Intensive Behavioral Intervention and Autism Spectrum Disorders: Outcome Research in a Community Setting

Casey F. Wixson
Pacific University

Recommended Citation

This Thesis is brought to you for free and open access by the College of Health Professions at CommonKnowledge. It has been accepted for inclusion in School of Graduate Psychology by an authorized administrator of CommonKnowledge. For more information, please contact CommonKnowledge@pacificu.edu.
Intensive Behavioral Intervention and Autism Spectrum Disorders: Outcome Research in a Community Setting

Abstract
Previous studies have evidenced favorable outcomes for early intensive behavioral intervention in research-based settings for children and adolescents diagnosed with autism spectrum disorders (ASDs). The purpose of the current study was to investigate the clinical utility of intensive behavioral intervention in an independent community-based setting for children diagnosed with ASDs. This study provides evidence that intensive behavioral intervention can be effective for increasing adaptive behaviors and for decreasing problem behaviors. This study was unable to effectively answer the question of whether changes in adaptive and maladaptive functioning are related to treatment intensity as defined by the number of hours of intervention per week. Finally, this study provides limited evidence for using the Scales of Independent Behavior-Revised (SIB-R) to distinguish between the autism spectrum disorders of Autistic Disorder, PDD-NOS, and Asperger’s Disorder based on adaptive and problem behavior scores. This study contributes to the literature regarding community-based interventions for autism spectrum disorders. In summary, this study concludes that intensive behavior intervention in a community-based setting can result in increases in adaptive behaviors and decreases in problem behaviors for children and adolescents with autism spectrum disorders.

Degree Type
Thesis

Degree Name
Master of Science in Psychology

Department
<--Please Select Department-->

Committee Chair
Susan Tinsley Li, Ph.D.

Keywords
Autism, Asperger’s, Pervasive Developmental Disorder-NOS, Intervention, Behavioral, Intensive

Subject Categories
Psychiatry and Psychology

This thesis is available at CommonKnowledge: https://commons.pacificu.edu/spp/110
INTENSIVE BEHAVIORAL INTERVENTION AND AUTISM SPECTRUM DISORDERS: OUTCOME RESEARCH IN A COMMUNITY SETTING

A THESIS

SUBMITTED TO THE FACULTY

OF

SCHOOL OF PROFESSIONAL PSYCHOLOGY

PACIFIC UNIVERSITY

HILLSBORO, OREGON

BY

CASEY F. WIXSON

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN CLINICAL PSYCHOLOGY

JULY 24, 2009

APPROVED: _______________________________  
Susan Tinsley Li, Ph.D.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>iv</td>
</tr>
<tr>
<td>INTRODUCTION AND LITERATURE REVIEW</td>
<td>5</td>
</tr>
<tr>
<td>PURPOSE OF THE CURRENT STUDY</td>
<td>33</td>
</tr>
<tr>
<td>METHODS</td>
<td>37</td>
</tr>
<tr>
<td>RESULTS</td>
<td>41</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td>52</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>62</td>
</tr>
</tbody>
</table>
ABSTRACT

Previous studies have evidenced favorable outcomes for early intensive behavioral intervention in research-based settings for children and adolescents diagnosed with autism spectrum disorders (ASDs). The purpose of the current study was to investigate the clinical utility of intensive behavioral intervention in an independent community-based setting for children diagnosed with ASDs. This study provides evidence that intensive behavioral intervention can be effective for increasing adaptive behaviors and for decreasing problem behaviors. This study was unable to effectively answer the question of whether changes in adaptive and maladaptive functioning are related to treatment intensity as defined by the number of hours of intervention per week. Finally, this study provides limited evidence for using the Scales of Independent Behavior-Revised (SIB-R) to distinguish between the autism spectrum disorders of Autistic Disorder, PDD-NOS, and Asperger’s Disorder based on adaptive and problem behavior scores. This study contributes to the literature regarding community-based interventions for autism spectrum disorders. In summary, this study concludes that intensive behavior intervention in a community-based setting can result in increases in adaptive behaviors and decreases in problem behaviors for children and adolescents with autism spectrum disorders.

**Keywords:** Autism, Asperger’s, Pervasive Developmental Disorder-NOS, Intervention, Behavioral, Intensive, Community, Adaptive
LIST OF TABLES

Table                     Page

Table 1: Demographic Information ................................................................. 42
Table 2: Pearson Correlations for Measured Variables at Time 1 .................... 44
Table 3: Pearson Correlations for Measured Variables at Time 2 .................... 45
Table 4: Mean Scores for Variables at Pretest and Posttest ............................ 47
Table 5: Effect of Diagnosis on Post-Intervention Adaptive and Problem
           Behaviors .......................................................................................... 51
INTRODUCTION AND LITERATURE REVIEW

Autism spectrum disorders (ASDs) present as a growing challenge to families, schools, and healthcare professionals alike (Thompson, 2007). Advances in diagnostic assessments, leading to earlier identification of ASDs, has afforded the opportunity for increased exploration into early forms of intervention. Intervention proponents and researchers have emphasized that successful intervention for ASDs must begin early, be intensive, and actively involve families (Mastergeorge, Rogers, Corbett, & Solomon, 2003). There is now a large body of empirical support for early intensive behavioral intervention as the standard treatment for children diagnosed with ASDs (Lord & McGee, 2001). An increased demand for professionals trained in the implementation of early intensive behavioral intervention and the successful outcomes attributable to these programs has led to a need for community-based agencies to provide interventions that have been found effective in controlled university-based settings. Community-based settings are inherently different from university contexts and thus it remains to be seen whether early intensive behavioral intervention has an impact when applied in community agencies.

Recently, public awareness campaigns such as Autism Speaks™ have experienced remarkable success in the effort to inform the lay public about the increasing diagnostic prevalence, inherent challenges, and meaningful victories that define the lives of children, adolescents, and families living with ASDs. An integral function of increasing awareness about these developmental disabilities is working to ensure that the families with children
with ASDs remain informed about the most effective interventions available that can help to encourage positive and adaptive daily functioning.

Etiology and Historical Contexts

An increase in public awareness regarding Autism Spectrum Disorders has led to a need for easily accessible, funded, and effective therapeutic interventions for increasing adaptive functioning. Autism Spectrum Disorders constitute a group of related disorders which all have as defining features deficits in communication, socialization and repetitive and stereotyped behaviors (APA, 2000). These disorders are thought to fall on a continuum ranging from greater to lesser impairment and to include the DSM-IV-TR diagnoses of Autistic disorder, Asperger’s disorder, and Pervasive Developmental Disorder – Not Otherwise Specified. Due to negative historical theories on the etiology and treatment for ASDs, current therapeutic modalities for working with children with ASDs are regarded with scrutiny and as politically and scientifically complex topics (Rogers & Vismara, 2008). Historically, it was believed that parents of children with autism were overly intellectual, were cold-hearted, and had a limited interest in other people (Kanner, 1943; Bettelheirm, 1967). Bruno Bettelheim's 1967 book *The Empty Fortress: Infantile Autism and the Birth of the Self*, prompted the theory that autistic symptoms in children could be attributed to rejecting parents, specifically mothers. Until the mid-1970’s, interventions focused on teaching parents (e.g., refrigerator mothers) to be less rejecting of their children (Klinger, Dawson, & Renner, 2003).

Competing theories of etiology (Rimland, 1964; Schopler & Reichler, 1971) began to emerge in the mid-1960’s that proposed that ASDs were indicative of a neurological impairment rather than rejecting parents (Klinger et al., 2003). Researchers such as
McAdoo and DeMyer (1978) also helped to alter theories of etiology and maintaining conditions by conducting research on psychological profiles of parents of children with autism on the Minnesota Multiphasic Personality Inventory. Interpretation of the results of testing indicated that parents of children with autism scored within the normal range on all the personality measures. Further, no differences were noted in scores regarding marital satisfaction and family cohesion between parents of children with autism and parents of children without disabilities (McAdoo & DeMyer, 1978).

Today ASDs are defined as a group of neurodevelopmental disorders whose characteristic features are usually evident by early childhood (Crighton & Hovanitz, 2006). Rapin (2001) noted that while ASDs do present as specific behavioral syndromes, they are not diseases or conditions with a single etiology. Family characteristics, genetic factors, and environmental conditions all play a role in these disorders. In addition, Cantwell, Baker, and Rutter (1980) concluded that families of children with ASDs do not exhibit any particular abnormalities in family life or interaction. The current focus of intervention for children with ASDs emphasizes early and intensive behavioral supports that encourage active involvement of families in the treatment of their children (Lord & McGee, 2001).

Domains of Impairment Associated with Autism Spectrum Disorders

Autistic Disorder, Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS), and Asperger’s Disorder have recently been conceptualized as synonymous under the umbrella term Autism Spectrum Disorders or ASDs (Newsome & Hovanitz, 2006). The DSM-IV-TR includes the diagnosis of PDD-NOS for children who display core symptoms of autism after the age of 3 years, or for children who display atypical autistic symptomology (Klinger et al., 2003). Both Autism and PDD-NOS share similar
impairments in functioning in the domains of social interaction, communication, and
restricted repetitive and stereotyped patterns of behavior (APA, 2000; Klinger et al., 2003;
Newsom & Hovanitz, 2006). Children diagnosed with Asperger’s Disorder, much like
children diagnosed with Autistic Disorder and PDD-NOS, display deficits in social
interaction and present with restricted repetitive and stereotyped patterns of behavior, but
do not display as severe deficits in communication as children diagnosed with Autistic
Disorder (APA, 2000). Asperger’s Disorder can be further differentiated from Autistic
Disorder and PDD-NOS by the presence of average to sometimes high levels of
intelligence (Newsom & Hovanitz, 2006). However, as the 2001 National Academy of
Sciences National Research Council’s report, *Educating Young Children with Autism*,
suggested, “distinctions among classical Autism and atypical Autism, Pervasive
Developmental Disorder – Not Otherwise Specified (PDD-NOS), and Asperger’s Disorder
can be arbitrary and are often associated with the presence or severity of handicaps, such as
mental retardation and severe language impairment” (p. 212). There is debate as to whether
or not children “on the spectrum” can be meaningfully distinguished from one another and
whether these distinctions have clinical relevance. In contrast to diagnostic categories,
deficits in individual skills are meaningful, due to the fact that “behavioral presentation and
outcome…have specific implications for educational goals and strategies” (Lord &

The following sections will explore the core domains of symptomology associated
with ASDs, as discussed in the DSM-IV-TR (APA, 2000) including social interaction,
communication, and restricted repetitive and stereotyped patterns of behavior. It should be
noted that similarities in constructs within the domains (e.g., language development) create some overlap (Ozonoff & Rogers, 2003).

