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A PRELIMINARY ANALYSIS:
CHILDREN AGED BIRTH TO TWO WITH ASD
AND THE EARLY INTERVENTION METHODOLOGIES OF
ABA, PECS, AND FLOOR-TIME

by
ERIN L. BOYLE

A Thesis

Submitted in partial fulfillment of the requirements of the
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of
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Approved by _____
Professor

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ABSTRACT

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A PRELIMINARY ANALYSIS:
CHILDREN AGED BIRTH TO TWO WITH ASD
AND THE EARLY INTERVENTION METHODOLOGIES OF
ABA, PECS, AND FLOOR-TIME
2002/03
Dr. Klanderma and Dr. Dihoff
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The archival data regarding 20 children who received early intervention services from a child development center in southern New Jersey were reviewed. Each child in the study was aged 0 to 2 years, had a disorder of the autistic spectrum, and was provided treatment in the form of ABA, PECS, floor-time, or a combination of interventions. Because research on ASD and its treatment has not yet focused on children under the age of 3, the purpose of this study was to investigate which methodology of intervention is most feasible for such young children. Additional aims of the study were to examine how intensity of service delivery and severity of disorder related to treatment outcome. Statistical analyses revealed that, regardless of treatment methodology, early intervention on the whole produced significant developmental gains in the domains of cognition, gross motor, fine motor, communication, social emotion, and self-help. Additionally, the number of hours of treatment services provided per week had a significant effect on treatment outcome. Lastly, severity of disorder was found to be negatively correlated with the developmental progress made in the domain of communication.

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CHAPTER I OVERVIEW OF THE THESIS

NEED

The wide range of complex developmental disorders that encompass the autistic spectrum, namely autism, Asperger's syndrome, and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), are not at all rare. Rather, the incidence rates of these disorders indicate that they are more prevalent in the pediatric population than cancer, diabetes, spina bifida, and Down syndrome (Filipek et al., 1999). In fact, the prevalence of Autistic Spectrum Disorders (ASD) has been estimated at 10-20 cases per 10,000, or one in every 500-1,000 people (Bryson, 1996).

All of the disorders in the autistic spectrum share the following three core deficits: (1) impairments in verbal and non-verbal communication; (2) impairments in social interaction; and (3) restricted and repetitive patterns of behavior (American Psychiatric Association, 1994). Because these symptoms are highly individualistic and present themselves in differing degrees of severity, Autistic Spectrum Disorders are said to exist on a continuum ranging from mild to severe. Therefore, some individuals within the autistic spectrum have significant difficulties in all areas, while others have difficulties that seem much more subtle. Some people with the condition may also have accompanying cognitive limitations, while others may have average or above average intelligence (Wing, 1996). The onset for ASD occurs prior to age 3, and the prognosis is generally poor.

Although there is no known cure for the disorders of the autistic spectrum, there exist many behavioral, biological, and educational intervention programs designed to minimize the effects of such debilitating conditions. These interventions are said to be most effective when they are applied to children with ASD of preschool age or younger. According to child development research, it is in these early years that the rate of human learning and development is most rapid (Smith, 1988). However, the investigation of the influence of early intervention programs on children's development to date is quite narrow. Evidence gathered over the past four decades on the effectiveness of early intervention has reported enhanced outcomes in the areas of communication, cognition, and social functioning. These kinds of treatment outcomes, though, have been documented only for children who received intensive intervention services during the preschool years (Filipek et al., 1999). Unfortunately, there exists little documentation on the impact of early intervention for children aged birth to two years.

Because research thus far has not focused on children with ASD under the age of three, questions remain regarding the type of intervention needed for such young children. Specifically, which methodology of intervention is most feasible for children aged birth to two years? How intense does intervention have to be for these children to make significant developmental gains? To address such critical questions, it is important to investigate which types of early intervention program are effective in treating infants and toddlers with ASD.

PURPOSE

The primary aim of the present study was to identify effective early intervention methodologies utilized for children with ASD under the age of three. The specific

methodologies assessed in this report include: applied behavior analysis (ABA), floor-time, and the Picture Exchange Communication System (PECS). An effective early intervention methodology, for the purpose of this study, was one that was capable of producing significant developmental gains in its children. Because this researcher believes that intensity of intervention influences overall effectiveness, this study also analyzed the relationship between intensity of service delivery and treatment outcome. An additional aim of this report was to examine how severity of disorder and developmental status related to treatment outcome. This is especially important to investigate because each child with ASD differs in the degree to which their disorder affects their overall functioning.

RESEARCH QUESTIONS:

- I. Are the early intervention methodologies of ABA, PECS, and floor-time effective treatments for children with ASD aged 0 to 2 years?
- II. How intense must therapy be for children to make substantial developmental gains?
- III. How does severity of disorder and developmental status relate to treatment outcome?

HISTORY

In 1975, Congress passed P.L.94-142, the Education for All Handicapped Children Act (EHA). This piece of landmark legislation ensured that all children with disabilities would receive a free and appropriate education. In 1990, EHA was amended and renamed the Individuals with Disabilities Act (IDEA). During this reauthorization, Congress added autism to the list of eligibility categories for special education and

related services. In 1986, a revision to IDEA created the option for states to serve children from birth to three years of age. This particular amendment was referred to as Part H from 1987 to 1998, but was reclassified as Part C under the 1997 reauthorization. This led to the creation of what is now known as the early intervention system (Ramey et al., 1998). The early intervention services provided under IDEA Part C include family training, counseling, and home visits; special instruction, speech-language pathology and audiology services; occupational services; service coordination; medical services; early identification, screening and assessment; social work services; vision services; assistive technology; and transportation and related costs that enable children and families to partake in services (Hanson & Bruder, 2001).

To qualify for early intervention services under IDEA Part C, infants and toddlers must demonstrate one of the following conditions: developmental delays, a diagnosed physical or mental condition that has a high probability of resulting in developmental delays, or a risk of having substantial developmental delays if early intervention services are not provided (O'Brien, 2001). Early intervention services, therefore, can either be remedial or preventative—remediating existing developmental problems or preventing their occurrence (Smith, 1988).

Congress established Part C of IDEA in 1986 for a number of reasons. Specifically, there was “an urgent and substantial need” to: (1) enhance the development of infants and toddlers with disabilities; (2) reduce educational costs by minimizing the need for special education through early intervention; (3) minimize the likelihood of institutionalization, and maximize independent living; and (4) enhance the capacity of

families to meet their child's needs (Early Intervention Program for Infants and Toddlers with Disabilities, n.d.).

DEFINITIONS

- **Autism-** A disorder of the autistic spectrum. Core deficits include: (1) a qualitative impairment in social interaction; (2) a qualitative impairment in communication; and (3) patterns of restricted, repetitive, and stereotypic behaviors, interests, and activities. Can be mild, moderate, or severe.
- **Asperger's syndrome-** A disorder of the autistic spectrum. In contrast to the diagnostic criteria for autism, Asperger criteria does not require a clinically significant language delay. Normal or near normal IQ is typical of those with this disorder.
- **Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS)-** A disorder of the autistic spectrum. A diagnosis of PDD-NOS is given when the symptoms of autism are present, but full criteria is not met. PDD-NOS is a diagnosis by exclusion of other autistic spectrum disorders.
- **Intensity of service delivery-** Measured by the following: number of months in intervention program, number of visits per week, and number of hours per visit.
- **Severity of disorder-** How profoundly the child is affected by his/her disorder. Those least affected by their condition would typically be those functioning on the mild end of the spectrum with PDD-NOS, high functioning autism, or Asperger's syndrome. The children on the opposite end would generally be those with severe or low functioning autism.

- **Developmental Status-** At intervention intake, the age in months in which a child is delayed in the developmental domains of cognition, language, fine motor, gross motor, social emotion, and self-help.
- **Applied Behavior Analysis (ABA)-** A method of early intervention based on the principles of operant conditioning. ABA assumes that children are more likely to repeat behaviors or responses that are rewarded, and less likely to continue behaviors that are not reinforced.
- **Floor-time-** A method of early intervention developed by Stanley Greenspan. This is a relationship-based intervention in which the practitioner enters the child's activities and follows the child's lead in "play." The purpose is to make each activity during floor-time an affective interaction.
- **Picture Exchange Communication System (PECS)-** A method of intervention that helps children to initiate communicative interaction and to understand the function of communication. PECS begins with teaching students to exchange pictures for desired items, then moves on to teach them how to communicate in simple sentences using the picture system.

ASSUMPTIONS

The assumptions for this analysis were threefold. First, this study was based on the assumption that the sample population for this study was truly representative of individuals with a disorder in the autistic spectrum. Second, this study assumed that the intensity of intervention service delivery was consistent across visits. Third, it was assumed that the professionals who provided early intervention services were trained, knowledgeable practitioners in their respective methodology of intervention.

