

EFFECTIVENESS OF APPLIED BEHAVIOR ANALYSIS (ABA) THERAPY IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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DOI:https://doi.org/10.5281/zenodo.22942612

Abstract. This article analyzes the scientific-theoretical foundations and practical effectiveness of Applied Behavior Analysis (ABA) in the rehabilitation of children diagnosed with autism spectrum disorder (ASD). The purpose of the article is to statistically evaluate, on the basis of systematic reviews and meta-analyses published in international scientific journals, the effect of ABA therapy on children's intellectual development, adaptive behavior, speech, and social skills. For this study, data from 9 international meta-analyses and systematic reviews published between 2009 and 2023 were comparatively analyzed.

Keywords: autism spectrum disorder, applied behavior analysis, ABA therapy, early intensive intervention, meta-analysis, adaptive behavior, effect size.

INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that affects a child's social communication and interaction abilities as well as behavior, characterized by restricted interests, repetitive movements, and distinctive reactions to sensory stimuli. According to the World Health Organization (WHO), autism spectrum disorder is observed in one out of every 100 children worldwide.

Over the past twenty years, the prevalence of ASD has increased considerably. In an updated systematic review published by Zeidan and colleagues in 2022, 99 epidemiological estimates from 34 countries were analyzed, finding an average rate of 100 cases per 10,000 children (i.e., 1%) — a significant increase compared to the rate of 62 per 10,000 children in 2012. According to data from the US Centers for Disease Control and Prevention (CDC) Autism and Developmental Disabilities Monitoring (ADDM) Network, ASD prevalence among 8-year-old children rose more than fivefold, from 0.67% in 2000 to 3.2% in 2022.

Against the backdrop of this rapid increase in prevalence, early diagnosis and effective rehabilitation of children has become a pressing social and medical task. Although various approaches exist internationally for working with children with ASD (speech therapy, occupational therapy, sensory integration, the Early Start Denver Model, and others), Applied Behavior Analysis (ABA) has been recognized as an evidence-based method by the American Psychological Association and the US Surgeon General, and is currently considered the 'gold standard.'

ABA is a scientific approach based on B.F. Skinner's theory of operant conditioning, aimed at changing behavior through systematic observation, measurement, and positive reinforcement. Within this method, a number of techniques are applied, including Discrete Trial Training, Naturalistic Environment Training, and Incidental Teaching.

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The purpose of this article is to systematize, on a statistical basis and using international meta-analyses, the impact of ABA therapy on various domains of children's development (intellectual, adaptive, social, and speech), and to formulate scientifically grounded conclusions for practitioners and parents.

MATERIALS AND METHODS

The study methodology was organized as a narrative literature review. Scientific articles of the meta-analysis and systematic review type evaluating the effectiveness of ABA therapy, published between 1987 and 2023 in the PubMed/PMC, ScienceDirect, BMC Psychiatry, Autism Research, and Google Scholar databases, were selected as sources.

The inclusion criteria for sources were as follows: (1) the study included children diagnosed with ASD; (2) the intervention was based on ABA principles; (3) results were presented as a statistical effect size (Cohen's d, Hedges' g, or SMD); (4) the study had a comparison group (control group or treatment as usual). According to these criteria, a total of 9 meta-analyses/systematic reviews (with a combined total of more than 3,000 child participants) were selected and are presented in Table 1.

The data obtained were analyzed grouped by four main developmental domains — intellectual function (IQ), adaptive behavior, speech/communication, and social skills — and effect sizes were evaluated according to Cohen's classification (0.20 — small, 0.50 — moderate, 0.80 and above — large effect).

RESULTS

According to the data from the analyzed sources, ASD prevalence has shown a steady upward trend over the past two decades (Figure 1). This is explained, on the one hand, by the broadening of diagnostic criteria and increased public awareness, and on the other hand, by a genuine rise in the actual prevalence rate.

Figure 1. Trends in ASD prevalence, 2000-2022 (based on Zeidan et al., 2022; CDC ADDM, 2023)

