

Applied Behavior Analysis and Neurodevelopmental Disorders

Overview and Summary of Scientific Support:

Authors: Louis P. Hagopian & Eric W. Boelter

The Kennedy Krieger Institute and Johns Hopkins University School of Medicine

Applied Behavior Analysis Defined

Behavior analysis is the systematic study of variables that influence behavior (Sulzer-Azaroff & Mayer, 1991). Applied behavior analysis (ABA) is a discipline concerned with the application of behavioral science in real-world settings such as clinics or schools with the aim of addressing socially important issues such as behavior problems and learning (Baer, Wolf, & Risley, 1968). Procedures derived from the discipline of ABA have been implemented to assess and treat a broad range of behaviors with individuals diagnosed with intellectual and developmental disabilities. However, despite more than 40 years of applied behavior analytic research there continues to be misconceptions about ABA. One misconception is that ABA is a standardized treatment program that is used for a specific type of problem and with specific types of individuals. For example, some incorrectly believe that ABA is a type of therapy or a specific procedure for teaching children with autism, and that it is synonymous with "Lovaas Therapy" or "discrete trial training." Although discrete trial training represents one type of ABA-based approach, the field of ABA is much broader and includes a range of tactics, methods and procedures that have been shown to be effective for many different types of problems. Features common to all ABA-based approaches are the objective measurement of behavior, precise control of the environment and use of procedures based on scientifically established principles of behavior. Any clinical procedure or research investigation adhering to these basic criteria can be considered to be an ABA-based procedure. This includes "functional behavioral assessment," and approaches such as "Positive Behavioral Support," and forms of "Behavior Therapy" that rely on direct observation of behavior and analysis of behavior-environment relations.

Scientific Support for Applied Behavior Analysis

Over the past 40 years a large body of literature has shown the successful use of ABA-based procedures to reduce problem behavior and increase appropriate skills for individuals with intellectual disabilities (ID), autism and related disorders. Several review articles and meta-analyses have been published summarizing this large body of literature. Six of these articles (DeMyer, Hingtgen, & Jackson, 1981; Herbert, Sharp, & Gaudiano, 2002; Hingtgen & Bryson, 1972; Kahng, Iwata, & Lewin, 2002; Matson, Benavidiz, Compton, Paclawskyj, & Baglio, 1996; Sturmey, 2002) collectively reviewed thousands of published studies spanning the years 1946 to 2001. Each of these reviews supported efficacy of ABA-based procedures in the assessment and treatment of problem behavior associated with autism, mental retardation and related disorders. Similarly, three meta-analyses (Didden, Duker, & Korzilius, 1997;

Lundervold & Bourland, 1988; Weisz, Weiss, Han, Granger, & Morton, 1995) that collectively analyzed hundreds of studies published between 1968 and 1994 concluded that treatments based on operant principles of learning were more effective for reducing problem behavior displayed by individuals with ID as well as typically-developing individuals than were alternative treatments. The large body of literature reviewed in these studies provides empirical evidence indicating that procedures developed using ABA-based principles are effective at assessing and treating a variety of socially important behaviors engaged in by individuals with a variety of diagnoses. Furthermore, ABA-based approaches for educating children with autism and related disorders have been extensively researched and empirically supported (e.g., Howard, Sparkman, Choen, Green, & Stanislaw, 2005; Koegel, Koegel, & Harrower, 1999; Krantz & McClannahan, 1998; Lovaas, 1987; McGee, Morrier, & Daly, 1999; Strain & Kohler, 1998).

Application of ABA-Based Procedures Across Settings and Populations

ABA-based procedures have been implemented across a variety of settings including hospitals (e.g., Iwata, et al., 1994), schools (e.g., Boyajian, DuPaul, Handler, Eckert, & McGoey, 2001; Northup et al., 1997) and homes (e.g., Derby, et al. 1997; Harding et al., 1999); across a variety of forms of problem behavior including self-injurious behavior (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994; Kahng, Iwata, & Lewin, 2002), aggression (e.g., DeLeon, Fisher, Herman, & Crosland, 2000; Oliver, Oxener, Hearn, & Hall, 2001.), stereotypic behavior (e.g., Ahearn, Clark, DeBar, & Florentino, 2005; Durand & Carr, 1997; Rapp, Vollmer, St. Peter, Dozier, & Cotnoir, 2004) and pica (e.g., Hagopian, & Adelinis, 2001; McCord, Grosser, Iwata, & Powers, 2005; Piazza, Roane, Keeney, Boney, & Abt, 2002). Additionally, ABA-based procedures have been employed to establish and increase adaptive behaviors as alternatives to problem behavior including communication (e.g., Carr & Durand, 1985; Durand, & Carr, 1992; Hagopian, Fisher, Sullivan, Acquistio, & LeBlanc, 1998; Wacker et al., 1990), daily living skills (e.g., Cuvo, Jacobi, & Sipko, 1981; Horner & Keilitz, 1975) and academic skills (e.g., Daly & Martens, 1994; McComas, Wacker, & Cooper, 1996). ABA-based procedures have also been used with individuals with a variety of diagnoses including, schizophrenia (e.g., Wilder, Masuda, O'Connor, & Baham, 2001), mental retardation (e.g., Lindauer, Zarcone, Richman, & Schroeder, 2002; Saunders, McEntee, & Saunders, 2005), autism (e.g., Hoch, McComas, Thompson, & Paone, 2002; Lerman, Vorndran, Addison, & Kuhn, 2004; Lovaas et al. 1987), attention deficit hyperactivity disorder (e.g., Northup et al. 1997), stereotypic movement disorder with self-injury (e.g., Kahng, Iwata, & Lewin, 2002; Smith, Iwata, Goh, & Shore, 1995), Down Syndrome (e.g., Dalton, Rubino, & Hislop, 1973), and pediatric feeding disorders (e.g., Cooper et al., 1995; Kerwin, Ahearn, Eicher, & Burd, 1995; Piazza, et al., 2003).

