

Early intervention for children with autism: Methodologies critique

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The topic of early intervention for autism is widely researched and discussed within the literature. The application of applied behavioral analysis (ABA) continues to be an important topic. Due to the extensive amount of research on behavioral treatments for autism, and its widespread practice, the focus of this paper will be based upon treatment of autism using learning theory and behavioral principles. Specifically, the work of Lovaas will be reviewed followed by a brief examination of replication and follow-up studies. The efficacy of ABA style treatment programs will be reviewed along with methodological concerns that impact on the validity of treatment results.

Introduction

In order to understand the rationale for intensive early intervention for autism, it is necessary to be familiar with the characteristics associated with the diagnosis. Autism Spectrum Disorder (ASD) can be defined as a neurological disorder of unknown specific etiology. It is a lifelong, pervasive developmental disorder that affects approximately two to four times more males than females. Presently, a diagnosis of autism is dependent upon having a minimum of six of 12 criteria from the Diagnostic and Statistical Manual fourth Edition (DSM-IV; American Psychiatric Association [APA], 2000). The six required criteria span four major diagnostic areas, including impairment in social interactions, impairment in communication, restricted repetitive pattern of behavior and age of onset prior to age three. The qualitative impairments associated with the disorder can be further defined as social skills deficits, which include impaired use of nonverbal behaviors, impairment in the development of appropriate friendships, sharing, and social and emotional reciprocity. Communication deficits are characterized by

delayed or deviant use of language, pragmatics, and appropriate spontaneous imaginative play. The restricted repetitive pattern of behavior is characterized by some form of preoccupation, stereotyped motor mannerism, restricted range of interests, and/or an interest in specific non-functional routines that are abnormal in intensity or focus (APA, 2000). In addition to the three core areas of impairment, there are also a variety of associated behavioral symptoms that include hyperactivity, aggression, impulsivity, self-injurious behaviors, and difficulty attending. Evidently, the interplay of the impairments and symptoms associated with ASD has the capacity to greatly impede an individual's ability to learn. Current prevalence estimates of children presenting with autistic characteristics are 1 in 166 (Chakrabarti & Fombonne, 2005; Fombonne, 2003), thus making effective early intervention even more critical. The promotion of a child's social development, language development, and the minimization of behaviors that interfere with social functioning and learning are the main aims of treatment for children with autism (e.g., Koegel & Koegel, 2006; Prizant, Wetherby, Rubin, & Laurent, 2003; Smith, 1999).

Theories of Autism

Numerous theorists have attempted to explain the complex underlying cognitive and social deficits that characterize autism. There exists a lengthy tradition of cognitive research, especially in the UK, and autistic children have been found to differ from other handicapped children on a variety of cognitive tasks, particularly those involving abstraction. This research has been formed into the proposal that autistic children lack a theory of mind (Baron-Cohen, Leslie, & Frith, 1985). Theory of mind refers to the mental construction of how the people we interact with think and feel based on their statements and behaviour. An individual is thought to lack a theory of mind when he or she observes the behaviour of others but does not imagine what they are thinking or feeling that brings about the behaviour. One prominent theorist behind the theory of mind deficit is Uta Frith. Frith's explanation of autism emphasizes deficits in the ability to engage in imaginative ideas, the ability to interpret feelings, and in understanding intentions beyond the literal content of speech; abilities ultimately dependent on an innate cognitive

mechanism (Frith, 1993). The cognitive deficit that is hypothesized by Frith is specific enough so as not to exclude achievement by autistic people in diverse areas of learning, including memorization of facts and social skills that do not necessarily involve exchanges or interactions between two individuals. Research by Baron-Cohen et al. (1985) has shown that some theory of mind deficits in autistic children may be overcome. Baron-Cohen et al. found that emotions can be learned by people who have problems in this area. A computer program entitled *Mind Reading* provides opportunities to study emotions through the use of video clips, stories and voices in order to overcome specific theory of mind deficits. *Mindreading: the interactive guide to Emotions* was developed by a team of scientists at Cambridge University led by Simon Baron-Cohen (Baron-Cohen, Golan, Wheelwright, & Hill, 2004). The program includes quizzes and lessons that enable this learning to be tested. *Mind Reading* was designed with awareness of the special needs of children and adults who have difficulties recognizing emotional expression in others. It enables the user to study emotions and to learn the meanings of facial expressions and tone of voice, drawing on a comprehensive underlying audio-visual and text database. The *Mind Reading* program is based upon a cognitive/information processing theory of autism.

