
APPLIED BEHAVIOR ANALYSIS: AUTISM AND BEYOND[†]

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Over the past 60 years, applied behavior analysis (ABA) has made notable contributions to the literature involving populations with developmental disabilities. Practitioners and researchers have made impressive advances in addressing challenges posed by autism spectrum disorder (ASD), in particular. The focus on autism has resulted in an improved public image of ABA and, in turn, has helped highlight the need for increased awareness surrounding ASD. A summary of relevant research contributions is provided, and although the advances in autism are impressive, individuals with ASD constitute a minority portion of the educational system. A review of the existing literature, as well as a novel literature search, supports the suggestion that ABA has narrowed its focus to issues affecting populations with ASD, while concurrently being less attentive to problems faced by society as a whole, particularly general education. Copyright © 2012 John Wiley & Sons, Ltd.

In his 1974 book *Behaviorism*, Skinner defines behaviorism as the philosophy of the science of human behavior and contends that it is a science largely misunderstood by those outside its field. Skinner discovered the principles of behavior in research using white rats and pigeons and later asserted that behaviorism was meant to be applied to all species, including human beings (Skinner, 1953). Friman (2010) reminds the reader of Skinner's vision for behavior analysis to become 'a mainstream force' (p. 19) relevant for all human concerns. A turning point in the application of the principles of behavior to human beings was the 1968 publication by Baer, Wolf, and Risley. This article spearheaded the *Journal of Applied Behavior Analysis* (JABA) and defined applied behavior analysis (ABA) as the direct application of behaviorism to the improvement of human behavior. Although there is nothing inherent about behaviorism that is specific to developmental disabilities, the field of ABA

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has a strong history of addressing the needs of populations with disabilities. According to Friman (2010), most findings in ABA research are a result of studying participants in 'only one tail of the normal distribution' (p. 19).

The organization's relationship with populations with disabilities is clearly stated on the website for the Association for Behavior Analysis International (ABAI; n.d.). It specifies, 'Over the past 60 years, applied behavior analysis has become recognized as the treatment of choice for behavior problems associated with mental retardation, autism spectrum disorders, brain injury, and other disorders...' (<http://www.abainternational.org/BA/FAQ14.asp>). This claim is further substantiated in the April 2009 issue of the Association of Professional Behavior Analysts' (n.d.) *APBA Reporter #5* (<http://www.apbahome.net/newsletter.php?nid=5&aid=2>). This issue reports the findings of an employment survey with regard to consumer population. More than 80% of respondents (employed applied behavior analysts) reported they work with children with autism spectrum disorders, whereas few reported working with typically developing children (21%). Moreover, the credentialing organization governing the process for behavior analysts to become board certified (Behavior Analyst Certification Board, n.d., <http://www.bacb.com>) has published the *BACB Task List for Board Certified Behavior Analysts Working with Persons with Autism*[®]. The board offers no other population-specific guidelines or practices.

In this paper, we examine the admirable contributions of the field of ABA to autism and, in turn, the substantial contributions of people with autism and their families to the field of ABA. In doing so, however, we provide a summary of available evidence that ABA, by focusing its efforts on issues affecting subgroups of individuals and largely ignoring problems faced by general-education populations, has become a restricted discipline. Furthermore, we evaluate the current status of ABA with regard to public perception.

CONTRIBUTIONS OF ABA TO PEOPLE WITH AUTISM

Diagnostic criteria for identification of autism and related disorders are provided by the *Diagnostic and Statistical Manual of Mental Disorders IV-TR* (2000). These disorders fall under the category of Pervasive Developmental Disorders and are referred to as ASD's because of the range of functioning and abilities that can be observed in affected individuals. We refer to autism and ASD interchangeably in this paper. Moreover, the term 'developmental disabilities' is used when referencing publications whose authors did not differentiate between populations of developmental disabilities and autism in their findings.

According to the Center for Disease Control (n.d.), autism is currently postulated to affect 1:110 individuals and is considered to be a life-long developmental

disability (<http://www.cdc.gov/ncbddd/autism/index.html>, retrieved 28 December 2009). Recent research has suggested the prevalence of ASD, when the broad spectrum is considered, to be as high as 1:91 (Kogan, et al., 2009). As identified by Dawson (2008), autism was previously considered a disorder associated with poor prognosis, with only 50% of those affected expected to develop spoken language. Individuals affected by autism experience impairments or difficulties in socialization, verbal and non-verbal communication, and restricted/repetitive patterns of behavior (Filipek et al., 1999).

