PARENT RATINGS OF THE EFFECTIVENESS OF INCREASING
ADAPTIVE BEHAVIOR AMONG CHILDREN WITH AUTISM
SPECTRUM DISORDERS AT A REMEDIATION SUMMER DAY
CAMP

A DISSERTATION
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Dedication

To my wife, Aireal Jenkins, whose unceasing love and support make me thankful on a daily basis that she is a part of my life.
Abstract

**DISSERTATION**: Parent Ratings of the Effectiveness of Increasing Adaptive Behavior among Children with Autism Spectrum Disorders at a Remediation Summer Day Camp

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The purpose of this study was to examine how participation in an academic and behavioral remediation summer camp impacts broad adaptive behavior in children with autism spectrum disorders. Adaptive behavior was measured by administering the Adaptive Behavior Assessment System, Second Edition (ABAS-II; Harrison & Oakland, 2002) to the parents of a sample of 23 children whose ages ranged from 5 years, 10 months to 11 years, 4 months. Adaptive behavior was assessed prior the beginning of camp and again during the last week of camp. Repeated measures ANOVA and repeated measures MANOVA were conducted to assess whether significant changes in adaptive behavior were observed. Results from these analyses indicated statistically significant changes in adaptive behavior were not observed, but the MANOVA indicated there was a significant interaction between time and gender. Although significant improvement in adaptive behavior was not observed, there also were no significant decreases in adaptive behavior. Additionally, clinical significance was assessed using reliable change indexes (RCI). These analyses suggested most children did not exhibit clinically significant changes in adaptive behavior. Results also were mixed with three children reportedly
exhibiting clinically significant increases and two children reportedly exhibiting clinically significant decreases in adaptive behavior. Suggestions for future research include using a control or comparison group, obtaining larger sample size, using multiple measures of adaptive behavior, and obtaining observations of adaptive behavior from multiple sources.
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Pervasive developmental disorders (PDD) include autistic disorder, Asperger’s disorder, Rett’s disorder, childhood disintegrative disorder (CDD), and pervasive developmental disorder not otherwise specified (PDD-NOS; American Psychiatric Association, 2000). Pervasive developmental disorders are becoming an increasingly predominant category of developmental disorder (Fombonne, 2003b). Indeed, estimations of the current prevalence rate of autistic disorder in the United States is 30-60 per 10,000 children (Centers for Disease Control and Prevention, 2009; Rutter, 2005), and this trajectory indicates that prevalence will continue rise in the future. Concurrently, with an increase of general awareness of PDD, a great amount of research has been conducted on PDD during the past two decades (Volkmar, Lord, Bailey, Schultz, & Klin, 2004; Volkmar, State, & Klin, 2009).

Recent research has indicated that symptoms observed in autistic disorder, Asperger’s disorder, and PDD-NOS occur on a continuum in the normal U.S. population (Constantino & Todd, 2003). Prevalence rates of Rett’s disorder and CDD are much smaller relative to those of the other three PDDs, and there are significant diagnostic differences between the two groups (American Psychiatric Association, 2000). Subsequently, the current study will focus solely on autistic disorder, Asperger’s
disorder, and PDD-NOS. Treatment goals and intensity tend to be similar for each of these disorders (Klin et al., 2007), and they are commonly considered part of a broader autism spectrum disorder (ASD; Fombonne, 2005; Volkmar et al., 2004). Therefore, autistic disorder, Asperger’s disorder, and PDD-NOS will be collectively referred to as ASD throughout the remainder of this manuscript in order to maintain clarity. When referring to these three disorders, Rett’s disorder, and CDD collectively, the acronym PDD will be used.

There is some debate about the diagnostic criteria of autistic disorder, Asperger’s disorder, and PDD-NOS due to the overlap of criteria for each diagnosis (Volkmar, State, & Klin, 2009). Although it is still being debated, proposals for the fifth edition of the Diagnostic and Statistical Manual for Mental Disorder include bringing all of these disorders as well as CDD into one diagnosis because of difficulties in differentiation among the disorders (American Psychiatric Association, 2010). For current clinical use, however, diagnoses of these three disorders utilize diagnostic criteria presented in the Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association, 2000) or the International Classification of Diseases, Tenth Edition (ICD-10; World Health Organization, 1992). The diagnostic criteria common to both of the current manuals include the presence of significant developmental delay occurring before the age of three. The three hallmark categories of delayed development vary depending on the disorder and include reciprocal social interactions, restrictive and repetitive behavior, and communication.


Statement of the Problem

Adaptive Behavior

Adaptive behavior includes the quality an individual’s daily functioning. Specifically, adaptive behavior refers to those behaviors that allow one to function well within one’s various environments (American Association on Mental Retardation [AAMR], 2002; Cohen & Spenciner, 2007). Having strong, well developed, adaptive behavior skills are important for everyone, but it is especially important for individuals with disabilities as these individuals tend to have lower levels of adaptive behavior (Harrison & Boney, 2002). Cognitive disabilities, in particular, tend to create impairment in adaptive behavior (Bruininks, Thurlow, & Gilman, 1987; Klin et al, 2007), and the assessment of adaptive behavior has been utilized in diagnosing a cognitive disability for decades. Indeed, federal law requires the presence of impaired adaptive behavior in order to classify a child to receive special services due to a cognitive disability (U.S. Department of Education, 2004).

Research also has demonstrated children with ASD often have less developed adaptive behavior even compared to cognitively matched peers with other disabilities (Bölte & Poutska, 2002; Gabriels, Ivers, Hill, Agnew, & McNeill, 2007; Klin et al., 2007). Not surprisingly, individuals with ASD typically exhibit less developed behaviors that would allow them to function in social and communication situations (Bölte & Poutska, 2002; Klin et al., 2007). Increasing or improving a child’s adaptive behavior has the potential to improve his or her everyday life both in the present and in the future (Bruininks, et al. 1987). Although research has demonstrated a clear link between ASD and adaptive behavior (Bölte & Poutska, 2002; Gillham, Carter, Volkmar, & Sparrow,
2003; Liss et al., 2001), few studies have investigated methods of improving adaptive behavior in children with ASD.

Although the DSM-IV does not include low adaptive behavior in the diagnostic criteria for autism, adaptive behavior is an indication of one’s daily functioning. Because a diagnosis of ASD ultimately impacts one’s ability to function well in everyday environment (e.g., social skills, self-help skills), improving adaptive behavior may be seen as the ultimate or pragmatic goal of ASD intervention. Furthermore, adaptive behavior must be impaired in order for a child to be classified as having ASD in the schools allowing them to receive the special services they need (U.S. Department of Education, 2004). Research has demonstrated that consideration of adaptive behavior can improve accurate and consistent diagnosis of ASD when used in conjunction with traditional diagnostic measures (Tomanik, Pearson, Loveland, Lane, & Shaw, 2007). Moreover, consideration of adaptive behavior can aid in the differential diagnosis of the various ASD’s (Paul et al., 2004).

Adaptive behavior is very much related to the symptomology of ASD (Bölte & Poutska, 2002; Gillham et al., 2003; Liss et al., 2001) and can be useful in the diagnosis of ASD (Tomanik et al., 2007). Adaptive behavior is important for the daily functioning of all individuals, and research has demonstrated that adaptive behavior is typically low in children with ASD (Bölte & Poutska, 2002; Klin et al., 2007). Given the practical importance of adaptive behavior, it is important to understand the effects of interventions in terms of how they improve adaptive behavior.
Interventions for ASD

Although there are many interventions for children with ASD, applied behavior analysis (ABA) is considered the most widely used and successful intervention, and ABA forms the basis for a number of newer adaptations of the intervention (e.g., positive behavior supports, discrete trial instruction, applied verbal behavior, etc.; Dunlap, Carr, Horner, Zarcone, & Schwartz, 2008; Kates-McElrath, 2006; Koegel & Koegel, 1990; Lovaas, 1987). The primary foundation of ABA focuses on assessment and analysis of behavior and the implementation of an empirically based intervention (Steege, Mace, Perry, & Longenecker, 2007). By analyzing the function of a behavior (i.e., why the behavior occurs) and identifying triggers or precursors of the behavior, psychologists and behavioralists may develop an individual intervention plan intended to alter the environmental factors that enable the behavior or the consequences administered in response to the behavior (Carr et al., 2002; Dunlap, Carr, Horner, Zarcone, & Schwartz, 2008; Horner, Carr, Strain, Todd, & Reed, 2002; Steege et al., 2007).

Part of the ABA’s utility seems to lie in its ability to be applied individually as well as in a variety of situations and settings. The current study aims to observe the effectiveness of ABA techniques in a summer camp setting on enhancing the adaptive behavior of children with autism spectrum disorders.

Summer Programs for Children with ASD

The use of summer programs has been justified as the National Research Council (2001) concluded children with ASD benefit most when interventions are implemented throughout the entire year. As the scholastic summer break also creates a break in interventions, summer programs that utilize interventions designed specifically for
children with ASD would help bridge the intervention gap between spring and fall semesters. Additionally, it is thought that continuing intervention throughout the summer may prevent the loss of previously achieved progress (Brookman et al., 2003). Given the clear need for children with ASD to receive services during the summer and the potential for summer programming to fulfill this need, it is surprising that research regarding the efficacy of these programs is so scarce. Despite this lack of research, the potential for children with ASD to benefit from summer programming may be informed to some extent by the relatively larger research base regarding similar summer programming.

Numerous studies have documented positive effects of summer camps on children with other special needs including medical or physical disabilities (Briery & Rabian, 1999; Goodwin & Staples, 2005; Jelalian, Mehlenbeck, Lloyd-Richardson, Birmaher, & Wing, 2006), behavioral problems (Larson, 2007; Rawson, 1973; Russell, 2003), and psychological problems (Blachman & Hinshaw, 2002; Eikenaes, Gude, & Hoffart, 2006; Heckel, Hursh, & Hiers, 1977; Kean, 2004; Kelley, Coursey, & Selby, 1997; Melnick & Hinshaw, 2000). Due to the relative wealth of research on the benefits of summer programming for special needs populations other than ASD, it would be reasonable to suspect that similar effects of summer programming would occur for children with ASD.

Indeed, the several studies that have investigated the impact of summer programming on children with ASD have indicated summer day camps have strong potential for benefiting children with ASD (Brookman et al., 2003; Hung & Thelander, 1978; Lopata, Thomeer, Volker, & Nida, 2006; Lopata, Thomeer, Volker, Nida, & Lee, 2008; Van Wert & Reitz, 1978). Hung and Thelander (1978) conducted one of the earliest studies regarding the effects of summer programming on children with ASD. The
camp investigated in this study was similar in design to that of the current study in that it included a strong focus on behavior modification techniques using well trained staff and individualized behavior plans. Results found that each child made gains of 15% in at least one targeted behavioral goal were promising.

More recently, a few studies have been conducted which added to Hung and Thelander’s promising results. Brookman and colleagues (2003) investigated the impact of a community summer camp program on the social skills of children with ASD, and they reported anecdotal evidence of improved social integration. Later, Lopata and colleagues (2006; 2008) conducted two studies investigating the impact of summer programming on the social and adaptive skills of children with higher functioning autism, Asperger’s disorder, or PDD-NOS. These studies, which utilized more rigorous methodology, also resulted in significant improvement in social and adaptive skills based on behavior rating scales.

The current study will attempt to expand upon the results of these studies by investigating the efficacy of a summer camp program designed for a broader spectrum of ASD by utilizing a measure designed specifically to assess various domains of adaptive behavior. Indeed, research looking specifically at the effects of interventions on the global adaptive behavior of children with ASD as measured by a standardized measure of adaptive behavior is extremely scarce and none was found in this current review of the literature. Therefore, the goal of this study will be to add to current knowledge regarding the effectiveness of summer programming on improving the adaptive behavior for children with ASD.
Purpose of the Study

As stated above, there is a lack of research investigating the efficacy of summer day camp interventions to improve the adaptive behavior of children with ASD. Consequently, the purpose of the current study is to help fill this research gap by examining the effects of participation in an academic and behavioral remediation summer camp for children with ASD that uses ABA as its fundamental guide to intervention. The current study will measure global adaptive behavior using a standardized measure of adaptive behavior, the Adaptive Behavior Assessment System, Second Edition (ABAS-II; Harrison & Oakland, 2003). The ABAS-II provides standard scores for three general composite categories of adaptive behavior: conceptual, social, and practical. A pretest-posttest comparison group quasi-experimental design will be used to examine the effects of participation in the summer camp. The proposed study will utilize data obtained during the summer of 2009 from the parents of children who participated in the camp.

Research Questions

The primary goal of this study is to examine the effects of participation in the summer camp on the adaptive behavior of children diagnosed with ASD as reported by their parents. The primary research questions are as follows:

1. What were the effects of participation in the summer camp on conceptual adaptive behavior?
2. What were the effects of participation in the summer camp on social adaptive behavior?
3. What were the effects of participation in the summer camp on practical adaptive behavior?
The expectation is the same for all three questions, and it is that children exhibited positive increases in adaptive behavior as a result of the intervention.