Different theories of autism ultimately lead to different approaches to psychological and educational intervention. An alternative theory of autism is based upon learning theory. Given that it is an alternative theory, alternative methods of treatment are utilized. To date, treatment for autism has predominately had its foundation in operant learning theory, promoting achievement in areas such as basic concepts acquisition, communication, and adaptive functioning. Achievements in these areas may be considered prerequisites for acquiring the higher level skills associated with theory of mind deficits. In acquiring the prerequisite foundational skills, some of the most promising treatments for individuals with autism are those based on behavioral modification or applied behavior analysis (ABA). Behavior modification and ABA have their foundation in operant learning theory (Lovaas, 1987); a theory whereby it is hypothesized that behavioral excesses and deficits

observed in children with autism could be controlled by environmental consequences such as reinforcement, punishment, and extinction.

One behavioral treatment is Intensive Behavioral Intervention, which integrates Applied Behavioral Analysis (ABA) as a key component. Given that autism is the most common of the developmental disorders, treatment programs that may increase the likelihood of a positive prognosis are critical (APA, 1994). The efficacy of ABA style treatment programs will be reviewed along with methodological concerns that impact on the validity of treatment results.

ABA defined

Applied Behavioral Analysis refers to a method of teaching which utilizes a series of trials to shape desired behaviors and responses (Leaf & McEachin, 1999). Within ABA, skills are broken down into their simplest components and then taught to a student using a positive reinforcement system. This style of intervention requires high levels of both structure and reinforcement. Leaf and McEachin, (1999) describe the use of discrete trial instruction to teach children with autism. Each trial serves as a building block which provides the basic foundation for learning. A critical component of the ABA approach to treating autism is its high intensity of service, which typically consists of 30-40 hours per week of one-to-one intervention provided by a trained therapist (Lovaas, 1987; McEachin, Smith, & Lovaas, 1993). The term ABA is often used synonymously with Lovaas therapy and interchangeably with Intensive Behavioral Intervention (IBI); it is important however, to distinguish the meanings of IBI and ABA. IBI refers to early intervention which is carried out during most of a child's waking hours and addresses all significant behaviors in all of the child's environments for a period of many years. It is a blanket term used to describe intensive behavioral programs for children with autism. While ABA therapy is often included in the IBI definition, its distinct definition is important to understand in order to comprehend the literature. Within the literature, applied behavior analysis is the process of systematically applying interventions based upon the principles of learning theory, to both improve socially significant behaviors to a meaningful degree and

demonstrate that the interventions employed are responsible for the improvement in behavior (Baer, Wolf, & Risley, 1968). Socially significant behaviors can include reading, academics, social skills, social-emotional competence, communication, and adaptive living skills. Adaptive living skills include gross and fine motor skills, eating, food preparation, toileting, dressing, personal self-care, domestic skills, time, punctuality, money, value, home orientation, community orientation and work skills.

Currently, ABA is a widely used method for teaching children with autism. The widespread utility and support for the use of ABA is, in part, due to the contention that it is the only scientifically based treatment available. ABA is not a new phenomenon as it has its roots in operant conditioning, made famous by B.F Skinner. Many people mistakenly credit O. I. Lovaas for the development of ABA. While Lovaas was most definitely not the creator of ABA, he is credited for executing one of the most thorough studies examining its effectiveness on children with autism.

Lovaas Therapy

The popularity of the term, "Lovaas Therapy," grew out of the Young Autism Project which began in 1970, and through the publication of project results in 1987 by Lovaas. The project was a behavioral intervention program that sought to maximize behavioral treatment gains by treating children with autism during most of their waking hours for a number of years. The treatment focused on the development of language, increasing social behaviors, and the promotion of cooperative play. In addition, treatment targeted independent and appropriate toy play along with efforts to decrease socially inappropriate behaviors, such as excessive rituals and aggressive behaviors (McEachin, Smith, & Lovaas, 1993). Guidelines for treatment were described in the book, *Teaching Developmentally Disabled Children: The ME Book* (Lovaas, Ackerman, Alexander, Firestone, Perkins, & Young, 1980). Young children below the age of four with professionally assessed diagnoses of autism were the target population of the project. Lovaas (1987) rationalizes the study population by emphasizing the likelihood that

younger children may be less likely to discriminate between environments, thus increasing the potential for treatment generalization and the maintenance of treatment gains. In addition, it is argued that it may be easier to integrate a preschool child with autism into the regular education classroom as opposed to school aged children with autism. The author hypothesized that an intensive environment for very young autistic children would allow them to catch up to their typically developing peers. The methods used by the author to assess this hypothesis will be the focus of the next section.