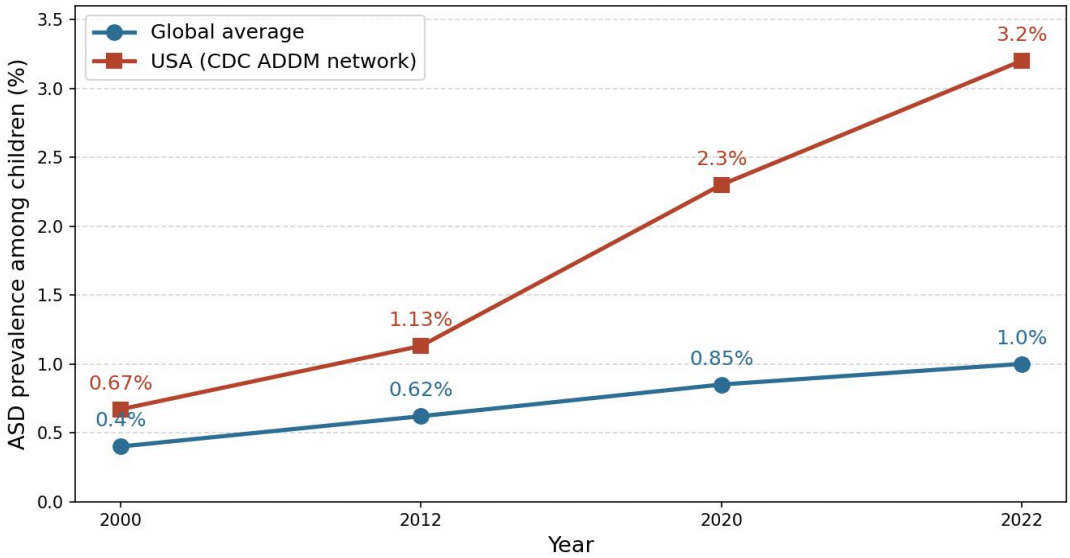


Figure 1. Trends in ASD prevalence, 2000-2022 (based on Zeidan et al., 2022; CDC ADDM, 2023 data)

A general description of the selected meta-analyses is presented in Table 1.

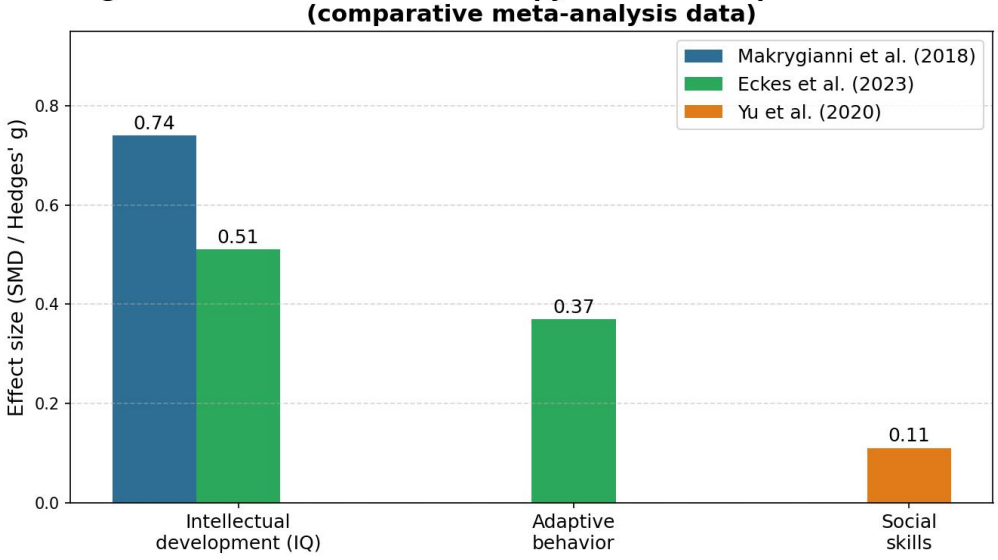
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№	Authors, Year	No. of studies	No. of participants	Key finding
1	Spreckley, Boyd (2009)	9	172	Positive but statistically non-robust change in cognitive and adaptive domains
2	Makrygianni et al. (2018)	21	~900	High effect on IQ: g = 0.740 (95% CI: 0.554-0.927)
3	Peters-Scheffer et al. (2011)	11	344	Moderate-to-high effect on intellectual and adaptive measures
4	Rodgers et al. (2021)	10	491	IQ: MD = 14.13 points; adaptive behavior: MD = 7.00 points (2-year follow-up)
5	Yu et al. (2020)	14	555	Significant effect on expressive language; small effect in the social domain
6	Eckes et al. (2023)	11	632	IQ: SMD = 0.51; adaptive behavior: SMD = 0.37; no significant difference in language or parental stress

Table 1. Comparative description of the main meta-analyses evaluating the effectiveness of ABA therapy

Summarizing the data presented in the table shows that the most robust and statistically reliable effects of ABA-based interventions were recorded in the domains of intellectual development (IQ) and adaptive behavior (Figure 2). Across the various meta-analyses, the effect size for IQ ranged from 0.51 to 0.74 (moderate-to-high level), while for adaptive behavior it ranged from 0.37 to 0.42 (moderate level).

Figure 2. Effect sizes of ABA therapy across developmental domains (comparative meta-analysis data)



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The meta-analysis by Rodgers and colleagues (2021), based on international individual participant data, is of particular importance, as it pooled raw data from 491 children. In this study, children who received an early intensive ABA program showed, over a two-year follow-up period, an average increase of 7.00 points on the Vineland Adaptive Behavior Scale and 14.13 points on IQ measures.