Social Interaction

The cardinal feature of ASDs is the qualitatively abnormal character of a child’s reciprocal social interaction (Rapin, 2001). “Children with ASDs do not bond with their parents, do not play with other children, may ignore or avoid the social initiations of others, and prefer to be alone” (Rapin, 2001, p. 28). Klinger et al. (2003) identified the ability to form attachment relationships, imitate another person, share a focus of attention with another person, understand another person’s emotions, and engage in pretend play as early developing social abilities. Children with ASDs often display a diminished capacity to engage in these early prosocial behaviors.

Attachment. Attachment is conceptualized as the emotional tie between special people that leads to pleasure and comfort through nearness and interaction (Berk, 2007). Quality of attachment is associated with future adjustment and positive outcomes in development. Children with ASDs are susceptible to difficulties in forming secure attachment bonds and little is known about how these bonds develop. Rutgers, Bakermans-Kranenburg, van IJzendoorn, and van Berckelaer-Onnes (2004) found that children with more strictly defined ASDs (e.g., Autistic Disorder), as defined by a DSM-IV diagnosis, are less securely attached and show less responsiveness to caregiver interaction. Rutgers et al. confirmed that children with ASDs display less contact seeking and less contact maintaining with their caregivers than typically developing children. Empirical evidence suggests that children with ASDs present commonly as disorganized in their attachment
style, but still are able to develop secure attachment bonds with caregivers (Klinger et al., 2003).

**Social Imitation and Joint Attention.** In an effort to understand and enable early detection of ASDs, Sigman, Dijamco, Gratier and Rozga (2004) identified dyadic interaction and imitation as a core deficit in social development for these children. Children with ASDs were found to be qualitatively different from their typically developing peers in their ability to effectively communicate through social imitation. Deficits in social understanding, spontaneous social approach, emotional responsiveness, and nonverbal social skills were identified as obstacles to social imitation and joint attention. Dawson, Meltzoff, Osterling, and Rinaldi (1998) concluded that children with ASDs have specific impairments with both immediate and deferred imitation (e.g., movements) and that this impairment may be associated with later deficits in expressive communication.

**Orienting to Social Stimuli.** Dawson et al. (1998) proposed that children with ASDs experience difficulties in the area of orienting and shifting their attention. The authors concluded that these deficits appear to be particularly pronounced with social interactions (e.g., facial expressions, speech, and gestures) which present as complex, variable, and often unpredictable forms of social stimuli. Dawson (1991) suggested that critical early social experiences provide the foundation for social development. Children with ASDs who experience difficulties with orienting to social stimuli may be at an increased risk for later receptive communication deficits (Dawson et al., 1998).

**Emotional and Perceptual Expression.** A crucial component in the development of interpersonal relationships is the ability to recognize facial and emotional expressions
(Klinger et al., 2003). Children with ASDs appear to have difficulty both recognizing and creating appropriate emotional expressions. Bormann-Kischkel, Vilsmeier, and Baude (1995) found that individuals with ASDs displayed impaired performance when asked to choose a picture displaying a specific emotional expression out of a selection of varied pictures. Celani, Battacchi, and Arcidiacono (1999) confirmed that children and adolescents with ASDs experienced difficulties when asked to match pictures according to facial expressions. Individuals with ASDs have also been noted to experience deficits in their ability to produce affective expressions (Loveland et al., 1994). The authors noted that when affective expressions are produced by individuals with ASDs they often appear bizarre and mechanical.

Symbolic Play. Children with ASDs often display minimal play skills that are both delayed and unusual (Newsom & Hovanitz, 2006). Amato, Barrow, and Domingo (1998) note that an important precursor to the development of social and language skills is the ability to understand symbolic representations. An understanding of symbolic representations is most often acquired through early play. Symbolic play requires that children attribute animate characteristics to inanimate objects (e.g., pretending that a toy elephant can talk) and using an object in a manner outside of its intended function (e.g., pretending that a tree branch is a sword). Amato et al. (1999) concluded that although children with ASDs do develop symbolic play skills, these skills are often delayed or below the level expected for the child’s language abilities.

Communication and Language Development

Speech and language are typically impaired in children with strictly defined ASDs (e.g., Autistic Disorder and PDD-NOS) (Thurm, Soorya, & Wagner, 2007). Failure to
acquire and effectively use language in a developmentally appropriate timeframe is the most frequently presenting complaint for children with ASDs (Rapin, 2001). Many of the abovementioned impairments in social interaction (e.g., imitation and symbolic play) act as precursors to the development of language (Klinger et al., 2003) and impairments in social interaction will often indicate similar impairments in communication and language.

Regarding Asperger’s Disorder, impairments in social interaction often lead to communication “oddities” in areas such as intonation and rhythm (Klinger et al., 2003).

*Use of Language and Language Abnormalities.* There is a good deal of variability in the capacity of children with ASDs to verbally communicate (Wetherby et al., 2004). Matson and Minshawi (2005) proposed that children with ASDs are known to have verbal skill deficits from 2-3 years of age that persist even after later linguistic skills develop. Children with ASDs display difficulties with understanding the meaning of social signals (e.g., hand gestures and facial expressions). Due to impairments in their ability to perceive social signals children with ASDs present as deficient in their adherence to conversational rules (Adams & Bishop, 1989). Children who do learn to verbally communicate often display abnormal speech patterns including echolalia (e.g., child repeats back to a speaker exactly what they have said verbatim) and abnormal prosody (e.g., child exhibits atypical rhythm, stress, intonation, and loudness) (Ozonoff & Rogers, 2003).

*Gesturing.* Wetherby et al. (2004) noted that children with ASDs display deficits in the capacity to use conventional and symbolic gestures. Children with ASDs often do not supplement verbal communication with gestures (e.g., pointing and waving). When children with ASDs do use gestures they are often of a guiding nature (e.g., pulling on a caregiver’s hand or pushing a caregiver towards an object of interest) (Wetherby et al.,
Mundy et al. (1990) concluded that the failure to acquire gestural joint attention is a core deficit in ASDs and may inhibit future language development such as verbal communication.

**Perspective Taking.** The ability to engage in perspective taking (e.g., understanding that other people have knowledge, beliefs, feelings, and intentions that are separate from our own) is generally referred to by researchers as “Theory of Mind” (Schreibman, 2005). Berk (2007) suggested that ASDs, specifically autism, can be conceptualized as a form of “mindblindness” (p. 241) that impedes children from attributing mental states to themselves or to others (e.g., words such as believe, think, feel, and know are rarely a part of their vocabularies). Researchers have proposed that deficits in imitation may be linked to difficulties in development concerning the coordination of the representation of self and others (Berk, 2007; Baron-Cohen, Leslie, & Firth, 1985). Schreibman (2005) noted that imitation provides the foundation for the development of communicative language. Impairment in the ability to take another’s perspective may be an integral component in the tendency of children with ASDs to exhibit difficulties in understanding the social world. It may be that this inability to develop an internal working model of others is where communication in children with ASDs diverges from typically developing children (Sigman et al., 2004).

**Restricted Repetitive and Stereotyped Patterns of Behavior**

Children with ASDs often exhibit ritualistic, repetitious, obsessive, and stereotyped behaviors (Schreibman, 2005). Repetitive behaviors are idiosyncratic and their functions are often difficult to interpret. Although little research has been conducted into the function of abnormal ritualistic behaviors in children with ASDs, Howlin (2004) hypothesized that...
these behaviors may serve as coping strategies (e.g., a calming function) to reduce anxiety and provide sensory input from the environment. Thompson (2007) added that repetitive behaviors function to prevent and reduce distress associated with feared situations. Repetitive behaviors may also be a result of a learned or operant behavior that is maintained by the reinforcement provided (Turner, 1999). Specifically, Lovaas, Newsome, and Hickman (1987) theorized that repetitive motor behaviors are maintained by sensory reinforcements. Restricted, repetitive, and stereotyped patterns of behavior are so frequently observed in these disorders that Turner (1999) noted the following regarding suspicions of repetitive behaviors as being associated with ASDs,

> Any clinician who is told that a child repetitively flaps his arms, spends hours lining up Lego bricks, will not tolerate changes in routine, and has a peculiar fascination with the many varieties of electric fan available on the market will, before hearing anything about the social functioning or communicative abilities of that child, be deeply suspicious that the child is autistic. (p. 839)

Turner (1999) subdivided repetitive behaviors exhibited by children with ASDs into two categories: lower level behaviors that describe movement stereotypes and more complex higher level behaviors that indicate a need for internal and external environmental sameness. Lower level repetitive behaviors may serve a sensory seeking function, while higher level behaviors may serve as a coping strategy to reduce anxiety (Schreibman, 2005).

*Lower Level Repetitive Behavior.* Lower level repetitive behaviors can be subdivided into gross- and fine-motor categories and include such behaviors as: rhythmic body rocking, hand flapping, spinning, pacing, grimacing, saliva swishing, hair twirling,
toe-walking, repetitive manipulation of objects, and repetitive self-injurious behaviors (Klinger et al., 2003; Schreibman, 2005; Turner, 1999). Turner (1999) suggests that although some degree of repetitive behavior is evidenced in typically developing children, unlike children with ASDs, rates of these behaviors appear to be correlated with age.

Higher Level Repetitive Behavior. Higher level repetitive behaviors include such behaviors as: insistence on sameness and routine, repetitive language, and ritualistic play (e.g., patterned block stacking) (Schreibman, 2005; Turner, 1999). Higher level repetitive behaviors can also be exhibited through restricted interests (e.g., absorption in trains or train-related themes) and eating disturbances (e.g., preference for specific texture of food and mealtime routines) (APA, 2000).

Problem Behaviors

Youth diagnosed with ASDs may engage in behaviors that result in self- and other-injury and property destruction (Newsom & Hovanitz, 2006). These problem behaviors are sometimes considered to be repetitive behaviors, although they are not specified as criteria in the DSM-IV-TR other than as an aspect of functional impairment (APA, 2000). The most common self-injurious behaviors identified in youth diagnosed with ASDs are finger, hand, and wrist biting and repetitive head hitting (with fists or against hard surfaces) (Thompson, 2007). Problem behaviors are often perceived as aggressive acts, but have most recently been conceptualized as maladaptive coping mechanisms for oftentimes nonverbal ASD youth to communicate subjective experiences such as discomfort or fear (Thompson, 2007).
**Adaptive Behaviors**

Adaptive functioning refers to the ability of a child to take care of themselves and function independently in day-to-day activities and settings (Goodlin-Jones & Solomon, 2003). Adaptive behaviors are defined by Sattler and Hoge (2006) as a collection of conceptual, social, and practical skills that enable an individual to “meet cultural expectations for personal and social responsibility at various ages” (p. 304). Regarding ASDs, Lord and McGee (2001) emphasized that interventions work to increase adaptive functioning in social, communication, and community living behaviors and emphasized that interventions decrease the intensity and frequency of problem behaviors that cause functional impairment (e.g., repetitive behaviors and self-injurious behaviors).