LIMITATIONS

A few limitations of this study pertain to the particular population sampled. Most notably, the sample size was small—there were only 20 children with ASD assessed in this study. The children examined in this study also received services from the same, district-wide agency. The results of this study, therefore, may not be generalizable to the broader ASD population. A further limitation of this study was that the design of this investigation was not experimental in nature. Because the design of this research study did not utilize a control group and an experimental group, the findings cannot be interpreted in relation to children who did not receive treatment.

OVERVIEW

This study examined three early intervention methodologies: applied behavior analysis, floor-time, and the Picture Exchange Communication System. Each of these methodologies was investigated to determine their degree of effectiveness in treating children with ASD who are aged birth to two years. In assessing the effectiveness of these methodologies, intensity of service delivery, severity of disorder, and status of developmental functioning was examined. In the following chapter, pertinent literature regarding ASD and its treatment will be reviewed.

CHAPTER II REVIEW OF THE LITERATURE

INTRODUCTION

This chapter will begin by discussing the importance of early identification and intervention. The following section in this chapter will review 3 models of treatment utilized for preschool-aged children with autistic spectrum disorders: ABA, PECS, and floor-time. More specifically, this section will: (1) explain each type of intervention in detail; and (2) present the research findings on each intervention's effectiveness. The last section of this chapter will address the following question: How intense must therapy be for children with ASD to make significant developmental progress?

THE RATIONALE BEHIND EARLY IDENTIFICATION AND INTERVENTION

The onset for ASD is typically within the first 30 months of life (Gillberg, 1989; Volkmar et al., 1985). During these early months a number of symptoms present themselves, signaling the existence of a developmental problem. Leo Kanner was the first to describe these autistic-like characteristics apparent in infancy. According to Kanner's original report (1943), children with, what he termed, early infantile autism may seem particularly calm and unchallenging. They may fail to develop the smiling response within the first 3 months of life and/or fail to assume the anticipatory posture prior to being picked up. Similarly, these children may fail to develop normal eye contact and/or lack responses to verbal and non-verbal stimulation.

Since Kanner's time, a variety of clinical tools have been developed for the behavioral and diagnostic assessment of children with disorders in the autistic spectrum. These assessment tools range from parental interviews and practitioner observations to checklists and rating scales. Current research indicates that instruments such as these can reliably diagnose children under the age of three with autism or other related developmental disorders (Adrien et al., 1992; Gillberg et al., 1990; Cox et al., 1999). In fact, it has been shown that the symptoms of autism can be reliably assessed by 20 months of age (Cox et al., 1999; Lord, 1995) allowing a clinical diagnosis to be made early in a child's life.

Such early diagnosis of autistic spectrum disorders has become a key focus of research for several reasons. According to Cox et al. (1999), "The opportunities offered by early identification include earlier treatment, educational planning, implementation of professional support services, and genetic counseling" (p.720). Particularly, the early diagnosis and treatment of ASD is crucial for the following two reasons: (1) to afford the child a maximum opportunity to develop, and (2) to provide support and assistance to the family of the exceptional child (Tanguay, 1973).

To date, a number of research studies have reported the developmental benefits of treatment programs specially designed for young children with disorders of the autistic spectrum. In the next section, these benefits will be discussed in full detail. However, it can be said quite generally that strategic early interventions are beneficial in that they improve, to a degree, the child's social, communicative, and/or cognitive functioning. Introducing the child to treatment early on can produce such developmental gains

presumably because the most teachable moments in the child's life are being taken advantage of (Smith, 1988).

Early intervention services can also greatly impact the family of a child with ASD. McCubbin and Patterson (1983) report that families of children with developmental disabilities often suffer from strained relationships, increased financial difficulties, social isolation, challenging educational arrangements, and grief for the restricted life of their child. Early intervention programs, however, can enhance parents' attitudes about themselves and their child, increase their wealth of knowledge about their child's disorder, and provide them with the skills necessary for working daily with their child (Smith, 1988).

Simply stated, then, the purpose of early identification and intervention is to lessen the effects of ASD, a developmental disorder that can have profound consequences for both the identified child and his or her family.

RESEARCH REVIEW OF 3 EARLY INTERVENTION METHODOLOGIES

APPLIED BEHAVIOR ANALYSIS (ABA)- Before a discussion of ABA begins, a clarification of terminology is necessary. The term ABA, for the purpose of the present study, was broadly utilized. It is an all-encompassing term, representing each of the major behavior treatments of today that are rooted in ABA philosophy. These treatments include the structured programs of early intensive behavioral intervention (EIBI), discrete trial training (DTT), and, what some may call, Lovaas therapy.

ABA is fundamentally rooted in behavior analysis, the study of behavior and behavior change. In brief, the science of ABA is applying what is learned from the analysis of behavior to understand the functional relationship between behavior and

conditions. Hypotheses are formulated as to why a particular behavior occurs in a particular context. Interventions are then created to alter the identified behavior. Some techniques used to alter behavior in ABA-based interventions include functional assessment, prompting, shaping, and reinforcement. The underlying goal of such ABA techniques is to systematically and purposefully modify behavior (Jenson & Sinclair, 2002). Note that in behavioral interventions, all fundamental areas of functioning are targeted, not simply behavioral functioning. That is, the domains of language and cognition are also targeted (Pelios & Lund, 2001).

Of the numerous treatments available for children with disorders of the autistic spectrum, ABA is the most empirically evaluated (Rosenwasser & Axelrod, 2001). In fact, the surgeon general of the United States has recognized ABA as the treatment choice for autism in his mental health report for children: “Thirty years of research demonstrated the efficacy of applied behavior methods in reducing inappropriate behavior and in increasing communication, learning, and appropriate social behavior” (U.S. Department of Health and Human Services, 1999).

The documentation of such benefits in ABA interventions began in the 1960’s with the work of Ivar Lovaas and his colleagues at the University of California, Los Angeles. In their classic study (Lovaas, 1987) it was demonstrated that, with appropriate behavioral intervention, children with autism could make significant gains in intellectual and educational functioning. The study evaluated 3 groups of children with autism who were under the age of four at the time of intake. The experimental group was comprised of 19 children who received 40 hours per week of one-to-one, in-home applied behavior analysis. The control group, comprised of 19 children, received minimal treatment—10

per week or less. An additional control group of 21 children was treated for 10 hours or less at other agencies not affiliated with Lovaas's clinic. All groups received treatment for 2 or more years. Though the three groups were similar in pre-intervention measures, the differences of outcomes between groups was profound. The experimental group at age seven achieved a mean IQ of 83 compared to the control group scores of 52 and 58 respectively. Also, 9 of 19 experimental group participants were successfully mainstreamed in regular education classrooms compared to 1 of 40 in the control groups. Furthermore, a follow-up study (McEachin et al., 1993) conducted when the children were approximately 12 year old showed that the experimental group maintained its gains over the control groups.

Other studies that assessed the efficacy of ABA-based interventions also produced results similar to Lovaas's. Anderson et al. (1987) and Birnbrauer and Leach (1993) provided 18 to 25 hours of behavior treatment to preschool-aged children. Both studies showed substantial average increases in nonverbal IQ (22-29 points) among their participants.

Another replication of the Lovaas study was conducted by Smith and colleagues (2000). Eighteen children under the age of 4 with autism or PDD-NOS were randomly assigned to groups that either received intensive behavioral treatment or parent training. Fifteen of these children received an average of 24.52 hours of behavioral treatment for 2 to 3 years. Parents of the other 13 children were given 5 hours a week of training in ABA for 3 to 9 months. At intake, the groups were similar on all measures; however, at follow-up the intensive treatment group was superior to the parent training group on measures of intelligence, visual spatial skills, language, and academics. Moreover, 4

children from the intensive treatment group were able to be educated in regular education classes without support, and 24 were in regular education classes with support. In the parent training group, however, none were in regular classes without support, and 3 children were placed there with instructional support.

Together, these research findings indicate that ABA-based interventions can have significant, long-term benefits for some children with ASD. Unfortunately, it is difficult to draw comparisons across the studies because each project differed in the intensity and duration of treatment and in the overall functioning of their participants. However, it is evident through the previously reviewed studies that behavioral intervention for children with ASD is effective when applied early.

PICTURE EXCHANGE COMMUNICATION SYSTEM (PECS)- Because most children with ASD display marked impairments in language, several programs in early intervention target the development of communication. PECS is one particular training program that was developed in 1985 to provide children with ASD and alternate mode of functional communication. More specifically, PECS is a 6-phase program that teaches children to use visual graphic symbols as a means of communicating.

