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Applied Behavior Analysis (ABA) for Autism: What is the Effective Age Range for Treatment?

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There is extensive research in the field of Applied Behavior Analysis (ABA) that shows the effectiveness of focused treatment of behavior disorders with children who suffer from autism who are between the ages of five to twenty-one.

In the research listed here, over 2,000 children and adolescents who were between the ages of five and twenty-one were documented as receiving effective ABA treatment.

In addition, the cost effectiveness of Early Intensive Behavioral Intervention (EIBI) for autism is also well documented. Much of the research emphasizes the need to treat the children at as young an age as possible, and this is certainly an important aspect of effective treatment. However, the following list of several hundred references also reports the clinically important impact of Applied Behavior Analysis (ABA) with children who are specifically *above* the age of seven.

For a child starting treatment at any age, the average length of intensive ABA treatment would be expected to be 3 years, and the range of medically necessary treatment durations has been shown to be from 18 months to 5 years of duration. Maximum cost effectiveness will be achieved when a competent authorization process involves evaluation of the child's response to treatment and prognosis every six months, as was typically done in the studies listed here. When applying such standards, the children would not automatically continue treatment indefinitely. Instead the intensity and duration would be tailored to each child's optimum effectiveness, by periodically evaluating each child's individual response to treatment, and thereby dramatically control costs by providing time-limited ABA for only so long as is medically necessary.

These following studies reported meta-analyses of ABA treatment of children and adolescents with autism, between the ages of five and fifteen.

Reichow and Volkmar, in 2010, reported on 31 studies of children, aged four to fifteen, who benefited from ABA social skills training:

"The school-age category had the highest participant total of the three age categories (N= 291)." (page 156).

"Within the last 8 years, 66 studies with strong or acceptable methodological rigor have been conducted and published. These studies have been conducted using over 500 participants, and have evaluated interventions with different delivery agents, methods, target skills, and settings. Collectively, the results of this synthesis show there is much supporting evidence for the treatment of social deficits in autism." (page 161).

Reichow, B. & Volkmar, F.R. (2010). Social Skills Interventions for Individuals with Autism: Evaluation for Evidence-Based Practices within a Best Evidence Synthesis Framework. Journal of Autism and Developmental Disorders. 40, 149-166.

Bellini and colleagues, in 2007, reported the following age ranges of 155 children who benefited from ABA social skills training:

“21 studies involved preschool-age children, 23 involved elementary age children, and 5 studies involved secondary-age students.” (page 158).

Bellini, S., Peters, J.K., Benner, L., & Hopf, A. (2007). A meta-analysis of school-based social skills interventions for children with autism spectrum disorders. Remedial and Special Education, 28, 153-162.

These following studies reported peer reviews of ABA treatment of children and adolescents with autism, between the ages of five and eighteen.

Brosnan and Healy, in 2011, reported on 18 studies of children aged three to 18, who received effective ABA treatment to reduce or eliminate severe aggressive behavior:

“All of the studies reported decreases in challenging behavior attributed to the intervention. Of the studies included, seven reported total or near elimination of aggression of at least one individual during intervention in at least one condition.” (page 443).

“only four of the studies conducted follow-up assessments. However, each of these studies reported that treatment gains were maintained.” (page 443).

Brosnan, J., & Healy, O. (2011). A review of behavioral interventions for the treatment of aggression in individuals with developmental disabilities. Research in Developmental Disabilities. 32, 437-446.

Lang, et al. in 2010, reported on nine studies which involved 110 children aged nine to 23, who received a variety of forms of behavior therapy for anxiety.

“Within each reviewed study, at least one dependent variable suggested a reduction in anxiety following implementation of CBT.” (page 60).

“CBT has been modified for individuals with ASD by adding intervention components typically associated with applied behaviour analysis (e.g. systematic prompting and differential reinforcement). Future research involving a component analysis could potentially elucidate the mechanisms by which CBT reduces anxiety in individuals with ASD, ultimately leading to more efficient or effective interventions.” (page 53).

