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# Applied Behavior Analysis and Autism Spectrum Disorders: literature review

## *Análise de Comportamento Aplicada e Distúrbios do Espectro do Autismo: revisão de literatura*

### ABSTRACT

**Purpose:** Systematic literature review about Applied Behavior Analysis (ABA) proposals directed towards persons with Autistic Spectrum Disorders aiming to contribute to a truly evidence-based practice. **Methods:** References from the last five years were obtained from the Web of Science, Medline, SciELO and Lilacs databases. Papers published in peer-reviewed journals were selected. Exclusion criteria were language, type of paper, theme and repeated papers. This selection resulted in 52 articles that were completely analyzed. Information regarding author, journal and date; title; theme and approach; casuistic; inclusion and exclusion criteria and conclusion was considered. **Results:** The papers refer to intervention processes, literature reviews, professional education, and parents' contributions to the intervention programs. Only four papers report the parents' role in the use of ABA principles at home. Studies about Professional education emphasize the specialized education. Most of the literature review papers conclude that the intervention programs are controversial, expensive and dependent of external variables. Although the articles describing intervention processes include 663 participants, a meta-analysis is not possible due to the lack of comparable inclusion and characterization criteria. **Conclusion:** There is not enough evidence of ABA's preponderance over other alternatives.

### RESUMO

**Objetivo:** Realizar uma revisão sistemática da literatura envolvendo as propostas de terapia baseada na análise de comportamento aplicada (ABA) dirigida a pessoas portadoras de distúrbios do espectro do autismo (DEA), contribuindo, dessa forma, para uma prática efetivamente baseada em evidências. **Métodos:** As bases de dados *Web of Science*, Medline, SciELO e Lilacs foram consultadas para o levantamento das referências bibliográficas publicadas nos últimos cinco anos. Foram selecionados os artigos publicados em periódicos com revisão por pares. Foram utilizados como critérios de exclusão o idioma, o tipo de artigo, o tema e os artigos repetidos. Essa seleção resultou em 52 artigos, que foram analisados na íntegra. Foram consideradas as informações referentes a autor, periódico e data; título; tema e abordagem; casuística; critérios de inclusão e exclusão e conclusões. **Resultados:** Os artigos abordam processos de intervenção, revisões de literatura, formação profissional e a contribuição dos pais no processo de intervenção. Apenas quatro artigos relatam a contribuição dos pais na aplicação dos princípios da ABA no ambiente doméstico. Os estudos sobre formação profissional enfatizam a valorização da formação especializada. A maioria das revisões de literatura conclui que os processos de intervenção são controversos, caros e dependentes de fatores externos. Embora artigos que relatam processos de intervenção envolvam 663 participantes, não é possível a realização de meta-análise devido à ausência de critérios de inclusão e caracterização comparáveis. **Conclusão:** Não há evidência suficiente para corroborar a preponderância da ABA sobre outras alternativas.

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**Conflict of interest:** nothing to declare.

## INTRODUCTION

Educational and therapeutic proposals directed towards persons with autism spectrum disorders (ASD) have been the object of debates frequently contaminated by ideology, politics and fads, frequently disregarding or demeaning scientific evidence about their efficiency and social validation<sup>(1,2)</sup>. Intervention proposals based on the applied behavior analysis (ABA) model are frequently mentioned as the only proposal with results scientifically proven<sup>(2-4)</sup>.

ABA based programs demand detailed assessment of environmental factors and their interference on the ASD child's behavior aiming to identify determinants of behaviors and factors that will probably lead to their repetition. These information are essential to the delineation and follow-up of intervention processes<sup>(2,3)</sup>. Programs frequently include verbal and communication abilities in intensity intervention levels that are similar to those directed toward cognitive and academic abilities and to behavior disorders<sup>(2,3)</sup>. Furthermore the strict use of ABA principles and therapists' consistent and specific training are also considered essential elements to the proposal success<sup>(4,5)</sup>. Parents' involvement, allowing a more intensive stimulation in home environment is frequently mentioned as one of the positive points of ABA intervention proposals<sup>(6,7)</sup>.