Lovaas Methods

Criteria for participation in the Lovaas study was based upon a proper professional diagnosis of autism, a chronological age less than 40 months (if participant was mute), or less than 46 months (if the participant was echolalic) and a prorated mental age of 11 months or greater at a corresponding chronological age of 30 months. The selection criteria resulted in an experimental group of 19 and what was referred to as a control group (control group one) of 19. The conditions of the experimental group were based upon 40 hours or more per week of intensive 1:1 therapy whereas control group one received 10 hours or less per week of intensive 1:1 therapy. Both groups received treatment for two or more years. An additional control group (control group 2) of 21 children with autism was included in the study. This group did not receive referral for treatment and thus did not receive treatment from the Young Autism Project staff; rather they received an unspecified form of treatment. Subjects were assigned to the experimental group if therapists were available, if not; they were assigned to the control group, thus making the study quasi-experimental with a matched pairs design. Once assigned to a group, assessment procedures were utilized to establish pretreatment measures. Throughout the text of the 1987 publication, Lovaas describes in detail the methods for assessment and the observational and interview methods utilized to obtain behavioral and demographic information, respectively. He outlines the qualification of data collectors and the supervision which was utilized throughout data collection. At intake, both experimental and control groups were similar on various measures of intellectual and adaptive functioning,

indicative of matched pairs. One significant difference between the groups was age, with the control group subjects having a mean age six months older than the experimental group. Children in the experimental group began treatment at a mean age of 34.6 months whereas control group one participants initiated treatment at an average age of 40.9 months. Following pretreatment assessment, treatment was based upon the Lovaas teaching manual. Both therapists and parents were trained in the Lovaas methods required to carry out treatment. Within the experimental group, contingent aversives such as a thigh slap or loud "no" were utilized. This methodology in teaching was not applied to control group one because of a lack of staff training, which training was considered a necessity for teaching alternative appropriate behaviors. Two main outcome measures were utilized in the study to establish efficacy: IQ and educational placement (EDP). The measurement of IQ was executed through the use of several instruments measuring cognitive functioning and development (e.g. Stanford Binet Intelligence Scale, WISC-R). The use of different IQ measurements was based upon the accommodation of different developmental levels. Educational Placement was rated via a nominal scale of measurement which was based upon three variables including IQ score, class placement, and promotion/retention. The three point ranking system was defined as follows: A child received a three if his/her IQ score fell within the normal range, he/she passed grade one in a regular education classroom, and he/she was promoted to grade 2. A score of two was defined as being placed in a smaller resource room classroom for grade one, and a score of 1 was defined as having an IQ in the severe mental retardation range and placement in a self-contained classroom for students with mental retardation and autism. The assessment procedures utilized to establish efficacy yielded significant results.

Reported Outcomes

At post-treatment, the use of standardized IQ testing and EDP ratings resulted in a significant difference between the experimental group and the two control groups. Within the experimental group, an average gain of 30 IQ points was attained by the participants, while no gains were evident for the two control groups. Lovaas (1987) reported that 47% of

subjects in the experimental group obtained normal functioning. Normal functioning was operationally defined as having an IQ within the average range and the successful independent completion of grade one in a regular education placement. Forty two percent of the experimental group was reported to have passed their first grade in an aphasia class and obtained mean IQ scores within the mildly retarded range. The final 10% of the experimental group were in segregated classes for their grade one year and obtained mean scores in the profoundly retarded IQ range. Control group one, in contrast, only had two percent of its subjects obtaining normal functioning as it is operationally defined by Lovaas (1987).