**Definition of Terms**

*Autism Spectrum Disorder*

Autism spectrum disorder is a classification term that includes autistic disorder, Asperger’s disorder, and PDD-NOS. The educational community uses this term to classify and provide services to children who are classified with these disorders (U.S. Department of Education, 2004). Also, this term is used throughout the literature to briefly encompass all three disorders (Fombonne, 2005; Volkmar et al., 2004), and the same is true for the current study.

*Autistic Disorder*

Autistic disorder is estimated to affect the development and subsequent functioning of 30-60 per 10,000 children in the U.S. (Centers for Disease Control and Prevention, 2009; Rutter, 2005). The diagnostic criteria of autistic disorder according to the DSM-IV-TR state that an individual must have exhibited a significant delay in normal development prior to the age of three. The three primary areas of developmental delay include impairment in social interaction, impairment in communication abilities, and the presence of restricted repetitive and stereotypical behavior (American Psychiatric Association, 2000).

*Asperger's Disorder*

Research on the prevalence of Asperger’s disorder is limited, but it is estimated to be 2.5 to 2.6 cases per 10,000 children (Fombonne, 2003a; Fombonne, 2005). The diagnostic criteria for Asperger’s Disorder is similar to that of autistic disorder in that the
child must have significant developmental delay in social interaction and significant restricted, repetitive, and stereotyped behavior. Unlike autistic disorder, significant developmental delays in communication do not occur with Asperger’s disorder (American Psychiatric Association, 2000).

**Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS)**

PDD-NOS is a general category of ASD in that it encompasses individuals who exhibit marked developmental delay but do not meet the full criteria for diagnosis of another ASD. Best estimates indicate the prevalence of PDD-NOS in the U.S. is 21 out of 10,000 children (Fombonne, 2005). Individuals who exhibit atypical symptoms of autism also receive this diagnosis. Indeed, atypical autism is included in PDD-NOS (American Psychiatric Association, 2000).

**Adaptive Behavior**

Generally, adaptive skills are those needed to adequately function in everyday life in one’s environment. Adaptive behavior as conceptualized by the ABAS-II spans three composite domains including conceptual, social, and practical adaptive behavior (Harrison & Oakland, 2002). Furthermore, these three composites are broken down into skill areas based on the 10 areas of adaptive functioning delineated by the AAMD (American Association on Mental Retardation, 2002). The conceptual composite includes the three subdomains of communication, functional academics, and self-direction. The social composite includes the two subdomains of social and leisure adaptive behavior. Finally, the practical composite consists of four subdomains including community use, home/school living, health and safety, and self-care.
Examples of conceptual adaptive skills include the abilities to effectively communicate with others in the environment (e.g., speaking in complete sentences to convey a complete thought) as well as academic related activities necessary for independent functioning (e.g., being able to read one’s own name). Examples of social adaptive skills include the ability to interact with others appropriately in social situations (e.g., showing sympathy to others) and to engage in appropriate levels of social reciprocity (e.g., saying thank you when someone does a favor). Examples of practical adaptive skills include independent and daily living skills such as following safety rules or daily routines for hygiene (Harrison & Oakland, 2002).

According to the American Association on Mental Retardation (AAMR), additional considerations should be made when assessing one’s adaptive skills. Among these considerations is that adaptive skills should be considered within an individual’s personal context. For example, one’s standards for adaptive behavior are affected by community and cultural norms as well as group norms within one’s age and disability cohort (AAMR, 2002).

**Significance of the Study**

ASD is a debilitating category of disorders whose prevalence has risen dramatically since its original inception (Fombonne, 2003b). However, much research has been conducted investigating methods of improving the functioning of individuals with ASD. The most researched method is ABA, which has demonstrated effectiveness in improving functioning in a variety of domains. Although interventions such as ABA tend to be effective, they typically are primarily implemented in the child’s school. Consequently, children may not receive ABA interventions during the annual summer
break and may lose skills learned during the school year. This may create the need for summer programs for children with ASD to continue ABA services (Brookman et al., 2003).

Unfortunately, there is limited research regarding the efficacy of summer programs to improve upon, or even maintain, the academic, behavioral, and adaptive gains achieved prior to the summer break. The goal of the current study is to provide additional empirical evidence for the ability of a summer day camp that utilized ABA to improve the adaptive behavior of children with ASD. Research has indicated that adaptive behavior is a significant concern for children in this population, and their ability to independently function within their environments depends on having adequate adaptive behavior (Bölte & Poutska, 2002; Gabriels, Ivers, Hill, Agnew, & McNeill, 2007; Klin et al., 2007). Because of this, children with ASD would greatly benefit from a better understanding of how to best improve this vital facet of normal functioning.

**Basic Assumptions**

The following assumptions will be made by the researcher in this study:

1. Ratings of adaptive behavior were completed in a consistent and honest manner. Also, parents knew the children well enough and were able to observe them sufficiently to give an accurate understanding of their child’s adaptive behavior.
2. Parents completed the measure in the manner instructed by the researcher.
3. Children had reasonably similar experiences during their participation in the summer camp. There was some potential for extraneous experiences to affect the children in ways that may alter the results.
4. Camp counselors will be sufficiently invested in providing the best experience for the children. Also, counselors will ensure treatment fidelity by uniformly adhering to the rules and guidelines set by the summer camp coordinator.

**Basic Limitations**

The following are limitations of this study:

1. Participants were not randomly selected to participate in the program. The sample used consisted of participants who were already attending the summer day camp. Using a convenience sample such as this limits the study’s ability to generalize potential conclusions to individuals with ASD who were not part of the sample. Additionally, this study’s generalizability is further limited by a relatively small number of participants. Under optimum conditions, a sufficiently large sample size would likely account for the individual variations that would occur within the greater population of children with ASD.

2. This study is limited by the lack of a non-treatment or alternative treatment control group. Because of this, it will be difficult to conclude that presence of any significant changes in adaptive behavior was due to characteristics unique to the summer day camp intervention. Without sufficient controls, any conclusions made would lack a degree of specificity needed to state that the treatment used in this study was more effective than no treatment or an alternative treatment.
Chapter II

Review of the Literature

*Introduction*

The objective of this chapter is to provide an overview of the literature pertinent to the proposed study as well as a compelling rationale for conducting it. The chapter will begin with a brief discussion of the history of autism and the theoretical and practical considerations inherent in this disorder. The following sections will feature discussion of the various disorders considered to be part of the autism spectrum as well as their etiology, prevalence and prognoses as best understood by current research. There will then be a section on the research regarding a broad variety of interventions and treatments including those focused on behavior modification, improving social skills, and ameliorating communication delays. Following this will be an in-depth, research-based discussion on the various facets of summer camp interventions for children with ASD as well as children with other special needs.

The remainder of the chapter will be dedicated to the topic of adaptive behavior beginning with its definition and theoretical foundations. The focus will then shift to research on the various ways adaptive behavior is related to ASD and why this relationship is important. Following this will be sections on the history of assessing adaptive behavior and the contemporary issues related to this endeavor. Finally, the
concluding summary will attempt to concisely re-state the literature findings most pertinent to this current study and explain, in context, why the study should be conducted.

Autism Spectrum Disorders

History of Autism

Kanner (1943) initially described the autistic condition as individuals’ “inability to relate themselves in the ordinary way to people and situations from the beginning of life” (p. 242). However, there continued to be much debate about the degree to which autism was related to childhood schizophrenia. Due to similarities of presentation in both disorders in children (e.g. odd behaviors, etc.), it was proposed that autism was merely an early phase of schizophrenia (Bender, 1947). In contrast, Rutter (1972) presented an argument differentiating autism from childhood schizophrenia by comparing age of onset, symptomology, and prognosis. In spite of this debate, or perhaps due to it, autism was not considered an independent disorder until the publication of the Diagnostic and Statistical Manual of Mental Disorders Third Edition (DSM-III; American Psychiatric Association [APA], 1980). However, debate continued regarding the diagnostic criteria of autistic disorder until the publication of the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV; APA, 1994; Volkmar, Klin, & Cohen, 1997). The diagnostic criteria of autistic disorder, as delineated in the DSM-IV, are widely accepted by practitioners today. Now debate has shifted to differentiating autistic disorder from other pervasive developmental disorders (PDDs) such as Asperger’s disorder and pervasive developmental disorder not otherwise specified (PDD-NOS; Matson & Minshawi, 2006; Volkmar, State, & Klin, 2009).
Theoretical and Practical Conceptualization

Symptoms of autistic disorder are divided into three primary categories: impairment in social interaction, impairment in communication, and restricted repetitive and stereotyped patterns of behavior (APA, 2000). In order to be diagnosed with autistic disorder, an individual must meet criteria in each category before the age of three years. Additionally, individuals with autistic disorder often exhibit other symptoms such as low adaptive behavior, and many individuals with autism also are classified with cognitive disabilities (Boisjoli & Matson, 2009). However, autistic disorder manifests differently as evidenced by varying levels of adaptive behavior and cognitive functioning from individual to individual (Bölte & Poutska, 2002; Gabriels, Ivers, Hill, Agnew, & McNeill, 2007; Klin et al., 2007) Although each case of autistic disorder requires the presence of the above mentioned criteria, there is room for variation even within each of the three main symptom categories (APA, 2000).

Impairment in social interaction refers to the difficulty or inability to relate to others using nonverbal behavior (e.g., eye contact, body posture, gestures, etc.), using non-verbal cues to mutually attend to objects or events with others (APA, 2000; Boisjoli & Matson, 2009), or engaging in imitation of others’ actions (Rapin, 1996). Social deficits often include the failure to engage in joint attention or coordinating attention with others to mutually share an interest or an event (Vismara & Lyons, 2007). Individuals with autism also tend to fail to form or maintain developmentally appropriate relationships or to demonstrate desire or interest in engaging in activities of interest to others (APA, 2000). Individuals with both autism and concurrent low cognitive
functioning tend to have more pronounced social skills deficits (Njardvic, Matson, & Cherry, 1999).

Individuals with autism are not likely to develop functional speech relative to normally developing peers (Boisjoli & Matson, 2009; Lord & Rutter, 1994), and it has been suggested in the past that some individuals will never acquire speech in any capacity (Rutter, 1978). Diagnostic criteria within the communication domain include the failure to develop adequate spoken language, impairment in effectively initiating or sustaining conversations, and the use of stereotyped or repetitive verbalizations (APA, 2000).

Previously acquired language skills may regress prior to three years of age (Rutter & Lord, 1987; Volkmar & Cohen, 1988). There has been some evidence that early diagnosis and intervention may be useful in ameliorating deficits in language (Klinger, Dawson, & Renner, 2003).

Language deficits in individuals with autism also take the form of nonverbal communication such as interpreting eye gaze, head nodding, and other forms of body language. Because of this, deficits in communication can overlap with deficits in social skills. Individuals who develop functional verbal language, such as those with higher functioning autism or Asperger’s disorder, may still fail to recognize or consider the social aspects of verbal and nonverbal communication due to deficits within the social domain (Boisjoli & Matson, 2009).

Because children with deficits in expressive language have difficulty communicating their needs or desires, it is hypothesized that they may resort to acting out or having tantrums as an alternate method of communication (Howlin, 1998; Langdon, Carr, Owen-DeSchryver, 2008). More research is needed to determine the veracity of
such a hypothesis which could inform current understanding of the nature of many of the behavioral problems that are common with children with autism.

The third category of diagnostic criteria for autistic disorder is the presence of restricted, repetitive or stereotyped patterns of behavior. Individuals with autism often engage in ritualized body movement or behavior such as body rocking, head banging, hand flapping, twirling, and other self-stimulating behaviors (Boisjoli & Matson, 2009; Harris, 1998). These behaviors are thought to serve the role of sensory input and can occupy a child for extensive lengths of time (Charlop-Christy, Schreibman, Pierce, & Kurtz, 1994). Another manifestation of this diagnostic category is the strong insistence on sameness or routine (Boisjoli & Matson, 2009; Rutter, 1978). Children with autism may become distressed if objects, such as furniture or personal items, are moved or if they are required to break from a regular routine or setting.

The combination of social, communication, and stereotyped or restricted behavior creates a profile that is highly restricted in functioning within daily environments such as school and home. Furthermore, the long-term prospects for individuals diagnosed with an autism spectrum disorder are bleak due to the pervasive and chronic nature of their deficits (Billstedt, Gillberg, & Gillberg, 2005; Howlin, Goode, Hutton, & Rutter, 2004). The three diagnostic domains of PDD vary in terms of presence and severity depending on the specific disorder within the spectrum. This variation of symptomology has ramifications regarding diagnosis as well as treatment.

**Disorders on the Spectrum**

According to the DSM-IV-TR, there are a total of five disorders within the category of pervasive developmental disorders: autistic disorder, Asperger’s disorder,
Rett’s disorder, childhood disintegrative disorder (CDD), and PDD-NOS (APA, 2000). Because of significant differences between Rett’s disorder and CDD and the other three PDDs, (American Psychiatric Association, 2000), this review of the literature will cover only autistic disorder, Asperger’s disorder, and PDD-NOS. Also, these disorders will be referred to as ASD when referring to these three disorders collectively. The rationale for this is that treatment tends to be similar for each of these disorders, and referring to them as a spectrum when appropriate reflects the overlap of diagnostic criteria and debated diagnostic boundaries between them (Klin et al., 2007; Volkmar et al., 2004). Moreover, the vast majority of the studies included in this review also did not included Rett’s disorder or CDD indicating that research of PDD largely focuses on ASD.

