

## Is One Style of Early Behavioral Treatment for Autism 'Scientifically Proven?'

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**Abstract.** *Within the field of autism spectrum disorder, the attribute 'scientifically proven' is most commonly seen in reference to the results of early behavioral treatment, and in particular, one style of early behavioral treatment. In this brief article, such claims are evaluated. Concerns raised by other researchers about the methodology of the original Lovaas (1987) study are briefly summarized. A particular concern that has been raised repeatedly is the lack of random assignment of participants to treatment versus control group. A more recent study (Smith, Groen, & Wynn, 2000), which included the necessary random assignment of participants to treatment versus control group and assessed multiple outcome measures, is reviewed. The results of the Smith et al. (2000) study with random assignment appear to be less dramatic than the results from the original Lovaas (1987) study.*

The attribute 'scientifically proven' is common bait for consumers. Over 20 books advertised on Amazon.com contain in their title the phrase, 'scientifically proven.' These books include titles promising readers that they can reverse heart disease (Ornish, 1996); gain physical fitness without exercise (Stamford, 1990); become an effective coach (Smith & Small, 1996); cure age-related memory decline (Crook & Adderly, 1998); and create world peace (Roth, 1994). Over 300,000 websites promise scientifically proven solutions to a myriad of challenges, ranging from the scientifically proven way to stop cancer ([www.stopping-cancer-naturally.org/](http://www.stopping-cancer-naturally.org/)) to the scientifically proven "best way to lace your shoes" ([www.techdirt.com/articles/20021204/1436200.shtml](http://www.techdirt.com/articles/20021204/1436200.shtml)). There is even a U.S. political party ([www.natural-law.org](http://www.natural-law.org)) whose members claim that their platform is based solely on "scientifically proven solutions to the nation's problems."

Of those 300,000 websites promising scientifically proven solutions, over 600 discuss scientifically proven 'solutions' for autism. Frequent among these websites about autism are the following claims: "FACT: There is a scientifically proven effective treatment principle for treating children with autism. This treatment is called Applied Behavior Analysis (ABA). Using highly trained certified staff administering 30-40 hours per week of intensive one-to-one treatment, the studies show that 47% of the children reach normal functioning. They are indistinguishable from their peers." ([www.oregonparentsunited.org/articles/effective\\_autism\\_treatment](http://www.oregonparentsunited.org/articles/effective_autism_treatment))

Indeed, many agencies and individuals claim that only one style of early behavioral intervention for autism is scientifically proven. For instance, BridgesABAtapes.com (a company that sells audio tapes for ABA training) claims that "although parents of autistic children are constantly bombarded by theories claiming to cure autism, only one treatment is passing the test of time and research: Applied Behavior Analysis (ABA)" ([www.bridgesabatapes.com/autism.html](http://www.bridgesabatapes.com/autism.html)). A student at Drury University reporting about her summer internship claims that "ABA therapy is the only scientifically proven and documented way of enabling preschoolers to enter grade school indistinguishable from their peers" ([www.drury.edu/multinl/story.cfm?ID=4397&NLID=202](http://www.drury.edu/multinl/story.cfm?ID=4397&NLID=202)). In his online comment about Maurice et al.'s (1996) book, a reader-reviewer on the Barnes & Noble website claims: "Behavioral therapy, the discrete trial method used by Dr. Lovaas, is the only scientifically proven treatment for autism."

The sense of singularity among some individuals is so strong that the Clinical Practice Guideline for Assessment and Intervention of Young Children with Autism/Pervasive Developmental Disorder (1999), sponsored by the New York State Department of Health, recommends that some interventions not even be included in a child's therapeutic program because those interventions might take time away from an intervention that had been scientifically proven. Behavior Analysis, Inc ominously warns that "diverting attention, even for a brief period of time, away from treatment methods that have been scientifically proven to be effective is a disservice and can have serious consequences" ([www.behavior-analysis.org](http://www.behavior-analysis.org)).

But what is the science behind these claims that one style of early behavioral intervention for autism is 'scientifically proven'? Are there, as stated on the Surgeon General's website, "thirty years of research demonstrating the efficacy of applied behavioral methods in reducing inappropriate behavior and in increasing communication, learning, and appropriate social behavior" ([www.surgeongeneral.gov/library/mentalhealth/chapter3/sec6.html#autism](http://www.surgeongeneral.gov/library/mentalhealth/chapter3/sec6.html#autism))? This question can be answered by referring to the New York State Department of Health Guideline for Assessment and Intervention of Young Children with Autism/Pervasive Developmental Disorder (1999) because, in formulating their guideline, the authors conducted a thorough literature search. The authors found "232 articles that reported using behavioral and educational approaches in children with autism. ... These articles were systematically screened and five articles [reporting four studies] were found that met the [authors'] established criteria for adequate evidence about efficacy" (p. IV-17).