At the same time, not all sources yield the same optimistic results. The recent meta-analysis by Eckes and colleagues (2023) found that comprehensive ABA programs did not produce a significant difference from control groups in speech development, ASD symptom severity, or parental stress indicators. This suggests that treatment intensity and the child's baseline speech level may significantly affect outcomes.

The demographic and clinical characteristics of ASD are also an important factor in planning therapy outcomes (Figure 3). According to the global analysis by Zeidan and colleagues (2022), ASD occurs on average 4.2 times more often in boys than in girls, and a co-occurring intellectual disability is observed in approximately 33% of ASD cases.

Figure 3. Demographic and clinical profile of children diagnosed with ASD (based on Zeidan et al., 2022)

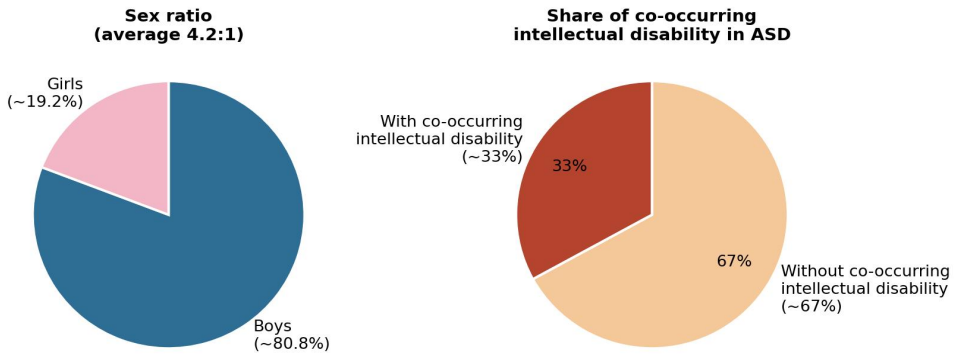


Figure 3. Sex ratio and share of co-occurring intellectual disability among children diagnosed with ASD

Table 2 presents the relationship between ABA therapy intensity (weekly hours) and observed developmental outcomes, reflecting a general trend recognized by practitioners.

Therapy intensity	Weekly duration	Observed outcome
Low intensity	5-10 hours	Limited, slow developmental progress
Moderate intensity	10-25 hours	Moderate positive change
Early intensive intervention	25-40 hours	Most robust and significant developmental gains

Table 2. General relationship between weekly ABA therapy intensity and developmental outcomes

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DISCUSSION

The findings confirm the positive effect of ABA therapy on the development of children with ASD, particularly in the intellectual and adaptive domains, although the magnitude of this effect was found to vary considerably depending on study methodology, sample size, and treatment intensity. The high effect sizes reported by Makrygianni and colleagues (2018) and Rodgers and colleagues (2021) mainly relate to early-started, high-intensity programs (more than 25 hours per week), which once again confirms the importance of early intervention.

At the same time, the findings of Eckes and colleagues (2023) show that ABA programs do not affect all domains to the same degree — in particular, speech development and family stress indicators did not differ significantly from control groups. Such inconsistency may be related to the variety of measurement instruments used across studies, as well as moderating factors such as the child's baseline speech level.

The comprehensive review conducted by Gitimoghaddam and colleagues (2022) likewise shows that a large proportion of studies examining ABA effectiveness lack a control group and do not measure the child's quality of life. This methodological limitation points to the need for future research in this field to employ large-scale, randomized controlled designs.

From a practical standpoint, the findings suggest that ABA therapy should be organized according to the following principles: (1) starting the intervention as early as possible, i.e., at preschool age; (2) setting program intensity at 20-40 hours per week according to the child's individual needs; (3) building the program on a comprehensive approach aimed not only at behavior correction but also at developing speech, social, and daily living skills; (4) actively involving parents in the program process and providing them with psychological and pedagogical support.

CONCLUSION

The literature analysis conducted confirmed the scientific validity of ABA therapy in the rehabilitation of children with autism spectrum disorder. According to international meta-analyses, comprehensive and early-started ABA programs lead to moderate-to-high positive changes in children's intellectual development (effect size 0.51-0.74) and adaptive behavior (0.37-0.42). At the same time, results for indicators such as speech development and family stress remain insufficiently robust, indicating the need to tailor therapy to individual needs and combine it with additional methods (speech therapy, family counseling).

Future research is recommended to use large-scale randomized controlled designs, to follow up on outcomes over the long term, and to pay particular attention to assessing the child's quality-of-life indicators. Widely implementing ABA therapy in Uzbekistan in coordination with an early childhood screening system could significantly improve the quality of social and medical support for children with autism spectrum disorder and their families.

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