Recent studies admit the need for more research about the results of intervention processes directed toward "higher level behaviors" (as speech and insistence on sameness)<sup>(8,9)</sup>. In this sense, the "cognitive-behavioral" intervention has been proposed as an alternative to the continuity of the strict behavioral intervention<sup>(10)</sup>.

The inclusion of "communicative behaviors" as part of the objectives of the ABA based interventions to children with ASD<sup>(11)</sup> has lead professionals of other areas to propose approaches for speech that are frequently opposed or conflicting with language therapy<sup>(12)</sup>. On the other hand some speech-language pathologists (SLP) have used ABA intervention based on language therapy with ASD children. Therefore, it is relevant to critically review the literature that reports the results of this type of intervention.

## OBJECTIVES

Systematically review the literature about intervention proposals based on ABA with ASD individuals, therefore contributing with evidence-based practice.

## RESEARCH STRATEGY

The data bases *Web of Science*, Medline, SciELO and Lilacs were consulted using the terms "autism, ABA"; "autism, applied behavior analysis"; "*autismo, ABA*" and "*autismo, análise de comportamento aplicada*", to the identification of bibliographic references published in the last five years..

## SELECTION CRITERIA

The first data survey identified 672 papers. The articles published in peer reviewed journals were mechanically selected, resulting in 427 papers. From this point on a manual revision was conducted by reading the title and abstract of each paper. Exclusion criteria were language (including just papers in English, Portuguese and Spanish), the type of article (excluding abstracts, letters to the editor and tutorials) and the theme (excluding articles about treatment funding, health system resources, access to services, services provided to military families, legal issues, animal models and other issues in mental health). In this process repeated papers were also excluded. This selection resulted in 52 papers that were fully analyzed.

## DATA ANALYSIS

The articles selected to this review were synthesized on a spread-sheet to the record of information regarding author, journal and date; title; theme and approach; case series; inclusion and exclusion criteria when possible, and conclusions of the study.

## RESULTS

The 52 articles analyzed were published in 25 different journals. The distribution of this publication is presented in Chart 1. It is expressively comprehensive, including journals specialized in autism, pediatrics, behavior studies, communication disorders, psychology and even dental health. The analysis of the impact factor (IF) reveals that 64% of the journals have their IF calculated and there is a large variation in these index. While the largest identified impact factor is above 9, the smaller of them is below 0.5. There are 20 papers published on the six journals with IF above 2, four in journals with IF above 1 and 13 articles published in journals with IF below 1. These results show once more the comprehensiveness and the interest generated by this study field.

It can be observed on Chart 2 that 43% of the articles focus on the analysis of intervention processes; 32% are literature reviews; 19% refer to the analysis of professional practice and education and 6% study parents' role and contribution to the intervention process.

It can also be observed that there isn't a significant repetition of authors' names or research groups. The name of just one author appears in four papers; another researcher is the author of three articles and other four names are among the authors of two papers each. It suggests, still once again, the comprehensiveness of the theme and of the research groups involved with this proposal.

Although several studies point out to the meaning of parents' contribution to the application of ABA principles in home environment<sup>(2,4,5,8,13)</sup>, this literature review has found few scientific results of this proposal. One research<sup>(9)</sup> with 53 parents of ASD children reported that all of them

**Chart 1.** Impact factor and number of papers per journal

Journal title	Nº of papers	IF-JCR
Journal of Autism and Developmental Disorders	14	3.34
Focus on Autism and Other Developmental Disabilities	1	1.048
Annual Review of Clinical Psychology	1	9.111
Autism	2	2.265
Research on Developmental Disabilities	4	0.88
Journal of Intellectual Disability Research	1	1.877
Behavior Modification	2	–
Education and Treatment of Children	1	0.47
The American Journal of Occupational Therapy	1	1.7
Journal of Behavioral Education	2	0.51
Journal of Pediatrics	1	4.115
Journal of Speech Language Pathology and Applied Behavior Analysis	3	1.19
Teaching Exceptional Children	2	–
Journal of the American Dental Association	1	2.195
British Journal of Special Education	1	–
The Psychological Record	1	–
Infants & Young Children	1	0.91
The Behavior Bulletin	1	–
International Journal of Behavioral Consultation and Therapy	2	–
The Behavior Analyst Today	3	0.491
The Journal of Early and Intensive Behavioral Intervention	2	–
Clinical Psychology Review	1	8.392
Behavioral Interventions	2	0.8
Revista da Facultad de Medicina de a.Universidad Nacional de Colombia	1	–
Current Topics in Review	1	–