As explained by Bondy and Frost (2001), the goal of the initial phase in the PECS program is to teach children to make requests by exchanging pictures for desired items such as food and toys. A corresponding goal of this phase, then, is to determine which items are reinforcing to the child and to ultimately identify his/her hierarchy of preferences. Follow-up phases would teach the child to persist in his/her communicative attempts, to discriminate or make preferences, to construct sentences, to answer direct questions, and to eventually make spontaneous comments.

Although most of the published data on the efficacy of PECS is anecdotal in nature (Mirenda, 2001), data on a large number of children suggest that the PECS program is effective in producing functional communication in children with ASD. One published study on the use of PECS (Schwartz & Garfinkle, 1998) involved 31 preschool-aged children, 16 of whom were diagnosed with autism or PDD-NOS. The study was conducted over a 4-year period in which the children were exposed to PECS training in their university affiliated preschool. Over an average of 14 months, all 31 children learned to use PECS with adults and peers in the preschool. In a subsample of 18 children, 8 developed unprompted, non-echolalic verbal communication. The remaining 10 acquired some speech but used PECS as their primary mode of functional communication.

Bondy and Frost (1994) also studied the use of PECS in children with disorders of the autistic spectrum. Eighty-five children aged 5 or above who were diagnosed with autism and had no functional communication received PECS training. Of the 66 children who used PECS for more than one year, 39 acquired speech as their sole means of communication, 20 others used a combination of speech and PECS, and the remaining 7 used PECS by itself.

Another study on the efficacy of PECS training (Bondy, 1989) revealed patterns of language acquisition in children with ASD. The 7 participants of this study were preschool-aged and diagnosed with autism. After reviewing the children's progress in PECS training, the following pattern was identified: (1) confirmed absence of speech or other form of functional communication; (2) rapid development of picture use via PECS; (3) gradual development of speech during a period of mixed picture and speech use; and

(4) total use of speech without the assistance of pictures. This study also found that the average time for the children to use their first picture functionally was 2 weeks, and the average time to acquire their first 10 pictures was 3 months. To speak their first word took an average of 5.4 months, while the average number of months until they spoke 10 words was 7.1.

The results of these studies suggest that the Picture Exchange Communication System is an effective way to develop communication skills in preschool-aged children who are language impaired. That is, the preceding studies demonstrated that children with ASD could, at the very least, learn to use PECS in a functional manner and, at best, acquire full-blown speech.

FLOOR-TIME- Floor-time, developed by Stanley Greenspan, offers another intervention for preschool-age children with ASD. This particular intervention is considered a developmental approach to therapy. According to Greenspan and Wieder (1998) there are six developmental milestones to be achieved in early childhood: (1) self-regulation and interest in the world; (2) intimacy; (3) two-way communication; (4) complex communication; (5) emotional ideas; and (6) emotional thinking. If a child misses one of these milestones, the child is taken back to that phase and begins the developmental sequence again so the child may acquire the skills he/she is lacking. Floor-time interventions, therefore, are individualized in that they are designed according to the child's developmental level and individual characteristics.

Floor-time is just as it sounds—a 20 to 30 minute period when parents or practitioners get down on the floor and play with the identified child. The more severe a child is affected by his/her disorder, the more developmental milestones it is believed the

child has missed. This, in turn, increases the number of floor-time sessions needed per day. For example, many children with ASD are suggested to receive 6 to 10 sessions of floor-time a day to optimally develop (Greenspan & Wieder, 1998).

In floor-time, the emphasis is on interacting. Parents or therapists are encouraged to join the child in his/her activities and to follow the child's lead in play (Heflin & Simpson, 1998). Through the interactions of floor-time, the child can build interpersonal, emotional, and intellectual skills (Greenspan & Wieder, 1998). These interactions also "foster warmth, intimacy, and pleasure in interactive relationships" (Wieder, 1996, p. 30). Joining in the child's activity to create enjoyable interactions can motivate the child to engage, initiate, and communicate in reciprocal play (Rogers, 1999). Floor-time can also impact the child's behavioral repertoire. That is, floor-time provides an opportunity to transform perseverative play into more developmentally appropriate behavior and expand the play themes of children with ASD (Lantz, n.d.).

The efficacy of the floor-time approach is supported mainly through testimonials (Heflin & Simpson, 1998). One particular article in the April/May 1997 issue of *Zero to Three* supported the effectiveness of floor-time. In this testimonial, parents of a child named Jacob discussed the issues involved in raising a disabled child and the intervention model that helped him progress developmentally. Jacob, diagnosed with PDD, began floor-time intervention at age 3, receiving 4 to 5 hours a day of interactive play with his parents, sisters, or nanny. According to his family and therapists, Jacob's progress was rapid and remarkable. Two weeks into the intervention, Jacob's non-verbal communication began to strengthen. By one month, Jacob was engaging in symbolic

play. Nine months since the start of floor-time, Jacob began to speak. In 21 months, Jacob was speaking in full sentences.

Although no experimental studies have been conducted on the effectiveness of the floor-time approach, one descriptive study found that floor-time can make significant improvements in social behavior, affect, and cognition in children with ASD. Greenspan and Wiedner (1997) reviewed the charts of 200 children diagnosed with ASD and revealed that most children who received floor-time for more than 2 years made significant gains in all areas of development. All participants in the study received 2 to 5 hours of floor-time at home as well as other services such as speech therapy, occupational therapy, and special or general education services. It was found that 58 percent of the participants made significant improvements in affect, social behavior, cognitive skills, symbolic play, and creative behavior. They also no longer engaged in avoidant, self-stimulatory behavior or met the criteria for autism according to the Childhood Autism Rating Scale (CARS).

Although the research on the efficacy of floor-time is still in its infancy, the previously reviewed findings suggest that the floor-time approach is useful in making significant developmental improvements in preschool-aged children with ASD.

INTENSITY OF INTERVENTION AND DEVELOPMENTAL PROGRESS

The early intervention methodologies reviewed in the preceding section suggest that treatment for young children with ASD must be intensive in nature (25-40 hours per week). Applied behavior analysis, as advocated by Lovaas, was meant “to take place over a 3-year period, 365 days a year for 40 or more hours a week” (Gresham et al., 1997, p. 186). The Picture Exchange Communication System also appears to be an intense

intervention program, requiring children with language impairments to take part in a comprehensive preschool program that teaches PECS usage throughout each entire school day. Floor-time is equally intensive. Recall that children with ASD are recommended to engage in floor-time activities 4-5 hours a day, averaging approximately 32 hours a week. Must therapy be this intense for children with ASD to make significant developmental gains?

One particular report (Rogers, 1996) that reviewed 6 studies on early intervention revealed that focused treatment under 40 hours a week can improve the functioning of children with ASD. The 6 studies differed in their use of intervention programs, settings, participant ages, and assessment tools. Most importantly, the studies differed in their intensity of service delivery (15-40 hours). However, all of the studies reported significant IQ gains, significant language gains, improved social behavior, and decreased symptoms of autism. Moreover, the majority of treated children (73%) acquired functional speech by the end of their intervention period regardless of service delivery intensity.

Another study showed the effectiveness of early intervention programs that deliver fewer hours of treatment than the suggested 40 hours. Sheinkopf and Siegal (1998) compared an experimental group who received in-home behavioral treatment to a control group who received conventional school-based and brief one-to-one interventions. Each group was comprised of 11 children and the participants in both groups were matched on pre-treatment measures and diagnoses (i.e., autistic disorder or PDD-NOS). The experimental group received treatment for an average of 19.4 hours a week, for an average duration of 15.7 months. The children who received home-based

intervention showed significant gains in IQ from pre- to post-treatment services regardless of receiving 12-27 hours per week or 28-43 hours per week. Although these gains in IQ were greater than those made by the control group, the two groups were not notably different in diagnostic classification. This led the researchers of this study to conclude that “variation in treatment intensity did not relate to therapeutic response” (p. 21).

Luiselli et al. (2000) also evaluated treatment outcome in relation to intensity of service delivery. Sixteen children with diagnoses of autism or pervasive developmental disorder who participated in home-based behavioral treatment were assessed to determine whether intensity of service delivery (hours per week, duration in months, total hours) and the age at which intervention was introduced (before or after age 3) impacted assessments of developmental progress. The findings of this study were threefold: (1) all children, whether under or over 3 years of age, demonstrated significant gains in all developmental domains assessed by the Early Learning Accomplishments Profile (ELAP) and Learning Accomplishments Profile (LAP); (2) the magnitude of the improvements made between the 2 groups did not differ significantly; and (3) the children’s gains in the communication, cognitive, and social-emotional domains of the ELAP/LAP was predicted by the number of months spent in treatment. These findings led the researchers to conclude that “a longer duration of continuous intervention, independent of the number of hours that is provided per week, may be associated with the best learning outcomes” (p. 436-7).