Each of the three disorders included in ASD varies according to type and magnitude of presented autistic symptoms. Autistic disorder is often considered the most severe disorder on the spectrum as this diagnosis requires multiple symptoms from all three of the primary diagnostic categories. Indeed, individuals with autistic disorder tend to exhibit more severe deficits in each category (Boisjoli & Matson, 2009). Also, autistic disorder is the disorder that is most likely to exhibit significant cognitive deficits (Badcock & Crespi, 2006; Volkmar et al., 2004).

The PDD-NOS diagnosis is typically given to individuals who do not meet the diagnostic threshold of any other PDD but clearly exhibit autistic symptoms that significantly hinder normal development and functioning (APA, 2000; Tidmarsh & Volkmar, 2003). Because of this, PDD-NOS is often considered a less severe disorder than autistic disorder, although it can be misleading to conceptualize PDD-NOS in this way (Volkmar, State, & Klin, 2009). Due to the loose diagnostic criteria for PDD-NOS, it
potentially covers a wide range of autistic symptoms. Although few studies have been conducted on PDD-NOS (Matson & Boisjoli, 2007) and reliable diagnostic criteria have yet to be established (Towbin, 1997; Volkmar, State, & Klin, 2009), PDD-NOS is the most prevalent of the PDDs (Chakrabarti & Fombonne, 2005).

Asperger’s disorder also is often considered to be less severe than autistic disorder due to the absence of communication deficits, cognitive delays, and deficits of adaptive behavior other than social skills. Indeed, a diagnosis of Asperger’s disorder only requires the presence of symptoms from the social and repetitive/stereotypic behavior domains (APA, 2000). Individuals with Asperger’s disorder often have normal or above average cognitive ability (Boisjoli & Matson, 2009; Volkmar et al., 2004; Volkmar, State, & Klin, 2009). There is currently debate within the field concerning the differentiation between Asperger’s disorder and the other disorders within ASD. High-functioning autism is an unofficial subtype of autistic disorder and it is differentiated from classical autism by the lack of significant cognitive deficits. Because high-functioning autism and Asperger’s disorder both present normal cognitive abilities, there can be confusion in differentiating between the two diagnoses. However, the key difference is individuals with high-functioning autism do exhibit the communication delays required to be considered autistic, whereas individuals with Asperger’s disorder do not experience language or communication delays (Volkmar et al., 2004; Volkmar, State, & Klin, 2009). If individuals diagnosed with Asperger’s disorder do experience impaired communication, it is most likely due to the effects of their social impairment (e.g., failure to consider social context or pragmatics of language; Boisjoli & Matson, 2009).
Due to the lack of diagnostic specificity of the DSM-IV’s categorical model, there is often confusion and diagnostic overlap when differentiating within ASD. Indeed, some researchers propose using dimensional methods of assessment looking at the severity of the symptoms rather than getting bogged down attempting to discern which set of diagnostic criteria best represents an individual (Volkmar, State, & Klin, 2009). Using such a method would allow more accurate assessment of an individual’s profile, and would subsequently aid in providing interventions tailored to the individual’s needs. The dimensional model would look at autistic symptoms on a continuum allowing consideration of diagnostic gray areas as opposed to the black and white method of deciding whether an individual meets certain criteria or not. Research has provided evidence for the use of a dimensional perspective by demonstrating that autistic symptoms do appear to occur on a continuum (Constantino & Todd, 2003).

**Etiology**

The growing body of research on ASD consistently provides strong evidence of a genetic contribution (Badcock & Crespi, 2006; Folstein & Rosen-Sheidley, 2001; Rutter, 2005; Newschaffer et al., 2007; Volker & Lopata, 2008). However, the lack of a 100% concordance rate between monozygotic twins with autism indicates the presence of non-genetic factors (Folstein & Rosen-Sheidley, 2001). Indeed, research has indicated ASD is caused by multiple genetic and non-genetic or environmental factors (Rutter, 2005; Newschaffer et al., 2007). Unfortunately, research has not conclusively identified clear non-genetic causes (Folstein & Rosen-Sheidley, 2001; Rutter, 2005; Newschaffer et al., 2007). Potential non-genetic/environment factors that have been the subject of research include co- or pre-morbid medical conditions such as congenital rubella (Folstein &
Rosen-Sheidley, 2001), pre- or peri-natal complications, being a member of a set of twins, birth order, and post-natal risk factors such as the measles-mumps-rubella vaccine and vaccines containing Thimerosal (Rutter, 2005).

Badcock and Crespi (2006) present a neurological, evolutionary theory called “imprinted brain theory.” According to this theory, humans are the product of paternal and maternal genes. Paternal genes are thought to be the driving force for behaviors including self-focused behavior, systematic or mechanistic thought processes, and the pursuit of basic survival needs. Conversely, maternal genes are thought to be the driving force for behaviors including empathy, pro-social desires and behaviors, and communication abilities (see Badcock & Crespi, 2006 for further discussion of underlying evolutionary processes). Therefore, autistic symptoms are thought to be due to the over-expression of paternal genes, the under-expression of maternal genes, or a combination of both (Badcock & Crespi, 2006). This theory states that the mechanism for the development of autistic symptoms is the same for male and females which is consistent with research demonstrating that ASD has the same genetic roots for males and females (Constantino & Todd, 2003).

Because maternal genes are considered to impact the development of higher-order brain areas such as the frontal lobe, impairment in the expression of maternal genes is more likely to result in communication and cognitive deficits. However, if the maternal genes are intact and the paternal genes are abnormally strengthened, then the individual is more likely to exhibit social and behavioral deficits with relatively intact communication and cognitive abilities (Badcock & Crespi, 2006).
It is important to state that both paternal and maternal genes are co-products of evolutionary processes and both sets of characteristics and behaviors are mutually adaptive to survival and social competency. However, when the balance of paternal and maternal gene expression is offset by inherited or environmentally developed mutation, the influence of paternal genes becomes maladaptive and increases the risk of developing ASD (Badcock & Crespi, 2006).

Although the literature indicates the likelihood of multiple etiologies, with much debate regarding the specifics, the long-term prospects for individuals with ASD are disheartening regardless of root causes. Furthermore, research investigating root causes of ASD also has not adequately explained current prevalence rates.

*Prevalence and Prognosis*

Current estimates for the prevalence of ASD fall within the range of 30-60 per every 10,000 children (Centers for Disease Control and Prevention, 2009; Rutter, 2005; Newschaffer et al., 2007). These estimates are considerably higher than the estimates of 2-5 per 10,000 children made when research regarding ASD was still in its infancy (Folstein & Rosen-Sheidley, 2001). The steep rise in the number of reported cases of ASD has been attributed to more broadly defined diagnostic criteria and changing diagnostic practices. However, these changes are not likely to be responsible for the entire increase in prevalence, and it is safe to assume that there has been an actual increase in the number of ASD cases (Rutter, 2005; Newschaffer et al., 2007). Currently, there is no way to know how much the actual increase in cases has been.

Research has shown autistic symptoms occur on a continuum with the normal population (Constantino & Todd, 2003), and there are genetic influences throughout the
broad spectrum of autistic behaviors even for individuals not diagnosed with ASD (Rutter, 2005). Furthermore, there is evidence that the severity of symptoms of ASD also varies along a continuum (Spiker, Lotspeich, Dimiceli, Myers, & Risch, 2002). Indeed, the fact that autistic symptoms vary in severity between individuals with ASD and normally developing individuals may partially explain the current debate over the distinctiveness of the three primary disorders within ASD (i.e., higher functioning autism versus Asperger’s disorder, PDD-NOS versus autistic disorder and Asperger’s disorder, etc.). That ASD can be conceptualized on a continuum may explain the reported difficulties with differential diagnosis among the three principle disorders within ASD. This also may explain the fact that PDD-NOS has a higher prevalence rate than autistic disorder and Asperger’s disorder as the broad diagnostic range of PDD-NOS occupies a larger portion of the continuum.

Traditionally, ASD has been understood to affect boys at a much higher rate than girls. However, the actual gender ratio is more nuanced. The gender ratio of boys to girls with ASD is 4.3 to 1 (Newschaffer et al., 2007). This ratio fluctuates with differing cognitive abilities. When there are no cognitive delays, the ratio is 5.5 to 1, and when there are cognitive delays, the ratio is 2 to 1 (Newschaffer et al., 2007). In diagnostic terms, boys have a higher prevalence of higher functioning autism and Asperger’s disorder whereas the prevalence of more severe or classic autistic disorder is more equal across gender (Badcock & Crespi, 2006).

According to the imprinted brain theory, the expression of autistic symptoms is thought to be caused by varying expression from male versus female dominant genes. Essentially, higher functioning autism and Asperger’s disorder are thought to be caused
by the over-expression of paternal genes along with normally expressed maternal genes. Autistic disorder in its more classic form is thought to be caused by a deficit in maternal gene expression accompanied by normal or over-expressed paternal genes. Because boys are pre-disposed to the strong development of paternal genes, they are more at risk of those paternal genes being over-expressed and are thus more likely to develop Asperger’s disorder or higher functioning autism (Badcock & Crespi, 2006).

The long-term prognosis for individuals with ASD is generally considered to be dismal as the majority of adults with ASD tend to have poor outcomes in general functioning and remain dependent on others throughout life (Billstedt, Gillberg, & Gillberg, 2005; Howlin et al., 2004). Many of these individuals require constant supervision and demonstrate a lack of awareness of their psychology difficulties as adults (Billstedt, Gillberg, & Gillberg, 2007). Howlin and colleagues found adults with ASD had few friends and many did not have permanent employment. Studies also have shown problems related to social interaction and sensory issues persist into adulthood and the presence of communication and stereotypic/repetitive behavior is more variable in adulthood (Billstedt, Gillberg, & Gillberg, 2007; Howling et al., 2004).

However, some studies have indicated more positive potential long-term outcomes for individuals with ASD (Seltzer, Krauss, Shattuck, Orsmond, Swe, & Lord, 2003), and predictors of more positive long-term outcomes include earlier development of communication and higher cognitive abilities (Billstedt, Gillberg, & Gillberg, 2005; Billstedt, Gillberg, & Gillberg, 2007). Specifically, Seltzer and colleagues found that only 54% of their sample of adolescents and adults with previous diagnoses of ASD would have met the requirement of diagnosis at the time of the study. Unfortunately,
methodological weaknesses reduced the ability of those findings to generalize to the greater population of individuals with ASD. Currently, the preponderance of research indicates that the majority of individuals diagnosed with ASD can be expected to experience significant difficulties related to their disorder throughout life.

Interventions and Treatment for Autism Spectrum Disorder

Much research has been conducted since Kanner’s (1943) original conception of autistic disorder in regard to the intervention and treatment for individuals with ASD. As the target symptoms vary along with the diagnostic considerations for each disorder, the wide range of available treatments also vary according to specific symptoms. What follows is a brief description of current knowledge and implementation of treatments and interventions for individuals with ASD.

Behavioral Problems. Prior to the 1960s, many held the belief that autistic disorder was untreatable. However, researchers during this period of time began experimenting with applying principles of behavioral psychology, such as applied behavior analysis (ABA), with some degree of success (Weiss, Fiske, & Ferraioli, 2009). Many studies have documented the positive effects of ABA across a variety of populations and symptomologies. Steege, Mace, Perry, and Longenecker (2007) described the goals of ABA specific to ASD to include:

(a) to teach new skills (e.g., systematic instruction and reinforcement procedures to teach functional life skills, communication skills, or social skills), (b) to reinforce and maintain previously acquired skills, (c) to generalize behavior from one situation to another (e.g., teaching and transferring social skills to natural settings), (d) to restrict or narrow conditions under which interfering behaviors
occur (e.g., modifying the learning environment; antecedent modification), and (e) to reduce interfering behaviors by discontinuing their reinforcement and reinforcing competent replacement behaviors. (pp. 92-93)

The two primary components of ABA include comprehensive assessment of the target behavior and an empirically based intervention chosen or developed based upon information obtained from the assessment. Furthermore, the assessment process takes place throughout the entire application of ABA. Assessment is first used to obtain information about the target behavior, and assessment continues throughout the intervention to monitor the efficacy of the intervention (Steege et al., 2007).

A primary focus of assessment in ABA is to identify antecedents or precursors to the target behavior. Antecedents can be thought of as triggers or predictors of the target behavior and can include a range of things such as other behaviors, situational factors, or specific stimuli. It has been documented that, by altering a problem behavior’s antecedent, the intervention can effectively reduce the occurrence of the problem behavior. Therefore, interventions in ABA tend to focus on preventing the problem behavior from occurring by attempting to change or alleviate the antecedents identified during assessment (Carr & Durand, 1985; Carr et al., 2002; Dunlap, Carr, Horner, Zarcone, & Schwartz, 2008; Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991; Horner, 2000; Horner, Carr, Strain, Todd, & Reed, 2002; Johnston, Foxx, Jacobson, Green, & Mulick, 2006).