Lang, R., Regeher, A., Lauderdale, S., Ashbaugh, K., & Haring, A. (2010). Treatment of anxiety in autism spectrum disorders using cognitive behaviour therapy: a systematic review. Developmental Neurorehabilitation, 13, 53-63.

Hanley, Iwata, and McCord in 2003, reported on 277 studies which involved 536 children and adults (70% of the studies included persons between the ages of 1 and 18, and 37% also included persons older than 18), who received functional analyses of problem behaviors. Of these, 96 percent were able to yield an analysis of the controlling variables of the problem behavior. The specific functional analysis of individual problem behaviors is crucial to the successful intervention with those behaviors.

“Large proportions of differentiated functional analyses showed behavioral maintenance through social-negative (34.2%) and social-positive reinforcement (35.4%). More specifically, 25.3% showed maintenance via attention and 10.1% via access to tangible items. Automatic reinforcement was implicated in 15.8% of cases.” (pages 166-167).

Hanley, G., Iwata, B.A., & McCord, B.E. (2003). *Functional analysis of problem behavior: A review. Journal of Applied Behavior Analysis, 36, 147-185.*

Iwata and colleagues, in 1994, reported on the effective treatment of self-injurious behavior with 152 children, adolescents, and adults. In their sample, 39 were between the ages of 11 and 20, and 74 were 21 and older. The function of the self-injurious behavior could be identified in 95% of the persons, and in 100% of those cases an effective treatment could then be prescribed.

“Across all categories of intervention, restraint fading was the most effective, but its 100% success rate is misleading because it was always implemented in conjunction with another procedure. As single interventions, EXT (escape) had the highest success rate (93.5%); sensory integration and naltrexone had the lowest (0%).” (page 233).

“Results of the present study, in which single-subject designs were used to examine the functional properties of SIB in 152 individuals, indicated that social reinforcement was a determinant of SIB in over two thirds of the sample, whereas nonsocial (automatic) consequences seemed to account for about one fourth of the cases.” (page 234).

Iwata, B.A., Pace, G.M., et al. (1994). *The functions of self-injurious behavior: An experimental-epidemiological analysis. Journal of Applied Behavior Analysis, 27, 215-240.*

The following studies reported age cut-offs for initiating EIBI up to the age of seven years (84 months) and completing treatment up to the age of twelve.

Several articles of note are highlighted that report the effectiveness of EIBI/ABA that was delivered to children who *started* treatment even up to the age of seven, and then continued treatment for up to five more years, up until the age of twelve, where still medically necessary. The range of age cut-offs in evidence-based EIBI studies were established for the purpose of controlled research, and were based upon a number of factors, such as available funding. They weren't meant to imply that autism was untreatable after those ages. Throughout the EIBI literature, the published range of such age cut-offs, for the purpose of research, was 48 to 84 months for the maximum age to *begin* receiving treatment, and then the subsequent duration of treatment was one to five years, lasting up to the age of twelve.

Eikeseth and colleagues, in 2007, used the following cut-off:

“All referrals who met the following criteria were admitted to the study: (a) a diagnosis of childhood autism... (b) chronological age between 4 and 7 years at the start of treatment, (c) a deviation IQ of 50 or above... and (d) no medical conditions... that could interfere with treatment.” (page 266).

“The largest gain was in IQ; the behavioral treatment group showed an increase of 25 points (from 62 to 87) compared to 7 points (from 65 to 72) in the eclectic treatment group.” (page 269).

“in the behavioral treatment group, all correlations among intake age and outcome measures and changes were nonsignificant, with $r(12)$ ranging from $-.40$ to $.46$. Thus, age was not reliably associated with outcome or amount of change for this group.” (page 273).

Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2007). *Outcome for children with autism who began intensive behavioral treatment between ages 4 and 7: A comparison controlled study. Behavior Modification, 31, 264-278.*

Mudford and colleagues, in 2001, reported the following cut-off:

“By the age of 4 years, 71% of the sample had started EIBI. At the ages of 5, 6 and 7 years, the corresponding cumulative figures were 91%, 97% and 100%.” (page 177).