A body of research designed to address problems faced by persons with ASD has undeniably directly benefited this consumer population, with gains extended to those who care for and serve affected individuals (Friman, 2006, 2010). Specific gains include improved quality of life, improved productivity, and the elimination of potentially life-threatening behaviors. Behavioral intervention has proven to be the most effective method in addressing the needs of children with ASD (Bailey & Burch, 2010; Friman, 2010).

A hallmark behavioral intervention study published by Ivar Lovaas in 1987 found that with 40 h/week of early intensive behavioral intervention (EIBI), involving a curriculum that emphasized language skills, and intensively applied behavioral procedures, nearly one half of the participants achieved IQ's exceeding 100. Participants also had greatly improved social development and were successfully mainstreamed. The Lovaas (1987) study was monumental—the first in history to produce such encouraging outcomes for individuals with autism, with gains replicated and maintained in several follow-up studies.

In an effort to determine if the gains demonstrated by Lovaas (1987) could be maintained over time, McEachin, Smith, and Lovaas (1993) conducted a long-term study of the same children by assessing intelligence and adaptive functioning 4.5 years later. Their results showed that the outcome of the EIBI was superior in relation to gains made by the minimal treatment/control group. Sallows and Graupner (2005) further validated the results reported by both Lovaas (1987) and McEachin et al. (1993). Their four-year long-term study demonstrated a replication of the success of EIBI when intensive treatment and parent-directed intensive treatment were used. A major contribution of their findings, however, was to demonstrate similar gains without the use of the aversive techniques used in earlier studies.

The Lovaas (1987) study met with methodological criticisms, one of which was the lack of randomization of participant assignment to experimental and control groups (Gresham & MacMillan, 1998; Schopler, Short, & Mesibov, 1989). Other researchers have attempted to replicate Lovaas's (1987) findings while addressing the problem of randomization. Smith, Groen, and Wynn (2000) published the first randomized trial evaluating less intensive treatment (20 h/week) as compared with parent training alone. Results showed that even when delivered with less intensity, EIBI showed improvement

over parent training alone. Although a type of dose effect had been demonstrated by Smith et al. (2000), the question remained about the need for adherence to ABA principles and whether intensity alone was the significant variable.

Subsequent studies attempted to validate the necessity for adherence to ABA versus eclectic approaches that might be more common in early intervention programs. Eikeseth, Smith, Jahr, and Eldevik (2002) validated the Lovaas style of EIBI in children with autism who received the Lovaas treatment for one year. The EIBI participants had superior skills when compared with a second group that had experienced well-regarded eclectic procedures, with gains evident on measures of intelligence, language, and adaptive behavior. These findings were further supported by Howard, Sparkman, Cohen, Green, and Stanislaw (2005) who found that reasonable-sounding eclectic approaches did not produce the favorable results that the Lovaas approach did. Despite the remarkable contributions of Lovaas and other researchers, an ensuing focus was on improving the quality of interventions.

The Lovaas style of EIBI was also criticized by ABA practitioners for not making use of Skinner's (1957) analysis of verbal behavior (Sundberg & Michael, 2001). Two examples of efforts to incorporate Skinner's analysis into teaching verbal behavior to children with language impairments were made by Bondy and Frost (1994) and Partington and Sundberg (1998). The efforts of these practitioners have resulted in the development and refinement of effective technology and teaching procedures such as the *Picture Exchange Communication System* (Frost & Bondy, 1994) and an ABA treatment package at times referred to as Applied Verbal Behavior (n.d.) (<http://www.asatonline.org/resources/procedures/verbal.htm>, retrieved 1 July 2009; Carr & Firth, 2005; Evans, Wilde & Axelrod, 2008). Although it is unclear whether approaches based on Skinner's analysis of verbal behavior will produce outcomes superior to Lovaas's teaching techniques, it is a question that is currently under investigation (Hineline, 2010). Regardless, it is exceptionally gratifying to claim with certainty that ABA treatment can help individuals diagnosed with autism live more fulfilling lives. In summary, ABA has been good for people with autism, but people with autism have also been good for ABA.