Although intensive early interventions have been viewed as the treatment standard for young children with ASD, the findings of the three previous studies indicate that

fewer hours of treatment services can indeed yield meaningful results and that the hours of treatment provided per week may not be as important as the number of months spent in treatment. These findings are especially important when considering how children aged birth to 2 would fair in treatment programs that stressed intensity of service delivery. After all, programs that deliver treatment for many hours a week may not be suitable for such young children. That is, they may not be developmentally wired at that age for such time and energy consuming interventions.

CONCLUSION

In this chapter, the rationale behind early identification and intervention for children with ASD was first addressed. In this section it was explained that early diagnosis and treatment of ASD could: (1) afford the child maximum opportunity to develop; and (2) provide support and assistance to the family of the identified child. This chapter then discussed three early intervention methodologies in detail: ABA, PECS, and floor-time. Research on the efficacy of these types of treatment indicate that they are each effective in producing significant, long-term developmental gains in a majority of their clients. Literature evaluating treatment outcome in relation to intensity of service delivery was also reviewed in this chapter. These reports suggest that early intervention need not be intensive in nature (25-40 hours a week) to yield meaningful results in young children with ASD.

Research questions that remained but were addressed in the present study include:

- (1) Can the results on the efficacy of these 3 models of early intervention be generalized to children aged birth to two?

(2) How minimal can treatment intensity be if intervention does not have to be provided 25-40 hours per week to be effective?

CHAPTER III METHOD

INTRODUCTION

The purpose of the present study was to identify effective intervention methodologies for children with ASD who are under the age of three. Additional aims of this study were to investigate how factors such as intensity of service delivery, developmental status, and severity of disorder relate to treatment outcome. The archival data of children receiving early intervention in the form of ABA, PECS, and floor-time was reviewed. In the end, multiple statistical analyses were conducted to determine if the methodologies were effective in terms of producing significant developmental gains, and also to see if there existed any significant relationships between treatment outcome and the factors of developmental status, severity of disorder, and intensity of service delivery.

PARTICIPANTS

The participants in this study were randomly selected from a population of children who received treatment services from a child development center in southern New Jersey (described on the following page). To be included in this study, the children must have met the following criteria: (a) chronological age between 0 and 36 months; (b) diagnosis of an autistic spectrum disorder or manifestation of autistic-like tendencies; and (c) absence of major medical problems other than ASD or mental retardation. Those children with a formal diagnosis of a disorder in the autistic spectrum, namely autism, PDD-NOS, or Aspergers Disorder, met the diagnostic criteria set forth by the DSM-IV (*The Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition*).

The total number of children whose files were reviewed in this study was 20. Seventeen of the children in the sample were boys, while 3 were girls. Fifteen of the children in the sample were Caucasian, 3 were Hispanic, and 1 was African American. Data regarding race or ethnicity was missing for one of the children. The age at which intervention began for the children in this sample ranged anywhere from 6 months to 31 months ($m = 20.53$). The age at which most of the children ended treatment was on the day of their third birthday, when early intervention services routinely come to an end and the children are discharged. The exact duration of each child's intervention, however, will be addressed later in this chapter, as will methodology, developmental status, and severity of disorder.

OVERVIEW OF THE CHILD DEVELOPMENT CENTER

The child development center in which this study was based is a behavioral health care organization oriented toward the education, treatment, and habilitation of children who have a developmental delay or disorder. Specifically, this center provides early intervention services for children aged birth to two years who have a developmental delay/disorder or who are at risk of a developmental delay/disorder. It also provides preschool special education services to children with disabilities aged 3 to 5 years.

To offer these children and their families with the assistance they require, the center's staff is multidisciplinary and made up of clinical and school psychologists, behavioral therapists, speech pathologists, physical therapists, special education teachers, and occupational therapists. The intervention approach or methodology used in treatment sessions vary according to each professional's area of expertise and training as well as the individualized needs of the child and family. For example, some interventions may target

the development of language while others may be more behaviorally oriented. These intervention services also take place in a variety of settings, such as the child's home, the child development center, a day-care center, or a local hospital.

Each service provided by the center encompasses the following components:

1. Pre-treatment assessments- All major areas of developmental functioning (i.e., motor, cognitive, and language) are assessed to determine the child's degree of impairment. Assessments are completed by the center's staff and include standardized measures as well as direct observation and parent interviews.
2. Service plan- A service plan is developed for each child based on the consensus of the center's staff and other professionals who may have been involved with the child and his/her family. The plan specifies the number of hours of intervention the child would receive each week.
3. A therapist is assigned to each child and is responsible for implementing the procedures outlined in the service plan as well as for following the behavior-specific learning objectives. Therapists are individuals with BA or MA degrees in psychology, education, or a related field and are trained in intervention procedures and assessments.
4. Services are provided for the child and family until a predetermined criterion was achieved. Such a decision is based on several factors: (a) the child has reached his/her third

birthday and will receive preschool special education services; (b) funding sources no longer allowed the continuation of services; or (c) the child accomplished the specified learning objectives of the service plan that he/she no longer requires intervention services.

MEASURES

The children of this study did not directly participate in this study. Rather, the archival data regarding these children were reviewed. Of particular interest in these files were the following: severity of disorder, developmental status, intensity of service delivery, intervention methodology, and overall developmental progress.

SEVERITY OF DISORDER- To identify the severity of each child's condition, the disorders of the autistic spectrum were ranked from least to most severe. Therefore, the ranking was as follows: (1) PDD tendencies; (2) mild PDD or Asperger's Syndrome; (3) moderate PDD or Asperger's Syndrome; and (4) autistic disorder. As stated previously, all of the children in the present study were receiving early intervention services because they manifested characteristics of such disorders. While some children's files reported a formal diagnosis of autistic disorder, others were simply diagnosed with the broader labels of PDD or ASD. In cases such as this, the professionals who provided individualized services to these children were made to classify each of their patients with one of the disorders in the autistic spectrum and to further delineate if the condition was mild or moderate. As illustrated in Figure 3.1, 10 children in the present study were formally diagnosed with Autistic Disorder, 2 were classified as having moderate PDD, 1

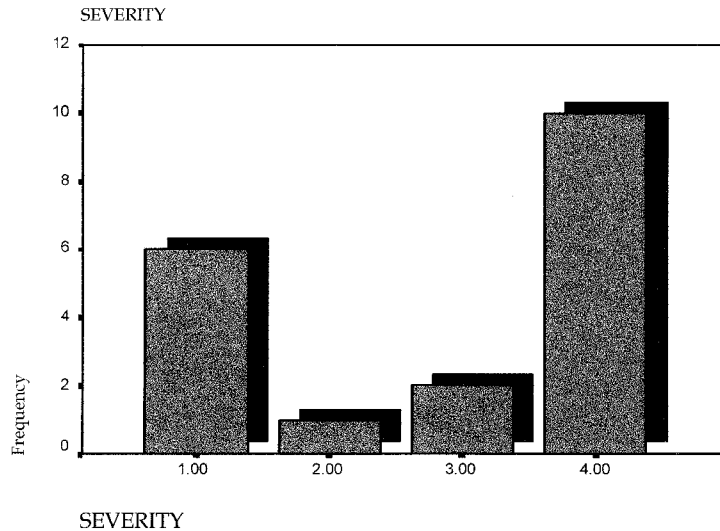


Figure 3.1

was classified with mild PDD, and 6 of the children were thought to display PDD tendencies. One child's data regarding treatment methodology was missing and, therefore, was not used in any of the analyses pertaining to intervention methodology. Note also that none of the children in the present study were diagnosed as having Asperger's syndrome.

DEVELOPMENTAL STATUS- Developmental status, for the purpose of this study, refers to the age in months in which a child is developmentally delayed at intervention intake, or at the child's first individualized family service plan (IFSP) meeting. Status at intake is particularly important because it is used to compute developmental progress. The six developmental domains measured were cognition, language, gross motor, fine motor, social emotion, and self-help. These measures were stated in each of their files and were obtained from one or more of the following instruments: The Early Learning Accomplishments Profile (ELAP), The Hawaii Early Learning Profile (HELP), or The Receptive/Expressive Emerging Language Scale (REEL). Those children's files whose developmental status was reported anecdotally at the initial IFSP meeting were reviewed

to determine quantitatively the number of months in which they were delayed. Note that the developmental status for each of the domains was averaged. In other words, if a child was reported to function cognitively at 15 to 20 months, the child was ultimately recorded as functioning at 17.5 months.