Mudford, O.C., Martin, N.T., Eikeseth, S., & Bibby, P. (2001). *Parent-managed behavioral treatment for preschool children with autism: Some characteristics of UK programs. Research in Developmental Disabilities, 22, 173-182.*

Sallows and Graupner, in 2005, reported the following data for children who ranged up to the age of 8.5 years of age at the conclusion of treatment:

“Following 2 to 4 years of treatment, 11 of 23 children (48%) achieved Full Scale IQs in the average range, with IQ increases from 55 to 104, as well as increases in language and adaptive areas comparable to data from the UCLA project. At age 7, these rapid learners were succeeding in regular first or second grade classes, demonstrated generally average academic abilities, spoke fluently, and had peers with whom they played regularly.” (page 433).

Sallows, G.O., & Graupner, T.D. (2005). Intensive Behavioral Treatment for Children With Autism: Four-Year Outcome and Predictors. American Journal on Mental Retardation, 110, 417-438.

Love, Carr and colleagues, in 2009, reported the following average ages of treatment in a comprehensive survey of nationwide ABA practices:

“Seventy-four percent (n = 153) of respondents reported that the *average* age of the children they served was between 2 and 5 (33% reported serving children who were 4-years old), and 26% (n = 55) reported an *average* client age of 6 or greater.” (page 177).

Love, J.R., Carr, J.E., Almason, S.M., Petursdottir, A.I. (2009). Early and intensive behavioral intervention for autism: A survey of clinical practices. Research in Autism Spectrum Disorders, 3, 421-428.

These additional 227 studies report the evidence base for ABA treatment of children who suffer from autism between the ages of five and twenty-one.

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- Baer, D.M. & Guess, D. (1971). Receptive training of adjectival inflections in mental retardates. *Journal of Applied Behavior Analysis, 4, 129-139.*
- Baer, D.M. & Guess, D. (1973). Teaching productive noun suffixes to severely retarded children. *American Journal of Mental Deficiency, 77 (5), 498-505.*
- Barbetta, P.M., Heron, T.E., & Heward, W.L., (1993). Effects of active student response during error correction on the acquisition, maintenance, and generalization of sight words by students with developmental disabilities. *Journal of Applied Behavior Analysis, 26, 111-120.*
- Barbetta, P.M., Heward, W.L., & Bradley, D.M. (1993). Relative effects of whole-word and phonetic-prompt error correction on the acquisition and maintenance of sight words by students with developmental disabilities. *Journal of Applied Behavior Analysis, 26, 99-111.*
- Belchic, J.K., & Harris, S.L. (1994). The use of multiple peer exemplars to enhance the generalization of play skills to the siblings of children with autism. *Child and Family Behavior Therapy, 16,1-25.*
- Bellini, S., & Akullian, J. (2007). A Meta-Analysis of Video Modeling and Video Self-Modeling Interventions for Children and Adolescents with Autism spectrum disorders. *Exceptional Children, 73, 261-284.*
- Bellini, S., Peters, J.K., Benner, L., & Hopf, A. (2007). A meta-analysis of school-based social skills interventions for children with autism spectrum disorders. *Remedial and Special Education, 28, 153-162.*
- Bernard-Opitz, V., Sriram, N., & Nakhoda-Sapuan, S. (2001). Enhancing social problem solving in children with autism and normal children through computer-assisted instruction. *Journal of Autism & Developmental Disorders, 31, 377-384.*
- Bibby, P., Eikeseth, S., Martin, N.T., Mudford, O.C., & Reeves, D. (2001). Progress and outcomes for children with autism receiving parent-managed intensive interventions. *Research in Developmental Disabilities, 22, 425-447.*
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- Blew, P.A., Schwartz, I.S., & Luce, S.C. (1985). Teaching functional community skills to autistic children using nonhandicapped peer tutors. *Journal of Applied Behavior Analysis*, 18, 337-342.
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- Buggey, T., Toombs, K., Gardener, P., Cervetti, M. (2000). Training responding behaviors in students with autism: Using videotaped self-modeling. *Journal of Positive Behavior Interventions*, 1, 205-214.
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