Contributions of People with Autism to ABA and to Society in General

Consumers of ABA and parent advocates have made groundbreaking strides in the legal system in an effort to provide their loved ones with behavioral intervention, both home and school based. Specific examples of their efforts, detailed in the succeeding texts, have had a favorable impact on the education of children with autism as well as on ABA and its image. Their initiative, dedication, and drive serves as a model for other populations served by the general-education system, notably children of poverty.

Improving the Image of ABA and Making Educational Changes through Parental Involvement

Skinner (1974) identified 20 contentions misrepresenting the achievements and significance of behaviorism. Some of these include criticisms that behaviorism ignores consciousness, feelings, and states of mind; it formulates behavior simply as a set of responses to stimuli limited to the prediction and control of behavior, representing a person as a robot, puppet, or machine; it works with pigeons and white rats but not with people; its dehumanizing picture of human behavior is confined to those features that human beings share with non-humans; its achievements under laboratory control cannot be duplicated in daily life; and it is concerned with general principles that neglect the uniqueness of the individual.

These are damaging claims; but as previously stated, consumers of ABA have directly improved its image as a discipline by portraying practitioners as effective and humane teachers—a message ABA needs the world to hear. Credit for a public enthusiasm that ABA has never before been experienced can be attributed to parents and advocates of children with autism. With women such as Catherine Maurice and Mary Lynch Barbera as role models, parents of children with ASD have served as effective advocates for their children (Barbera, 2007). This advocacy has resulted in such advances as the founding of numerous non-profit support and research groups, the opening of schools and clinics for people on the autism spectrum (Barbera, 2007), and increased school-based and home-based services with federal reimbursement for families (PA Autism Insurance Act/Act 62, n.d.; <http://www.dpw.state.pa.us/ServicesPrograms/Autism/Act62/>). Catherine Maurice's book, *Let Me Hear Your Voice*, has been touted as the impetus behind board certification in behavior analysis (Barbera, 2007; Maurice, 1993). Given this successful history, this model should be realized and applied to other school-based challenges such as meeting the needs of children of poverty.

Understanding Verbal Behavior

Another way in which the autism population has helped ABA (and society in general) is by allowing practitioners to gain knowledge of whether Skinner's 1957 analysis of verbal behavior is valid and useful. Dixon, Small, and Rosales (2007) suggest that Skinner's analysis provided the first comprehensive account of language acquisition from a naturalistic perspective and made a lasting contribution to ABA, both conceptually and empirically. The lasting contribution is partly evidenced by an increase in the publication trend in the area of verbal behavior from the years 1963 to 2004. However, the applied literature that pertains to verbal behavior has focused mainly on language problems faced by individuals with developmental

disabilities and on introductory verbal operants (i.e., mands and tacts). The present authors make the case later that there is an escalating need for investigations involving complex issues and variables with regard to language of all human beings and with research efforts extended to typically developing populations.

Showing Us the Importance of Early Intervention

Resources such as Catherine Maurice's book (1993) and empirically validated evidence have both demonstrated how children with ASD have benefitted from EIBI (Dawson, 2008; Eikeseth et al., 2002; Howard et al., 2005; Lovaas, 1987; McEachin et al., 1993; Sallows & Graupner, 2005). It is likely that there is nothing idiosyncratic about children with autism when it comes to EIBI; it may accelerate the learning process of all children. If one considers the histories of people labeled as geniuses, one is often struck with the presence of unusual amounts of early training (e.g., Mozart; Howe, 1999). For all disability and ability populations, the power of EIBI may be vastly underestimated. Because of the benefit we see with children with ASD, we have good reason to investigate the effects of EIBI with other populations such as Down syndrome, fetal alcohol syndrome, and even children without disabilities.

Recognizing the Rightful Place of Science in Human Affairs

A concerning contention is that today's psychologists and laypeople may subscribe to the notion that behavior analysis died with B. F. Skinner (Poling, 2010). In its special issue *The Behavior Analyst, Special Section: The Future of Behavior Analysis* (2010), both Poling (2010) and Friman (2010) pose potential strategies to remedy ABA's impaired public perception and tenuous future as a discipline for all people. Given ABA's history of focusing on addressing the serious problems affecting people with severe disabilities (Friman, 2006), and because of the benefits the scientific method has produced for children with autism, we have to wonder if and when the general public will fully recognize the rightful place science has in improving the affairs of all human beings. We are reminded of Skinner's original vision of behavior analysis as a mainstream science (Friman, 2006) as reiterated in Hayes' 2001 article, 'The importance of a science of behavior derives largely from the possibility of an eventual extension to human affairs' (p. 441). Whereas Friman (2010) suggests that a potential solution may be for ABA to align itself with an already mainstreamed system, such as primary-care medicine, others have been critical of ABA's inability to align itself with educators outside of the special-education system (i.e., general education; Axelrod, 1991, 1992, 1993, 1996). Perhaps, someday, because of the benefits the scientific method has produced for children with autism, the public will fully recognize the rightful place science has in improving human affairs.