INTENSITY OF SERVICE DELIVERY- For each child, three measures of service delivery were examined. The hours per week of treatment is the first of these measures and is defined as the number of hours of services delivered to the child and family each week. The children in this study were categorized into one of two groups: (1) those who received 2 hours of services a week or less; and (2) those who received more than 2 hours a week of intervention services. Ten children in the present study received 2 hours or less of services, while 9 received over 2 hours a week. Second, the duration of treatment was investigated. That is, the cumulative number of weeks that services were provided for each child was assessed. The children in this study fell into one of the three following categories of treatment duration: (1) 50 weeks or less; (2) 51 to 100 weeks; or (3) 101 weeks or more. Ten children in the sample received treatment for 50 weeks or less, 6 were in treatment for 51 to 100 weeks, and 3 children received over 101 weeks of intervention services. Third, the total number of visits, or the number of services per week provided for the duration of the treatment program, was examined. Again, the children in this study belonged to one of two groups: (1) those who received 2 visits a week or less; and (2) those who received more than 2 visits a week. Nine children in this study received 2 visits or less a week, and 10 were seen more than 2 visits a week. Data of this sort, which indicates the intensity of service delivery, were routinely recorded by the therapists during the course of treatment and were reported in each of the children's

files. However, data regarding one child's treatment program was missing and, therefore, not included in any investigation having to do with intensity of service delivery.

INTERVENTION METHODOLOGY- Intervention methodology is the type of intervention used throughout treatment. As was reported in their program files, the children in this study received one or more of the following three methodologies: ABA, PECS, or floor-time. As seen in Figure 3.2, 6 of the children in the present study received intervention in the form of PECS, 9 were provided with ABA, and 2 children received floor-time. Additionally, 3 of the children received a combination of two

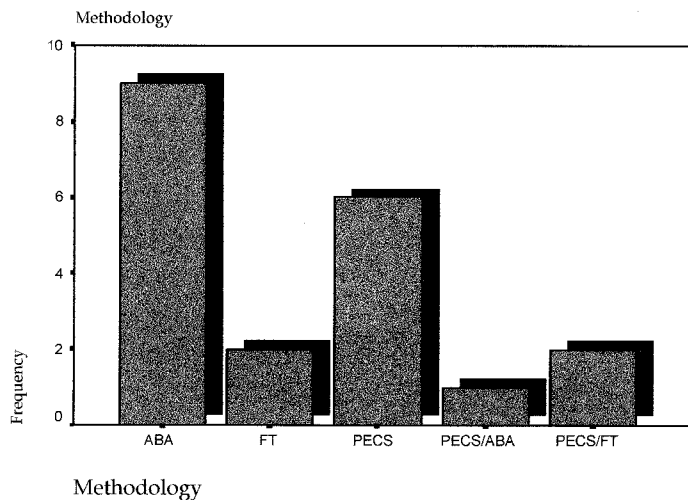


Figure 3.2

intervention methodologies (2 were provided with PECS training as well as floor-time; 1 received PECS training alongside ABA).

DEVELOPMENTAL PROGRESS- The files on these children reported their levels of developmental functioning not only at intervention intake, but also at each re-evaluation. Reviews of each child, or re-evaluations, occur at 6-month, 9-month, or 12-month intervals, and also at the time of discharge. The interval at which reviews occur differ from child to child depending on how long services are rendered. Over that course of

from child to child depending on how long services are rendered. Over that course of time, however, each child's progress can be noted as was in the present study. That is, by tabulating the number of months each child in this study had changed in the developmental domains of language, cognition, fine motor, gross motor, social emotion, and self-help, each child's progress in treatment was examined.

PROCEDURE

After the files were obtained for each child in the study and the five factors mentioned above were examined, comparisons were made across the children's data. To determine whether the methodologies of ABA, PECS, and floor-time were effective treatments, the developmental progress made by each child was assessed. The Wilcoxon Signed Ranks Test, which calculated the difference between each child's level of developmental functioning at the start of intervention and the level of functioning at a later evaluation, revealed the children's developmental progress made in early intervention programs. Also, multivariate analyses of variance and Kruskal-Wallis tests were conducted to investigate the effects of developmental status, severity of disorder, intensity of service delivery, and intervention methodology on treatment outcome. The results were then graphed to illustrate the effects or relationships found.

CONCLUSION

The archival data of 20 children who received intervention services from a child development center in southern New Jersey were reviewed to reveal if the methodologies of ABA, PECS, and floor-time were effective treatments for children with ASD aged 0 to 2. Of particular interest in these files was their developmental status, the severity of their disorder, and the intensity of the treatment they received. To determine if any significant

relationships existed between the treatment variables and treatment outcome, multiple statistical analyses were conducted. The findings from these tests will be graphed and discussed in full detail in the following chapter.

CHAPTER IV RESULTS

The research questions for the present study were threefold. First, are the early intervention methodologies of ABA, PECS, and floor-time effective treatments for children with ASD aged 0 to 2 years? After the analysis of each child's intervention methodology and their developmental progress in the domains of cognition, language, gross motor, fine motor, social emotion, and self-help, the exact efficacy of each individual intervention remained unclear. That is, multivariate analyses of variance (ANOVAs) revealed that no particular methodology produced more developmental gains in its children than any other methodology. Rather, the Wilcoxon Signed Ranks Test indicated that all of the early intervention methodologies examined in the present study produced significant developmental changes in its patients. As illustrated in Figure 4.1,

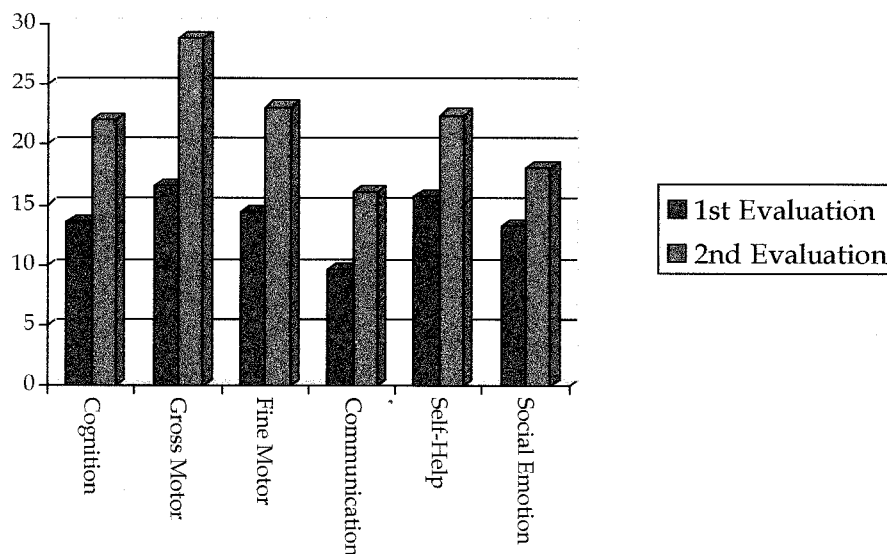


Figure 4.1

the children, regardless of the type of intervention they received, made significant gains on average in the developmental domains of cognition ($Z=3.521$, $p<.001$), gross motor ($Z=3.625$, $p<.001$), fine motor ($Z=3.517$, $p<.001$), communication ($Z=3.517$, $p<.001$), self-help ($Z=2.551$, $p=.01$), and social emotion ($Z=2.494$, $p=.01$). The Wilcoxon Signed Ranks Test further showed that the domains of cognition, gross motor, fine motor, and communication had the most significant difference between the first and second evaluation, while the domains of self-help and social emotion had the least.

The second research question guiding the present study was: How intense must therapy be for children to make substantial developmental gains in early intervention? After multivariate ANOVAs were conducted, it was revealed that the number of visits per week and the number of weeks in treatment did not effect developmental progress as did the hours of services provided per week. In fact, there was no difference found between groups based on the number of visits per week the children received. Although, the number of weeks in treatment did significantly effect the developmental progress made in the gross motor domain ($F_{(2,15)}=6.825$, $p<.01$), it did not significantly impact the progress made in the domains of cognition and communication, which are the two developmental areas perhaps most often affected in individuals with ASD. Hours provided per week, however, did significantly effect the progress made in the domains of cognition ($F_{(1,16)}=7.729$, $p<.01$) and communication ($F_{(1,16)}=5.188$, $p<.05$).