Adaptive behavior assessments measure a child’s typical functioning in familiar environments such as the home and the school (Lord & McGee, 2001). Assessing adaptive and problem behaviors is an important component of understanding functional impairments and developing treatment plans that address specific deficits and present goals that promote age-appropriate independence (Matson & Minshawi, 2006). The Scales of Independent Behavior-Revised (SIB-R) is a useful instrument for measuring adaptive and problem behaviors (Bruininks, Woodcock, Weatherman, & Hill, 2001). The SIB-R contains adaptive behavior domains that measure impairments in social interaction, communication, and community living behaviors. The SIB-R contains problem behavior domains that measure behaviors (e.g., repetitive behaviors and self-injurious behaviors) that may cause functional impairment (Bruininks et al., 2001).
Epidemiology of Autism Spectrum Disorders

Fombonne (1999) reviewed 23 surveys from 12 countries in an attempt to identify prevalence rates, associated medical conditions, typical versus atypical presentations, gender, social class, and immigrant status of individuals diagnosed with an ASD. Over 4 million subjects were surveyed worldwide from 1966 to 1998 and 1533 children were identified as being diagnosed with an ASD. Fombonne’s results indicated a median prevalence rate for Autistic Disorder of 7.2/10000 in studies conducted from 1989 to 1998. When combined, prevalence rates for all forms of ASDs jumps to 18.7/10000. Recent data from the U.S. Centers for Disease Control and Prevention suggest prevalence rates for ASDs of 6.7/1000 individuals (CDCP, 2006). Concerning gender differences, Fombonne found an average male to female ratio of 3-8:1 across studies. Regarding ASDs and medical conditions, Fombonne’s results indicated a significant association for Mental Retardation and tuberous sclerosis with Autistic Disorder. Fombonne’s results indicated no significant findings regarding social class and immigrant status as being associated with an ASD diagnosis.

Autism Spectrum Disorders are a universal phenomenon (Orzonoff & Rogers, 2003). Controversy exists as to whether the prevalence of ASDs has increased over time (Schreibman, 2005). Questions remain as to whether an increase in prevalence is due to an actual rise in ASDs or rather if an increase is a reflection of improved awareness and identification for these disorders (Thompson, 2007). Newsom and Hovanitz (2006) suggest that it is likely that higher functioning children are being diagnosed with ASDs as researchers and clinicians become better at differentiating between diagnoses. Newsom and Hovanitz (2006) also note that societal factors (e.g., special education services under
the Individuals with Disabilities Education Act (IDEA) and Supplemental Security Insurance benefits for diagnoses such as Autistic Disorder have created an incentive to diagnose children with ASDs.

Impairments associated with ASDs are stable across the lifespan. Fombonne (1998) indicated that a large portion of the ASD youth population will require ongoing and specialized services to function in society. Positive behavioral interventions and supports utilize operant conditioning techniques such as extinction and reinforcement to reduce and/or refocus problem behaviors (Lord & McGee, 2001). Although various medications have been utilized to reduce problem behaviors associated with ASDs, there are currently no medications to treat core symptoms of ASDs (Hollander & Anagnostou, 2007). Early intensive behavioral interventions have been shown to be efficacious as treatment options, but ASDs rarely if ever remit in the majority of children (Geschwind, 2009).

Early Intensive Behavioral Intervention

Ivar Lovaas and Eric Schopler were among the first researchers to establish the learning potential of children diagnosed with ASDs (Matson & Minshawi, 2006). Utilizing a behavioral and educational treatment approach that emphasized events over etiology, analysis of behavior, conditioning principals, and classification by behavior into appropriate intervention techniques (e.g., specific goals that work to reduce excesses and alleviate deficits or delays), Lovaas and Schopler noted dramatic gains in the cognitive functioning of individuals with ASDs (Lovaas & Smith, 2003; Matson & Minshawi, 2006).

Lovaas and Smith (2003) noted that while behavioral interventions are useful for children and adults with ASDs at all ages, there appears to be a critical learning period during the toddler and preschool years. Early intervention theories regarding ASDs suggest
that children who engage in treatment at a younger age succeed because they are not yet entrenched in routine and are better able to remain equivalent with their peer group in areas such as socialization and intellectual ability (Klinger et al., 2003; Lovaas & Smith, 2003).

Much like an individualized education program (IEP) used in a school setting to aid children with learning disabilities, early intensive behavioral intervention programs utilize a structured treatment plan based on a careful assessment of a child’s abilities (Thompson, 2007). Assessments are conducted by experienced professionals with training in ASD diagnoses and treatment planning. The assessment process is designed to identify domains of functioning (e.g., communication) where a child with an ASD may be experiencing difficulties (Department of Health and Welfare, 2004). Following a comprehensive assessment period, an individualized treatment plan is developed in collaboration with the child’s family, school, and other service providers (e.g., speech therapists and occupational therapists). The individualized treatment plan is then implemented and closely monitored to assess the child’s progress as well as assess areas of the treatment plan that may require modifications (Department of Health and Welfare, 2004). Variations of the abovementioned early intensive behavioral intervention program structure have been identified, but most programs adhere to principals shaped by Lovaas’ work with the UCLA Young Autism Project (Thompson, 2007).

The UCLA Young Autism Project

Perhaps the most widely referenced early intensive behavioral intervention is Lovaas’ UCLA Young Autism Project (Thompson, 2007). In the mid-1980’s Ivar Lovaas conducted a multiple-year intervention intended to optimize functioning in all areas of development for children with ASDs. Lovaas concluded that almost one-half (47%) of
children with an ASD who began early intensive behavioral intervention prior to age 4-
years exhibited significant gains in intellectual achievement and most were able to be
placed into kindergarten classes with a typically developing peer group (Lovaas, 1987). A
follow-up study by McEachin, Smith, and Lovaas (1993) reassessed participants from
Lovaas’ original multiple-year intervention conducted in 1987 and concluded that children
were able to preserve their intellectual gains over time. McEachin et al. (1993) noted that 8
out of 9 children from Lovaas’ original study who achieved best outcomes (i.e., significant
gains in intellectual achievement) were indistinguishable from their typically developing
peers on measures of intelligence and adaptive behavior at the follow-up assessment.

Currently, the UCLA Young Autism Project emphasizes one-to-one interactions
with a therapist, discrete and clear instructions from a therapist, carefully planned
instructional procedures (e.g., prompting), and immediate reinforcement of correct
responding by children (Lovaas & Smith, 2003). In its original form, the UCLA Young
Autism Project employed highly trained student therapists who worked in a child’s home,
school, and community for an average of 40 hours per week under the supervision of
doctoral-level directors (Lovaas, 1987). Parents of children involved in the project were
required to be active participants, attending all intervention related meetings and working
alongside therapists to learn intervention techniques for 5 hours per week (Lovaas &
Smith, 2003).

The original UCLA Young Autism Project consisted of 6 individualized stages.
The first stage involved establishing a teaching relationship in which discrete trial training
(DTT) was introduced (Lovaas & Smith, 2003). Discrete trial training or teaching is a form
of operant conditioning that is utilized for children with ASDs to help with learning by
reducing teaching interactions to their most basic components (Newsom & Hovanitz, 2006). A discrete trial includes a trainer-provided antecedent in the form of an instruction or stimulus, a behaviorally defined response from a child, and an immediate consequence that either rewards or corrects a child’s response (Mastergeorge et al., 2003).

The second stage of the UCLA Young Autism Project involved integrating more challenging programs that were meant to encourage complex behaviors (Lovaas & Smith, 2003). This stage emphasized receptive communication skills though imitation of gross-motor movements, matching, dressing, and initial play skills (Lovaas & Smith, 2003). During the second stage, a prompt hierarchy (e.g., full physical, partial physical, direct verbal, indirect verbal, and gestural prompts) was utilized to encourage approximations of correct responding (Lovaas & Smith, 2003). As a child mastered an instruction, prompts were faded through the hierarchy until they became subtle reminders or were altogether unnecessary for a response to occur.

The third stage of the UCLA Young Autism Project acted as an intensive expressive language program. In this stage, the foundation of expressive communication was built through imitation of sound, self-help skills, and more advanced play skills (Lovaas & Smith, 2003). Children who had difficulties with verbal imitation were offered alternative methods for communication such as a Picture Exchange Communication System or PECS. The PECS program is a visual communication system in which a child is taught to communicate with a partner through pictorial requests (Bondy & Frost, 1994).

Stage four of the UCLA Young Autism Project extended stage three by expanding communication and introducing abstract concepts (e.g., near and far) and peer interactions (Lovaas & Smith, 2003). The concept of incidental teaching was utilized in stage four to
motivate communication. Incidental teaching encourages communication by providing a child with a stimulus rich environment and “then uses any child-initiated communication as an opportunity to prompt for more elaborate communication” (Mastergeorge et al., 2003, p. 136).

The fifth stage of the UCLA Young Autism Project emphasized advanced language concepts (e.g., prepositions, pronouns, and past tense) to encourage effective communication with peers (Lovaas & Smith, 2003). This stage utilized one-to-one therapeutic interactions in a classroom setting to promote preacademic skills and encourage socialization to classroom norms (e.g., transitioning between activities and raising one’s hand to indicate a request or response) (Lovaas & Smith, 2003). Small group work was also emphasized to increase a child’s ability to understand the perspective of others. The ultimate goal of the fifth stage was to fade a child’s reliance on the therapist’s assistance by increasing independent learning abilities within a classroom setting (Lovaas & Smith, 2003).

The sixth and final stage of the UCLA Young Autism Project involved the termination of the intervention. By age 5, children who displayed age appropriate developmental characteristics (e.g., peer play, cooperation, and effective communication) were placed into a kindergarten class with typically developing peers (Lovaas & Smith, 2003). Further fading of therapeutic assistance was closely monitored to ensure that a child had an opportunity to succeed in a typical classroom setting. If children were unable to experience success, then kindergarten was repeated in order to keep children with peers that mirrored their developmental level and capabilities (Lovaas & Smith, 2003).

McEachin et al. (1993) noted that the majority of children who completed the UCLA
Young Autism Project were able to function in a typical kindergarten setting by the end of the year without therapeutic assistance. Further, McEachin et al. (2003) identified that these children were able to maintain their adaptive gains and function in typical classroom settings throughout elementary school and beyond.