Thus, of the 232 articles that the authors of the New York State Guideline found in their exhaustive literature search, only five articles met their own standards for adequate evidence. And those five articles report only four studies. Those four studies are what can now be called the classic study by Lovaas (1987) published over fifteen years ago, a study by Birnbrauer and Leach (1993), a study by Smith and colleagues (1997), and a study by Sheinkopf and Siegel (1998). Those four studies are the only scientific proof that met the New York State Department of Health Clinical Practice Guideline's criteria for adequate evidence.

However, as even the New York State Guideline state: "None of the four studies that met criteria for efficacy used random assignment of the children to groups (such as to the group receiving intensive behavioral intervention versus the group receiving a comparison intervention)" (p. IV-22). Random assignment is the practice of assigning participants to conditions (e.g., treatment versus control) such that each participant has an equal chance of being assigned to each of the conditions. As any scientist knows, random assignment is a core feature of scientific credibility in treatment studies.

Unfortunately, however, even though Lovaas' (1987) study did include an experimental and a control group—indeed, there were two intended control groups—assignment to either the experimental or the control group was not random. Rather, as the authors described, assignment to the experimental versus control group was based on the therapists' availability. Birnbrauer and Leach's (1993) study also included an experimental and a control group; unfortunately, as with the Lovaas (1987) study, assignment to either the experimental or the control group was again not random. In this case it was based on what the authors called "practical factors." And neither Smith et al's (1997) study nor Sheinkopf and Siegel's (1998) study used a classic experimental design. Rather, both used retrospective data (i.e., once the outcomes were known, the authors looked back in time to see which treatment the subjects had received; therefore, by definition, subjects were not assigned randomly to those treatments). Thus, only the Lovaas (1987) and the Birnbrauer and Leach (1983) studies qualify as true experimental designs, but disappointingly neither used random assignment, which is a prerequisite for empirical interpretation.

Although the New York State Guideline authors suggest that "it has been argued that the [non-random] method for group assignment probably did not bias the results" (p. IV-22), many scientists would draw the same conclusions as those drawn in a recent article titled, "Separating fact from fiction in the etiology and treatment of autism: A scientific review of the evidence," which was published in the *Scientific Review of Mental Health Practice* (Herbert, Sharp, & Gaudiano, 2002; see also Foxx, 1993; Kazdin, 1993; Schopler, Short, & Mesibov, 1989). The *Scientific Review of Mental Health Practice* article suggests that the "methodological weaknesses of the existing studies, however, severely limit the conclusions that can be drawn about their efficacy. ... Of particular note is the fact that no study to date has utilized a true experimental design, in which subjects were randomly assigned to treatment conditions" (p. 37). Indeed, Herbert and Brandsma (2001) wrote, in an editorial titled "Applied Behavioral Analysis for childhood autism: Does the emperor have clothes?," published in the *Behavior Analyst Today*: "Most critically, the Lovaas study was not a true experiment, as participants were not randomly assigned to [treatment versus control] groups. The manner in which subjects were assigned to groups raises serious questions about the possibility of selection bias, which are underscored by pre-intervention differences between the experimental and control groups. These methodological weaknesses limit the conclusions that can be drawn from this hallmark study (p. 47)."

However, in 2000, Smith, Groen, and Wynn published the first truly randomized trial of intensive early intervention for children with pervasive developmental disorder. As the authors wrote: "To address criticisms of previous research and increase methodological rigor, we conducted a fully randomized clinical trial with uniform, comprehensive assessment protocols for all participants" (p. 271). Smith et al.'s (2000) experiment attempted to overcome other criticisms, as well. Despite claims that early intervention based on the principles of ABA can produce "large, comprehensive, lasting and meaningful improvements in many important domains" (Green, 1996, p. 38), the original Lovaas (1987) study included only two outcome measures: post-treatment IQ scores and public school placement. Changes in IQ could reflect increased compliance with testing rather than true changes in cognitive abilities, and school placement could have more to do with parent advocacy and differential school policies than with actual functional changes. Thus, Smith et al.'s (2000) first randomized treatment study overcame these limitations by including assessment of several important domains of functioning.

