 90 minutes of coded data. The average number of

behaviors per minute of the typical children was 6.66, with a standard deviation of 2.73. The range of behaviors for the typical children was 1 to 13 behaviors per minute. See Figure 2 for the graphical depiction of the ranges and means. The variance was assumed, and the independent sample *t* test showed the difference in rate of behavior for the typical children ($N = 90$, $M = 6.66$, $SD = 2.73$) and the children with ASD ($N = 148$, $M = 4.41$, $SD = 2.36$) was statistically significant, $t = 6.69$, $df = 236$, $p < .05$. Examining the means of the samples, the typical children were engaging in significantly more behaviors per minute than the children with ASD in EIBI. The average number of behaviors observed of the typical children was consistent with Rogers and Dawson's (2010) estimate of about six behaviors per minute—the rate suggested in the ESDM training manual.

Child 1 engaged in an average of 3.43 behaviors per minute. Child 2 engaged in an average of 4.75 behaviors per minute. Child 3 engaged in an average of 5.35 behaviors per minute. Child 4, a young preschool male, had on average 5.89 behaviors per minute. Child 5, a young preschool male, had on average 6.57 behaviors per minute. Child 6, a young female preschooler had on average 7.31 behaviors per minute. The Figure 2 show that compared to the EIBI children, the typical children were engaging in about 2.5 more behaviors per minute. The typical children are engaging in higher rates of behaviors per minute than that of children in EIBI, which was found to be statistically significant.

Number of activities. It was hypothesized that the number of activities independently performed by a typical child will be the same as, or less than, that of a child with ASD in standard EIBI. The children in the EIBI condition engaged in 108 different activities in over 148 minutes. The typical preschool children engaged in 31 different activities over 90 minutes of observation. The session and video clips varied in length for both the children with ASD in EIBI

and the typical preschool children. The EIBI sessions ranged from 5-19 minutes and the preschool children's engagement clips ranged from 2-18 minutes. Thus, the most meaningful measure of activity difference is to report on the approximate average duration of each activity. The typical children spent approximately 2.9 minutes per activity, while the children with ASD were engaged for about 1.37 minutes per activity. See Figure 3 for a graphical depiction of the minutes per activity data.

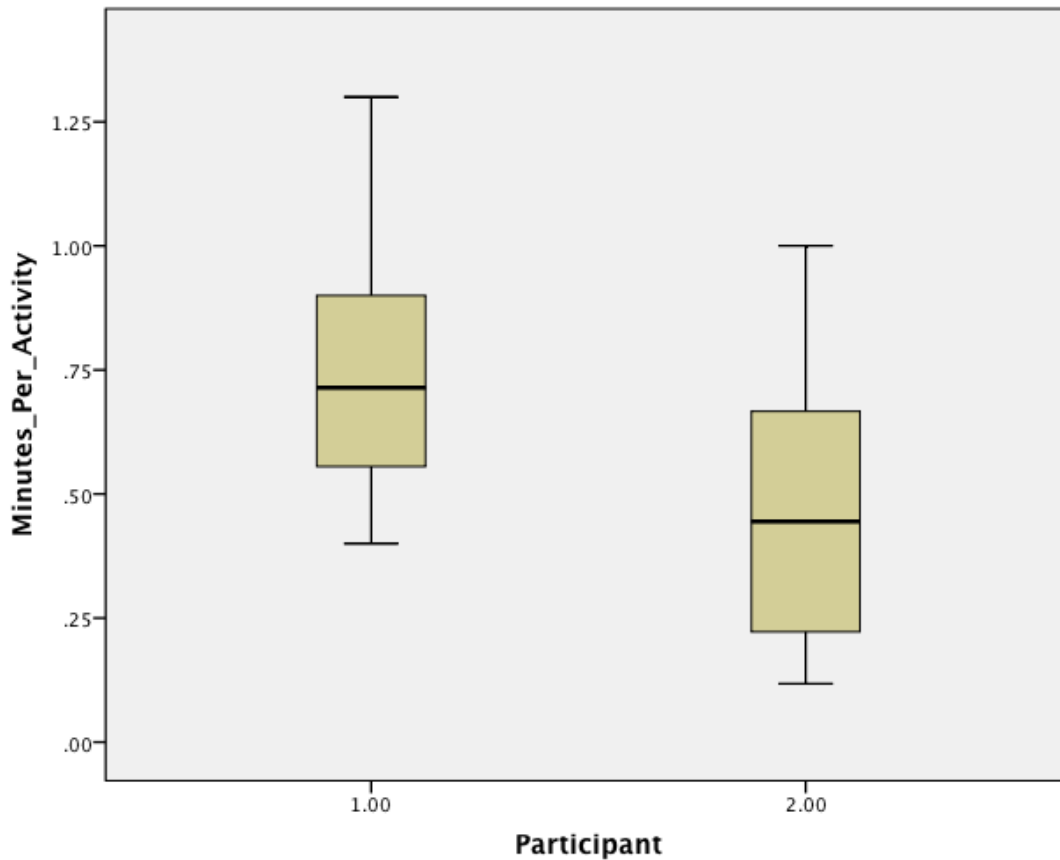


Figure 3. Box and whisker plots depicting the range and means of minutes per activity for the children with ASD in EIBI (value 1.0) and typical preschool children (value 2.0).