These results led Lovaas to conclude that the data promised a major reduction in the emotional hardships of families with autistic children, arriving at this conclusion through his promotion of sound methodology and significant gains within the study. He reported the minimization of pretreatment differences by making the groups as random as possible, adhering to consistent diagnosis and IQ tests and maintaining the stability of groups throughout treatment. He argued that there was a high reliability of independent autism diagnosis within the study. A case is made for the difficulty of attributing gains to spontaneous recovery given that the study utilized two control groups. Given the use of methods outlined above, Lovaas concluded that the favorable outcome can in all likelihood be attributed to treatment. Within the conclusions, Lovaas reported the difficulty associated with future replications given a need for extensive training, along with the use of contingent aversives that were found to be an integral component of treatment in the experimental group. To support the latter, McEachin and Leaf (1984 as cited in Lovaas, 1987) presented research on the contingent-aversive strategy utilized in the experimental group and applied it to four subjects in the control group receiving 10 hours of treatment (control group one). The results indicated that the strategy resulted in a sudden and stable reduction of inappropriate behaviors and an increase in appropriate behavior. Lovaas (1987) reported on these findings and concluded that at least one component of his treatment used in the experimental group functioned to produce change. He also concluded that the findings provided evidence for the similarity of

subjects across groups, given that the component had similar effects in both treatment groups. In conclusion, Lovaas appears to have presented a comprehensive and thorough study which produced favorable outcomes for young children with autism. The study is not, however, without its critics and controversy.

Methodological Concerns

The implications associated with the results of the study are widespread. The use of Lovaas style treatment for autism gained momentum following the publication of the Young Autism Project results. Parents of children with autism felt that the results offered a potential cure for autism and the potential achievement of "normal functioning." The overstated claims and the resulting misleading of treatment consumers led many researchers to criticize both Lovaas' study and his resulting conclusions. Criticisms of the study emphasize methodological problems. Initially, the assignment of groups was reported to be based upon staff availability and parental influence. This reported pseudo-random assignment into groups decreases the potential for group equivalency at pretreatment. The sample itself has been argued to lack representation of the autism population given the ratio of males to females utilized in the study, thus decreasing the potential for generalization to a typical autistic population (Gresham & MacMillan, 1998). At intake, children in the study received different intelligence tests that were selected by their individual examiners, which has the potential to weaken group equivalency and comparisons amongst groups. Smith (1999) cites Schopler et al. (1989), stating that, in the view of some, Lovaas' (1987) sample functioned at a higher level than that which is typical of children with autism and, thus, the results require serious scrutiny.

Lovaas has been questioned and criticized broadly relating to his choice of outcome measures, the general criteria used in subject selection, the overall intellectual capabilities of his subjects, and the general procedure employed in designing his control groups (Gresham & MacMillan, 1998). These concerns directly contrast to the methodological safeguards that Lovaas' reported. Herein lies the controversy. Lovaas' (1987) study

produced outcome claims that report the possibility of complete recovery from autism. Strong claims such as this must be supported by strong empirical evidence through sound methodology and true experimental design. The criterion of school placement to define “normal functioning” has been questioned given that placement depends significantly on location, school district policies, and available assistance to the schools. In light of this, children of equal levels of ability may have achieved different placement outcomes, making it difficult to compare the effectiveness of the program with a basis on placement data (Dawson & Osterling, 1997). In addition, there is the confounding variable of the effect of inclusive or special education placement on the children’s functioning. Given the convincing arguments against sound methodology and resulting conclusion in the Lovaas study (Gresham & MacMillan, 1998), the controversy is warranted and, in actuality, advantageous. Critical evaluation of research is essential for appropriate application of a therapy. Given that the general population may not possess the skills of critical evaluation, it is the responsibility of academics to use such skills on the consumer’s behalf to promote the best possible treatment.

Another feature of Lovaas’ (1987) study that fuels the controversy is the claim that 40 hours of intervention per week is necessary for young children with autism to make substantial gains, especially given that it is unclear if study participants did in fact receive that many hours of intervention each week. Studies to examine the relationship between hours of intervention and treatment outcome have been conducted in response to the preceding statement (Luiselli, Cannon, Ellis, & Sisson, 2000; Sheinkopf & Siegel, 1998). Details on these studies will be reviewed in the forthcoming pages. Given the controversy that ensued following the publication of the 1987 study, it was foreseeable that Lovaas would provide a rebuttal and an acknowledgement of the concerns. Both rebuttal and acknowledgement of the critiques of others were embedded in the conclusions of a follow-up study, which examined the long-term effectiveness of the Lovaas treatment (McEachin, Smith, & Lovaas, 1993).