Replication and Implications

Since Lovaas’ work with the UCLA Young Autism Project, various researchers have attempted to replicate and further develop the early intensive behavioral intervention model. Various university-based programs have reported success in using aspects of Lovaas’ work. The Children’s Unit at the State University of New York at Binghamton utilizes Applied Behavior Analysis (ABA) techniques with individualized goals and curriculums for children with ASDs (Romanczyk, Arnstein, Soorya, & Gillis, 2000). The Douglas Developmental Center at Rutgers University uses ABA techniques in a small classroom setting with similar emphases as Lovaas regarding communication, socialization, and preacademic skills (Lord & McGee, 2001). The Walden Early Childhood Programs at Emory University School of Medicine emphasizes incidental teaching, peer interactions, academic skills, and socialization to classroom norms (Thompson, 2007). The Princeton Developmental Institute provides early intensive behavioral intervention for children diagnosed with an ASD who are under 24 months of age or younger. This program emphasizes 30 hours of intervention services per week and encourages active parental involvement (McClannahan & Krantz, 1994). The Pivotal Response Model at the University of California at Santa Barbara provides social and education interventions that emphasize changes in behavior in pivotal areas (e.g., self-management and responding). This program utilizes ABA techniques to target communication, self-help, academic, and
social skills across settings (Koegel, Koegel, & Carter, 1998). All of the aforementioned programs are similar in that they are housed in university clinics and are based on Lovaas’ applied behavior analysis approach to intervention.

**Intervention Effects**

Rogers and Vismara (2008) conducted a comprehensive review of intervention research for children diagnosed with ASDs published since 1998 and concluded that early intervention programs are beneficial for improving developmental functioning and decreasing maladaptive behaviors. In most studies, significant gains in language and communication were noted and “interventions with many targeted hours per week resulted in increases in IQ” (Rogers & Vismara, 2008, p. 30). In a review of eight different university-based early intervention programs for children diagnosed with ASDs, Dawson and Osterling (1997) concluded that 50% of children who received services were successfully mainstreamed into elementary school classrooms with typically developing peers. Further, across these eight programs Dawson and Osterling (1997) noted IQ improvements averaging 23 points.

Klinger et al. (2003) suggested that there is a sensitive period in which early interventions may prove to be most effective for children with ASDs. Schreibman (2005, p. 252) agreed that there is a “crucial window of opportunity for very young children” with ASDs to begin and benefit most from intervention services. Green (1996) concluded that children with ASDs benefit most from intervention services when services are initiated with children at an age of 2-3 years, for a minimum of 30 hours per week, and maintained over at least 2 consecutive years. In a study conducted at the Douglas Developmental Center at Rutgers University, researchers concluded that children who entered into
intervention services prior to 48 months of age achieved significantly higher IQ score gains and were more likely to be placed into typical classroom placements than were children who entered into intervention services after 48 months of age (Handleman & Harris, 2000).

Characteristics of Effective Interventions

In 2001, a selected committee of researchers with the National Academy of Sciences National Research Council (NAS-NRC) reviewed ten intervention programs for Autism Spectrum Disorders (Lord & McGee, 2001). The intervention programs were selected utilizing a simple frequency count of the number of times each program was described in a peer-reviewed journal (e.g., *Infants and Young Children*). The committee identified that all ten intervention programs emphasized the importance of early intervention (i.e., preschool aged children), intensive intervention (i.e., 20 to 45 hours of intervention per week), active family involvement, highly trained staff, ongoing assessment, individualized intervention plans, varied intervention environments (i.e., intervention center, home, school, and community), and a primary focus on communication, socialization, cognitive and academic, self-help, and motor skills, as well as behavioral management strategies (Lord & McGee, 2001).

In 2001, the National Academy of Sciences National Research Council (Lord & McGee) published their report on evidenced based interventions for ASDs and identified the following characteristics of effective intervention programs:

1. The intervention program begins as soon as an autism spectrum diagnosis is seriously considered.
2. Program participants are actively engaged in intensive instructional programming for a minimum of the equivalent of a full school day, 5 days (at least 25 hours) a week.

3. Children receive repeated, planned teaching opportunities that are generally organized around relatively brief periods of time.

4. The program includes a family component such as parent training.

5. There is a low student/interventionist ratio.

6. Finally, mechanisms for ongoing program evaluation and assessments of individual children’s progress are included and reviewed, with results later being translated into adjustments in programming. (p. 219).

The National Academy of Sciences National Research Council (Lord & McGee, 2001) detailed that effective intervention programs utilize a range of techniques that are empirically supported (e.g., functional assessment, functional communication training, reinforcement of alternative behaviors) and emphasized the generalization and maintenance of communication, play, and cognitive skills.

**Autism Spectrum Disorder Interventions in Community Settings**

As Lovaas and Smith note (2003, p. 336), “Parental advocacy has led to a dramatic rise in requests from families for [early intensive behavioral intervention] EIBI,” which necessitates the implementation of effective EIBI models in community settings. Horner, Carr, Strain, Todd, and Reed (2002) conducted a research review of behavioral interventions for ASDs published between 1996 and 2000 and identified that there is a need for more research on the feasibility of using behavioral interventions administered by typical service providers in typical community settings. As discussed above, efficacy for
early intensive behavioral intervention has been established in university and controlled laboratory settings (Lovaas & Smith, 2003; Rogers & Vismara, 2008). The question is posed as to whether or not community agencies can effectively mirror the quality and intensity of services that programs such as the UCLA Young Autism Project and the NAS-NRC have provided as gold standards for evidenced based intervention for ASDs.

A study conducted by Cohen, Amerine-Dickens, and Smith (2006) attempted to replicate the UCLA Young Autism Project Model in a community setting. The authors conducted a 3-year outcome study that compared an ASD treatment group that received 35 to 40 hours per week of early intensive behavioral therapy (EIBT) in a community agency with a matched comparison group that received special education services at local public schools. The authors concluded that the EIBT group obtained significant increases in IQ scores and adaptive behavior scores over the comparison group. The authors noted that a significantly greater proportion of children in the EIBT group were able to enter typical education classes without assistance in contrast with the comparison group (Cohen et al., 2006). The authors noted several limitations (i.e., nonrandom assignment to groups and concerns about treatment fidelity in the comparison group) and ultimately suggested that based on the results of their study, the UCLA Model of EIBT can be successfully implemented in a nonuniversity community-based setting (Cohen, et al., 2006). It is important to note that although Cohen and colleagues (2006) conducted services in a community-based setting, 5 staff members in the study completed 3- to 4-month internships at UCLA, and consultants from UCLA made on-site visits 2 to 4 times per year along with weekly telephone consultations to ensure proficiency of services. Thus, that
particular community setting was heavily influenced by the work being done at UCLA. The question remains as to the viability of EIBT in independent community agencies.

*Viability of Interventions in Community Settings*

Community-based settings for ASD interventions refer to any agency or service provider that is not directly affiliated with a university-based intervention program. A setback to the implementation of intensive behavioral intervention programs in community settings is that the current demand for services far exceeds the number of trained intervention professionals to administer these services (Lovaas & Smith, 2003). Because full-time intervention services (e.g., 25-40 hours per week) are expensive, upwards of $60,000 a year, and due to the limited number of intervention professionals, parent-management programs have gained popularity as a treatment option (Schreibman, 2005). A study conducted by Bibby, Eikeseth, Martin, Mudford, and Reeves (2002), assessed the effectiveness of parent-managed behavioral interventions for children with ASDs. The authors noted that the interventions did not reproduce the results from clinic-based professionally directed programs (Bibby et al., 2002). Lovaas and Smith (2003) also concluded that the results of Bibby et al.’s (2002) findings suggest that intensive behavioral intervention in community settings is “probably less effective than clinic-directed programs” (p. 337).

Due to concerns about the feasibility of intensive behavioral intervention programs in community settings associated with cost and the limited number of intervention professionals, Luiselli, Cannon, Ellis, and Sisson (2000) conducted a study to better understand the relationship between intensity of services to outcome as defined by hours of treatment per week versus duration of treatment in months. Luiselli and colleagues (2000)
concluded that children engaged in behavioral intervention for less than 20 hours per week demonstrated improvements in functioning independent of the number of hours of services that occurred on a weekly basis and that a longer duration of continuous services may be associated with positive outcomes. Luiselli and colleagues (2000) noted meaningful improvements in developmental rating scale assessments of children with ASDs engaged in community behavioral interventions and suggested that further research be conducted to increase understanding of the function of intensity in these programs.

Idaho and Intensive Behavioral Intervention

In response to the growing need for ASD intervention in the state of Idaho, the Idaho Training Cooperative Center on Disabilities and Human Development created an intensive behavioral intervention (IBI) training course designed to prepare professionals to work with the ASD population (Department of Health and Welfare, 2004). In the state of Idaho, IBI is a Medicaid reimbursed service that is available to children with developmental disabilities (e.g., Autism Spectrum Disorders) who display challenging behaviors (Idaho Department of Health and Welfare, 2004). Intensive behavioral intervention professionals work with children to increase levels of adaptive behaviors (i.e., personal living skills, community living skills, leisure and play skills, and social interaction and communication skills) and to decrease the frequency and intensity of problem behaviors (i.e., self-injurious and asocial behaviors) and functional limitations. To be eligible to receive IBI services, the Idaho Department of Health and Welfare (2004) states that a child must:
1. Be determined to have a developmental disability as defined by Idaho Code. Not all children who are eligible for special education will be eligible for IBI, and not all children with an Autism Spectrum Disorder will be eligible for IBI.

2. Have severe maladaptive behaviors as measured by the Scales of Independent Behavior-Revised (SIB-R) General Maladaptive Index with a score of minus 22 or lower (Bruininks et al., 2001), and

3. Have a severe limitation (perform at 50 percent or less of normal age level) in verbal and nonverbal communication OR social interaction OR leisure and play skills. (p. 2).

Currently, developmental disability agencies in Idaho may deliver up to 30 hours per week of IBI services. The frequency and intensity of services depends on a child’s functional limitations as assessed by the Scales of Independent Behavior-Revised (SIB-R) (Bruininks et al., 2001). The SIB-R is a standardized measure of adaptive and maladaptive behavior that is frequently used with children who have disabilities (Bruininks et al., 2001). An additional 10% of eligible hours are utilized for family consultation and training. Eligibility for services is assessed on an annual basis and a child may receive no more than 36 months of IBI from one or more service providers in their lifetime (Idaho Department of Health and Welfare, 2004).

In Idaho, intensive behavioral intervention services may be delivered by IBI professionals or IBI paraprofessionals under the close supervision of IBI professionals. Intensive behavioral intervention professionals are certified to implement IBI services by the Idaho Department of Health and Welfare after successful completion of a training course in intensive behavioral intervention. The training course was developed by the
Center on Disabilities and Human Development, Idaho Training Cooperative, through the University of Idaho (Department of Health and Welfare, 2004). To be eligible to enroll in the IBI training course, individuals must hold at least a bachelor's degree in a health, human services, educational, behavioral science or counseling field from a nationally accredited university of college. Individuals must also be able to provide documentation of one year's supervised experience working with children with developmental disabilities. The year's experience must be gained through paid employment or university practicum experience or internship and be documented to include direct contact or care of children with developmental disabilities in a behavioral context (Center on Disabilities and Human Development, 2009).