Scientific, Professional, and Government Organizations' Position on Applied Behavior Analysis

Based on the empirical evidence, many scientific, government, and professional agencies and organizations have concluded that ABA-based procedures represent best practices for individuals with autism and mental retardation. For example, the **American Association on Intellectual and Developmental Disabilities** (formerly the American Association on Mental Retardation), the oldest and largest

interdisciplinary organization of professionals concerned with mental retardation and related disabilities, designated ABA-based procedures for the treatment of behavioral problems with individuals with mental retardation and related disorders as "highly recommended" (their highest rating). Based on the scientific evidence supporting the efficacy of ABA-based procedures for treating problems associated with mental retardation and autism, various scientific organizations have concluded that ABA-based procedures are highly effective, including:

- [National Institute of Mental Health](#) (see treatment options section)
- [The National Academies Press](#) ("Educating Children with Autism (2001) Commission on Behavioral And Social Sciences and Education")
- [Association for Science in Autism Treatment](#)
- [Autism Speaks](#)
- [Organization For Autism Research](#) ("The Best of the OARacle"; see page 10)

Various government agencies have also advocated for the use of ABA-based procedures -- particularly for individuals with mental retardation and autism who display problem behavior. For example, in 1999 a report on mental health prepared by the **Surgeon General of the United States** stated, "Thirty years of research demonstrated the efficacy of applied behavioral methods in reducing inappropriate behavior and in increasing communication, learning, and appropriate social behavior." Government agencies supporting the use of ABA-based procedures include:

- [Surgeon General of the United States](#) ("Surgeon General's Report on Mental Health -- see p. 163 for information on Autism")
- [New York State Department of Health](#) ("Guidelines: Autism/Pervasive Development Disorders, Assessment and Intervention for Young Children (0-3), Chapter IV - Behavioral and Educational Approaches")
- [Maine Administrators of Services for Children with Disabilities](#) ("Report of the MADSEC Autism Task Force"; see page 21 of report)

Empirically Supported Treatments for Problems Associated with Mental Retardation, Autism and Related Disorders

Several academic and trade journals that represent specific medical disciplines have published articles indicating that treatments for autism and mental retardation derived from ABA-based procedures are empirically supported treatments. For example, the journal *Current Opinion in Psychiatry* is a current opinion journal with the goal of assisting clinicians and researchers in keeping up-to-date with the large amount of information published in psychiatry. An article reviewing literature on the assessment and treatment of individuals with mental retardations and psychiatric disorders concluded that: "Interventions based on applied behavior analysis have the strongest empirical basis, although there is some evidence that other therapies have promise" (Sturmey, 2002). Also, in the journal *Pediatrics*, the official journal of the American Academy of Pediatrics, an article offering guidelines on scientifically supported treatments for childhood psychiatric disorders concluded: "The most efficacious psychosocial treatment for autism is applied behavior analysis" (Lilienfeld, 2005). Discipline-specific journals that have published articles indicating that ABA-based procedures are empirically supported include:

- Current Opinion in Psychiatry (Grey & Hastings, 2005; Sturmey, 2002)
- Pediatrics (Lilienfeld, 2005)
- Psychiatric Times (Erickson, Swiezy, Stigler, McDougle, & Posey, 2005)
- Scientific Review of Mental Health Practice (Herbert, Sharp, & Gaudiano, 2002)

Furthermore, in 1993 Division 12 of the American Psychological Association developed guidelines for what defined an Empirically Supported Treatment (EST). Regarding ESTs based on single-case design research these guidelines state: "A large series of single-case design experiments must demonstrate efficacy with, (a) use of good experimental design and (b) comparison of intervention to another treatment" (Chambless & Ollendick, 2001). Based on these criteria, ABA-based behavioral treatments have been defined as ESTs for individuals with developmental disabilities (Chambless, et al, 1996).

Legislative Rulings in Support of Funding and Access to ABA-Based Services

Finally, multiple legislative rulings have supported the efficacy of ABA-based approaches for addressing both problem behaviors associated with MR and autism, as well as for educational instruction. Landmark decisions have been made by the **Federal District Court of Philadelphia, U.S. District Court for the Northern District of Illinois, U.S. District Court for the Eastern District of Michigan, South Carolina Federal District Court, U.S. District Court for the Southern District of Indiana; the U.S. District Court for the Eastern District of Tennessee**, and when ruling on a case involving the use of ABA-based treatment for children with autism the Supreme Court of British Columbia concluded, "[...] It is beyond debate that the appropriate treatment is ABA or early intensive behavioural intervention."