A recent study documented how problem behaviors are reliably preceded by precursor behaviors or other signals (Langdon, Carr, & Owen-DeSchryver, 2008). In this study, it was concluded that precursor behaviors were predictors of problem behavior
rather than the cause. In other words, children with autism may engage in relatively innocuous behavior that actually serves as a form of communication of the child’s desires or needs. It was hypothesized that problem behaviors arise when this form of communication is not understood and the child’s wishes are not fulfilled. Through analysis of precursor behaviors, the interventionist can learn what the child is attempting to communicate via those precursor behaviors. Langdon and colleagues were successful in reducing problem behaviors by rewarding alternative, normal communication of their desires or needs rather than the use of precursor behaviors.

That problem behaviors serve the function of obtaining certain desires or needs is in line with other studies investigating the functional role of problem behaviors (Asmus, Wacker, Harding, Berg, Derby, & Kocis, 1999; Day, Horner, & O’Neill, 1994). Functional analysis of behavior is necessary to understand why the behavior is taking place. Through proper assessment, one can discern the function of the behavior as well as how the behavior is reinforced. Both pieces of information are essential in choosing and implementing the appropriate intervention.

Another key component to ABA assessment and intervention is the implementation of consequences for behavior. Classic behavior modification principles such as reinforcement and punishment must be considered. In regards to assessment, it is critical to determine how problematic behaviors are reinforced. In general, behaviors are not reoccurring unless they are being reinforced. Intervention could entail punishment strategies to decrease the occurrence of the problem behavior, redirection of reinforcement to encourage positive behaviors, or a combination of both strategies implemented simultaneously.
Another method of behavior modification that has origins in ABA is positive behavior support (PBS). There is debate about the relationship between ABA and PBS and whether ABA is threatened by the growing popularity of PBS (Dunlap et al., 2008; Johnston et al., 2006). Proponents of PBS claim that it can be considered to be an “evolution” of ABA in that it originated in the behavioral principles of ABA (Dunlap et al., 2008, p. 691). A key distinguishing concept of PBS is its emphasis on improving individuals’ quality of life in addition to decreasing problem behavior. Focal points of PBS intervention include changing environmental or situational factors that promote the problem behavior, social validity (i.e., how well the intervention is received by caretakers, practicality, etc.), ecological validity (i.e., the ability of the intervention to make noticeable changes in the natural or real-life setting), and generalization of behavior across environments and situations (Carr et al., 2002; Dunlap et al., 2008).

According to Dunlap and colleagues (2008), the primary emphases of PBS are on social and ecological validity. Indeed, proponents of PBS hold that an in-depth analysis and empirically founded intervention will be significantly limited if the individuals in the child’s life do not involve themselves with the intervention or if the intervention is not practical or feasible. By tailoring the intervention to the child’s environment and to the needs and limitations of the individuals who will be responsible for maintaining the intervention, PBS can be a useful means to ensure that behavioral modification will translate into lasting change (Dunlap et al., 2008).

Some researchers presented concerns about the popularity of PBS due to its relative lack of emphasis on empiricism (Johnston et al., 2006). Specifically, Johnston and colleagues stated that the PBS movement “has been driven more by ideological and
marketing interests than by research findings and professional considerations” (p. 69).

Johnston and colleagues also took issue with the tendency of PBS to focus on antecedents of behavior while ignoring consequences, which they claimed were critical in any attempt of behavior modification.

Although the debate is heated at points, some researchers view PBS as having more in common with ABA than they do differences (Tincani, 2007). It has been suggested that most differences between PBS and ABA are “a matter of degree or levels of emphases” (Dunlap et al., 2008, p. 692). Indeed, there is always a balance to be struck between external and internal validity when choosing interventions. A conscientious psychologist or behavioralist would take efforts to maximize both types of validity and attempt to choose an empirically founded intervention that has a strong likelihood of being received and implemented within the child’s natural setting.

**Social Skills.** Interventions intended to improve social skills are particularly salient to children with ASD. As a lack of effective social interaction or relationship building and maintenance is a hallmark of autism related disorders, it is important for children with ASD to receive well researched and effective social skills interventions.

Scattone (2007) reviewed a variety of social skills interventions that have been well documented by research. This review included video modeling, priming, self-monitoring or self-management, script fading, social stories, and pivotal response training. Some research has called into question the efficacy of many social skills interventions for children with ASD (Bellini, Peters, Benner, & Hopf, 2007). In their meta-analytic review, Bellini and colleagues concluded that most of the 55 reviewed social skills interventions were only minimally effective. However, given the significant
deficits in social skills with children with ASD, even minor improvements may have a significant impact on their daily functioning. Also, some measures that may be taken to improve the efficacy of social skills interventions include increasing the intensity of the intervention, ensuring the ecological validity of the intervention, tailoring the intervention to specific individual needs, and maximizing treatment plan fidelity (Gresham, Sugai, & Horner, 2001).

The remainder of this section on social skills interventions will focus on providing a brief overview of various research-supported interventions including video modeling, self-monitoring, priming, script-fading, social stories, and pivotal response training. Each of these strategies may be more or less appropriate depending on the characteristics of the individual targeted, variations in settings, the training or expertise of the individual implementing the intervention, and the desired goals to be achieved by the intervention (Gresham, Sugai, & Horner, 2001).

Video modeling has been shown to be effective at improving various social skills of children with ASD (Charlop-Christy & Daneshvar, 2003; Charlop-Christy, Le, & Freeman, 2000; Nikopoulos & Keenan, 2004; Scattone, 2007; Taylor, Levin, & Jasper, 1999). Studies involving video modeling have demonstrated increased perspective taking with relatively good generalization (Charlop-Christy & Daneshvar, 2003; Charlop-Christy, Le, & Freeman, 2000). Additionally, these studies indicated that video modeling was more effective than live modeling. Reasoning for this included the inherent acceptability of television based interventions in this population and children’s affinity towards objects rather than people (Charlop-Christy, Le, & Freeman, 2000).
The methods of self-monitoring have a strong history of empirical research and have been shown to be effective with children with autism. Koegel and Koegel (1990) noted that the main benefits of self-monitoring is that it can be implemented for long periods of time without the presence of the clinician and that it can be adapted for use across a variety of settings which could increase generalization. Children using this method have been able to significantly decrease stereotypic behaviors and maintain those improvements long after the study completed (Koegel & Koegel, 1990). Research also has shown that self-monitoring and peer-monitoring (e.g., normally developing peers monitor child with autism) of social behaviors were both effective in improving social skills (Morrison, Kamps, Garcia, & Parker, 2001). This was attributed to the fact that, in both methods, the child with ASD was reinforced for improving behavior.

Priming is the act of preparing an individual with ASD in advance of an aversive situation or occurrence (Scattone, 2007). By allowing children to predict an upcoming social situation, they may be less likely to react negatively. Furthermore, pre-teaching may be used to review behaviors the child has learned and how to implement them in the upcoming social situation (Licciardello, Harchik, & Luiselli, 2008). Licciardello and colleagues were successful in using priming and pre-teaching in a naturalistic method to increase social initiations and responses by children with ASD. Moreover, these authors reported heightened levels of social and ecological validity.

Script-fading essentially teaches children with ASD how to act in given social situations by eventually fading out details of the script. Studies have demonstrated the efficacy of fading social scripts from end to beginning and have documented that, as the script was faded, children increasingly demonstrated both scripted and non-scripted
behaviors (Krantz & McClannahan, 1993; Krantz & McClannahan, 1998). Indeed, the increase in non-scripted behaviors demonstrated the technique’s ability to generalize improvement within these studies.

Social stories are common and popular social interventions that utilize elaborate stories about how the child could effectively interact within their social environments. Other children also could be the subject of social stories when the goal is to promote perspective taking. Social stories are typically created on an individual basis based on each child’s needs (Crozier & Tincani, 2007). General guidelines for creating social stories include using a variety of sentences such as descriptive sentences (describing the situation), perspective sentences (providing what others are thinking), affirmative sentences (reassuring the child of normality and positive outcomes), directive sentences (describing what should be done), control sentences (giving analogies), and cooperative sentences (identifying who can help; Crozier & Tincani, 2007). Delano and Snell (2006) suggested social stories should focus on describing the situation as much as they focus on what should be done in the situation. Crozier and Tincani went further by suggesting that, for every directive sentence, 3-5 sentences of other types should be used. Studies implementing social stories have documented improvements in specific targeted skills as well as good social validity (Crozier & Tincani, 2007; Delano & Snell, 2006). However, these studies also raised some concerns relating to the interventions’ ability to generalize results to other situations or settings.

Pivotal response training (PRT) is an attempt to use motivational factors to teach children key skills or behaviors that are critical parts of more complex or generalized behavior (Scattone, 2007; Vismara & Lyons, 2007). A key goal in PRT is to increase
motivation for engaging in pivotal behaviors and for these behaviors to generalize to other settings (Scattone, 2007). This method utilizes the child’s natural interests as reinforcers, reinforces performances and attempts of target behavior, and promotes the use of a mix of target behaviors including behaviors with which the child is already proficient (Vismara & Lyons, 2007). By using this methodology, children are gradually taught to engage in target behaviors more often as well as experience increased motivation for those behaviors because of the inherently desired reinforcer. A recent study effectively used the perseverative interests common to individuals with ASD to increase joint attention behaviors (Vismara & Lyons, 2007). By presenting stimuli related to these children’s perseverative interests, the authors were able to increase joint attention behavior. Furthermore, they found that the children’s joint attention behavior generalized to stimuli that were unrelated to their perseverative interests. Additionally, other studies have demonstrated the efficacy of this technique being taught to parents in communities of diverse ethnicities (Baker-Ericzen et al., 2007).

Interventions utilizing ABA and PBS also can be used to increase positive social skills in much the same way those techniques are used to decrease problematic behavior. Brookman and colleagues (2003) were able to successfully integrate eight children with ASD into an inclusive summer camp with normally developing peers. The implemented treatment plan also made use of priming, self-management, and peer involvement to improve the children’s interactions with their peers (Brookman et al., 2003). Although this study only provided qualitative evidence of the intervention’s efficacy, it presents a promising method of intervention utilizing a variety of research based strategies.
**Communication Skills.** Behavioral principles also can be used to improve communication skills. Interventions utilizing time delay to improve communication skills have been shown to be effective (Charlop & Walsh, 1986; Charlop-Christy & Carpenter, 2000). In one study demonstrating the effectiveness of time delay, researchers instructed parents in the use of time delay as well as modeling techniques before giving reinforcers (Charlop-Christy & Carpenter, 2000). In this study, parents were told to wait 10 seconds after a child inappropriately indicated a need or desire. After 10 seconds, the parent modeled the correct method of communicating the need or desire and gave the child what they wanted. Eventually, the child learned to do what was required before the 10 seconds had elapsed. Results from this study indicated not only good skill acquisition but also powerful generalization across settings (Charlop-Christy & Carpenter, 2000).

The interesting aspect of the time delay technique is that it is essentially a modification of prompting, or more accurately, using delay of reinforcement as the prompt. It also utilizes self-monitoring as the parent says nothing for 10 seconds, and the child has to figure out why their communication is ineffective. In this way, the good generalization of this method is in line with that of the self-monitoring method. However, one would expect that this method may be less effective for children with lower reasoning skills or poor impulse control.

After reviewing the literature regarding interventions for children with ASD, it seems apparent that the best intervention program would utilize multiple aspects from the various interventions. Indeed, many of the techniques would complement one another quite well and increase the potential for effectiveness. Moreover, research has indicated early and intensive intervention is more effective in obtaining treatment goals. Taken
together, these findings support the use of early, intensive intervention programs that use multiple treatment modalities including behavioral intervention techniques. One such method of intensive and comprehensive intervention is the use of day camp programs that are often offered during the summer break of an academic year.

*Summer Programs for Individuals with Special Needs*

Although there are relatively few studies investigating the impact of summer programming on individuals with ASD, there is a healthy body of research regarding summer programming and individuals with a broader range of special needs. Summer programming has had positive effects on children with various needs due to a physical condition such as cerebral palsy (Goodwin & Staples, 2005), asthma, diabetes, spina bifida (Briery & Rabian, 1999) and obesity (Jelalian, Mehlenbeck, Lloyd-Richardson, Birmaher, & Wing, 2006). Reported benefits for these populations included increased sense of independence, reduced feelings of isolation (Goodwin & Staples, 2005), improved attitudes toward illness, reduced levels of anxiety (Briery & Rabian, 1999), as well as progress towards treatment or behavioral goals (Jelalian, Mehlenbeck, Lloyd-Richardson, Birmaher, & Wing, 2006).

Special needs as a result of psychological or psychiatric problems also have been well-served by summer programming. Studies have shown similar effectiveness of summer programming in helping children with attention-deficit/hyperactivity disorder (ADHD; Blachman & Hinshaw, 2002; Kean, 2004; Melnick & Hinshaw, 2000), avoidant personality disorder (Eikenaes, Gude, & Hoffart, 2006), behavior problems (Larson, 2007; Russell, 2003), as well as groups of children consisting of general mental health needs (Heckel, Hursh, & Hiers, 1977; Kelley, Coursey, & Selby, 1997).
The importance of a large body of research that supports the use of summer programming as interventions for individuals with special needs other than ASD is that it allows a conservative degree of extrapolation regarding the potential for similar summer programming to be effective with ASD populations. The fact that children with such a broad range of special needs are consistently reported to benefit from summer programming is a valid reason to expect children with ASD would benefit as well.