Once certified, IBI professionals may conduct functional assessments (i.e., SIB-R) and develop individualized treatment plans. Individualized treatment plans are reviewed by the Idaho Department of Health and Welfare on a biannual basis. Developmental disability agencies that provide IBI services are reviewed on an annual basis by the Idaho Department of Health and Welfare. Annual reviews include random competency assessments of IBI professionals regarding intervention services and related paperwork.

Summary

Questions remain as to the effectiveness of intensive behavior intervention in community settings for children with ASDs. Cohen and colleagues (2006) experienced success with implementing the UCLA Model of EIBT in a community setting with a highly trained staff and weekly consultation from UCLA Young Autism Project researchers. Bibby and colleagues (2002) concluded that parent-managed community behavioral interventions were not as effective as clinic-based professionally directed
programs. Various researchers have studied variables such as age of onset of services and intensity of services with varying results. As Lovaas and Smith (2003) suggest, more comprehensive research is needed to better understand how to effectively implement community-based intensive behavioral interventions.
PURPOSE OF THE CURRENT STUDY

In many parts of the United States and Europe, early intensive behavioral intervention is now considered a standard treatment for children diagnosed with ASDs (Newsom & Hovanitz, 2006). An increased demand for professionals trained in early intensive behavioral intervention has led to a need for community agencies to provide interventions that have been found to be effective, usually defined by treatment success in university-clinic or model school environments (Newsom & Hovanitz, 2006). Few studies have examined early intensive behavioral intervention in natural community settings rather than research programs (Rogers & Vismara, 2008). Results are still unclear regarding whether treatment is effective when carried out through community agencies, as opposed to when provided within tight experimental conditions (Lovaas & Smith, 2003; Rogers & Vismara, 2008). Mastergeorge et al. (2003) noted that in small or rural communities, access to early intensive behavioral interventions has been typically limited or unavailable. A goal for intervention research includes not only the development and assessment of community-driven interventions, but also communication of current knowledge to parents, teachers, and other support providers (Klinger, Dawson, & Renner, 2003).

Studies that have examined early intensive behavioral intervention in community settings have primarily focused on intelligence (as measured by IQ) and school placement as indicators of treatment success (Rogers & Vismara, 2008). “The most commonly reported outcome measure in group treatment studies of children with autistic spectrum disorders has been changes in IQ scores, which also have many limitations” (Lord &
Limited attention has been given to the study of adaptive behavior domains, specifically decreases in problem behaviors and increases in communication and socialization that might result from intensive behavioral intervention.

One goal of the proposed research is to add to a newly growing body of knowledge concerning the effectiveness of early intensive behavioral intervention in community settings. Specifically, this research will look to identify what domains of adaptive functioning (e.g., broad independence, personal living skills, community living skills, and social interaction and communication skills) benefit from early intensive behavioral intervention. Thus, it is expected that children and adolescents diagnosed with ASDs engaged in community-based intensive behavioral intervention will experience increases in the abovementioned adaptive behavior domains. A second goal of the proposed research is to investigate whether children and adolescents diagnosed with ASDs whom are engaged in intensive behavioral intervention experience a reduction in problem behaviors.

A third goal of this research is to identify whether there is a correlation between intensity of therapy as compared with changes in adaptive functioning and problem behaviors. Prior studies that have examined cognitive gains made by children and adolescents diagnosed with ASDs engaged in intensive behavioral intervention have raised questions regarding the correlation of treatment intensity and therapeutic response (Luiselli et al., 2000; Sheinkopf & Siegel, 1998). Specifically it has been noted that children diagnosed with ASDs have experienced cognitive gains despite variations in treatment intensity (Sheinkopf & Siegel, 1998). Therefore, a hypothesis of the proposed study is that children diagnosed with ASDs engaged in intensive behavioral intervention will experience positive changes in adaptive functioning that are related to treatment intensity.
A fourth goal of the proposed research is to inform a community-based developmental disability agency regarding characteristics of their supported population and the positive and negative outcomes of their interventions. The data for the proposed research will be collected at an outpatient community agency whose state and federally funded mandate is to provide services to children with disabilities. This agency is likely to benefit from increased knowledge regarding the impact and outcome of the services being provided.

Finally, the present study leaves open the possibility to investigate whether variations may exist in the findings for children diagnosed with the different ASD diagnoses. Although Autistic Disorder and Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS) have recently been conceptualized as synonymous under the umbrella term of ASDs (Crighton & Hovanitz, 2006) variations exist in the children who are diagnosed with these disorders. Furthermore, Asperger’s Disorder has recently been applied to children with autistic features at upper levels of intelligence (Newsom and Hovanitz, 2006). A research question of the current study is whether children and adolescents diagnosed with Autistic Disorder, PDD-NOS, and Asperger’s Disorder are distinguishable from one another in their adaptive behavior and problem behavior at both the start and end of intensive behavioral intervention.
The following specific hypotheses will be addressed in this research study:

1. It is hypothesized that children and adolescents diagnosed with ASDs whom are engaged in intensive behavioral intervention will experience increases in adaptive behaviors (e.g., broad independence, personal living skills, community living skills, and social interaction and communication skills as defined by the SIB-R (Bruininks et al., 2001) and evidenced by increased scores from time 1 to time 2.

2. It is hypothesized that children and adolescents diagnosed with ASDs whom are engaged in intensive behavioral intervention will experience a reduction in problem behaviors (e.g., generalized, internalized, asocial, and externalized problem behaviors) as defined by the SIB-R (Bruininks et al., 2001) and evidenced by decreased scores from time 1 to time 2.

3. It is hypothesized that children diagnosed with ASDs engaged in intensive behavioral intervention will experience changes in adaptive and maladaptive functioning and that this change in functioning will be related to treatment intensity as defined by the number of hours of intervention per week.

**Exploratory Hypothesis**

1. It is hypothesized that children and adolescents diagnosed with Autistic Disorder, PDD-NOS, and Asperger’s Disorder will be distinguishable from one another in their adaptive behavior and problem behavior, as defined by the SIB-R results, at both the start and after 1 year of intensive behavioral intervention.
METHODS

Participants and Setting

The sample for the current study was identified through analysis of the archival treatment records of children who received services from an independent developmental disability agency in Boise, ID. The archival records contain information regarding behavioral progress, as measured by the Scales of Independent Behavior-Revised (SIB-R) as well as demographic data such as age, gender, diagnosis, and treatment variables (e.g., length and intensity of support services). The ethnic/minority representation was assumed to be consistent with a community sample collected primarily in the Boise Metropolitan area; however, no specific information on participant ethnicity was available. A total of 22 participants were identified who met the study criteria. These participants had SIB-R data both prior to intervention and at 1 year follow-up. All participants had been diagnosed with an autism spectrum disorder. Participants were excluded if they did not have at least 1 year of intensive behavioral intervention services and SIB-R data both prior to intervention and after 1 year follow-up. Detailed information on the participants is provided in the results section.

Research Design and Procedures

Families were referred to an independent community-based developmental disability agency specializing in ASDs through various healthcare and other service providers (e.g., pediatricians, school teachers, and occupational and speech therapists) for an evaluation for intensive behavioral intervention services. Prior to the initiation of
intervention services, an independent developmental disability agency conducted evaluations to assess for service eligibility. This evaluation included the administration of the Scales of Independent Behavior-Revised (SIB-R) as a method to assess for adaptive and problem behaviors in children diagnosed with ASDs. Children who were found eligible for services were enrolled in an intensive behavioral intervention program. Eligibility for services was determined on a yearly basis and evaluation for eligibility included re-administration of the SIB-R.

Internal Review Board (IRB) approval from Pacific University was obtained prior to collecting archival information and creating a database. After approval was obtained, demographic information and archival records of the SIB-R were collected and entered into an SPSS (16.0 version) database located on a secure drive at Pacific University. Dates on SIB-R protocols indicated that the initial/pretest evaluations occurred prior to the initiation of intensive behavioral intervention services and were intended to act as baseline assessments of adaptive functioning. The second/posttest SIB-R evaluations occurred after the child had participated in 1 year of intensive behavioral intervention services. Intensive behavioral intervention services were conducted by the independent developmental disability agency between January of 2007 and March of 2009.

**Measures**

*Demographic Information.* Demographic information in the form of age, gender, diagnosis, and treatment variables (e.g., length and intensity of support services) was collected from archival chart records. Diagnosis was determined by psychologists and medical care providers (e.g., pediatricians) prior to the initiation of intensive behavioral intervention services.
Scales of Independent Behavior Revised. The SIB-R is a standardized measure of adaptive and maladaptive behavior that is frequently used with children who have developmental disabilities (Bruininks et al., 2001). Developed in 1984, the SIB-R measures adaptive and problem behavior constructs (Bruininks et al., 2001). The adaptive behavior portion of the SIB-R consists of 14 subscales divided into four behavior clusters (motor skills, social interaction and communication skills, personal living skills, and community living skills). Adaptive behavior scores reflect what a person is capable of doing independent of help. The problem behavior portion consists of eight present/absent scored maladaptive behaviors across three indexes: internalized (withdrawal or inattentive behavior), asocial (socially offensive behavior), and externalized (destructive to property). The SIB-R is administered through a structured interview format and is appropriate to assess individuals between 3 months and 80+ years of age. The SIB-R is intended for use in making decisions for individual evaluation, individual program planning, selection and placement, and to assess for service needs (Bensen et al., 2005).