The image demonstrates that children with ASD in EIBI are engaging in more activities over time than typical children.

Contrived reinforcement. In the EIBI conditions, an analysis found that children with ASD received 68% of reinforcement from contrived situations. In the preschool condition, the children received about 2% of contrived reinforcement.

Discussion

As the results of these analyses demonstrate, the intensity of EIBI does not exceed that of a typical older child's day, taking the everyday behavior of the typical child from *One Boy's Day* (Barker & Wright, 1951/1966) and the preschool children to be reasonably representative of typical older children's behavior. In fact, the rate of activity of the typical children reliably exceeded that of the EIBI children. Thus, the hypotheses that EIBI would not exceed the rate of behaviors of a typical child were supported. The direction presumed by the critics, more intensity experienced by the EIBI children was not found. If anything, EIBI is significantly less intense than ordinary child behavior, with typical children engaging in significantly more behaviors per minute than children in EIBI. In terms of activities, the typical children engaged in less activities. The results demonstrated the children with ASD are engaging in more activities for less time. This represents the skill set of each set of children. The children with ASD have fewer skill repertoires and can only perform limited behaviors with certain activities, and as a result move on to other learning opportunities to increase skill acquisition. Whereas, generally, typical preschool children are working on sustained attention and broader skill sets allowing them to stay with a single activity for longer periods of time (Ruff, Capozzoli, & Weissberg, 1998). Additionally, the children with ASD are getting "breaks" or time to engage in specific reinforcing activities.

In terms of the contrived reinforcement, it was found that the ASD children's interactions were more reliably rewarding—a condition hardly likely to make anyone unhappy or stressed.

Future analysis could determine the amount of punishment used in either condition.

Anecdotally, it was unfortunate that the children in the preschool were not praised for the “good” or appropriate learning behavior any were close to as frequently as the children in EIBI; it was more likely that a child would be reprimanded if they were off task. In other words, the typical children in the preschool received little praise. Again, future analyses and research can determine the differences in rates of punishment or other non-codeable consequences.

The findings, the intensity of EIBI being less than that of typical children’s behavior, are consistent with the evidence gathered and presented. Rogers and Dawson’s (2010) ESDM study where treatment intensity is predicated on typical child’s rate of behavior, specifically six behaviors a minute. This is consistent with the current study’s finding of typical child behavior.

Some other observations are relevant. In contrast to the typical children, whose behavioral interactions were unprogrammed, the children with ASD were placed in situations in which their often stereotyped behavior was replaced by other more functional activities (APA, 2013). Left on their own, the typical children contact a wide range of stimuli, even if the contact is unsystematic. Children with ASD, in contrast, are likely to create their own impoverished environments, full of restricted and repetitive activities, but little variety. This is problematic because the restricted and repetitive behaviors do not advance their learning. It is plausible that EIBI programming may seem restrictive to critics due to the blocking of these repetitive behaviors. But, EIBI settings are likely to be far richer and varied than what the children would experience on their own. This includes being richer in social reinforcement. Insensitivity to social reinforcement contingencies is seen in other psychological disorders, such as depression. People with Major Depressive Episode, for instance, may become insensitive to social reinforcement and then are negatively reinforced by withdrawal, which then perpetuates the

depression (e.g., Carvalho, Trent, & Hopko, 2011; Ferster, 1973; Lewinsohn & Grosscup, 1980). Altering the reinforcing contingencies for behavior change is not restricted to children with ASD. Thus, for children with ASD, EIBI, rather than leading to psychological problems of stress, creates conditions consistent with recovery from depression.