Follow-up Study

In a 1993 publication, McEachin, Smith, and Lovaas report on a follow-up study based on Lovaas' 1987 publication. The experimental group and control group who received treatment were tested to examine the durability of treatment gains or lack thereof. The main areas being investigated were (1) the extent to which the experimental group had maintained its treatment gains and (2) the extent to which the nine best-case outcomes could be considered free of autistic symptomology. Methodological precautions were taken to ensure objectivity of the follow-up. A blind administration and scoring of tests was conducted for the nine best outcome subjects while other subjects were evaluated by staff members in the treatment program or outside agencies. Assessment consisted of ascertaining school placement information from subjects' parents and the administration of three standardized tests to measure IQ, adaptive functioning and personality. These measures were utilized to provide a comprehensive measure of social and emotional functioning. Results of the follow-up indicated that the experimental group maintained their level of intellectual functioning, with a mean IQ of approximately 30 points higher than the control group. The experimental group had higher levels of adaptive functioning and personality measures than the control group; however there was a deviance from average on measures of personality (McEachin et al., 1993). The nine best-outcome subjects obtained average or above average IQ scores at follow-up and average scores for adaptive functioning. It was reported that these subjects were "indistinguishable" from their normal peers, but no data were reported to substantiate this last claim.

The retention of gains in the experimental group is an indication that children with autism may experience not only an immediate difference with intensive behavioral treatment, but that these gains have longevity. Longevity of gains is the purpose of early intervention and the follow-up reviewed above provides evidence for its potential. The methodology used in the follow-up (McEachin et al., 1993) has been criticized because it is an extension of the original study and would thus be susceptible to the flaws of the original design. The authors conclude the follow-up with

an acknowledgement of certain criticisms and a justification or rebuttal for the methods in the original study. The authors report on subject assignment and intake assessment and acknowledge the flaws within these two areas while providing rationales for the execution of these two study variables. However, they do not acknowledge a number of other important concerns that had been identified previously, which could be considered cause for concern. In order to substantiate the claims made by Lovaas (1987) and diminish the concerns mentioned, replication is necessary. Reported partial replications of the original study have been executed with interesting results. The term *reported* is used here; because the extent to which the studies actually utilized Lovaas methodology is questionable. The content of two such studies will now be reviewed.

Replication Studies

Sheinkopf and Siegel (1998) conducted a retrospective study that examined the use of home-based intervention programs for children with autism and pervasive developmental disorder diagnoses that were based upon Lovaas' general methods. The intervention was implemented by parents and supervised by community based supports, a condition that differed from Lovaas' study. The participants in the study were drawn from a larger longitudinal study on young autistic children. The experimental group consisted of children whose families sought treatment through UCLA while the control group consisted of children whose families did not seek treatment (Smith, 1999). The two groups were matched into pairs on the basis of pretreatment chronological age and mental age, diagnosis, and length of treatment. An experimental group of 11 children aged 2-4, in home-based intervention, were compared to a control group of 11 children receiving typical school-based interventions. Treatment in the experimental group was for a shorter period of time (25-35 hours per week) than the Lovaas experimental group was claimed to have received (40+ hours).

Results reported by the authors affirm that children who received the Lovaas style treatment scored on average 28 IQ points higher than the comparison group that did not receive the same style of treatment. Interestingly, the authors reported that children who received an average

of 25 hours per week of treatment appeared to make similar gains when compared to those who received an average of 35 hours per week. This finding led the authors to conclude that, perhaps, Lovaas overestimated the number of hours needed to benefit optimally from treatment. While this may be true, it can definitely not be concluded from this study. The methodological concerns within this study are plentiful, thus making any inferences or comparisons to the original study very difficult. One of the most problematic aspects of the study is that all information regarding treatment was based upon parental telephone reports. Observation of treatment was not done by the researchers. Therefore, all study information is based upon parental reports, which increases the chance for bias. Subjects were assigned to groups on the basis of families seeking treatment. This is cause for concern as, in essence, the parents picked the treatment condition. Outcome data relied on a single outcome measure (cognitive assessment), which decreases the reliability of results. Overall, the poor design of the study makes it difficult to make conclusions in terms of IQ benefits. The extent to which this study replicates Lovaas is minimal and is based solely on parental reports that their children were receiving Lovaas style treatment. This partial replication study can neither support nor refute, reliably, any of the claims made by Lovaas.