Legend: IF-JCR: impact factor on the Journal Citation Report

were positive about the results of a two-year intensive intervention proposal. A recent study<sup>(14)</sup> assessed the opinion of parents and siblings of ASD children regarding the results of a home intervention program. The author concluded that the results were mostly neutral, with the parents more optimistic than the siblings regarding the proposal's results, but even they didn't report gains to the siblings that could be associated to the behavior intervention with the ASD children. The other revised paper<sup>(7)</sup> reports the experience of six mothers that opted to study the ABA methodology in depth and became accredited therapists in the field; but it is not possible to generalize the meaning of this experience to all of them neither anticipate this meaning to other parents that make the same choice.

The papers about professional education focus on distance learning, adaptation of programs to different linguistic contexts, use of video samples for behavior modeling and supervision. A total of 253 professionals (therapists

and educators) participated in all these studies but the only point that may be generalized is the value of specialized training<sup>(3,7)</sup>. Questionnaires and interviews are the main data gathering strategy but there is few information about how the research groups were determined.

The second largest group of papers includes those that made literature reviews. Two of them present meta-analyses that total 200 participants, and both conclude that there is no clear evidence that ABA has any relevant advantage over other intervention proposals<sup>(1)</sup>. A third study<sup>(15)</sup> revised five meta-analyses studies about intensive behavior intervention and identified limitations due to inconsistent description of the participants, methods, inclusion criteria and intervention process on the researches that were being reported. The positions that result from the literature reviews that were analyzed in the present study are also inconsistent. Results of the intervention processes are reported by seven papers as expensive and dependent of external factors (such as environment, amount of training provided and interaction with medication). These papers also point out to the need for more controlled studies about the results of these intervention processes<sup>(2,13)</sup>. Three other reviews<sup>(10)</sup> present positions that are clearly contrary to the use of ABA as the main intervention program provided to ASD individuals, considering this approach as inefficient and lacking in scientific support.

The papers that report intervention processes using ABA principles amount to 44% of the revised articles. The first aspect that was considered was the number of participants of each study. It varies from case studies with just one subject with ASD<sup>(16,17)</sup> to another that reports the results of intervention conducted with 208 participants<sup>(18)</sup>. Although these articles include a total of 663 participants, a meta-analysis is not possible due to the lack of comparable inclusion criteria or even a more detailed description about characteristics such as age, specific diagnostics and developmental level of the participants. In regard to the participants' age, there is a large variation, including participants under 36 months and adolescents. Besides that, this characteristic is also described with different degrees of specificity; while some papers describe age ranges as "between 2 years and 4 months and 6 years and 2 months"<sup>(11)</sup>, others refer just to "children"<sup>(19)</sup> or "adolescents"<sup>(20)</sup>.

In some studies the inclusion criteria are detailed and specific, using developmental measures, diagnostic protocols and social-demographic characterization<sup>(5-11)</sup>. In other studies, however, participants were included in the intervention processes according to convenience criteria, as attending a certain school or being enlisted in some intervention program provided to the children of a certain community<sup>(21)</sup>. Certainly to determine evaluation criteria to verify the results of intervention that may be efficient to assess processes that are so different is a challenge that still isn't solved.