Why are the critics spreading false claims, when the reality is not hard to discover, when the counterarguments are relatively simple to make? It may be as simple as the critics of ABA and EIBI need to make some kind of argument. When the intervention obviously works, something else must go wrong—and here there are supposedly dire unintended side effects. This general argument—that the good is a façade for the bad—has been made about ABA before (Todd & Morris, 1992), and is a frame for many other kinds of critiques of successful treatments. As demonstrated here graphically and statistically, intensity of EIBI is equal to or less than that of typical child rates of behavior. Typical children are engaging in at least six independent learning behaviors a minute, much like that demonstrated in other research (Rogers & Dawson, 2010). The EIBI children are seeing much fewer, approximately two to four fewer behaviors per minute. Thus, the EIBI children actually have less intense experiences with greater likelihood of relevant learning than the ordinary children. The breakdown of skills and immediate feedback on performance (e.g., reinforcement) allows for these significant learning experiences. As Moerk (1980, 1983) has described, frequency of exposure increases acquisition, however, children with ASD are not learning without the breakdown of skill as typical children would. To address deficits, EIBI utilizes intensity (high rate of exposure), with the break down of skills. The findings suggest that calling EIBI intense may actually be misleading since it is not more intense, defined by rate of behaviors, than that of typical children. In the end, the claim that EIBI can produce disordered stress is unlikely given the present results.

Limitations

While it was clear from the analyses in this study that children engaged in EIBI were engaged in significantly fewer behavioral interactions per unit of time than typical children, there remain some limitations to the study and the strength of its conclusions. The design of the study was flawed. A study of this nature cannot be randomly assigned to groups. The children were not matched by strict criteria (i.e., exact age). Additionally, the children with ASD are at different functioning levels. Typical children are not found in EIBI, and their behavior would, of course, be constrained by the tasks presented to them. Future analyses could include a comparison of non-EIBI behavior in ASD children and typical children.

A second potential limitation involves the small sample size of the study. As noted earlier, *One Boy's Day* (Barker & Wright, 1951/1966) involved the analysis of one boy's day raising concerns about the representativeness of this child. The EIBI comparisons samples were also small, with only three ASD children and three preschool children. The analysis looked at minutes as the sample unit, and this may be a limitation as well, but accounted for the very small number of actual participants. In other words, the sample was the minutes coded to increase the power of the results.

Other threats to validity involve subject characteristics. The age of the subjects in the graphic analysis were not equivalent - the children with ASD were younger than the preschool children and the typical child from *One Boy's Day* (Barker & Wright, 1951/1966). Research has demonstrated that as children age, they engage in fewer activities for longer periods of time due to increased sustained attention, (Ruff, Capozzoli, & Weissberg, 1998). This suggests that the behavior of older typical children is generally less intense in activity than that of younger children, and thus the comparison might be age rather than aspects of EIBI and typical behavior.

This raises the possibility that age, rather than instructional setting could be responsible for differences between children in EIBI and preschool children.

Also, the additional data collected from the preschool children accounted for this limitation. The preschool data also accounted for the limitation of using different media (i.e., video and written). The rate of behaviors for the typical child was derived from written form and the children with ASD were viewed in sessions captured on video. It can be difficult to compare data from different sources because it is likely behaviors will be missed. However, in the case, it was more of a possibility that behaviors from the written observations were missed than the behaviors missed on video. To elaborate, the observers in *One Boy's Day* (Barker & Wright, 1951/1966) were taking hand-written notes on the child's behavior and it was likely that some behaviors were missed when the observer looked down to write or if the child moved out of view (which occurred on a few occasions). Through the analysis of the videos, it was likely the noted frequency of behaviors are higher since the observers could stop and start the video for recording data or rewind in cases of uncertainty. As such, the rate differences could have been much more discrepant, with the videos of EIBI on the high end. It should be noted, in addition, that one aspect of the use of the book was to explore methods of converting textual representations of behavior into quantitative ones, particularly as a training exercise for the writer.

Other limitations include a lack of a standard duration for the EIBI group. The preschool group was filmed on one day, whereas the EIBI children were filmed across multiple sessions and days. The preschool children were in one classroom, same environment and same time. The EIBI children had different environments.

Conclusion

Autism Spectrum Disorder is a severe and pervasive developmental disorder affecting multiple facets of functioning (APA, 2013). Individuals outside and inside the scientific community have suggested that the empirically supported treatments for ASD, specifically ABA and EIBI, are so intense they cause disordered stress in the children enrolled. These claims and misinformation deter parents and even professionals from accessing EIBI and other empirically supported behavioral treatments for children affected by ASD (McDonald, Pace, Blue, & Schwartz, 2012). This is particularly troubling since the other treatments being accessed and used are not supported empirically, and many are harmful (Jacobson et al., 2005; McDonald, Pace, Blue, & Schwartz, 2012; Mostert, 2001, 2010; Smith, 2008b; Virues-Ortega et al., 2013). This study presented preliminary data that suggest EIBI is not more intensive than interactions in a typical preschool classroom or than a typical child's day. In the dimensions discussed, this study focused on the rate of behaviors in EIBI. Future research should address this definition of intensity and the number of hours in treatment, since both definitions are central to EIBI. If the results were to be replicated under more rigorous conditions, using the word "intense" to describe EIBI could be considered misleading.

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