More recently, another partial replication study was attempted by Luiselli, Cannon, Ellis, and Sisson (2000). A retrospective evaluation was executed on 16 children with autism and pervasive developmental disorder (PDD) involved in home-based behavioral intervention programs (Luiselli et al., 2000). The authors wanted to determine whether intensity of service delivery and age at which intervention was introduced influenced developmental rating scales of progress. The research question is based upon Lovaas' controversy-producing claims in these areas. The authors wanted to examine whether young children with autism or PDD, who were involved in home-based behavioral intervention programs, differed in learning, dependent upon factors of treatment initiation, length of treatment, and total hours of service. Sixteen children were involved in the study and were divided into two equal groups on the basis of those starting treatment prior to age three versus those starting after age three. All participants received treatment

through the May Center for Early Childhood Education, which bases its methods on those developed by Lovaas and colleagues (Smith, 1999). Participants were assessed using criterion-referenced measures in the areas of communication, cognition, fine motor, gross-motor, social-emotional behavior, and self-care abilities.

The reported results indicate that all subjects demonstrated significant changes across domains. The authors reported that there was no significant difference between age groups. Given the lack of norm-referenced psychometric instruments used in the study, comparisons to Lovaas are difficult to make. The retrospective nature of the study makes it impossible to control for variables such as length of treatment and hours of service. Without being able to control variables, validity is decreased. The brief summaries of these two attempted partial replications lend credibility to the seemingly supercilious statement made by Lovaas that "it is unlikely that a therapist or investigator could replicate our treatment..." (Lovaas, 1987, p.8).

Validity of treatment gains

At the time of this review in 2006, the 1987 Lovaas study is the only program with published data on a control group that did not participate in treatment, which is an essential element of an experimental design (Dawson & Osterling, 1997). Yet, given the methodological flaws, it cannot be considered a true experiment. In light of this, the outstanding question remains: should the treatment gains reported in the Lovaas (1987) study, the follow-up, and the subsequent attempts at replication on young children be considered valid or useful (Luiselli et al., 2000; McEachin et al., 1993; Sheinkopf & Siegel, 1998)? In order to answer this question, a closer examination of the experimental design must be conducted. The evaluation of research and resulting conclusions should be executed with the inclusion of an internal and external validity analysis.

Internal validity is characterized as the extent to which changes in the dependent variable can be attributed to systematic changes in the independent variable and not other factors extraneous to the study. In

contrast, external validity is the extent to which results can be generalized to new settings, people, and situations (Cook & Campbell, 1979, as cited in Gresham, Beebe-Frankenberger, & MacMillan, 1999). In terms of the studies reviewed in the context of this paper, validity based on these definitions is definitely called into question. Gresham and MacMillan (1997) investigated threats to internal and external validity in the Lovaas (1987) study. They concluded that the main threats to internal validity include instrumentation utilized to evaluate subjects, statistical regression of data, and selection biases, thus compromising the efficacy of the treatment. In terms of external validity, the characteristics of the sample and the characteristics of the therapists threaten the generalization of results and, thus, the effectiveness of the treatment. The same threats to experimental validity can be applied to the follow-up study (McEachin et al., 1993), given that it is an extension of Lovaas' (1987) study. The partial replications reviewed previously suffer from the same threats to validity with some disconcerting additions.

In Sheinkopf and Seigel (1998), within the experimental group, the number of parent reported treatment hours ranged from 12-43 hours which affords the possibility that some children received more than three times as much treatment as others (Gresham, Beebe-Frankenberger, & MacMillan, 1999). Internal validity is, therefore, increasingly threatened and any reported treatment gains are seriously called into question. In addition, there is no concrete evidence that the subjects did, in fact, receive Lovaas therapy provided by UCLA trained staff. While the threats to validity indicate a lack of empirical support for treatment efficacy for all of the studies reviewed, the effectiveness of the treatment has not been disproved. According to Rogers (1998 as cited in Gresham et al., 1999), it is important to recognize that a lack of empirical evidence for efficacy does not necessarily mean that a particular treatment is ineffective. Rather, what is evident is that the efficacy of the treatment has not been demonstrated in a carefully controlled and objective way. The demonstration of efficacy for Lovaas' (1987) treatment and the subsequent treatments in the publications discussed, as evaluated through internal and external validity, is deficient. Consequently, a scientifically validated treatment for autism is also absent. The contention that ABA programming is the only scientifically validated

treatment for autism is misguided, yet the widespread utility of such behaviorally oriented programs continues. This brings to the forefront the question of implications of results and value of treatment findings.