One concern for all children, and is especially a concern for children with autism, is the risk of losing academic and behavioral progress achieved during the course of a school year due to lack of service provided during the summer break (Brookman et al., 2003; Van Wert & Reitz, 1978). Moreover, children with ASD respond to intervention most favorably when the intervention is conducted 25 hours per week, 5 days per week, and 12 months per year (National Research Council, 2001). It would be no stretch to state that children with ASD would very likely benefit from participating in an effective summer program designed to meet these specific needs, and further research that supports the efficacy of summer programs would undoubtedly be of great service to children with ASD.

Additional rationale for investigating the impact of summer programming on children with ASD comes in the form of the handful of publications/studies that have already made strides in answering this question (Brookman et al., 2003; Hung & Thelander, 1978; Lopata, Thomeer, Volker, & Nida, 2006; Lopata, Thomeer, Volker, Nida, & Lee, 2008; Van Wert & Reitz, 1978). According to this research, summer programs for children with ASD typically take the form of a summer day camp in which children are dropped off at camp in the morning and picked up to go home in the
afternoon (Brookman et al., 2003; Mangan, 2007; Lopata et al., 2006; Lopata et al., 2008).

Studies have indicated that summer programs for children with ASD consist of many characteristics that improve those programs’ ability to be beneficial. Summer programs typically target social skills and other adaptive behavior (Brookman et al., 2003; Lopata et al., 2006; Lopata et al., 2008; Mangan, 2007; Van Wert & Reitz, 1978), utilize behavioral interventions such as ABA or PBS (Brookman et al., 2003; Hung, 1977; Hung & Thelander, 1978; Mangan, 2007; Van Wert & Reitz, 1978), plan a combination of small group and large group activities (Mangan, 2007), provide a high counselor to child ratio (Brookman et al., 2003; Hung & Thelander, 1978; Mangan, 2007; Van Wert & Reitz, 1978), and provide an individualized behavior plan for each child that is updated throughout the program (Brookman et al., 2003; Hung & Thelander, 1978; Mangan, 2007; Van Wert & Reitz, 1978).

Studies have demonstrated children with ASD may benefit both from programs that include the children with a cohort of normally developing peers (Brookman et al., 2003; Goodwin & Staples, 2005) as well as programs that only enroll children with ASD (Hung, 1977; Hung & Thelander, 1978; Lopata et al., 2006; Lopata et al., 2008; Van Wert & Reitz, 1978).

Studies have shown that children with disabilities experience benefits outside of those expected including increased potential for independence, feelings of universality, and increased self-confidence in light of discovery of own abilities (Goodwin & Staples, 2005) due to participating in a summer camp. Although prior research has demonstrated summer camps can be effective at maintaining behavioral and academic skills during the
summer months, there is limited research on the effectiveness of summer camps with children with ASD.

Although there appears to be a lack of empirical research offering strong evidence of the utility of summer day camps, the previously reviewed literature clearly indicates a strong potential for effectiveness. Due to this potential and the co-current lack of empirical research, this type of intervention for children with ASD stands to benefit from additional research. The goal of the current study is to provide additional information regarding the use of a summer day camp for the treatment of children with ASD.

**Adaptive Behavior**

*Definition and Theoretical Foundations*

There is some debate about the definition of adaptive behavior as well as its counterpart, maladaptive behavior (Cohen & Spenciner, 2007). Broadly speaking, adaptive behavior is typically considered to be those behaviors that allow an individual to function effectively in his or her daily environments (American Association on Mental Retardation [AAMR], 2002; Cohen & Spenciner, 2007). Another definition is adaptive behavior is one’s ability to translate cognitive abilities into effective functioning in one’s environment (Klin et al., 2007). The AAMR (1992) presented ten areas of adaptive skills: communication, community use, functional academics, home/school living, health and safety, leisure, self-care, self-direction, social, and work. More recently, these areas of adaptive behavior have been conceptualized as comprising three main clusters: conceptual, social, and practical (AAMR, 2002; Harrison & Oakland, 2003; Sparrow, Cicchetti, & Balls, 2005).
Adaptive behavior in the conceptual domain consists of effective communication, basic academic skills, following schedules, following directions, and following planned activities. Social adaptive behavior consists of engaging in recreational activities, positive interactions with others, and building and maintaining relationships. Practical adaptive behaviors include effective use of community resources, performing necessary chores and activities at home, following proper safety protocol, and maintaining proper hygiene (AAMR, 2002; Harrison & Oakland, 2003).

Maladaptive behaviors are considered to be those behaviors that cause the individual to ineffectively function in his or her environments (Bruininks, Thurlow, & Gilman, 1987). These behaviors also can be referred to as problem behaviors, and they may include “bed wetting, unusual physical aggressiveness, poor attention, impulsivity, self-injurious behaviors, rocking back and forth repetitively, and poor eye contact” (Cohen & Spenciner, 2007, p. 300). When maladaptive behaviors are present, they tend to be targeted for intervention. However, research has shown that maladaptive behavior is not correlated with adaptive behavior (Klin et al., 2007). Consequently, interventions may be successful in curtailing maladaptive behavior while leaving adaptive behavior unchanged. Therefore, it is recommended that interventions target the increase of adaptive behaviors as well as the decrease of maladaptive behavior (Klin et al., 2007). By taking the perspective that assessing adaptive behavior can elucidate a child’s strengths and weaknesses regarding everyday living, the psychologist can use such information to better design treatment plans specific to individual needs (Klin et al, 2007).

Historically, adaptive behavior has been intricately associated with cognitive ability, and this link has only strengthened over time (Bruininks, Thurlow, & Gilman,
1987; Klin et al., 2007). Indeed current diagnostic laws require assessment of adaptive behaviors before diagnosing individuals with a cognitive disability with the purpose of receiving special education services (Bruinink et al., 1987; Indiana State Board of Education, 2008; U.S. Department of Education, 2004). Additionally, the inclusion of assessment of adaptive behavior of individuals with cognitive deficits can have practical benefits in regard to intervention planning due to the fact that adaptive behavior is much more malleable and modifiable than cognitive abilities (Harrison, 1987). It also has been suggested that psychologists broaden their conceptualization of the utility of adaptive behavior measures for all children with disabilities (Harrison & Boney, 2002) such as ASD.

*Adaptive Behavior and Autism Spectrum Disorder*

As is the case for the diagnosis of a cognitive disability, adaptive behavior must be assessed before a child can be diagnosed with an ASD in the state of Indiana (Indiana State Board of Education, 2008), and similar requirements are in place throughout the United States (U.S. Department of Education, 2004). Not only is the assessment of adaptive behavior required in determining the diagnosis of ASD, but information obtained from such an assessment can indicate specific areas of adaptive functioning that are impaired (Harrison & Boney, 2002).

The general consensus in the literature is that individuals with ASD have lower adaptive behavior than their cognitive abilities would predict (Bölte & Poutska, 2002; Gabriels et al., 2007; Klin et al., 2007), although the gap between adaptive behavior and cognitive abilities is smaller with individuals with lower cognitive abilities (Bölte & Poutska, 2002). Research also has demonstrated that adaptive behavior is typically lower
in individuals with ASD relative to cognitively matched peers who have disabilities other than ASD (Bölte & Poutska, 2002; Carpentieri & Morgan, 1996; Liss et al., 2001; Stone, Ousely, Hepburn, Hogan, & Brown, 1999; Vig & Jedrysek, 1995; Volkmar et al., 1987). Moreover, children with ASD exhibit more variation within their adaptive profiles, whereas children with cognitive disabilities tend to have more stable adaptive profiles (Carter et al., 1998).

It also appears that adaptive behavior varies according to cognitive ability (Bölte & Poutska, 2002; Gabriels et al., 2007). Specifically, high functioning individuals with ASD tend to have better communication skills whereas low functioning individuals with ASD tend to have better daily living skills (Bölte & Poutska, 2002; Gabriels et al., 2007; Lee & Park, 2007). Generally speaking, however, socialization and communication adaptive skills are more of a concern for individuals with ASD than are daily living skills (Bölte & Poutska, 2002; Klin et al., 2007). Given that the symptoms of ASD consist of deficits in communication and socialization, it is unsurprising that research has shown that individuals with ASD demonstrate weaknesses in these adaptive areas. Autistic symptoms and behavioral problems also have been found to be negatively related to adaptive behavior, and low levels of adaptive behavior can cause individuals with ASD to not achieve at the level of their cognitive abilities (de Bildt, Sytema, Kraijer, Sparrow, & Minderaa, 2005).

There has been some variation within the literature regarding the developmental course of adaptive behavior with individuals with ASD. The general consensus is that adaptive behavior decreases with time (Fisch, Simensen, & Schroer, 2002; Gabriels et al., 2007; Klin et al., 2007). However, other research has documented an increase of adaptive
behavior (Freeman, Del'Homme, Guthrie, & Zhang, 1999; Goin-Kochel, Myers, Hendricks, Carr, & Wiley, 2007). One explanatory factor may be the finding of Gabriels and colleagues that the adaptive behaviors of individuals with ASD decreased based on the standard scores of adaptive measure whereas the raw scores on the measures increased. This indicated that, although individuals with ASD do make improvements in adaptive behavior over time, they do not do so at the same rate as their normally developing peers (Gabriels et al., 2007). Additionally, Goin-Kochel and colleagues attributed the increase of adaptive behavior in their study to the effects of early intensive intervention. Therefore, it may be the case that adaptive behavior develops as a function of the onset and intensity of intervention. However, it should be noted that in their study, Goin-Kochel and colleagues observed varying improvements in adaptive behavior based on cognitive ability. Consequently, it is difficult to state with confidence how adaptive behavior develops across time with individuals with ASD due to individual variations.

Given the debate concerning the sometimes subtle differences between the three disorders within ASD, research has investigated the role of additional constructs, such as adaptive behavior, in promoting more accurate diagnoses. Tomanik and colleagues (2007) found that including measures of adaptive behavior with traditional autism assessments can improve the accuracy of diagnoses of ASD. Assessment of adaptive behavior also has been found to be useful in distinguishing among the three disorders within ASD (Gillham, Carter, Volkmar, & Sparrow, 2000; Paul et al, 2004) with social adaptive behavior accounting for the most variance among the disorders comprising ASD.
Assessment of Adaptive Behavior

Because adaptive behavior can prove very useful in the accurate diagnosis and treatment of ASD, it is equally important that practitioners use appropriate, valid and reliable measures of adaptive behavior. Unfortunately, due to the discrepancy of the way many researchers define adaptive behavior, individual assessments of adaptive behavior may differ in how specific adaptive behaviors are assessed (Cohen & Spenciner, 2007) and interpreted.

When assessing individuals for adaptive behavior, psychologists are encouraged to consider “(a) the requirements in a person’s specific environments; (b) the developmental expectations for the person’s age group; (c) the person’s cultural and linguistic characteristics, communication skills, and problem behaviors; and (d) the supports and interventions that are needed to improve the person’s functioning” (Harrison & Boney, 2002, p.1168). Only by taking into consideration these factors can the psychologist obtain a true understanding of one’s adaptive functioning and how to go about improving it.

According to Cone (1987), measures of adaptive behavior optimally should have certain qualities that improve their validity. Adaptive measures should be relevant to all possible environments, be comprehensive of all behaviors within each possible environment, be specific enough to inform decisions regarding whether intervention is necessary, and be useful in designing the scope and content of interventions when necessary (Cone, 1987).

The predominant method of assessing adaptive behavior is the use of objective measures that are usually completed by third parties familiar with the client (Cone, 1987;
Harrison & Oakland, 2003; Sparrow, Cicchetti, & Balla, 2006). Objective measures of adaptive behavior can be useful for diagnosis of disabilities, identification of strengths and weaknesses, identifying individual needs, informing intervention programming, and for research studies of adaptive behavior (Harrison & Oakland, 2003; Sparrow, Cicchetti, & Balla, 2006).

However, there are limitations with the objective, third person perspective method of assessment. For example, these assessments rely on indirect reports of the individual being assessed, and these reports may therefore be subject to a lack of in depth knowledge of the client or intentional and unintentional biases (Cone, 1987; Oakland & Houchins, 1985; Sparrow, Cicchetti, & Balla, 2006). There also is some danger of cultural biases due to variations in what constitutes adaptive behavior across cultures (Richardson & Burns, 2005). Due to these limitations, it was recommended that interventions not be designed based solely on objective assessments of adaptive behavior, but instead to incorporate information from additional sources such as direct observations (Cone, 1987). Efforts also should be made to consider an individual’s strengths as well as weaknesses. Strength-based assessment of the adaptive behavior of children with ASD is considered to go beyond mere remediation of problem behaviors and to improve quality of life (Cosden, Koegel, Koegel, Greenwell, & Klein, 2006).