Figure 4.2 and Figure 4.3 on the following page further illustrate how cognitive and communicative progress is related to hours of services provided per week. Both of these bar graphs show that the children in group 2, those who received more than 2 hours of early intervention services a week, made more developmental progress on average

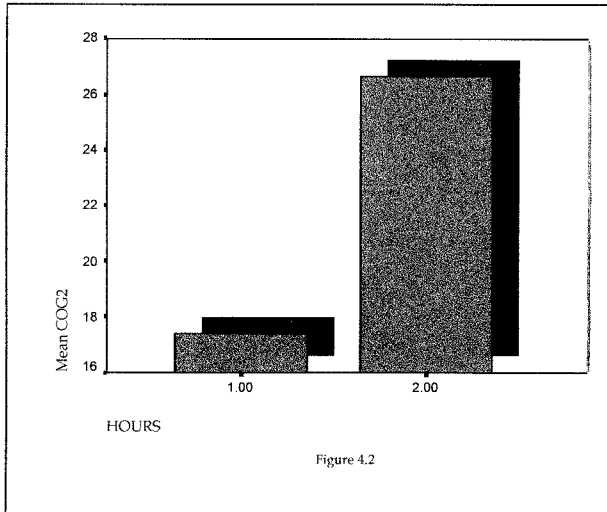


Figure 4.2

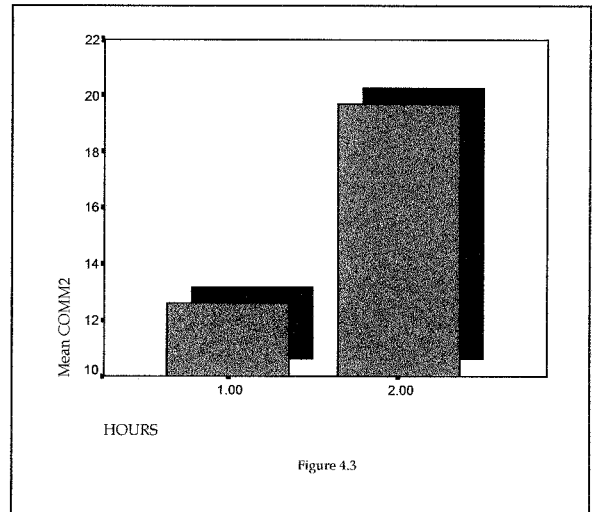


Figure 4.3

than those receiving 2 hours of services a week or less.

The last of the research questions that was addressed in this analysis asked: How does severity of disorder relate to treatment outcome? Kruskal-Wallis analyses of variance indicated that severity of disorder is not significantly related to treatment outcome in any of the developmental dimensions examined except for communication ($\chi^2=2.086$, $p<.05$). Specifically, this test indicated that severity of disorder is negatively correlated to communicative progress. As severity of disorder decreased, communicative gains increased.

SUMMARY

Numerous analyses have revealed many statistically significant relationships between treatment outcome and the factors of intervention methodology, intensity of service delivery, and severity of disorder. Although not one intervention methodology appeared more effective in producing developmental progress, the early intervention programs of ABA, PECS, and floor-time as a whole brought about substantial developmental gains. Upon investigation of intensity of service delivery, the hours per week of treatment services that children received was shown to most significantly effect

the developmental progress the children in the present study made. The number of visits per week and the total number of weeks in treatment were not found as predictive of positive treatment outcomes. Severity of disorder was also significantly related to treatment outcome in the developmental domain of communication. More specifically, it was found that as severity of disorder decreased, communicative progress increased.

CHAPTER V SUMMARY AND CONCLUSIONS

The archival data regarding 20 children who received early intervention services from a child development center in southern New Jersey were reviewed. Each child in the sample was aged 0 to 2 years, had a disorder of the autistic spectrum, and was provided with treatment in the form of ABA, PECS, floor-time, or a combination of interventions. The three questions that guided the research of the present study were as follows: (1) Are the early intervention methodologies of ABA, PECS, and floor-time effective treatments for children with ASD age 0 to 2 years?; (2) How intense must therapy be for children to make substantial developmental gains?; and (3) How does severity of disorder relate to treatment outcome?

Statistical analyses revealed that, regardless of intervention methodology, early intervention on the whole produces significant developmental gains in the domains of cognition, gross motor, fine motor, communication, social emotion, and self-help. Additionally, it was found that the number of hours of services provided weekly, not the number of visits or weeks in program, effected overall developmental progress. Lastly, severity of disorder was found to be associated with treatment outcome in the developmental domain of communication. The less severe a child's disorder was, the more communicative progress was made.

DISCUSSION

Although no particular treatment methodology rose above the others as most

effective, all of the treatment programs in which the children participated produced meaningful results. Because the sample in the present study had only 20 children and 15 percent of those children received a combination of intervention methodologies, meaningful comparisons could not be made across the treatments of ABA, PECS, and floor-time. It is also difficult to compare across interventions because no methodology is pure in nature, especially when working with such young patients. That is, when working with young children with developmental disorders, oftentimes practitioners pull different techniques from the various treatment approaches, creating an individualized but assorted-type of intervention. Although patients are provided with one primary mode of treatment, for example ABA, it is likely that they will receive at one time or another a different form of treatment, like floor-time, especially if the children are under the age of 2 when it is difficult not to follow the child's lead during treatment sessions.

Although ABA, PECS, and floor-time have differing techniques and underlying philosophies, all three have basic commonalities that presumably account for the results presented earlier, that the early interventions assessed in the present study were, as a whole, effective. One key commonality among the three methodologies is the involvement of parents in their child's treatment. Having parents actively involved in intervention programs does not simply provide them with the support needed to cope with their child's special needs, but affords them the skills necessary to implement their child's program at home without the presence or ability of the practitioners. This particular factor may play an important role in the success of treatment programs.

The interventions in this study are also similar in their degree of structure and individualization. That is, professionals at the child development center provide treatment services in a similar fashion regardless of the type of treatment they employ.

More specifically, professionals of any methodology: (1) adhere to clearly specified objectives set forth by their patients' IFSPs; (2) monitor the progress of their children regularly through assessments; and (3) modify treatment services and objectives when needed. Such structured and individualized treatment may also contribute to the effectiveness of the early intervention programs implemented.

As was mentioned previously, all of the children in the present study made significant gains on average in each of the developmental domains examined, indicating that early intervention as a whole is effective. However, the progress made in the domains of social emotion and self-help were not as substantial as those made in the areas of cognition, gross motor, fine motor, and communication. This finding requires elaboration. The areas targeted most consistently in treatment sessions are those that present the most problems for the child and family. Therefore, communication and non-verbal skills, which are cognitive in nature, are usually the focal point of treatment. Motor skills are not consistently deficient in children with ASD, but if a child does have difficulties with gross or fine motor, he/she will be provided with physical and/or occupational therapy. In other words, motor problems are immediately addressed. This is not necessarily the case with social emotion and self-help skills. Generally, practitioners give the children's parents tips and advice on ways to promote growth in these domains. For example, if a child has not yet moved from the bottle to the cup, the service provider may give the parents ways to encourage such a transition rather than make it the focus of several treatment sessions. This being said, the developmental progress made in the domains of social emotion and self-help may be due more so to maturation than to treatment effect. Furthermore, it is presumed that because deficits in

these domains are not often directly addressed in treatment programs, these areas did not produce as substantial of developmental gains than the other domains examined.

In the previous chapter, it was revealed that the hours of services provided per week significantly effected the overall developmental progress made in treatment. The number of visits per week or weeks in treatment did not significantly impact treatment outcome. Although it did not reach statistical relevance, multivariate ANOVAs did show, in general, that the more hours, visits, or weeks of services delivered, the more progress the children made. Consider the following three figures:

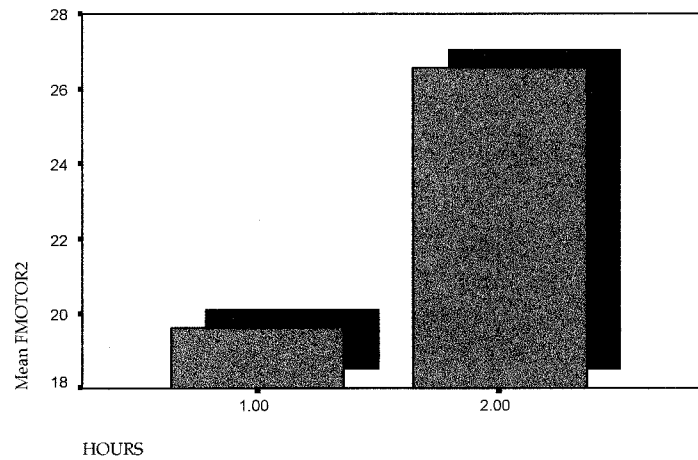


Figure 5.1

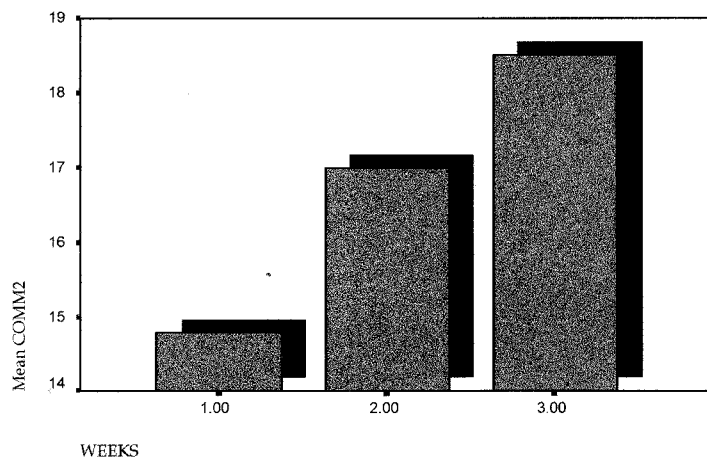


Figure 5.2

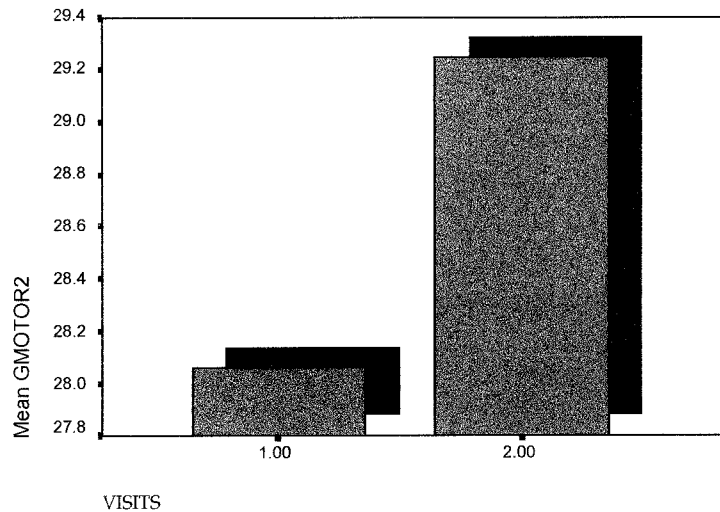


Figure 5.3

Figures 5.1, 5.2, and 5.3 illustrate the general association between intensity of service delivery and treatment outcome. Figure 5.1 indicates that the children in group 2, or those children who received more than 2 hours per week of services, progressed more on average in the domain of fine motor than those children who received 2 hours or less per week. Figure 5.2 shows that the children in group 3, or those children who endured treatment for 101 weeks or more made more communicative gains than those children in treatment for a shorter duration. Accordingly, Figure 5.3 illustrates that the children receiving more than 2 visits per week of services progressed more in the domain of gross motor on average than those receiving 2 visits or less weekly. In sum, the more services the children in the sample received, the more developmental gains they averaged. Note, again, that these associations were not found to be statistically significant. However, it is the belief of this writer that if the sample size in the present study had been larger, these findings may have indeed reached statistical relevance. Also important to note is that every domain measured did not make such developmental gains even when services were rendered intensely. Finding such as this, though, will be addressed later in this chapter.

As one will recall, a major point of discussion in Chapter 2 was that existing literature emphasizes the importance of intense intervention. That is, the early intervention methodologies reviewed in that chapter suggested that treatment for young children with ASD must be intensive in nature, or be provided at least 25-40 hours a week. Even those researchers that felt meaningful developmental gains could be made with less hours a week investigated children receiving 12 hours of services weekly or more. Like all of these research analyses, the present study does indicate that more hours of treatment per week is better associated with developmental progress than less hours a week. However, the group who made the most progress in the present study was receiving anywhere from 2.5 to 10 hours of treatment services per week, or an average of 4 hours weekly. The present study, therefore, stands apart from the previously reviewed research studies in that it shows children with ASD aged 0 to 2 can substantially benefit from early intervention programs that provide less than 10 hours of services per week.

The last of the findings in the present study indicated that severity of disorder was significantly associated with communicative progress. The more severe a child's disorder, the less progress was made. Even though the relationship between severity of disorder and treatment outcome was not found to be statistically significant in the other 5 developmental domains, multivariate ANOVA's revealed a slight trend that deserves to be highlighted. Consider the two figures on the following page. These figures illustrate the relationship between weeks in treatment and developmental progress. As mentioned previously, not all children receiving the most intense of interventions made progress in certain developmental domains. Weeks, for example, was not associated with progress in the domains of fine motor and gross motor. This is presumably due to the effect of a

confounding variable—severity of disorder. In other words, the children who are most severely affected by their condition are those children who receive treatment for the longest period of time. In reference to Figures 5.4 and 5.5, group 3, or those children

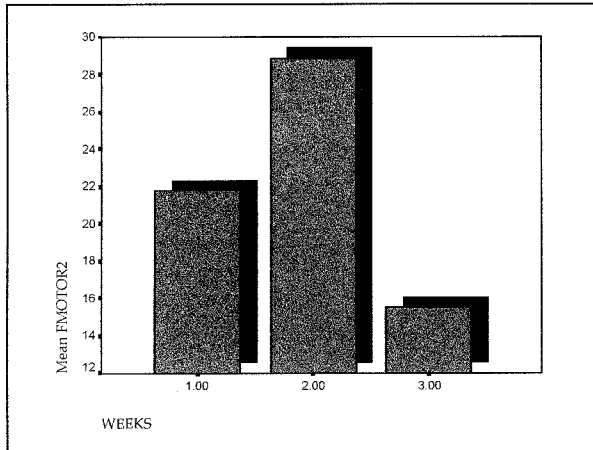


Figure 5.4

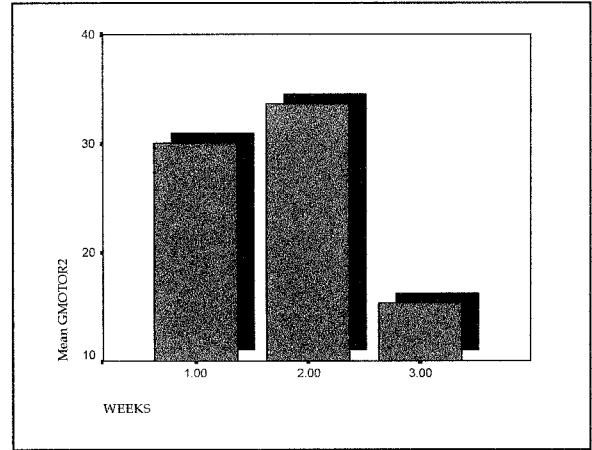


Figure 5.5

receiving treatment for 101 weeks or more, were those children who had the most severe of disorders, and who ultimately made the least of progress in the domains of fine motor and gross motor respectively. It is believed that if the present study obtained a larger sample size and, therefore, had more children with disorders of varying degrees of severity, these relationships would have been more clearly defined.

LIMITATIONS

After the previous discussion, it is apparent that a major limitation to this study is its small sample size. The archival data regarding only 20 children were used, limiting the amount of comparisons that could be made across treatment factors, and restricting the amount of statistically significant relationships found. When conducting archival research, it is inevitable that some data will be missing in the files. However, when the sample is small, missing data can substantially affect the results of statistical analyses.

Another shortcoming related to the study's sample is that the children obtained for this analysis received services from the same, district-wide agency. The results of this report, therefore, may not be generalizable to the broader ASD population.

A further limitation of the present study is that the design of the investigation was not experimental in nature. In their report to the National Institute of Health, Bristol and colleagues (1996) suggested that future analyses regarding individuals with autism be experimental in design to generate more scientific, precise results. More specifically, they suggested: (1) experimental designs should be used that allow comparisons to be made across treatment approaches; (2) the experimental designs should be double-blind and use random assignment to reduce bias and promote sample representativeness; and (3) longitudinal designs should be employed in which immediate, intermediate, and long-term effects can be assessed.

IMPLICATIONS FOR FUTURE RESEARCH

There are several questions that the present study raised which warrant future analyses regarding children with ASD aged 0 to 2. Firstly, the research presented in this report indicated that ABA, PECS, and floor-time all are effective in producing meaningful developmental gains. However, due to small sample size, it was not possible to assess which intervention approach most improved the children's functioning in the domains of cognition, gross motor, fine motor, communication, social emotion, and self-help. Therefore, future research is needed to investigate which methodology is most successful in treating each independent domain. Secondly, the degree of progress made by children who receive early intervention services for less than 10 hours a week need to be compared against the degree of progress made by children who receive the previously

recommended 15-40 hours a week of treatment. Research such as this will shed light onto a highly debated issue—how intense treatment programs must be to have children with ASD make substantial progress. Lastly, more research is needed to show the precise relationship between severity of disorder and developmental progress. Unfortunately, the present study was unable to reveal many statistically significant correlations between these two factors.

The following lists other issues related to the topic of this report, but which were beyond the scope of the study. These subjects also necessitate future research:

- 1) What are the specific characteristics of children that lead to successes in early intervention? In other words, why do some children progress considerably and others do not?
- 2) What is the best way to teach communication across treatment approaches? Because children with ASD typically have weak communication skills and because many interventions target the development of communication, research on this topic is warranted.
- 3) What are the effects of different intervention methodologies on various groups of children within the ASD population (i.e., verbal vs. non-verbal)?