Implications of Results

The discrete trial training utilized in the studies discussed has strong empirical support in the applied behavioral analysis literature (Gresham et al., 1999). The discrete trial component is but one component in the treatment of autism and its utility in producing normal functioning is inconclusive. The empirical basis for recommending which type of program or which specific components are more effective for children with autism is absent from literature. However, doubts about claims on the basis of empirical evidence should not lead us to dismiss them; rather, the doubts should lead to further studies to test them (Rutter, 1996, as cited in Gresham et al., 1999). The National Institute of Health (NIH) reports on several methodological and statistical issues that need to be addressed in future research on treatment efficacy for children with autism. Gresham et al. (1999) review the recommendations that are reported by the NIH.

Initially, studies should employ experimental designs that compare treatment approaches in order to differentiate between program effectiveness. As mentioned previously, this design is lacking in the reviewed literature. The random assignment of children to groups is also a necessity of future experimentation in order for the experimenter to have direct control over treatment. Ethically, this poses a problem when parents advocate for certain types and intensities of treatment, making this aspect of experimentation difficult. Lovaas (1987) was subject to this same ethical problem and discussed these concerns in the study publications. The NIH additionally reports the necessity of standard treatment protocols for assessment in order to solidify the establishment of both treatment efficacy and effectiveness. The minimization of bias is also critical for future studies, demonstrated through the use of outside evaluators. It is important to maintain procedural integrity of the study through continuous assessment of intervention implementation. Finally, the use of longitudinal designs

that examine gains at various points in time is critical given a primary objective of early intervention is to establish the foundations which are essential for long-term health, academic success, and overall well-being. The difficulty in executing studies that adhere to the recommendations outlined by the NIH is apparent in terms of personnel required, organization, time, and funding. To date, Lovaas' (1987) study and the resulting follow-up (McEachin et al., 1993) has been the most thoroughly documented treatment model for children with autism regardless of its methodological flaws (Smith, 1999). Although it is not a true experimental design, in comparison to studies to date in this area, the methodology utilized to evaluate the efficacy of Lovaas' therapy most closely resembles the recommendations outlined by the NIH. This resemblance relates to Lovaas' (1987) longitudinal design, pseudo-random assignment of groups, utilization of a control group not receiving treatment, and minimization of bias by using follow-up double blind assessment. Given these circumstances, the value of treatment results to the field of autism cannot be dismissed.

Value of Treatment Results

In actuality, all of the studies reviewed demonstrate some degree of developmental gain in their experimental participants, most specifically related to gains in IQ. While it has been established that the gains cannot empirically be attributed to the treatment, it is unlikely that they can feasibly be attributed to other factors. Given that there is no known cure for autism, treatment modalities that function to alleviate the wide range of symptoms associated with the diagnosis are a reasonable place to start. Even without true experimental validation, there is enough evidence that specific strategies of ABA programming are improving outcomes for those affected by autism (e.g., Luiselli et al., 2000; McEachin et al., 1993; Sheinkopf & Siegel, 1998). Yet, it was the lack of empirical validation that led researchers to criticize exaggerated claims of recovery. It is important to note that Lovaas (2000) has contested that he made exaggerated claims of curing autism. He states:

The UCLA project has never claimed to cure autism. We have earlier warned that "certain residual deficits may remain in the

normal functioning group" (Lovaas, 1987, p. 8). The term "cure" implies removal of the original cause of the problem and because the cause of autism is unknown, claiming a cure would certainly be unjustified and unethical. In contrast, it is possible to enable a child with autism to achieve normal functioning without finding a cure for autism, just as it is possible for a physician to recover patients to normal functioning without having found a cure for their illness. Hodgkin's disease is a case in point. It can only undermine parents' and professionals' confidence in the UCLA project to imply that we have made unethical claims (<http://www.ctfeat.org/articles/LovaasRebut.htm>).

However, it is, indeed, true that confidence in Lovaas and his colleagues' work has been compromised due to evaluation using a strict experimental design (Gresham & MacMillan, 1998). This undermining of Lovaas' treatment results is disconcerting despite the sound experimental criticisms made by others. The feasibility of adhering to such strict criteria is questionable given both ethical and practical implications. To discredit the treatment gains obtained by Lovaas without consideration for this feasibility confuses the treatment consumer. Treatment consumers may turn to alternative methods for treating autism that have consistent refuted efficacy in the literature. The effectiveness of alternative treatments for autism, such as vitamin therapy, has been refuted in literature. In addition, many fad treatment approaches to autism exist that have no scientific basis or supporting theory and thus are absent from the literature. Therapies from special diets to sensory integration therapy fall into this latter category.