**History of Adaptive Behavior Assessment.** One of the first objective measures of adaptive behavior was the Vineland Social Maturity Scale (VSMS; Doll, 1965). Edgar Doll viewed the development of adaptive behavior along three dimensions: dependence versus independence, irresponsibility versus responsibility, and incompetence versus competence (as cited in Oakland & Houchins, 1985). The VSMS, as well as subsequent
versions of adaptive measures, was more or less based on these dimensions (Oakland & Houchin, 1985). Shortly after, the AAMD Adaptive Behavior Scale (Nihira, Foster, Shellhaas, & Leland, 1974) was developed and became one of the most widely used assessments of adaptive behavior (Cone, 1987).

The VSMS was later revised to become the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984) due to concerns about outdated norms and lack of standardization for both the VSMS and the AAMD ABS (Oakland & Houchins, 1985). Subsequent research on the VABS indicated its usefulness in assessing the adaptive behavior of individuals with a variety of disabilities including cognitive disabilities (de Bildt, Kraijer, Sytema, & Minderaa, 2005) and ASD (Carter et al., 1998). The VABS recently was revised with updated procedures, content, and norms (Sparrow, Cicchetti, & Balla, 2006), and it remains one of the most widely used measures of adaptive behavior.

The most recent new measure of adaptive behavior is the Adaptive Behavior Assessment System which was based on much of the same theory of adaptive behavior that was the basis for the VABS and earlier measures (Harrison & Oakland, 2003).

*Adaptive Behavior Assessment System.* The Adaptive Behavior Assessment System (ABAS) was originally published in 2000, and it assessed the ten areas of adaptive behavior delineated by the AAMR (Perkins-Dock, 2003). The most current edition, the Adaptive Behavior Assessment System, Second Edition (ABAS-II), was released in 2002, and it measures three domains of adaptive behavior consisting of the ten sub-domains of adaptive behavior presented by the AAMR (Harrison & Oakland, 2002). Extensive tests of reliability and validity indicate that the ABAS-II is an appropriate
measure of adaptive behavior for individuals aged 0-89 (Harrison & Oakland, 2002; Richardson & Burns, 2005).

The ABAS-II can be administered via five distinct report forms that vary according to the age of the individual and the status of the reporter completing the form. There is the parent/primary caregiver form (for ages 0-5), the parent form (for ages 5-21), the teacher/daycare provider form (for ages 0-5), the teacher form (for ages 5-21), and the adult form (for ages 16-89) which can be completed by the individual being evaluated or anyone else with an adequate degree of knowledge of the individual. The ABAS-II estimates adaptive behavior using an overall composite score as well as normative scores for each of the three domains of adaptive behavior (Harrison & Oakland, 2002). An in-depth analysis of the ABAS-II, parent form, will be included in Chapter III.

Summary

Autism spectrum disorder is a potentially debilitating, long-term disorder that affects approximately 0.3-0.6% of children. Many studies have been conducted since the original conceptualization of autism as a distinct disorder. Despite the large number of studies that have been conducted and continue to be conducted, there remain specific questions regarding ASD that require additional research. One such question that researchers are still attempting to answer conclusively is how can children with ASD be best treated to allow them the potential of experiencing a better future. A key requisite to answering this question in any capacity is to define or identify what characteristics indicate how individuals with ASD will function in the future. In this regard, it is clear from the reviewed literature that adaptive behavior is both a valid and widely accepted estimate of an individual’s ability to function within his or her environments. Therefore,
one conclusion would be that the question regarding the efficacy of ASD interventions should be answered in terms of those interventions’ ability to improve adaptive behavior. 

Unfortunately, research on interventions’ efficacy for improving adaptive behavior remains scarce. As outlined previously, there are many strategies that target individual areas of adaptive behavior such as social skills. However, there appears to be no research regarding the impact of various interventions on all areas of adaptive behavior that are pertinent for children with ASD. Because children need to be adept in all areas of adaptive behavior, it is important to target all domains of adaptive behavior rather than focus exclusively on the specific areas that are commonly low for children with ASD.

Research has demonstrated that higher levels of adaptive behavior typically translate to improved functioning in most areas of life. Because of this, investigating an intervention’s ability to enhance the adaptive functioning of children with ASD would prove useful in determining the efficacy of that intervention. In the current study, the intervention of interest takes the form of a remediation summer day camp intended to improve academic and behavioral functioning. There have been many studies reporting positive effects of summer camps for populations with special needs other than ASD as well as a few studies that have indicated similarly positive results for summer camps designed for children with ASD. Furthermore, the previously discussed studies by Lopata and colleagues reported positive growth within the individual adaptive domain of social skills. Because preliminary research has demonstrated potential for improvement in one adaptive domain, it would be both reasonable and beneficial to investigate whether similar results can be obtained for all domains of adaptive behavior. The current study
will attempt to expand this body of research. Specifically, the goal of the current study is to discern whether a summer day camp designed to improve academic and behavioral skills in children with ASD also is effective in improving adaptive behavior across all adaptive domains.
The purpose of the study will be to examine the effects of participation in an academic and behavioral remediation summer camp for children with autistic spectrum disorder (ASD) on the adaptive behavior of those children as measured by the Adaptive Behavior Assessment System, Second Edition (ABAS-II; Harrison & Oakland, 2003).

Participants

After obtaining approval from the Ball State University Institutional Review Board, participants for the proposed study included the parents or legal guardians of 30 children diagnosed with ASD who were enrolled in an eight week academic and behavioral remediation summer camp for children with ASD during the summer of 2009. Of the original 30 children, at least one parent or legal guardian of 23 children completed both the pre-test and post-test phase of the study. The ages at the time of the pre-testing of the 23 children whose parents completed the study ranged from 5 years and 10 months to 11 years and 4 months with a mean of 8 years and 11 months. Of the group of 23 children, six were female (26%) and seventeen were male (74%).

Four males and one female participated in the camp for the first time, and the other children participated in the same program the previous summer. When asked to rate the severity of their children’s ASD as mild, moderate, or severe, nine males were
reported to have mild ASD, seven males were reported to have moderate ASD, and the severity of two males’ ASD was not reported. Four females were reported to have mild ASD and two were reported to have moderate ASD.

Additionally, requests were sent via a statewide autism support listserv to parents of children diagnosed with an ASD who were not participating the summer camp program to participate in a control group. However, no parent chose to participate in the control group.

Parents of each child completed an application for their child to participate in the summer camp (see Appendix A). Criteria for admission into the camp were based on the following:

1. The child was diagnosed with ASD by an outside professional using criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association, 2000);
2. Each child was 5 to 12 years of age or would turn 6 during the course of the camp;
3. Each child presented with behavioral problems that adversely affect his current functioning in social, academic, or daily living;
4. No child exhibited severe self-injurious behavior;
5. No child was severely limited by a physical handicap so that the camping experience might have been hindered;
6. No child was psychotic or brain damaged; and
7. The child’s parents, guardians, or referral agency were interested in participation in the program and research study and agreed to cooperate in providing full
application information (including permission to assess the child for evaluation and/or research purposes), providing records information (i.e., child’s school individualized education plan and most recent psychoeducational report), answering a parent questionnaire, filling out adaptive behavior rating scales for their child, and providing daily transportation to and from the camp.

During the week prior to the start of camp, the primary investigator (PI) provided parents a letter describing the study and its requirements, forms of informed consent, and an informal questionnaire designed to obtain personal and demographic information about each child (see Appendix B). Consent to participate in the study was separate from consent to participate in the camp, and parents were informed that their child would be able to participate in the camp regardless of their decision to allow the use of their data in the study.

Description of Instrumentation

Adaptive Behavior Assessment System, Second Edition. The Adaptive Behavior Assessment System, Second Edition (ABAS-II) is a measure of an individual’s adaptive behavior. Adaptive behavior generally refers to how well an individual functions in his/her daily environment (American Association on Mental Retardation [AAMD], 2002; Cohen & Spenciner, 2007). The AAMD conceptualized adaptive behavior as falling into ten various skill sets, and the ABAS-II was designed to assess adaptive behavior according to each skill area. The developers of the ABAS-II also viewed some skill areas as being related to each other, and they subsequently created three adaptive domains consisting of related skill areas. These domains are conceptual skills, social skills, and practical skills (Harrison & Oakland, 2003). There also is one skill area for work
behavior assessed by the ABAS-II for adults. However, the current study will only observe the adaptive behavior of children.

The ABAS-II can be administered via five distinct report forms that vary according to the age of the individual for whom the report is regarding and the status of the reporter completing the form. There is the parent/primary caregiver form (for ages 0-5), the parent form (for ages 5-21), the teacher/daycare provider form (for ages 0-5), the teacher form (for ages 5-21), and the adult form (for ages 16-89) which can be completed by the individual being evaluated or anyone else with an adequate degree of knowledge of the individual (Harrison & Oakland, 2003).

The ABAS-II form that was used in the current study was the parent form designed for individuals ages 5-21. Scoring and interpretation of the parent form yields estimations of adaptive behavior in the conceptual, social, and practical domains as well as a general estimation of the individual’s overall adaptive ability or the general adaptive composite (GAC). Table 3.1 presents information regarding the parent form for individuals ages 5-21 including descriptions of each skill area obtained from the ABAS-II manual (Harrison & Oakland, 2003, p.5).

The parent form of the ABAS-II includes a total of 232 items with 21-25 items per skill area (Harrison & Oakland, 2003). Each item consists of a statement of a specific behavior, and the respondent must indicate on a four point Likert scale the extent to which the individual being evaluated engages in that behavior when needed. This scale ranges from 0-3 with 0 indicating is not able, 1 indicating never or almost never, 2 indicating sometimes, and 3 indicating always or almost always. Additionally, respondents are prompted to indicate for every item whether the respondent guessed on
that item or had an additional comment relating to that item (Harrison & Oakland, 2003). According to Harrison and Oakland, the evaluator should interview the respondent when four or more guesses are made in an individual skill area in order to assess whether the respondent has adequate knowledge of the individual being evaluated.

The numbers indicated for each item in an individual skill area are added to obtain a raw score total for that skill area. This raw score is then converted to a scaled, or normative, score with a mean of 10 and a standard deviation of 3. The scaled scores for the individual skill areas are then factored according to adaptive domain and GAC to produce a scaled score for each adaptive domain and the GAC. The mean for these scores is 100, and the standard deviation is 15 (Harrison & Oakland, 2003).

Normative data for the parent form for school age children was collected from a nationwide sample of 1,670 parents. According to the authors of the measure, the sample was stratified by gender, race/ethnicity, and educational level according to census data from 1999, and efforts were made to ensure accurate geographic representation. Furthermore, 4.97% of the normative sample consisted of individuals with specific clinical diagnoses, and 0.24% of the sample consisted of individuals diagnosed with autistic disorder (Harrison & Oakland, 2003). Therefore, standard scores obtained from the ABAS-II provide a comparison of normal adaptive behavior that is strongly representative of the larger population. However, separate normative data for individual clinical diagnoses were not obtained meaning the ABAS-II is not useful in making normative comparisons with clinical groups.

Tests of the validity and reliability of the ABAS-II have been reported by the authors of the measure (Harrison & Oakland, 2003; Richardson & Burns, 2005). Harrison
and Oakland provided four types of reliability data relevant to the current study including internal consistency by age group for the parent form (average $r$ coefficients of 0.98 for GAC, 0.95-0.97 for adaptive domains, 0.86-0.93 for skill areas), test-retest reliability for the parent form ($r$ coefficient of 0.93 for GAC, 0.89-0.93 for adaptive domains, 0.84-0.92 for skill areas), inter-rater reliability for the parent form ($r$ coefficient of 0.91 for GAC, 0.84 for adaptive domains, 0.77 for skill areas), and cross-form reliability for the school-age sample ($r$ coefficient of 0.70 for GAC, 0.70 for adaptive domains, 0.66 for skill areas). Adequate validity for the ABAS-II has been established through experts’ ratings of items, respondents’ comments regarding the ease of completion, comparison with definitions of adaptive behavior from the AAMR and DSM-IV-TR, sensitivity to age differences, confirmatory factor analysis, and through correlations with other assessments of behavior, intelligence, and achievement (Harrison & Oakland, 2003; Richardson & Burns, 2005).

**Procedures**

The PI had received graduate level training in the administration of psychoeducational assessments such as the ABAS-II, and he administered this assessment according to proper standardization protocol. The ABAS-II was presented by the PI to the parent(s) or legal guardian(s) of each child during a parent-staff meeting during the week prior to the first day of camp. The PI met parents the first few days of camp to collect the ABAS-II protocols when they dropped off their children. Finally, the ABAS-II was presented once again by the PI at the beginning of the last week of camp when the parents arrived to pick up their children. The PI met the parents one final time on the last day of camp to collect the second set of ABAS-II protocols. The protocols
were scored by the PI using the ABAS-II scoring software. Score reports were created using assigned participant numbers to protect the confidentiality of the participants. The data from the score reports were entered into a data file for analysis using SPSS.

Camp Program

The summer day camp took place in central Indiana, and spanned eight weeks excluding weekends. Children arrived at the camp each day (Monday through Friday) between 7:30 a.m. and 8:30 a.m. Daily sessions lasted from 8:30 a.m. to 4:00 p.m.