CONCLUSIONS

The results of the present study did not prove that one intervention methodology was better than another. However, the findings indicate that treatment provided early in the course of a child's disorder is successful in improving his/her overall degree of functioning. Moreover, it is theorized that effective early intervention programs are those that actively involve the parents, and are highly structured and individualized in nature.

It has also been shown that intensity of service delivery has significant effects on treatment outcome. Contrary to the research regarding preschool-aged children with ASD, children aged 0 to 2 with disorders of the autistic spectrum can make considerable developmental gains with less than 10 hours of intervention services. It has also been found that severity of disorder is negatively correlated with the progress that is made in treatment. Because Autistic Spectrum Disorders are widespread in the pediatric population and existing literature is not generalizable to children under the age of 3, further research is needed to better understand the variables that most affect treatment outcome and promote intervention success.

REFERENCES

- Adrien, J.L., Barthelemy, C., Perrot, A., Roux, S., Lenoir, P., Hameury, I., & Sauvage, D. (1992). Validity and reliability of the infant behavioral summarized evaluation: A rating scale for the assessment of young children with autism and developmental disorders. *Journal of Autism and Developmental Disorders, 22*, 375-394.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders (4th ed.)*. Washington, D.C.: American Psychiatric Association.
- Anderson, S. R., Avery, D. L., DiPietro, E. K., Edwards, G. L. & Christian, W. P. (1987). Intensive home-based early intervention with autistic children. *Education and Treatment of Children, 10*, 352-366.
- Birbrauer, J. S., & Leach, D. J. (1993). The murdock early intervention program after 2 Years. *Behavior Change, 10*, 63-74.
- Bondy, A. (1989). The development of language via picture exchange communication system: communicative outcomes for young children with disabilities. *Topics in Early Childhood Special Education, 18*, 144-160.
- Bondy, A. S., & Frost, L. A. (1994). The picture exchange communication system. *Focus on Autistic Behavior, 9*, 1-19.
- Bondy, A., & Frost, L. (2001). The picture exchange communication system. *Behavior Modification, 25*, 725-744.
- Bryson, S. E. (1996). Brief report—Epidemiology of autism. *Journal of Autism and Developmental Disorders, 26*, 165-167.

- Cox, A., Charman, T., Baron-Cohen, S., Drew, A., Klein, K., Baird, G., Swettenham, J., & Wheelwright, S. (1999). Autism spectrum disorders at 20 and 42 months of age: Stability of clinical and ADI-R diagnosis. *Journal of Child Psychology and Psychiatry Allied Disciplines*, 40, 719-742.
- Early intervention program for infants and toddlers with disabilities (Part C of IDEA). (n.d.). Retrieved October 6, 2002, from <http://www.nectac.org/partc/partc.asp>
- Filipek, P. A., Accardo, P. J., Baranek, G. T., Cook, E. H., Dawson, G., Gordon, B., Gravel, J. S., Johnson, C. P., Kallen, R. J., Levy, S. E., Minshew, N. J., Prizant, B. M., Rapin, I., Rogers, S. J., Stone, W. L., Teplin, S., Tuchman, R. F., & Volkmar, F. R. (1999). The screening and diagnosis of autistic spectrum disorders. *Journal of Autism and Developmental Disorders*, 29, 439-484.
- Gillberg, C. (1989). Early symptoms in autism. In: Gillberg, C. (ed.). *Diagnosis and Treatment of Autism*. Plenum Press, New York, 23-32.
- Gillberg, C., Ehlers, S., Schaumann, Jakobssen, G., Dahlgren, S. O., Lindblom, R., Bagenholm, A., Tjuus, T., & Blidner, E. (1990). Autism under age 3 years: A clinical study of 28 cases referred for autistic symptoms in infancy. *Journal of Child Psychology and Psychiatry Allied Disciplines*, 31, 921-934.
- Greenspan, S. I., & Wieder, S. (1997). Developmental patterns and outcomes in infants and children with disorders in relating and communicating: A chart review of 200 cases of children with autistic spectrum diagnoses. *Journal of developmental and Learning Disabilities*, 1, 87-141.
- Greenspan, S. I., & Wieder, S. (1998). The floor-time approach. In S. Greenspan (Ed.). *Intellectual and Emotional Growth* (121-132). Reading, MA: Addison-Wesley.

- Gresham, F. M. & MacMillan, D. L. (1997). Autistic recovery: An analysis and critique of the empirical evidence on the early intervention project. *Behavioral Disorders*, 22, 185-201.
- Hanson, M. J. & Bruder, M. B. (2001). Early intervention: promises to keep. *Infants and Young Children*, 13, 47-58.
- Heflin, L. J., & Simpson, R. L. (1998). Interventions for children and youth with autism: Prudent choices in a world of exaggerated claims and empty promises. *Focus on Autism and Other Developmental Disabilities*, 13, 194-211.
- Jacob's story: A miracle of the heart. (1997 April/May). *Zero to Three*. Retrieved from <http://www.zerotothree.org/jacob.html>
- Jenson, V. K., & Sinclair, L. V. (2002). Treatment of autism in young children: Behavioral intervention and applied behavior analysis. *Infants and Young Children*, 14, 32-42.
- Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child*, 2, 217-250.
- Lantz, J. (n.d.). Play-time: An examination of play intervention strategies for children with autism spectrum disorders. Retrieved November 4, 2002 from <http://www.iidc.indiana.edu/irca/SocialLeisure/playtime.html>
- Lord, C. (1995). Follow-up of two-year-olds referred for possible autism. *Journal of Child Psychology and Psychiatry Allied Disciplines*, 36, 1365-1382.
- Lovaas, O. I. (1987). Behavior treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*, 55, 3-9.
- Luiselli, J. K., Cannon, B. O., Ellis, J. T., & Sisson, R. W. (2000). Home-based

- behavioral intervention for young children with autism/pervasive developmental disorder. *Autism*, 4, 426-438.
- McCubbin, H., & Patterson, J. (1983). Family transitions: Adaptation to stress. In H. I. McCubbin & C. Figley (eds.). *Stress and the Family: Coping with Normative Transitions* (Vol. 1). New York: Brunner/Mazel.
- McEachin, J. J., Smith, T., & Lovaas, O. I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal on Mental Retardation*, 97, 359-372.
- Mirenda, P. (2001). Autism, augmentative communication, and assistive technology: What do we really know? *Focus on Autism and Other Developmental Disorders*, 16, 141-152.
- Pelios, L. V., & Lund, S. K. (2001). A selective overview of issues on classification, causation, and early intensive behavioral intervention for autism. *Behavior Modification*, 25, 678-697.
- Ramey, C. T., & Ramey S. L. (1998). Early intervention and early experience. *American Psychologist*, 53, 109-120.
- Rogers, S. J. (1996). Brief report: Early intervention in autism. *Journal of Autism and Developmental Disorders*, 26, 243-247.
- Rogers, S. J. (1999). Intervention for young children with autism: From research to practice. *Infants and Young Children*, 12, 1-16.
- Rosenwasser, B., & Axelrod, S. (2001). The contributions of applied behavior analysis to the education of people with autism. *Behavior Modification*, 25, 671-677.
- Schwartz, I. S., & Garfinkle, A. N. (1998). The picture exchange communication

system: Communicative outcomes for young children with disabilities.

Topics in Early Childhood Special Education, 18, 144-160.

- Sheinkopf, S. J., & Siegal, B. (1998). Home-based behavioral treatment of young children with autism. *Journal of Autism and Developmental Disorders*, 28, 15-23.
- Smith, B. J. (1988). Does early intervention help? *Eric Clearinghouse on Handicapped and Gifted Children*. Retrieved September 18, 2002 from <http://ericir.syr.edu/plwebcgi/obtain.pl>
- Smith, T., Groen, A. D., & Wynn, J. W. (2000). Randomized trial of intensive early Intervention for children with pervasive developmental disorder. *American Journal on Mental Retardation*, 105, 269-285.
- Tanguay, P. E. (1973). A pediatrician's guide to the recognition and initial management of early infantile autism. *Pediatrics*, 51, 903-910.
- U.S. Department of Health and Human Services. (1999). *Mental Health: A report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Administration, Center for Mental Health Services, National Institutes of Health, National Institute of Mental Health.
- Volkmar, F. R. Stier, D. M., & Cohen, D. J. (1985). Age of recognition of pervasive developmental disorder. *American Journal of Psychiatry*, 142, 1450-1452.
- Wiedner, S. (1996). Integrated treatment approaches for young children with multisystem developmental disorder. *Infants and Young Children*, 8, 24-34.
- Wing, L. (1996). Wing Autistic Disorder Interview Checklist (WADIC). In I. Rapin

(Ed.), *Preschool children with inadequate communication: Developmental language disorder, autism low IQ* (pp. 247-251). London: MacKeith.