Conclusion

The effectiveness of Lovaas' approach using ABA and discrete trial techniques with contingent aversives has yet to be conclusively refuted. In fact, many other program studies using similar treatment components have shown similar results in terms of IQ and adaptive functioning gains (e.g., TEACCH [Mesibov, Shea, & Schopler, 2005]). To date, its effectiveness has not been disproven and will likely continue as such given the strict criteria needed to establish a true experiment. With an

understanding of behavioral techniques and their extensive support in the literature from the 1960s to date, it is not surprising that the early intervention for children with autism is one of the most widely known autism treatments today. Respect and utilization of early intervention, despite concerns outlined in this paper, will likely continue as its positive impact on the well-being of children and families plagued by autism cannot be contested. While behavioral treatment based on learning theory will likely continue, interventions related to cognitive/information processing theories of autism are gaining popularity as the research in this area continues to expand.

References

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (IV Ed.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (IV Ed. - Text Revision). Washington, DC: American Psychiatric Association.
- Baer, D., Wolf, M., & Risley, R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 1, 91-97.
- Baron-Cohen S., Leslie, A., & Frith, U. (1985). Does the autistic child have a Theory Of Mind? *Cognition*, 21, 37-46.
- Baron-Cohen, S., Golan, O., Wheelwright, S., & Hill, J.J. (2004). *Mindreading: the Interactive guide to Emotions*. Jessica Kingsley Publishers, London.
- Chakrabarti, S., & Fombonne, E. (2005). Pervasive developmental disorders in preschool children: Confirmation of high prevalence. *American Journal of Psychiatry*, 162(6), 1133-1141.
- Dawson, G., & Osterling, J. (1997). Early Intervention in autism. In M.J. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 307-326). Baltimore, MD: Paul H. Brookes.
- Fombonne, E. (2003). Modern views of autism. *The Canadian Journal of Psychiatry*, 48(8), 503-505.
- Frith, U. (1993). Autism. *Scientific American*, 268(6), 108-114.

- Gresham, F. M., & MacMillan, D.L. (1998). Early Intervention Project: Can its claims be substantiated and its effects replicated? *Journal of Autism & Developmental Disorders*, 28(1), 5-13.
- 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.
- Gresham, F.M., Beebe-Frankenberger, M. E., & MacMillan, D.L. (1999). Autism in children-treatment. *School Psychology Review*, 28(4), 559-576.
- Koegel, R.L., & Koegel, L.K. (2006). Pivotal response treatments for autism: Communication, social, and academic development. Baltimore, MD: Paul H. Brookes.
- Leaf, R., & McEachin, J. (1999). *A work in progress: Behavioral management strategies and a curriculum for intensive behavioral treatment of autism*. New York: DRL Books.
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*, 55, 3-9.
- Lovaas, O. I. (2000). *Clarifying Comments on the UCLA Young Autism Project*. University of California, Los Angeles. Department of Psychology. Available at <http://www.ctfeat.org/articles/LovaasRebut.htm>, accessed October 2005.
- Lovaas, O. I., Ackerman, A. B., Alexander, D., Firestone, P., Perkins, J., & Young, D. (1980). *Teaching Developmentally Disabled Children: The ME Book*. Austin, TX: Pro-Ed.
- Luiselli, J.K., Cannon, O., Ellis, J.T., & Sisson, R. W. (2000). Home-based behavioral interventions for young children with autism/PDD: A preliminary evaluation of outcome in relation to child age and intensity of service. *Autism* 4(4), 426-438.
- 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(4), 359-372.
- Mesibov G. B., Shea V., Schopler E. (2005). *The TEACCH Approach to Autism Spectrum Disorders*. Kluwer Academic/Plenum Publishers, New York

- Prizant, B.M., Wetherby, A.M., Rubin, E., & Laurent, A.C. (2003). The SCERTS Model: A transactional, family-centered approach to enhancing communication and socioemotional abilities of children with autism spectrum disorder. *Infants and Young Children, 16*, 296-316.
- Sheinkopf, S. J., & Siegel, B. (1998). Home-based behavioral treatment of young children with autism. *Journal of Autism and Developmental Disorders, 28*, 15 - 23.
- Smith, T. (1999). Outcome of early intervention programs for children with autism. *Clinical Psychology and Practice, 6*, 33-49.

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