Four groups of seven to nine children were formed based on age and severity of autism. Each group was assigned five staff members (one teacher/counselor, one tutor/counselor, two counselors, and one behavioral clinician) who remained with their respective groups for the remainder of the camp. The four lead teachers were either pre-service teachers who had completed student teaching or teachers who had graduated and were practicing at the time of the study. Also, the teacher/counselors and tutor/counselors were supervised by a licensed special education teacher, and all staff participated in a week-long training program prior to the beginning of camp. During training, a licensed psychologist trained the staff on ASD, and a board certified behavior analyst (BCBA) conducted training on applied behavior analysis. Staff participated in role playing activities to rehearse the lessons learned during training. The behavioral clinicians also were available throughout camp to provide daily training as needed, and they met with the BCBA 2-3 times weekly to discuss behavioral plans.

During the first week, each group’s behavioral clinician assessed the behavioral and social skills needs of each camper, under the supervision of the BCBA, by conducting observations and a functional behavioral assessment for each camper. Using
information from these assessments, the clinician developed individualized behavior plans for each camper with specific behavior goals for the child to meet by the end of camp. Progress monitoring was conducted throughout the camp to determine whether the behavior plans were showing signs of success or needed modifications. Alterations were made to the behavior plans if campers demonstrated too little progress or made progress too quickly (e.g., the behavior plan was not challenging enough).

The four groups of campers remained physically separated for the majority of the day. Each morning, the campers attended a series of four academic classes (math, language arts, science, and music/health) with fellow group members. Each group attended every class each day on a rotating schedule. The class portion of the camp lasted for three hours with each class lasting approximately 45 minutes. A twenty minute snack period occurred after the second class, and the lunch period immediately followed the fourth class. During lunch, campers who had been doing an exceptional job of meeting behavioral goals were given individual awards. These campers were given their award via a paper detailing their good deeds and receiving applause from the entire camp.

The afternoon portion of camp following lunch consisted of group activities focused on improving social skills and individual tutoring. Group activities were conducted by local artists, musicians, and counselors/psychologists and included activities such as modeling clay, relaxation therapy, playing instruments, etc. For the individual tutoring, the tutor/counselor for each group developed individualized tutoring plans in the morning for each camper based on his or her specific academic needs. The tutor then created tote bags including necessary materials for each camper to be used later in the afternoon. When the tutoring period arrived, campers were paired with counselors
who conducted the tutoring using materials from the tote bag. Two groups participated mutually in the group activity for 30-40 minutes while the other two groups engaged in tutoring. At the end of the activity, the groups switched and participated in the other activity for 30-40 minutes. During the course of the afternoon, each child received 30-40 minutes of tutoring.

A reinforcement schedule was implemented in which children could earn more desirable rewards by achieving or adhering to his or her behavioral goals. Each child would begin each day with a blank wristband. As they succeeded in meeting behavioral goals, the children were awarded points that were marked on the bracelet. After a certain number of points were received, the child’s bracelet would be upgraded to a colored bracelet indicating access to a higher level of rewards at the end of the day. As points continued to be awarded on each bracelet, the children eventually would have the opportunity to receive the highest level of wristband indicating they would be allowed to choose the highest reward at the end of the day. Rewards were administered during the payoff period which occurred during the last hour of the day. The reinforcement schedule and the behavior plan were in effect throughout the day except for the payoff period. The highest level of reward was the privilege of swimming in the pool or playing on the playground, and lesser rewards included less exciting activities such as reading books, using sidewalk chalk, or jumping rope.

**Research Design**

This study utilized a pretest-posttest analysis including all children to compare changes in adaptive behavior, as measured by the ABAS-II, over the course of the summer camp program. Participants served as their own controls by means of baseline
data that was collected during pre-testing. The independent variable for this study was participation in the summer day camp. The dependent variables consisted of the children’s adaptive behavior as measured by scores on the parent form of the ABAS-II.

One possible threat to internal validity was the study’s reliance upon the accuracy and honesty of the parental reports. However, scores from the ABAS-II are used in treatment planning and decision making during general psychological practice despite this threat to internal validity. Because of this, the use of ABAS-II scores to measure adaptive behavior in this study may have increased the study’s external validity or its ability to generalize to typical practice.

Another potential threat to internal validity was the potential that the children do not begin with comparable ratings of adaptive behavior. This risk was exacerbated by the lack of random sampling. Once again, however, this was a function of the naturalistic setting in which children were or were not placed regardless of the presence of the current study. Although this threat weakened the current study’s scientific foundation, it enhanced its ability to document the effects of a natural, realistic intervention.

One possible threat to external validity was the fact that participants were not randomly placed into the summer camp program. Because the sample was a pre-existing convenience sample, the study’s ability to generalize potential treatment outcomes to all individuals with ASD is limited.

Data Analysis

The results of the study will be determined using a gain score analysis using SPSS software. Essentially, the differences between the pre-test and post-test for each adaptive sub-domain from the ABAS-II will be computed, and these differences will then be
analyzed using a repeated measures multiple analysis of variance (MANOVA). If the differences are significantly different with the alpha level set at 0.05, then it can be concluded that there was a significant effect on each sub-domain of adaptive behavior by the independent variable. The direction of the effect will depend upon whether the dependent variable increased or decreased. Results in the change of overall adaptive behavior as measured by the GAC on the ABAS-II will be analyzed using a repeated measures analysis of variance (ANOVA). The criteria for analysis for this analysis will be identical to that of the analysis of the repeated measures MANOVA for the sub-domains of adaptive behavior.
Chapter IV

Results

This chapter reports the results of the current study regarding the effects of participation of a remedial academic and behavioral summer camp program on the adaptive behavior of children with autism spectrum disorder (ASD). Descriptive statistics from the Adaptive Behavior Assessment System, Second Edition (ABAS-II) results are presented for males and females, and results from the repeated measures ANOVA and repeated measures MANOVA are discussed.

The primary research question of this study is whether there were changes in adaptive behavior of children with autism as a result of participating in an eight-week summer day camp designed for that population. The ABAS-II was used to measure adaptive behavior, as reported by one parent of each child, immediately prior to the first week of camp and again during the last week of camp. The ABAS-II reports estimated levels of adaptive behavior in three adaptive behavior domains: conceptual, social, and practical. It also provides an estimation of overall adaptive behavior in the form of the general adaptive composite (GAC) score on the ABAS-II.

Descriptive Statistics

Descriptive statistics including mean, standard deviation, and range from each administration are included in Table 4.1. The range of standard scores was rather large
for most domains indicating there was a large degree of variability between children regarding their initial levels of adaptive behaviors. It appears some children exhibited generally much lower levels of adaptive behavior than other children who participated in the camp. Also, there appears to have been a general trend in variability becoming greater at the second administration. Standard deviations for the second administration were greater than those of the first administration for all domains.

Descriptive statistics for males including mean, standard deviation, and range from each administration are included in Table 4.2. Descriptive statistics for females are included in Table 4.3. There appears to have been less variability in scaled scores for males relative to females as standard deviations were lower for males for all domains. However, this may have been due, in part, to the relatively fewer number of girls who participated in the study.

Correlation coefficients for GAC and the three adaptive behavior domains are presented in Table 4.4. GAC, conceptual, and practical scores from the initial assessment were moderately to highly correlated with post-test scores within those same domains. Correlations were relatively weaker between the social domain pre-test scores and post-test scores of the other domains. It also was notable that social pre-test scores were only moderately correlated with pre-test scores within other domains when one would expect those correlations to be high to very high given the reliability statistics provided by the ABAS-II. This suggests variation in social adaptive behavior was not distributed in the same way as other domains of adaptive behavior during the initial assessment. Social adaptive behavior also did not change from pre-test to post-test in the same way as other forms of adaptive behavior.
Results from the ANOVA and MANOVA

A repeated measures ANOVA was conducted to ascertain whether there were significant changes in GAC between the first and second administrations of the ABAS-II. With the alpha level set at 0.05, results from this analysis indicate there was no significant change in GAC between administrations ($F = 1.432; p = 0.244$).

A repeated measures MANOVA was conducted to determine whether there were significant changes across time in adaptive behavior as measured by the conceptual, social, and practical adaptive behavior domains. Results from this analysis also indicate there was no significant change in adaptive behavior between administrations ($F = 1.44; p = 0.244$). However, there was an interaction between gender and time ($F = 7.63; p = 0.012$). Analysis of descriptive data indicated females were reported to have exhibited greater growth in adaptive behavior than males. In order to assess the degree to which scores of female participants changed differently than the scores of male participants, the net change of each mean score for each gender was calculated by subtracting the pre-test score from the post-test score. Differences in means of scaled scores for each gender are included in Table 4.5.

Gender differences in adaptive behavior growth were most pronounced within the practical domain with a 13-point difference in mean standard score growth, and females reportedly exhibited greater growth with the GAC and within the conceptual domain. Males reportedly exhibited mildly higher growth within the social domain.

Descriptive analysis of the females’ profiles indicated three of the six females reportedly exhibited larger growth in adaptive behavior. In order to better understand how this growth was reported, the ten subscales which make up the three domains were
analyzed for those three female participants. Changes in those subscale scores are presented in Table 4.6.

Female participant #1 exhibited fairly consistent growth in adaptive behavior across all subscales with the greatest growth in the practical domain. Adaptive behavior growth was somewhat less consistent for female participant #2, but growth for this participant also appeared to be greater in the practical domain. Change in adaptive behavior was most striking in the case of female participant #3 given the inconsistency of that change. Most prominently, she was reported to exhibit an 8-point increase in the community use subscale and a 6-point decrease in the leisure subscale. Given that the standard deviation for subscale scores is 3, these changes are remarkable. Given the relatively few number of females in the sample, these cases may be responsible for the significant interaction between gender and time in the repeated measures MANOVA.

Upon looking at the individual items on the ABAS-II assessments of the female participants, it was noted that much of the reported increase of adaptive behavior was due to ratings of behaviors changing from 0 to 1 meaning the participant went from not being unable to perform the behavior to never performing the behavior when needed. However, there were some trends of certain adaptive behaviors changing from 0 or 1 to higher ratings indicating the participants engaged in those behaviors sometimes or always when needed.

Within the Community Use skill area, adaptive behaviors that reportedly improved in three or more females included looking both ways before crossing a street, finding public restrooms, walking alone to a friend’s house in the neighborhood, finding specific departments in stores, and stating the address of a destination. Within the Home
Living skill area, such behaviors included putting away dirty clothes, cleaning their own rooms, and participating in large, household clean-up projects. Health and Safety adaptive behaviors that were similarly reported to improve included obeying safety rules in home and in public, using electrical sockets safely, and taking their own temperatures when sick. Within the Self-Care skill area, individual adaptive behaviors which were reported to improve included using the restroom at home without assistance, buttoning clothes, and straightening and fastening clothes after using the restroom.

**Clinical Significance**

The change in adaptive behavior for the children who participated in this study was not statistically significant using classic inferential statistical analysis. However, there is a growing trend in psychological research to not only look at statistical significance but also practical and clinical significance (Pintea, 2010). In response to inherent flaws in statistical significance testing, practical significance often is used, typically in the form of effect sizes, to assess the meaningfulness of statistical significance. There are mounting arguments that even these forms of analysis do not always indicate whether a treatment makes significant impacts in the daily lives of its recipients (Pintea, 2010). In order to address this shortcoming and ascertain whether the current study’s treatment had any meaningful impacts on the participants daily lives despite the lack of statistical significance, the clinical significance of the current study was assessed.

Pintea (2010) suggested using reliable change indexes (RCI) to report the clinical significance of a treatment. According to Pintea, the RCI for each participant is calculated by subtracting the pre-test score from the post-test score for each participant.
That number would then be divided by the standard error of the difference between scores which is calculated by taking the square root of $2S^2_1(1-R_{xx})$ where $S^2_1$ is the variance of pre-test scores and $R_{xx}$ is the test-retest reliability coefficient. The standard error of the difference between GAC scores for the current sample was calculated to be 3.71, and this number was used to calculate the RCI for each participant.

Pintea (2010) recommended using a RCI value of 1.96 to determine whether change in scores is clinically significant. In other words, if the RCI for a participant is greater than 1.96, it can be concluded that there was likely clinically significant improvement in that participant’s global adaptive behavior. In addition, a RCI lower than -1.96 could be interpreted as a clinically significant decrease in adaptive behavior.

Among the boys in the sample, there were RCIs of 8.89, -2.97, and -2.43 with all other RCIs being non-significant. RCIs did not appear to vary according to reported severity of ASD or whether children had participated in the camp during the previous summer.

Among the girls, significant RCIs included 3.50 and 4.04 with the other four RCIs being non-significant. As was the case with the boys, participation in the camp during the previous summer did not seem to have an effect on the change in adaptive behavior for girls. However, RCIs were higher for girls who were reported to have mild ASD (1.08, 1.89, 3.50, 4.04) relative to moderate ASD (0.27, -0.27).

Summary

The primary research question of this study is whether there were changes in adaptive behavior of children with autism as a result of participating in an eight-week summer day camp designed for that population. Analysis of the data from two administrations of the ABAS-II indicated statistically significant changes in adaptive
behavior were not made either positively or negatively. Additionally, analysis of clinical significance revealed participation in the summer camp resulted in varying degrees of improved adaptive behavior within the daily lives of participants, and most participants did not exhibit clinically significant changes in adaptive behavior in either direction. There was a significant statistical interaction between gender and time. Although this may have been an artifact of the fewer number of females who participated in the study relative to male participants, it is possible females exhibited improved adaptive behavior in various practical adaptive domains.
Chapter V
Discussion

This chapter presents a review of the purpose and rationale of the current study as well as the results of the analysis of the research questions. The implications of these results, and the potential impact they may have on interventions for children with autism spectrum disorders (ASD), also are discussed. Finally, the limitations of the current study and subsequent suggestions for future research are discussed.