TARGETED REVIEW OF ABA LITERATURE

In our efforts to improve service delivery for children with autism and related disorders, the question remains whether other populations have been left bereft of much needed ABA intervention and treatment. We use issues faced by parents, teachers, and students of general education to illustrate how societal problems ripe for behavioral intervention have been overlooked. Additionally, we conducted a review of the literature to determine whether ABA has become a restricted discipline with regard to consumer populations. Sources of information incorporated the existing behavioral literature including the following: other research with a similar purpose, a review of the literature to determine the frequency of publications involving populations of people with and without developmental disabilities, and a review of data on presentation trends at the ABAI annual conference.

Thirty-three years after the Baer, Wolf, and Risley (1968) article, Hayes (2001) identified six dangers faced by ABA as a discipline. Hayes (2001) reiterated Skinner's (1938) early promise, made true by the formation of ABA as a discipline, that our ultimate purpose was an understanding of complex human behavior. Hayes, however, criticized both applied and experimental practices for allowing narrow areas of interest to dominate the field, resulting in a failure to expand. According to Hayes (2001), a 'glance at a recent issue of *JABA*' (p. 61) will confirm this notion.

O'Donohue and Fryling (2007) conducted a systematic review of two journals that publish behavioral articles: *JABA* and *Behavior Therapy (BT)* (a cognitive-behavioral journal focusing on assessment and treatment of psychopathology and related clinical problems) (http://www.elsevier.com/wps/find/journaldescription.cws_home/707105/description#description). The review examined the first five years of each journal (1968–1972 for *JABA*, 1970–1974 for *BT*) and a more recent five-year period from 2000 to 2004. During the first five years of *JABA*, the percentage of articles involving people with autism or other developmental disabilities was 24.7. There was a notable increase to 61.8% during the 2000–2004 period. Publications identified in *BT* were 8% for the first five-year period and 2.7% for the latter five-year period. As a result, the authors claimed that ABA as a discipline has narrowed its focus to populations with developmental disabilities. This may have artificially restricted practitioners from dealing with other socially important problems such as cognitive or mental-health challenges (e.g., overeating, addictions, depression, and anxiety). This notion is further supported by Austin and Soeda (2008) who assert that the ABA literature is rife with effective interventions for populations of persons with developmental disabilities to the exclusion of children without disability labels who exhibit behavioral challenges. A case in point is the ABA research in the area of verbal behavior that has largely concentrated on populations of individuals diagnosed with developmental disabilities.

The results of a study by Dixon et al. (2007) confirm the notion that research in the area of verbal behavior has been vastly conducted with children with developmental disabilities. The authors conducted a citation analysis of verbal operant publications based on Skinner's (1957) *Verbal Behavior*. Their data set consisted of 100 articles previously referenced by Dymond, O'Hora, Whelan, and O'Donovan (2006). The authors reported that most data in the area of verbal behavior are derived from participants diagnosed with autism (52%) and intellectual disability (not involving autism; 37%). The authors concluded that although the clinical significance of this research cannot be questioned, applied behavior analysts need to expand research on verbal behavior to typically developing individuals in an effort to sustain reliance on Skinner's (1957) analysis as a conceptualization of human language.

A novel review of the literature was conducted by the authors of this paper to further authenticate the existence of a focus on populations with developmental disabilities, especially those with autism, in *JABA* using the search engine PsycINFO via EBSCOhost. Searching the years 1968–1972 and 2004–2008, and using the keywords 'autism' or 'developmental disabilities' in the title, we identified zero article for the early years of the journal and 36 articles could be identified for the later years. Given the language likely used to refer to persons with disabilities in 1968, 'mental retardation' and 'mentally retarded' were also used as a keyword for the 1968–1972 search, yielding two results—Ayllon and Kelly (1972); Schroeder (1972). Figure 1 summarizes the primary results of the search.