This same diversity may be observed in what regards to the time involved in the intervention program. It is possible to observe on Chart 2 that the described processes

**Chart 2.** Theme and case-load of the revised papers

Autor	Title	Theme/approach	Case-load
1 - Grindle, Kovshoff, Hastings, Remington JADD, 2009	Parents' Experiences of Home-Based Applied Behavior Analysis Programs for Young Children with Autism	Parents/ families	53 parents
2 - Odom, Boyd, Hall, Hume JADD, 2012	Evaluation of Comprehensive Treatment Models for Individuals with ASD	Literature review	
3- Callahan, Shukla-Mehta, Magee, Wie JADD, 2010	ABA Versus TEACCH: The Case for Defining and Validating Comprehensive Treatment Models in Autism	Literature review (metanalysis)	187 participants
4 - Reichow JADD, 2012	Overview of Meta-Analyses on Early Intensive Behavioral Intervention for Young Children with Autism Spectrum Disorders	Literature review (metanalysis)	5 metanalysis
5 - Cebula JADD, 2012	Applied Behavior Analysis Programs for Autism: Sibling Psychosocial Adjustment During and Following Intervention Use	Parents/ families	130 families
6 - Boyd, McDonough, Bodfish JADD, 2012	Evidence-Based Behavioral Interventions for Repetitive Behaviors in Autism	Literature review	
7 - Paul, Campbell, Gilbert, Tsiouri JADD, 2013	Comparing Spoken Language Treatments for Minimally Verbal Preschoolers with Autism Spectrum Disorders	Intervention	22 (2.4–6.2 years)
8 - Sulzer-Azaroff, Fleming, Tupa, Bass, Hamad FAoDD, 2008	Choosing Objectives for a Distance Learning Behavioral Intervention in Autism Curriculum	Professionals	34 specialists
9 - Vismara, Rogers Annu Rev Clin Psychol, 2010	Behavioral Treatments in Autism Spectrum Disorder: What Do We Know?	Literature review	
10 - Vismara, Colimbi, Rogers Autism, 2009	Can one hour per week of therapy lead to lasting changes in young children with autism?	Intervention – individual, 12 weeks, 1h/week	6 (under 6 m)
11 - Peters-Scheffer, Didden, Mulders, Korzilius Res Dev Disabilities, 2010	Low intensity behavioral treatment supplementing preschool services for young children with autism spectrum disorders and severe to mild intellectual disability	Intervention – 6.5 hs/ week for 1 year	12 children
12 - Klintwall, Gillberg, Bolte, Fernell JADD, 2012	The Efficacy of Intensive Behavioral Intervention for Children with Autism: A Matter of Allegiance?	Intervention – 30 hs/ weeks for 2 years	24 children
13 - Kroeger, Sorensen JIDR, 2010	A parent training model for toilet training children with autism mjr_1286 556..567	Intervention with parent's participation	2 (4 e 6 years)
14 - Hayward, Eikeseth, Gale, Morgan Autism, 2009	Assessing progress during treatment for young children with autism receiving intensive behavioural interventions	Intervenção – 1 ano 36hs/semana – na clínica e em casa	44 crianças
15 - Voos, Pelphrey, Tirrell, Bolling, Wyk, Kaiser, McPartland, Volkmar, Ventola JADD, 2013	Neural Mechanisms of Improvements in Social Motivation After Pivotal Response Treatment: Two Case Studies	Intervention – 4 months	2 children
16 - Goods, Ishijima, Chang, Kasari JADD 2013	Preschool Based JASPER Intervention in Minimally Verbal Children with Autism: Pilot RCT	Intervention – 30 hs/ week	15 pre-schoolers
17 - Eldevik, Hastings, Jahr, Hughes JADD, 2012	Outcomes of Behavioral Intervention for Children with Autism in Mainstream Pre-School Settings	Intervention – 2 years	31 (2–6 years)
18 - Grindle, Hastings, Saville, Hughes, Huxley, Kovshoff, Griffith, Walker-Jones, Devonshire, Remington Behavior Modification, 2012	Outcomes of a Behavioral Education Model for Children With Autism in a Mainstream School Setting	Intervention at classroom measures in 1 and 2 years	11 (3–7 years)