Purpose and Rationale of the Current Study

Pervasive developmental disorders (PDDs) consist of a number of disorders that are growing in nationwide prevalence (Centers for Disease Control and Prevention, 2009; Rutter, 2005). As the name implies, these disorders are pervasive and significantly limit one’s ability to function normally within various environments. The current study focused on three PDDs, autistic disorder, Asperger’s disorder, and pervasive developmental disorder not otherwise specified which collectively are referred to as ASD (Fombonne, 2005; Volkmar et al., 2004).

One’s tendency to function adequately within a variety of daily environments is reflected within the construct of adaptive behavior (American Association on Mental Retardation [AAMR], 2002; Cohen & Spenciner, 2007). Due to the pervasive and developmental nature of ASD, children with ASD often exhibit poor adaptive behavior
relative to their similarly-aged peers (Bölte & Poutska, 2002; Gabriels, Ivers, Hill, Agnew, & McNeill, 2007; Klin et al., 2007).

If adaptive behavior indicates the quality of one’s daily functioning and the goal of ASD intervention is to improve one’s daily functioning within a given environment or group of environments, then measures of adaptive behavior presumably would be ideal to ascertain whether an intervention is successful in accomplishing that goal. Although much research has been conducted on interventions designed to improve specific areas of adaptive behavior (e.g. social skills, communication, etc.), few studies have investigated the impact of interventions designed for children with ASD on comprehensive adaptive behavior.

Because children with ASD benefit the most from interventions that are implemented throughout the entire year (National Research Council, 2001), summer programs that utilize interventions designed specifically for children with ASD likely would help bridge the summer intervention gap between spring and fall scholastic semesters. It is thought that continuing intervention throughout the summer may prevent the loss of previously achieved progress (Brookman et al., 2003). Numerous studies have documented positive effects of summer camps on children with special needs, but research on the effects of summer camps designed specifically for children with ASD remains scarce. However, the several such studies that have been conducted thus far indicate great potential for summer camps for children with ASD (Brookman et al., 2003; Hung & Thelander, 1978; Lopata, Thomeer, Volker, & Nida, 2006; Lopata, Thomeer, Volker, Nida, & Lee, 2008; Van Wert & Reitz, 1978).
The current study is an attempt to add to the base of research regarding summer camps for children with ASD, and it investigates the efficacy of one such summer camp using comprehensive adaptive behavior as the outcome variable. The summer camp in question was an academic and remedial summer day camp designed specifically for children with autism using principles of applied behavior analysis. The Adaptive Behavior Assessment System, Second Edition (ABAS-II), a valid and reliable measure of comprehensive adaptive behavior, was completed by the parents of each participant prior to the start of the camp and again eight weeks later at the conclusion of the camp.

Results and Analysis of the Current Study

In order to determine whether there were significant changes in adaptive behavior between the first and second administrations of the ABAS-II, data analyses were conducted using the overall adaptive behavior composite (GAC) and the three adaptive subdomains, communication, social, and practical, from the ABAS-II.

Results from the MANOVA analysis indicated there was a significant interaction between gender and time on changes in adaptive behavior. Descriptive data indicated females exhibited more change in adaptive behavior than males. However, the relatively fewer number of female participants calls into question the potential of an outlier effect. Indeed, three of the six females were reported to have exhibited abnormally large changes in adaptive behavior. It currently is unknown why adaptive behavior for those three participants was reported to have changed so drastically. In particular, it is unclear why adaptive behavior changed to the extent it did with those three participants and not with the other three female participants. Perhaps more importantly, it is difficult to determine
whether the reported change in adaptive behavior for those three participants corresponded with actual change in adaptive behavior.

Although descriptive statistics indicated mild increases of adaptive behavior in general, statistical analyses indicated those changes in adaptive behavior were not statistically significant. Analysis of clinical significance was mixed and indicated three children exhibited significantly improved adaptive behavior whereas two children exhibited significantly decreased adaptive behavior. Based on these analyses, it must be concluded the children participating in the summer camp did not exhibit statistically significant increases in adaptive behavior at the end of the camp and observable changes in daily adaptive behavior varied among the children. In contrast, the lack of significant changes also means children did not exhibit statistically significant decreases in adaptive behavior. While the overt goal of the summer camp was to improve the academic skills and behavior of children with ASD, an implicit goal of the camp was to prevent “backsliding” of previously achieved gains that is thought to be a risk in the absence of summer intervention. In this regard, it also can be concluded that “backsliding” of adaptive behavior did not take place in this study.

Unfortunately, this last conclusion cannot be confidently attributed to the effects of participating in the summer camp due to the lack of a control group. Although improbable, it is possible that “backsliding” would not have occurred even had there been no intervention. As noted earlier, the ASD interventions should be in place throughout the entire year in order to achieve the highest level of efficacy (National Research Council, 2001) presumably to prevent “backsliding.”
It should be noted comprehensive adaptive behavior encompasses a much wider variety of behavior than the relatively more narrow focus of the goals of the summer camp. While many of the expressed goals of the camp were to make progress with some areas of adaptive behavior, the current study looked at areas of adaptive behavior that may be inherently less likely to be affected by participating in the summer camp. This also may have played a part in the lack of significant growth in comprehensive adaptive behavior.

Findings indicated there was a statistically significant interaction between gender and time, and it appears females may have benefitted more from participation in the camp. Although previous participation in the camp during the prior summer did not appear to have an effect on adaptive behavior, there was some evidence that females with mild ASD may have benefitted more from camp participation than females with moderate ASD based on clinical significance testing. One explanation for this is that females with mild ASD had higher levels of adaptive behavior at the beginning of the camp which made further improvement relatively easier to achieve. Unfortunately, conclusive explanations for this finding would be tenuous at best without specific research designed to assess this question.

Limitations and Suggestions for Future Research

The most significant limitation of the current study is the lack of a control or comparison group. Without such a component, it is impossible to know whether any changes in adaptive behavior were due to participation in the summer camp rather than other factors such as natural maturation. Given the low prevalence of ASD in the general population, obtaining a control group proved too problematic for the current study.
Despite this, utilizing a control group would be essential for future research in order to determine whether participation in summer camps for autism actually result in the desired changes in behavior. Future research also may include a comparison group utilizing an alternative treatment, perhaps clinic or school-based, in order to differentiate the effects of a summer camp intervention from the effects of other potential interventions.

Another limitation of this study is the small sample size and the use of convenience sampling. As mentioned previously, however, the relatively small number of children with ASD proves to be prohibitive to obtaining large, robust samples using true random sampling methods. Regardless, more concerted efforts to obtaining such samples should be made in future research in order to maximize the power of future research.

That the current study only spanned eight weeks also may have limited the study’s ability to obtain significant results. It is possible that future research could utilize summer camps that span more of the summer break, but such time expansions may be prohibited by funding constraints. Also, there is an upper limit on how long the summer program can last given the realities of academic calendars.

Future research may benefit from utilizing multiple measures of adaptive functioning. As discussed in Chapter II, there are other standardized measures of adaptive behavior that may offer differing degrees of nuance in assessing changes in adaptive behavior over relatively short time periods. An alternative solution could be to develop another, perhaps informal, method of measuring adaptive that would be more sensitive to short-term changes in adaptive behavior.

Another potential limitation of the current study is the reliance on parents’ reports of their children’s adaptive behavior. This limitation leaves the study vulnerable to the
Hawthorne effect in that parents may have been more likely to report improved adaptive behavior merely because they knew their children were participating in an intensive intervention. This is more salient when coupled with the fact that most parents likely had a natural and imminently understandable interest in the summer camp being effective.

Although blind and double-blind procedures are not feasible with this line of research, this limitation may be ameliorated to some degree by also utilizing the observations of individuals other than the parents such as staff members of the camp. Such observers also could be well-trained in making behavioral observations and reporting of observed adaptive behavior. Having neutral, objective observers assess the children’s adaptive behavior prior to and at the end of the camp may go a long way toward ensuring the adaptive behavior reporting is valid and reliable. Additionally, future research may incorporate teacher reports of adaptive functioning at the ends and beginnings of the academic year. Given that children spend a significant amount of time at school, improving adaptive behavior in such a way that it generalizes to the school environment obviously would be a desirable goal.

Based on item analyses, it appears female participants exhibited increased adaptive behavior generally related to cleanliness and self-care. Female participants also reportedly engaged in behaviors in a more safe fashion upon completion of the camp. It may be that certain aspects of the camp allowed more growth in adaptive behaviors within these domains with females than males. Although it is conceivable that the nature of ASD in females results in female participants reacting differently than males to summer camp interventions, it is uncertain which aspects of the camp resulted in different changes in adaptive behavior based on gender. Future research should be mindful of
potential gender effects with summer camp interventions for children with ASD. It may be the case that females and males benefit from summer camp interventions slightly differently from each other, and better understanding of these differences may allow interventions to be developed with nuanced differences that would allow for increased effectiveness for each gender.

Summary

Given the exploratory nature of the current study, the results of this study indicate there is some potential for summer camps to have a positive impact on the overall functioning of children with ASD. With the amelioration of the various limitations of the current study, future research has the potential to shed even more light on how summer programming for children with ASD can improve overall daily functioning. Such research can be used to design interventions for children with ASD that are more effective in achieving more comprehensive goals. The current study can be viewed as a first step toward deeper understanding about how ASD interventions can better achieve growth within all areas of adaptive functioning including those areas not traditionally targeted by current ASD interventions.
References


In E. Schopler & G. B. Mesibov (Eds.). *Diagnosis and assessment in autism.* (pp. 71-79). New York: Plenum.


## Appendix

Table 3.1

<table>
<thead>
<tr>
<th>Domain</th>
<th>Skill Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual</td>
<td>Communication</td>
<td>Speech, language, and listening skills needed for communication with other people, including vocabulary, responding to questions, conversation skills, etc.</td>
</tr>
<tr>
<td>Functional</td>
<td>Academics</td>
<td>Basic reading, writing, mathematics, and other academic skills needed for daily, independent functioning, including telling time, measurement, writing notes and letters, etc.</td>
</tr>
<tr>
<td>Self-Direction</td>
<td></td>
<td>Skills needed for independence, responsibility, and self-control, including starting and completing tasks, keeping a schedule, following time limits, following directions, making choices, etc.</td>
</tr>
<tr>
<td>Social</td>
<td>Social</td>
<td>Skills needed to interact socially and get along with other people, including having friends, showing and recognizing emotions, assisting others, and using manners.</td>
</tr>
<tr>
<td></td>
<td>Leisure</td>
<td>Skills needed for engaging in and planning leisure and recreational activities, including playing with others, engaging in recreation at home, following rules in games, etc.</td>
</tr>
<tr>
<td>Practical</td>
<td>Community Use</td>
<td>Skills needed for functioning in the community, including use of community resources, shopping skills, getting around the community, etc.</td>
</tr>
<tr>
<td></td>
<td>Home Living</td>
<td>Skills needed for basic care of a home or living setting, including cleaning, straightening, property maintenance and repairs, food preparation, performing chores, etc.</td>
</tr>
<tr>
<td></td>
<td>Health and Safety</td>
<td>Skills needed for protection of health and to respond to illness and injury, including following safety rules, using medicines, showing caution, etc.</td>
</tr>
<tr>
<td></td>
<td>Self-Care</td>
<td>Skills needed for personal care including eating, dressing, bathing, toileting, grooming, hygiene, etc.</td>
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Table 4.1

*Descriptive Statistics of Standard Scores on the ABAS-II*

<table>
<thead>
<tr>
<th>Composite/Domain</th>
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<th>Maximum</th>
<th>Mean</th>
<th>Standard Deviation</th>
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<td>85</td>
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<td></td>
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Table 4.2

*Descriptive Statistics of Standard Scores on the ABAS-II for Male Participants*

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<td></td>
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Table 4.3
Descriptive Statistics of Standard Scores on the ABAS-II for Female Participants

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Table 4.4

*Correlational Coefficients*

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<td>.528 (0.008)</td>
<td>.389 (0.067)</td>
<td>.605 (0.002)</td>
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<thead>
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<th>Pearson Correlation (Significance)</th>
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<th>Conceptual Post</th>
<th>Social Post</th>
<th>Practical Post</th>
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Table 4.5

*Net Changes in Scaled Scores Means from First Administration to Second Administration*

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<td>Practical</td>
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<td>Practical</td>
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Table 4.6

*Changes in Scaled Scores for Three Female Participants with Atypical Growth*

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<td>Self-Direction</td>
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<td>8</td>
</tr>
<tr>
<td>Social</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Leisure</td>
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<td>5</td>
</tr>
<tr>
<td>Community Use</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Home Living</td>
<td>5</td>
<td>9</td>
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<tr>
<td>Health and Safety</td>
<td>9</td>
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<td>Self-Care</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
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