The SIB-R has demonstrated good psychometric properties and was normed on a large sample of 2,182 individuals from 15 states and more than 60 communities (Bruininks et al., 2001). For adaptive behavior indexes, median split-half reliability for clustered scales ranged from .88 to .98, for individual subscales from .70 to .88, and for children diagnosed with mental retardation median split-half reliability was in the .90s. Test-retest reliability (4-week interval) for clustered scales ranged from .96 to .97 and for individual subscales from .83 to .97. For problem behavior indexes, test-retest reliability coefficients (4-week interval) were in the lower .80s.
Criterion-related validity coefficients for the SIB-R with the WJ-R Broad Cognitive Ability Scores were variable for individuals without disabilities and ranged from .20 for 3 to 4 year olds to .70 for 5 to 12 year olds, teens, and adults. Construct validity was ascertained utilizing a Multitrait-Multimethod Matrix (MTMM) for the SIB-R and the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984). The concurrent validity of the total standard scores (Broad Independence on the SIB-R with the Adaptive Behavior Composite on the Vineland Adaptive Behavior Scales) was .83. Convergent validity correlations ranged from .95 (personal living skills) to .50 (motor skills) (Middleton et al., 1990).
RESULTS

Characteristics of the Sample

Participants in the sample ranged in age from 3 to 15 years ($M = 8.27, SD = 3.49$). The sample consisted of both males (16) and females (6), with a male to female ratio of 2.7:1. See table 1 for complete information on age and gender characteristics. Fifty-nine percent of the participants were diagnosed with Autistic Disorder ($N = 13$), 36% were diagnosed with Asperger’s Disorder ($N = 8$), and 5% of the participants were diagnosed with PDD-NOS ($N = 1$). Weekly hours of intensive behavioral intervention in the sample ranged from 12 to 29 ($M = 20.45, SD = 5.21$; Table 1). Participants with Autistic Disorder averaged more weekly hours of intervention ($M = 22.46, SD = 4.7$) than participants diagnosed with Asperger’s Disorder ($M = 17.25, SD = 4.29$) and than participants diagnosed with PDD-NOS ($M = 20, SD = 0$).
Table 1

*Demographic Information*

<table>
<thead>
<tr>
<th>Participant</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>27.3%</td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
<td>72.7%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-5</td>
<td>8</td>
<td>36.4%</td>
</tr>
<tr>
<td>6-8</td>
<td>6</td>
<td>27.3%</td>
</tr>
<tr>
<td>9-11</td>
<td>4</td>
<td>18.2%</td>
</tr>
<tr>
<td>12-14</td>
<td>3</td>
<td>13.6%</td>
</tr>
<tr>
<td><strong>Weekly Hours of Intervention</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-15</td>
<td>7</td>
<td>31.8%</td>
</tr>
<tr>
<td>16-20</td>
<td>4</td>
<td>18.2%</td>
</tr>
<tr>
<td>21-25</td>
<td>9</td>
<td>41.0%</td>
</tr>
<tr>
<td>26-29</td>
<td>2</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

*Preliminary Analyses*

Before conducting the substantive analyses, preliminary analyses were completed to investigate the characteristics of the data. Pearson product-moment correlations were conducted between the variables to determine the need for covariate variables in subsequent analyses. See table 2 for correlations among the measured variables. Among demographic variables, significant negative correlations were found to exist between gender and diagnosis ($r = -.50$) and between weekly intervention hours and diagnosis ($r = -.49$). Significant positive correlations were found to exist between diagnosis and all adaptive behavior variables, ranging from ($r = .48$) to ($r = .65$), and between participants’ age in months and all adaptive behavior variables, ranging from ($r = .60$) to ($r = .71$). No
significant correlations were found for gender. A significant negative correlation was found between weekly intervention hours and community living behaviors ($r = -.43$). Adaptive behavior variables were all significantly positively correlated with one another, with very strong significant correlations ranging from ($r = .65$) to ($r = .98$). Significant positive correlations were found to exist between general maladaptive and internalized maladaptive behaviors ($r = .51$), between general maladaptive and externalized maladaptive behaviors ($r = .81$), and between asocial maladaptive and externalized maladaptive behaviors ($r = .62$). An unanticipated significant negative correlation was found to exist between generalized maladaptive and asocial maladaptive behaviors ($r = - .78$).
### Table 2

**Pearson Correlations for Measured Variables at Time 1**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diagnosis</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Age in Months</td>
<td>.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Gender</td>
<td>-.50*</td>
<td>-.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Weekly Intervention Hours</td>
<td>-.49*</td>
<td>-.15</td>
<td>-.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Broad Independence</td>
<td></td>
<td>.59**</td>
<td>.71**</td>
<td>-.36</td>
<td>-.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Social Communication</td>
<td>.52*</td>
<td>.71**</td>
<td>-.37</td>
<td>-.26</td>
<td>.95**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Social Interpersonal</td>
<td>.48*</td>
<td>.71**</td>
<td>-.36</td>
<td>-.13</td>
<td>.87**</td>
<td>.96**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Language Comprehension</td>
<td>.51*</td>
<td>.68**</td>
<td>-.35</td>
<td>-.29</td>
<td>.84**</td>
<td>.96**</td>
<td>.89**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Language Expression</td>
<td>.56**</td>
<td>.71**</td>
<td>-.39</td>
<td>-.28</td>
<td>.95**</td>
<td>.98**</td>
<td>.91**</td>
<td>.92**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Personal Living</td>
<td>.52*</td>
<td>.60**</td>
<td>-.29</td>
<td>-.41</td>
<td>.91**</td>
<td>.79**</td>
<td>.65**</td>
<td>.79**</td>
<td>.83**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Community Living</td>
<td>.65**</td>
<td>.68**</td>
<td>-.40</td>
<td>-.43*</td>
<td>.98**</td>
<td>.92**</td>
<td>.82**</td>
<td>.92**</td>
<td>.92**</td>
<td>.92**</td>
<td>.91**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>General Maladaptive</td>
<td>-.02</td>
<td>-.22</td>
<td>-.26</td>
<td>-.40</td>
<td>-.19</td>
<td>-.23</td>
<td>-.25</td>
<td>-.01</td>
<td>-.33</td>
<td>-.21</td>
<td>-.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Internalized Maladaptive</td>
<td>.15</td>
<td>-.02</td>
<td>-.04</td>
<td>-.31</td>
<td>.10</td>
<td>.13</td>
<td>.19</td>
<td>.23</td>
<td>-.01</td>
<td>-.07</td>
<td>.10</td>
<td>.51*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Asocial Maladaptive</td>
<td>-.24</td>
<td>-.14</td>
<td>-.23</td>
<td>-.29</td>
<td>-.34</td>
<td>-.35</td>
<td>-.35</td>
<td>-.26</td>
<td>-.37</td>
<td>-.28</td>
<td>-.28</td>
<td>-.78**</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Externalized Maladaptive</td>
<td>-.02</td>
<td>-.38</td>
<td>-.22</td>
<td>-.25</td>
<td>-.28</td>
<td>-.37</td>
<td>-.44</td>
<td>-.26</td>
<td>-.40</td>
<td>-.18</td>
<td>-.24</td>
<td>.81**</td>
<td>.04</td>
<td>.62**</td>
</tr>
</tbody>
</table>

* *p < .05 ; **p < .01*
Table 3

Pearson Correlations for Measured Variables at Time 2

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diagnosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Age in Months</td>
<td>.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Weekly Intervention Hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.49*</td>
<td>-.15</td>
<td>-.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Broad Independence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Social Communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Social Interpersonal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Language Comprehension</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Language Expression</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Personal Living</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Community Living</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. General Maladaptive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Internalized Maladaptive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Asocial Maladaptive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Externalized Maladaptive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05; ** p < .01

Hypothesis 1: Adaptive Behaviors

It was hypothesized that children and adolescents diagnosed with ASDs engaged in intensive behavioral intervention would experience increases in adaptive behaviors (e.g., broad independence, personal living skills, community living skills, and social interaction and communication skills) as defined by the SIB-R (Bruininks et al., 2001) as evidenced by increased scores from time 1 to time 2. Repeated measures paired-samples t tests were conducted to investigate whether the mean of the difference between pre- and posttest scores regarding adaptive behaviors was significantly different from zero after 1 year of intensive behavioral intervention. Using the Bonferroni approach to control for Type I error across the 11 paired-samples t tests, a p value of less than .0045 (.05/11 = .0045) was
required for significance. The results indicated significant differences in broad independence $t(21) = -5.4, p < .002$, social communication $t(21) = -3.82, p < .002$, language comprehension $t(21) = -4.73, p < .002$, and community living $t(21) = -3.87, p < .002$ before and after 1 year of intensive behavioral intervention. These results indicated that the mean scores after intensive behavioral intervention for broad independence, social communication, language comprehension, and community living skills were significantly higher than the mean scores before intensive behavioral intervention (table 4). The results did not indicate significant change for social interpersonal and language expression adaptive behaviors before and after 1 year of intensive behavioral intervention.

**Hypothesis 2: Problem Behaviors**

It was hypothesized that children and adolescents diagnosed with ASDs engaged in intensive behavioral intervention would experience a reduction in problem behaviors (e.g., internalized, asocial, and externalized problem behaviors) as defined by the SIB-R (Bruininks et al., 2001) and evidenced by decreased scores from time 1 to time 2. Repeated measures paired-samples $t$ tests were conducted to investigate whether the mean of the difference between pre- and posttest scores regarding problem behaviors was significantly different from zero after 1 year of intensive behavioral intervention. Using the Bonferroni approach to control for Type I error across the 11 paired-samples $t$ tests, a $p$ value of less than .0045 (.05/11 = .0045) was required for significance. The results indicated significant a difference in the general maladaptive index $t(21) = -4.53, p < .002$ before and after 1 year of intensive behavioral intervention. These results indicated that the mean scores after intensive behavioral intervention for the general maladaptive index were significantly higher than the mean scores before intensive behavioral intervention (table 4). The results
did not indicate significant change for asocial maladaptive and externalized maladaptive indices before and after 1 year of intensive behavioral intervention.

Table 4

Mean Scores for Variables at Pretest and Posttest

<table>
<thead>
<tr>
<th></th>
<th>Mean 1 (SD)</th>
<th>Mean 2 (SD)</th>
<th>Sig</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad Independence</td>
<td>42.55 (24.4)</td>
<td>49.01 (25.98)</td>
<td>.000*</td>
<td>1.15</td>
</tr>
<tr>
<td>Social Communication</td>
<td>35.32 (25.74)</td>
<td>42.95 (25.92)</td>
<td>.001*</td>
<td>.81</td>
</tr>
<tr>
<td>Social Interpersonal</td>
<td>30.36 (19.58)</td>
<td>34.82 (18.95)</td>
<td>.087</td>
<td>.38</td>
</tr>
<tr>
<td>Language Comprehension</td>
<td>34.68 (23.09)</td>
<td>46.41 (24.72)</td>
<td>.000*</td>
<td>1.01</td>
</tr>
<tr>
<td>Language Expression</td>
<td>40.64 (35.96)</td>
<td>48.14 (36.55)</td>
<td>.042</td>
<td>.46</td>
</tr>
<tr>
<td>Personal Living</td>
<td>42.55 (26.32)</td>
<td>47.14 (23.79)</td>
<td>.026</td>
<td>.51</td>
</tr>
<tr>
<td>Community Living</td>
<td>41.95 (24.38)</td>
<td>49.63 (28.78)</td>
<td>.001*</td>
<td>.82</td>
</tr>
<tr>
<td>General Maladaptive</td>
<td>-43.05 (9.16)</td>
<td>-35.91 (8.91)</td>
<td>.000*</td>
<td>.96</td>
</tr>
<tr>
<td>Internalized Maladaptive</td>
<td>-30.23 (11.39)</td>
<td>-27.82 (9.35)</td>
<td>.293</td>
<td>.23</td>
</tr>
<tr>
<td>Asocial Maladaptive</td>
<td>-27.40 (11.64)</td>
<td>-28.55 (5.47)</td>
<td>.599</td>
<td>.11</td>
</tr>
<tr>
<td>Externalized Maladaptive</td>
<td>-35.45 (9.14)</td>
<td>-24.59 (14.87)</td>
<td>.005</td>
<td>.67</td>
</tr>
</tbody>
</table>