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Chart 2. Continuação

Autor	Title	Theme/approach	Case-load
19 - Leaf, Taubman, McEachin, Leaf Education and Treatment of Children, 2011	A Program Description of a Community-Based Intensive Behavioral Intervention Program for Individuals with Autism Spectrum Disorders	intensive intervention	64 children
20 - Gutman, Raphael-Greenfield, Rao The American Journal of Occupational Therapy, 2012	Effect of a Motor-Based Role-Play Intervention on the Social Behaviors of Adolescents With High-Functioning Autism: Multiple-Baseline Single-Subject Design	Intervention – 1 year	12 adolescents
21 - Marion, Martin, Yu, Buhler, Kerr J Behav Educ, 2012	Teaching Children with Autism Spectrum Disorder to Mand “Where?”	Intervention – 3 a 4 weeks	3 (3–5 years)
22 - Spreckley, Boyd J Pediatr, 2009	Efficacy of Applied Behavioral Intervention in Preschool Children with Autism for Improving Cognitive, Language, and Adaptive Behavior: A Systematic Review and Meta-analysis	Literature review (metanalysis)	13 participants
23 - Barbera JSLP-ABA, 2009	The experience of “Autism Mothers” who become behavior analysts: a qualitative study	Parents/ families	6 mothers
24 - Gale, Eikeseth, Rudrud JADD, 2011	Functional Assessment and Behavioural Intervention for Eating Difficulties in Children with Autism: A study Conducted in the Natural Environment Using Parents and ABA Tutors as Therapists	Intervention – Oral hygiene habits (40hs/ week)	3 pre-schoolers
25 - Ryan, Hughes, Katsiyannis,McDanieil, Sprinkle Teaching Exceptional Children, 2011	Research-Based Educational Practices for Students With Autism Spectrum Disorders	Literature review	
26 - Hernandez, Ikkanda JADA, 2013	Behavior management of children with autism spectrum disorders in dental environments	Literature review	
27 - Fernella, Hedvall, Westerlund, Carlssone, Eriksson, Olsson, Holmc, Norrelgen, Kjellmer, Gillberg Res Devl Disab, 2011	Early intervention in 208 Swedish preschoolers with autism spectrum disorder. A prospective naturalistic study	Naturalistic intervention	208 (20-54 m)
28 - Reed, Osborne British Journal of Special Education, 2012	Impact of severity of autism and intervention time-input on child outcomes: comparison across several early interventions	Intervention – 4 alternatives	66 (2.6–4 years)
29 - Jones, Hoerger, Hughes, Williams, Jones, Moseley, Hughes, Prys J Behav Educ, 2011	ABA and Diverse Cultural and Linguistic Environments: A Welsh Perspective	Professional education	
30 - Forget, Rivard The Psychological Record, 2012	Verbal behavior in young children with autism spectrum disorders at the onset of an early behavioral intervention program	Intervention	14 children
31 - Bondi, Frost JSLPABA, 2010	A common language: using B.F. Skinner’s verbal behavior for assessment and treatment of communication disabilities in SLP-ABA Extending the Reach of Early Intervention Training for	Professional education	
32 - Hamad, Serna, Morrison, Fleming Infants & Young Children, 2010	Practitioners: A Preliminary Investigation of an Online Curriculum for Teaching Behavioral Intervention Knowledge in Autism to Families and Service Providers	Professional education	81 professionals
33 - Nikopoulos, Nikopoulou-Smyrni Jeibi, 2012	Teaching complex social skills to children with autism; advances of video modeling	Literature review	
34 - Lovitt Current Topics in Review, 2012	Applied Behavior Analysis: A Method That Languished but Should Be Restored	Literature review	