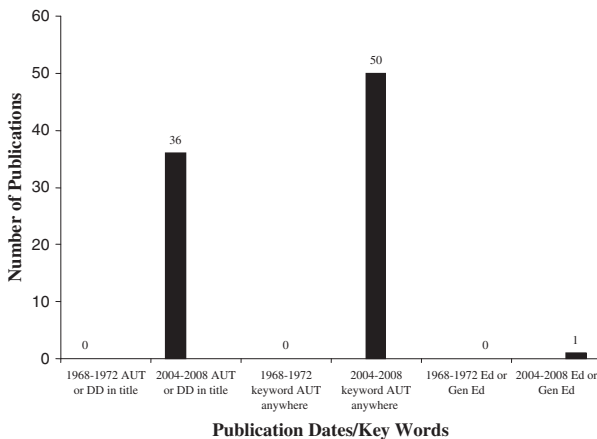


Figure 1. A period comparison of the number of articles published in the *Journal Of Applied Behavior Analysis* using keyword search 'autism', 'developmental disabilities', 'education', and 'general education'

For the same five years, using the keyword 'autism', not necessarily in the title but anywhere in the publication, we identified no article for the early years, whereas 50 articles could be identified for the 2004–2008 period. Moreover, for the same five years (2004–2008), only one article could be found using the keywords *Down syndrome* (Athens, Vollmer, Sloman, & St. Peter Pipkin, 2008), whereas additional searches using keywords *fetal alcohol syndrome* and *emotional behavioral disturbance* yielded zero results. An additional search of the same journal in the same two periods using the keywords *general* or *general education* yielded zero publications for the early period and one publication for the more recent period (Resetar & Noell, 2008). These findings are consistent with the previously summarized findings reported by O'Donohue and Fryling (2007). Hayes (2001) suggested that ABA has gradually become a subfield of developmental disabilities; however, with regard to general education, the information provided here might more readily support the hypothesis that ABA began with little influence in general education and remained that way over time.

A recent article by Kangas and Vaidya (2007), summarizing trends in presentations at the annual conference of the ABAAI, provided clear evidence of a trend toward presentations focusing on populations of persons diagnosed with developmental disabilities. The authors cited data from 1980 to 2007 using predefined presentation categories. An analysis of the data from the years 2002 to 2007 of ABAAI presentations suggests that 20% of the presentations were specific to developmental disabilities (category DDS, 3571 total presentations). An additional 26% of the presentations were specific to autism (category AUT). None of the presentations in the last five years were specific to mental retardation/developmental disabilities (category MRD DDS), traumatic brain injury (TBI), and education of preschool and school-aged children (SPE, CLD, ESC). Although 24% of the presentations were categorized under education (EDC), the defining characteristics of this category were not provided.

GENERAL EDUCATION

The paucity of application of ABA to general education is not indicative of failed attempts by applied behavior analysts to effect meaningful change in general education. In the late 1960s, direct instruction (DI), an empirically derived instructional method developed from behavior analytic principles, was evaluated along with other instructional methods. This study, named *Project Follow Through* (1968–1977), was cited as the largest and most expensive federally funded experiment in history (http://en.wikipedia.org/wiki/Project_Follow_Through, n.d.). With its focus primarily

on narrowing the achievement between children of poverty and middle-class children, the results of this study identified DI to be the superior instructional method in academic and cognitive skills (Gersten, Becker, Heiry, & White, 1984). Improved social skills were also correlated with the DI teaching methodology (Stebbin, St. Pierre, Proper, Anderson, & Cerva, 1977). Despite the overwhelming success of DI, the research outcomes have been largely ignored by the educational system (Lindsley, 1992).

Applied behavior analysts have also demonstrated useful methods in managing behaviors considered to interfere with the learning process. For example, applied behavior analysts have been successful in reducing student aberrant behaviors (e.g., running, shouting, and fighting) that could compete with a student's availability for academic instruction (Smith & Fowler, 1984) and in increasing socially appropriate behavior, such as compliance with adult requests, that could result in improved academic learning or performance (Tarbox, Wallace, Penrod, & Tarbox, 2007).