Note. *Corrected alpha = .0045
Hypothesis 3: Adaptive and problem behaviors as a function of treatment intensity

It was hypothesized that children diagnosed with ASDs engaged in intensive behavioral intervention would experience changes in adaptive and problem behaviors and that this change in functioning will be related to treatment intensity as defined by the number of hours of intervention per week. Repeated measures one-way analyses of covariance (ANCOVA) were conducted to investigate whether changes in adaptive and problem behaviors were related to treatment intensity. The National Academy of Sciences National Research Council (Lord & McGee, 2001) suggests a minimum of 25 hours per week of intensive behavioral intervention as a characteristic of an effective intervention program. Using this information as a guideline, the data was divided into 2 groups. The first group was defined as having received greater than 25 hours of intensive behavioral intervention services per week (N = 9) and the second group was defined as receiving less than 25 hours of intensive behavioral intervention per week (N = 13). In addition, based on the findings from the preliminary analyses, diagnosis was identified as an appropriate covariate for the analyses in order to look at relations among the other variables not due to the effect of diagnosis. Using the Bonferroni approach to control for Type I error across the 11 repeated measures one-way ANCOVAs, a p value of less than .0045 (.05/11 = .0045) was required for significance. The repeated measures one-way ANCOVAs revealed that there were no significant differences between the two intensity levels of intervention for: broad independence ($F_{(1,19)} = .493, p = .491$), social communication ($F_{(1,19)} = .589, p = .452$), social interpersonal ($F_{(1,19)} = .257, p = .618$), language comprehension ($F_{(1,19)} = .268, p = .611$), language expression ($F_{(1,19)} = .429, p = .520$), personal living ($F_{(1,19)} = .953, p = .341$), community living ($F_{(1,19)} = .945, p = .343$), general maladaptive index
Internalized maladaptive index \((F(1,19) = 2.88, p = 0.106)\), internalized maladaptive index \((F(1,19) = 1.33, p = 0.263)\), asocial maladaptive \((F(1,19) = 1.09, p = 0.309)\), and externalized maladaptive index \((F(1,19) = 2.56, p = 0.126)\). To more evenly split groups, further repeated measures one-way ANCOVAs were conducted to investigate whether changes in adaptive and problem behaviors were related to treatment intensity as defined as greater than or less than 20 hours \((> 20, N = 11; < 20, N = 11)\) and as defined as greater than or less than 15 hours \((> 15, N = 15; < 15, N = 7)\) with no significant differences noted.

**Exploratory Hypothesis: Distinguishing between ASD diagnoses**

It was hypothesized that children and adolescents diagnosed with Autistic Disorder, PDD-NOS, and Asperger’s Disorder would be distinguishable from one another in their adaptive behaviors and problem behaviors, as defined by the SIB-R results, at both the start and after 1 year of intensive behavioral intervention. Two one-way multivariate analyses of variance (MANOVAs) were conducted to investigate whether children and adolescents diagnosed with Autistic Disorder, PDD-NOS, and Asperger’s Disorder were distinguishable from one another in their adaptive behaviors and problem behaviors, as defined by the SIB-R results, at both the start of intervention services (time 1) and after 1 year of intensive behavioral intervention (time 2). Both MANOVAs revealed that there were no significant differences between the three diagnoses at both the start \((\text{Wilks’s } \Lambda = 0.17, F(1,19) = 0.953, p = 0.554)\) and after 1 year \((\text{Wilks’s } \Lambda = 0.12, F(1,19) = 1.31, p = 0.295)\) of intensive behavioral intervention.

Despite there being no significant results from the MANOVAs, there were significant zero-order relations between diagnosis and weekly intervention hours at time 1.
and time 2 (see tables 2 and 3). Specifically, community living and generalized maladaptive variables were significantly related to weekly intervention hours.

Linear regressions were conducted to describe changes in adaptive and problem behaviors from time 1 to time 2 as related to participant diagnosis (table 5). In all of these analyses, time 1 behavior was controlled for prior to looking at the effect of diagnosis on time 2 behavior. The overall models for social communication ($R^2 = .90$) and for language expression ($R^2 = .855$) were significant ($p < .05$). For social communication, 2.7% of the variance in time 2 social communication was accounted for by diagnosis after controlling for behavior at time 1. For language expression, 4.5% of the variance in time 2 language expression was accounted for by diagnosis after controlling for behavior at time 1. Thus, a significant part of the change in social communication and language expression scores from time 1 to time 2 are explained for by diagnosis. The overall models for broad independence ($R^2 = .941$), social interpersonal ($R^2 = .698$), language comprehension ($R^2 = .794$), personal living ($R^2 = .890$), community living ($R^2 = .915$), general maladaptive ($R^2 = .465$), internal maladaptive ($R^2 = .261$), asocial maladaptive ($R^2 = .267$), and external maladaptive ($R^2 = .078$) were not significant.

Despite there being no significant results from the MANOVAs, there were significant zero-order relations between diagnosis and behavior at time 1 and time 2 (see tables 2 and 3). Specifically, all adaptive behavior variables were significantly related to diagnosis and no maladaptive behavior variables were significantly related to diagnosis.
Table 5

*Effect of Diagnosis on Post-Intervention Adaptive and Problem Behaviors*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>B</th>
<th>SE B</th>
<th>F</th>
<th>Sig</th>
<th>R² Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad Independence</td>
<td>.717</td>
<td>1.849</td>
<td>.150</td>
<td>.703</td>
<td>.000</td>
</tr>
<tr>
<td>Social Communication</td>
<td>5.137</td>
<td>2.267</td>
<td>4.532</td>
<td>.035*</td>
<td>.027</td>
</tr>
<tr>
<td>Social Interpersonal</td>
<td>3.757</td>
<td>2.789</td>
<td>2.694</td>
<td>.194</td>
<td>.029</td>
</tr>
<tr>
<td>Language Comprehension</td>
<td>3.396</td>
<td>3.086</td>
<td>1.211</td>
<td>.285</td>
<td>.013</td>
</tr>
<tr>
<td>Language Expression</td>
<td>9.618</td>
<td>3.967</td>
<td>5.877</td>
<td>.025*</td>
<td>.045</td>
</tr>
<tr>
<td>Personal Living</td>
<td>2.180</td>
<td>2.173</td>
<td>1.007</td>
<td>.328</td>
<td>.006</td>
</tr>
<tr>
<td>Community Living</td>
<td>-3.594</td>
<td>2.606</td>
<td>1.902</td>
<td>.184</td>
<td>.009</td>
</tr>
<tr>
<td>General Maladaptive</td>
<td>1.369</td>
<td>1.537</td>
<td>.794</td>
<td>.384</td>
<td>.022</td>
</tr>
<tr>
<td>Internalized Maladaptive</td>
<td>.797</td>
<td>1.917</td>
<td>.173</td>
<td>.682</td>
<td>.007</td>
</tr>
<tr>
<td>Asocial Maladaptive</td>
<td>-.059</td>
<td>1.138</td>
<td>.003</td>
<td>.959</td>
<td>.000</td>
</tr>
<tr>
<td>Externalized Maladaptive</td>
<td>.446</td>
<td>3.464</td>
<td>.017</td>
<td>.899</td>
<td>.001</td>
</tr>
</tbody>
</table>

* * p < .05
DISCUSSION

The purpose of the current study was to investigate the clinical utility of intensive behavioral intervention in an independent community-based setting for children diagnosed with ASDs. This study provides evidence that intensive behavioral intervention is effective for increasing adaptive behaviors and decreasing problem behaviors. This study did not answer the question of whether changes in adaptive and maladaptive functioning are related to treatment intensity as defined by the number of hours of intervention per week. This study provides limited evidence for using the Scales of Independent Behavior-Revised (SIB-R) to distinguish between Autistic Disorder, PDD-NOS, and Asperger’s Disorder based on adaptive and problem behavior scores. Implications of these findings will be discussed further as well as limitations and directions for future research.

Demographic variables

There were several demographic variables of interest in this study. This sample of participants is both consistent with other ASD research samples and unique. In order to evaluate the implications of these findings, it is important to first look at characteristics of the sample. The sample population utilized for this study differed in male to female ratio, 2.7:1, for ASDs when compared with national averages. Recent data from the U.S. Centers for Disease Control and Prevention suggest an average male to female ratio of 4.7:1 (CDCP, 2006). The DSM-IV-TR suggests rates of Autistic Disorder are four to five times higher in males than in females and rates of Asperger’s Disorder are at least five times higher in males than in females (APA, 2000). An exact explanation for the lower male to
female ratio for this sample population is unclear. It could be possible that females in this specific population are more likely than males to engage in disruptive externalizing behaviors and as a consequence, females are referred to intervention services more often. Another demographic variable of interest for this study is age. The sample population utilized for this study had an average age of 8 years, which is higher than the specified “crucial window of opportunity for very young children” to benefit most from early intensive behavioral intervention (Schreibman, 2005, p. 252). Green (1996) specified that children with ASDs benefit most from intervention services when services are initiated with children at 2-3 years of age or by 48 months (Handleman & Harris, 2000). Only 14% of the sample population in this study was younger than 48 months of age.

Adaptive and maladaptive behaviors

Analysis of adaptive and maladaptive changes provides evidence that intensive behavioral intervention was effective in leading to increased functioning for broad independence, social communication, language comprehension, and community living skills, but not for social interpersonal, language expression, and personal living skills. These variables increased significantly from the start of intervention to the re-evaluation one year later, with an average increase of 7.15 scaled points. The analysis also provides evidence that intensive behavioral intervention was effective in leading to a decrease in general maladaptive behaviors. General maladaptive behaviors decreased significantly from the start of intervention to the re-evaluation one year later, with an average decrease of 4.82 scaled points. To be eligible to receive intensive behavioral intervention services, the Idaho Department of Health and Welfare (2004) states that a child must present with severe maladaptive behaviors as measured by the Scales of
Independent Behavior-Revised (SIB-R) General Maladaptive Index with a t-score of minus 22 or lower (Bruininks et al., 2001). The sample population in this study decreased their General Maladaptive Index by an average of 7.14 scaled points from the start of intervention to the re-evaluation one year later. After one year of intensive behavioral intervention services, 5% (N = 1) of the participants were able to “graduate” from intervention services as per the Idaho Health and Welfare (2004) guidelines.