Smith et al.'s (2000) study involved 28 children, whose age at intake ranged from 24 months to 43 months and whose age at follow up ranged from 41 months to 117 months. Fifteen children were randomly assigned to the treatment group, and 13 children were randomly assigned to the control group. The children randomly assigned to the treatment group received Lovaas style intervention for an average of 25 hours per week lasting a range of 18 months to 63 months. The children randomly assigned to the comparison group received intervention as delivered by their parents. In other words, the comparison group received parent-instructed treatment. At either intake or at follow-up, Smith et al. measured these domains: Intelligence, Academic Achievement, Language, Socioemotional Functioning, and Adaptive Functioning.

The researchers measured intelligence using either the Stanford-Binet Intelligence Scales (Thorndike, Hagen, & Sattler, 1986) or the Bayley Scales of Infant Development-Mental Development (Bayley, 1969) and the Merrill Palmer Scale of Mental Tests (Stutsman, 1948). The researchers measured academic achievement via Wechsler Individualized Achievement Test (WIAT). The WIAT was administered only at follow up. The researchers measured language via the Reynell Developmental Scales (Reynell, 1990), which have a scale for expressive language—how well the child produces language—and receptive language—how well the child comprehends language. The researchers measured socioemotional functioning via the Achenbach Child Behavior Checklist (Achenbach, 1991). This checklist, which was also administered only at follow up, was completed by both the child's primary caregiver and the child's teacher. The checklist covers issues such as social withdrawal, social problems, attention problems, and behavior problems such as aggression. The researchers measured "adaptive functioning" using the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984). These scales are derived from an interview with the primary caregiver. The study used three scales: Communication, Daily Living Skills, and Socialization. Adaptive functioning was assessed at both intake and follow up.

As Smith et al. (2000) report: "Two of the 15 intensively treated children met the criteria used by Lovaas (1987) and McEachin et al. (1993) for classifying children as 'best outcome,' namely placement in regular classes without special services and  $IQ > 85$ ." Thus, in contrast to Lovaas' (1987) reported 47% success rate according to their two outcome measures of IQ and school placement for children treated with Lovaas-style intervention, using the scientifically crucial random assignment Smith et al. reported only a 13% success rate.

The other outcome measures were also substantially less dramatic. There were statistically significant differences between the Lovaas-style treatment group and the parent-based treatment group at follow up on both the Stanford-Binet and the Merrill Palmer. There was only a marginally statistically significant difference between the Lovaas-style treatment group and the parent-based treatment group on the measure of academic achievement. However, this statistical analysis might be somewhat compromised because nearly one-third of the control group was missing data on this test. There were no statistically significant differences between the Lovaas-style treatment group and the parent-based treatment group on either of the two language scales. Although this is reported to be a significant difference in the paper, there was an error in data analysis (and an erratum was subsequently published, Smith, 2001). There were also no statistically significant differences between the Lovaas-style treatment group and the parent-based treatment group in socioemotional functioning, as assessed by the Achenbach Child Behavior Checklist. And there were no statistically significant differences between the Lovaas-style treatment group and the parent-based treatment group in adaptive functioning as assessed by the Vineland Scales of Communication, Daily Living Skills or Socialization or even as assessed by a composite of those three scales. Indeed, even within the Lovaas-style treatment group there were no gains in adaptive functioning from intake to follow up.

Smith et al. (2000) should be heartily applauded for undertaking the definitive test of Lovaas-style intervention using the crucial ingredient of randomized assignment. Such an experiment was far from easy to conduct; if it were, others would have done it much earlier. Most strikingly, no other intervention has been submitted to such empirical scrutiny. It is to the great credit of ABA proponents that they have consistently sought to provide scientific evidence of the efficacy of their treatment. However, given these data, namely that only one area of assessment showed a statistically significant difference due to treatment, and that only 13% met the criteria of success outlined by Lovaas (1987), it is perhaps appropriate to agree with the following admonition from the *Scientific Review of Mental Health Practice*: "Given the current state of the science, claims of 'cure' and 'recovery' from autism produced by ABA are misleading and irresponsible" (p. 37).

A recent *New York Times* article about intervention for autism (Tarkan, October 21, 2002) began by stating that "no one has found a cure for autism, the neurological disorder that leads to lifelong impairments in a child's ability to speak, respond to others, share affection and learn. But there is a growing consensus that intensive early intervention is both effective and essential—the sooner after diagnosis, the better. Early intervention, which involves many hours of therapy with one or more special-

ists [NB: the article later states that there are several different types of therapy] does not help every autistic child to the same degree ... and for reasons that are unclear, it does not help some children at all. But for those who are helped, their parents say, the changes are miraculous."

It behooves all of us to find the avenues that will lead to what every parent would call miraculous. In route to finding those avenues, we should most likely exercise caution in claiming that one style of intervention has been scientifically proven.

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