While general education has failed to incorporate scientifically validated teaching strategies, education as a whole continues to experience severe problems, which, in turn, results in problems for the community. An example of the problem is provided by the Philadelphia School District. An alarmingly low 44.5% of students in the Philadelphia School District met the state standards based on the Pennsylvania System of School Assessment compared with 85% of schools in area suburbs (Hardy, Purcell, & Graham, 2009). According to Volk (2010), 44% of students in the Philadelphia School District drop out, with minorities representing the highest dropout percentages (i.e., Latino-Americans, 59% and African-Americans, 49%). The average student dropout requires \$319 000 annually in social services, and 80% of the city's convicted murders and murder victims were dropouts. The results of a survey reported by Toppo (2006) suggest that 68% of students who dropped out reported improved parental involvement only when grades were poor and identify truancy as a precursor behavior to dropping out.

Between the years between 1991 and 1996, Axelrod published a series of discussion papers that were made available in a variety of journals addressing the problem of American education from the perspective of ABA. In his papers, he identified the failure of American public schools to provide an adequate education of a large number of youth, particularly children of poverty. He asserted that the effectiveness of behavior-analytic strategies has been ignored by general education (Axelrod, 1991). In his 1991 paper, Axelrod formulated two steps to potentially remedy this process—the identification of education strategies that work (originally proposed by Skinner, 1984) and the identification of ways of getting educators to use these procedures. The latter step is more largely concerned with effective dissemination of behavior analysis, a point made by both Poling (2010) and Friman (2010). The failure

to disseminate effective evidence-based practices in education may account for learning deficiencies in a variety of subgroups of individuals.

The standard policies and procedures adopted by general education for educating and supporting students are not reaching those whose circumstances require a differentiated approach in order for success to be attainable. The question remains, if hundreds of published and peer-reviewed studies spanning more than four decades are available and demonstrate that curricula and instruction based in ABA can promote learning in educational settings for all students (Heward, 2005), how then can we account for our failure to address the problems faced by general education today? If we accept as true the position provided by Heward (2005), that some problems faced by society may not be remedied until they become recognized as an 'urgent social mission' (p. 336), then perhaps there has been no 'boiling over' resulting in public outrage. When the current standards in a particular facet of society are no longer acceptable, and the need for improvement becomes a desperate one, society may more readily recognize the need for ABA and the scientific method. Large-scale application of ABA principles in inner-city general-education classrooms could have the benefits of improving the national economy, decreasing unemployment rates, and reducing the number of men experiencing incarceration. An intriguing possibility is the dissemination of web-based technology for teaching reading, as demonstrated in the *Headsprout Early Reading Program* (Layng, Twyman, & Stikeleather, 2003).

With regard to a narrowed focus within the field of ABA, perhaps its overall lack of acceptance in the field of general education, coupled with few public outcries for change, has resulted in applied behavior analysts themselves seeking reinforcement outside the field of general education. A wealth of employment opportunities available in serving individuals with autism may have the resultant effect of attracting individuals wishing to work in developmental disabilities, whereas those who wish to work in general education may turn to other professions (e.g., general-education teaching and counseling). The widespread applicability of ABA principles is obvious in research reported in the *Journal of Organizational Behavior Management* and the fact that such principles can be useful in the field of traffic safety (Van Houten, Malenfant, Zhao, Byungkon, & Van Houten, 2005).

The abundance of ABA research conducted in developmental disabilities, the employment opportunities in ABA, and the desire of many individuals to work exclusively within developmental disabilities all seem to have yielded a public perception that ABA is not for general education, or for that matter, many other problems the society faces. Many would likely argue that the continued increase in support for ABA could be directly attributed to its success in autism. The work performed by applied behavior analysts in autism has greatly improved the lives of many individuals, but applied behavior analysts have largely neglected the learners in general education that make up the vast majority of students. As has been previously pointed

out, parental involvement likely contributes to the positive public perception of ABA in developmental disabilities. This suggests a possible avenue for increasing the presence of ABA in general education as well.

Although our novel review of the literature is limited to only one journal publishing articles in behavior analysis, *JABA* is considered the flagship journal in the field and, thus, likely presents a fair picture of the work in which applied behavior analysts are routinely engaged. The evidence provided here supports the perception that ABA as a discipline has explicitly narrowed its focus to populations of persons with developmental disabilities. The authors of this paper are included in the group of applied behavior analysts who are proudly serving populations composed of special-needs individuals and in no way intend that these efforts should be diminished; we have attempted to demonstrate, however, that general education and society as a whole have been largely deprived of the effective interventions that ABA can provide.

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