These findings provide support that intensive behavioral intervention services can be effective when carried out through community agencies, as opposed to when provided within tight experimental conditions. These findings also suggest that intensive behavioral intervention may be more effective for increasing some adaptive behaviors over others. It is unclear as to why intensive behavioral intervention was more effective at increasing some behaviors and not others. It may be that individualized treatment plans utilized in this specific community setting targeted specific skills and behaviors over others. It is also possible that intensive behavioral intervention was just not effective for increasing certain skills or behaviors. For example, lower base rate behaviors may be less amenable to change in one year than higher base rate behaviors that present as more common symptoms of an autism spectrum diagnosis. It should also be noted that the Bonferroni correction is a conservative approach to data analysis and without this correction, more variables in the analyses would have been significant. The small sample size also makes finding significant results less likely.

Adaptive and maladaptive behaviors as a function of treatment intensity

Analysis of changes in adaptive and in problem behaviors as a function of treatment intensity did not provide evidence that treatment intensity, as defined by 15, 20,
and 25 hours per week of intensive behavioral intervention services, was significantly
related to improved behavioral outcomes for children diagnosed with ASDs. None of the
repeated measures ANCOVAs for treatment intensity were significant. Among the zero-
order correlations, only the general maladaptive index was related to the number of weekly intervention hours at time 2. This relation would need to be further explored to have confidence in the results. The National Academy of Sciences National Research Council (Lord & McGee, 2001) suggests a minimum of 25 hours per week of intensive behavioral intervention as a characteristic of an effective intervention program. The sample population involved in this study averaged fewer weekly hours (approximately 20 hours per week) of intensive behavioral intervention than this suggested minimum and none of the participants received the suggested 40 hours of intervention services used in university intervention programs. Only 41% (N = 9) of the participants in this study’s sample received 25 or more weekly intervention hours. However, in partial replications of Lovaas’ original study, which averaged 40 hours per week of intervention services, children with ASDs obtained similar significant results in intellectual achievement and adaptive behavior increases with 15 to 35 hours of weekly intervention (Cohen et al., 2006). In this study, a participants’ weekly intervention hours were confounded with diagnosis and thus not all children received the same intervention hours. Symptom severity may also have presented as a confounding issue in deciding the degree of treatment intensity. Therefore, the ability to detect change in behaviors as related to the number of intervention hours was limited. It may be the case that diagnosis interacts with intervention hours, such that not all children with ASDs require the full 25 or more weekly hours of intervention to be successful.
The Idaho Department of Health and Welfare (2004) allows for up to 30 weekly hours of intensive behavioral intervention for qualifying children with autism spectrum disorders. It is unclear why the sample participants in this study averaged fewer utilized hours ($M = 20.45$) than the maximum allotted hours. It may be the case that community-based intervention programs experience additional problems and greater barriers to providing intervention services as compared to university-based intervention programs. Alternatively, participants who seek treatment from a university-based clinic may be more compliant and committed to treatment than a general community sample.

Green (1996) suggested that children benefit most from intervention services when services are maintained over at least 2 consecutive years. The scope of this study included only assessment of behavioral changes over 1 year of intensive behavioral intervention services. It is assumed to be the case that the sample population in this study would experience further behavioral benefits with 2 years of intensive behavioral intervention services. The Idaho Department of Health and Welfare (2004) allows for up to 3 years of intensive behavioral intervention services to qualifying children with autism spectrum disorders.

**Exploratory hypothesis**

Analysis of the exploratory hypothesis did not provide evidence that that children and adolescents diagnosed with Autistic Disorder, PDD-NOS, and Asperger’s Disorder are distinguishable from one another in their adaptive behaviors and problem behaviors, as defined by the SIB-R results, at both the start and after 1 year of intensive behavioral intervention. However, a significant part of the change in specific domains of adaptive behavior (i.e., social communication and language expression scores) from time 1 to time 2
were explained for by diagnosis. Given that the variance explained was somewhat small, it suggests that differences in the expression of adaptive and problem behaviors across the ASD spectrum may also be small. It is likely that a larger sample size would provide further evidence for differences between ASD diagnoses in regards to adaptive and problem behaviors. Some zero-order relations were present between diagnosis and adaptive behavior at both time 1 and time 2, and thus it may be that adaptive skills rather than problem behaviors distinguish these groups. The debate continues (Lord & McGee, 2001) as to whether or not children “on the autism spectrum” can be meaningfully distinguished from one another and whether these distinctions have clinical relevance in terms of response to treatment.

Limitations

There are several limitations to the current study. Methodologically, the small sample size makes finding significant results less likely and requires that caution be used when generalizing results that are found to be significant. Any significant findings may be sample dependent and thus strictly limited to the independent community-based developmental disability agency population involved in the study. Having a larger sample size may have allowed for further differentiation between levels of intervention intensity as well as further differentiation between ASD diagnoses. Specifically, the sample in the currently study was missing a full range of intervention intensity participants for Pervasive Developmental Disorder (i.e., there was only 1 participant with this diagnosis in the sample and this individual received 20 hours of weekly intervention services).

A second methodological limitation of this study is the use of age-equivalent scores. There are inherent psychometric problems associated with age-equivalent scores
that seriously limit their reliability and validity. Standard scores are a more accurate representation of ability because they are based not only on the mean at a given age level but also on the distribution of scores (Bracken, 1988). Age-equivalent scores were used for adaptive behavior indexes in this study, because only those scores were provided by the community agency. Standard scores were used for problem behavior indexes in this study.

A third limitation of this study is that the average age of the sample population was older than the critical age for initiation of intervention services suggested by the literature (Green, 1996; Lord & McGee, 2001; Schreibman, 2005). Because of the average older age of the sample population, it may be difficult to generalize results to other early intervention settings. The sample population may also have experienced greater difficulties with adaptive behavior acquisition and reductions in problem behaviors due to increased time spent in maladaptive patterns of development. The lower male to female ratio of the sample is also atypical for the ASD population and may create further discrepancies when attempting to generalize the results of this study.

A final limitation to this study is the usefulness of looking at a single adaptive behavior measure, the SIB-R, as the only outcome measure. Intellectual testing is widely utilized in ASD research to investigate intervention effectiveness (Rogers & Vismara, 2008) and future research would benefit from more comprehensive assessment procedures. The SIB-R is a parent-report measure and thus can be subject to reporter bias. Parents and independent disability agencies who are knowledgeable of qualification guidelines for intensive behavioral intervention services may report biased scores in order to obtain outside funding for needed services. To encourage future integrity in practice and research, impartial assessors should be utilized to conduct SIB-R assessments.
Directions for future research

Based on the results and limitations of this study, it appears that future research would benefit from further investigation into the viability of independent community-based intensive behavioral intervention services for children and adolescents diagnosed with ASDs. One area for future research includes further investigation into the effects of treatment intensity on intervention outcome. Because full-time intervention services (e.g., 25-40 hours per week) are expensive, upwards of $60,000 a year, and due to the limited number of intervention professionals, further research into treatment intensity is warranted (Schreibman, 2005).

Future research may also benefit from further investigation into behaviors that may help to distinguish between Autistic Disorder, Asperger’s Disorder and PDD-NOS. This study provided evidence that certain effects of an intervention may be explained by different ASD diagnoses. Further identification of similarities and differences between ASDs may increase our understanding of these disorders as they exist on a continuum. As more is understood about specific behavioral characteristics of ASDs, treatment plans and intervention programs could be better tailored to attend to individual needs with specific implications for educational goals and strategies (Lord & McGee, 2001).

Finally, the effectiveness of an intervention is often evaluated in terms of a program’s ability to create clinically significant change. Clinically significant change, in regards to an intervention, is defined as a statistically reliable magnitude of change and as a return of the individual involved in the intervention to normal functioning (Jacobson, Roberts, Burns, & McGlinchey, 1999). In this study, participants improved their adaptive functioning by approximately 3/4ths of a standard deviation on average. However, it is
unknown if any of the participants experienced reliable clinical change. Assessing reliable clinical change, to determine if changes in adaptive and problem behaviors are in fact meaningful, is an important direction for future research.

Summary

Disability advocates, families, and researchers have supported further studies into effective interventions for autism spectrum disorders (ASDs). Early intensive behavioral intervention has been cited as a standard treatment for increasing adaptive behaviors and for reducing the frequency and intensity of problem behaviors in research-based settings (Newsom & Hovanitz, 2006). Overall, the present study attempted to explore the viability of intensive behavioral intervention, in an independent community-based setting, for children diagnosed with ASDs. Core domains of symptomology associated with impairment in ASDs (APA, 2000) include social interaction, communication, and restricted repetitive and stereotyped patterns of behavior. Characteristics of effective interventions include emphasis on early initiation of intervention services, intensity of intervention services, and utilization of an applied behavioral analysis approach to intervention services (Lord & McGee, 2001).

The state of Idaho currently utilizes independent developmental disability agencies to implement intensive behavioral intervention services for children with ASDs (Department of Health and Welfare, 2004). An independent community-based developmental disability agency in Idaho granted permission to the author of the present study to analyze archival records which contained information regarding behavioral progress after 1 year of intensive behavioral intervention, as measured by the Scales of Independent Behavior-Revised (SIB-R) as well as demographic data such as age, gender,
diagnosis, and treatment variables (e.g., length and intensity of support services) (Bruininks et al., 2001). This study suggests that overall, this particular community-based intervention program is serving its’ mission. Children are improving in some behavioral domains. However, more can be done to better serve this population. The children in this community-based intervention sample were significantly older and received significantly fewer weekly hours of intervention services when compared to children in university-based intervention programs. Given that research indicates that children diagnosed with ASDs benefit most from intervention services when services are initiated prior to 48 months of age (Handleman & Harris, 2000) and when a minimum of 25 weekly intervention hours are provided (Lord & McGee, 2001), more can be done to help children with ASDs achieve these treatment benchmarks.

The present study provided evidence that community-based intensive behavioral intervention can be an effective treatment option for children diagnosed with ASDs. Results of the present study provided information that intervention intensity, as defined by hours per week, is an important clinical issue to be solved. Unfortunately, the present study may not have been able to fully evaluate how treatment intensity affects clinical change independent of diagnosis and baseline behavior. Furthermore, other variables such as ASD diagnosis may merit further exploration in explaining changes in adaptive and problem behaviors. Overall, the present study offers an opportunity to better understand the effects of community-based intensive behavioral intervention on children diagnosed with ASDs.
REFERENCES


Green, G. (1996). Early behavioral intervention for autism: What does research tell us? In C. Maurice, G. Green, & S. Luce (Eds.) *Behavioral Intervention for Young Children with Autism* (pp. 29-44). Austin, TX: Pro-Ed.