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Chart 2. Continuação

Autor	Title	Theme/approach	Case-load
35 - Osborne, Reed The Behavior Bulletin, 2008	An evaluation of the role of reinforcement-based interventions in determining the effectiveness of 'eclectic' approaches for teaching children with autism spectrum disorders	Eclectic intervention and ABA	65 (2.6–4 years)
36 - Vismara, Young, Stahmer, Griffith, Rogers JADD, 2009	Dissemination of Evidence-Based Practice: Can We Train Therapists from a Distance?	Professional education	10 professionals
37 - Wolfe, Condo, Hardaway Teaching Exceptional Children, 2009	Sociosexuality Education for Persons With Autism Spectrum Disorders Using Principles of Applied Behavior Analysis	Professional education	
38 - Dyer JSLPABA, 2009	Clinical application of speech intelligibility research: the River Street Autism Program at Coltsville	Literature review	
39 - Healy, Keohane, Leader, Lydon, JEIBI, 2010	The effects of intensive tact instruction on three verbal operants in non-instructional settings for two children with autism	Intervention (15 minutes)	2 children
40 - Luiselli, MaGee, Sperry, St. Amand. IJBCT, 2008	Group training of applied behavior analysis (ABA) knowledge competencies to community-based service providers for adults with developmental disabilities	Professional education	47 professionals
41 - Gibson, Grey, Hastings. JADD, 2009	Supervisor Support as a Predictor of Burnout and Therapeutic Self-Efficacy in Therapists Working in ABA Schools	Professional education	81 professionals
42 - DePizzo-Cheng, LaRue, Sloman, Weiss The behavior analyst today, 2010	ABA and PBS: the dangers in creating artificial dichotomies in behavioral intervention	Professional education	
43 - Schreck, Mazur Behav Interventions, 2008	Behavior analyst use of and beliefs in treatments for people with autism	Professional education	
44 - Brock, Bruneau, Davis, McNulty, Rosswurm, Zane The behavior analyst today, 2010	Efficiency of forced choice preference assessment: comparing multiple presentation techniques	Intervention	6 (8-12 years)
45 - Eldevik, Jahr, Eikeseth, Hastings, Hughes Behavior Modification, 2010	Cognitive and Adaptive Behavior Outcomes of Behavioral Intervention for Young Children With Intellectual Disability	Intervention (comparing models)	25 children
46 - Healy, Kenny, Leader, O'Connor The J. of Early and Intensive Behavioral Intervention, 2008	Three years of intensive applied behavior analysis: a case study	Intervention (at school)	1 (2a,10m)
47 - Virués-Ortega Clinical Psychology Review, 2010	Applied behavior analytic intervention for autism in early childhood: Meta-analysis, meta-regression and dose–response meta-analysis of multiple outcomes	Literature review	
48 - DeRosa, Gadaire, Kelley. The behavior analyst today, 2011	Research needed for focusing on additional generality of applied behavior analysis	Literature review	
49 -Schreck, Miller. Behavioral Interventions, 2010	How To Behave Ethically In A World Of Fads	Literature review	
50 - Axelrod, Bloh. The Journal of Early and Intensive Behavioral Intervention, 2008	IDEIA and the means to change behavior should be enough: growing support for using applied behavior analysis in the classroom	Literature review	
51 - Barnes-Holme, Murphy The Psychological Record, 2009	Establishing derived manding for specific amounts with three children: an attempt at Synthesizing Skinner's Verbal Behavior with relational frame theory	Intervention (2 normal chld w. 9 and 10y.and 1 ASD w. 4y)	3 children
52 - Piñeros-Ortiz, Toro-Herrera Rev fac med u nal Colombia. 2012	General concepts concerning applied behavior analysis (ABA) in children suffering autistic spectrum disorders (ASD)	Literature review	

may take 12 weeks; eight months; one or two years in programs with one or 30 or even 36 hours per week. The training processes took place mostly in the school<sup>(21)</sup> (at the child's classroom or in some silent room), in clinics<sup>(8)</sup> or at the participant's home.

The purposes of the intervention programs ranged from motor imitation<sup>(11)</sup> to adaptation abilities<sup>(19)</sup>; toilet training; motor, social and linguistic abilities<sup>(5,9,20,21)</sup>. Some papers report successful results using ABA approaches, with relevant progress to all participants, in different areas, especially with early intensive intervention programs. However, most of these studies do not include control-groups. Studies comparing programs with ABA framework with "naturalistic" or "comprehensive" models<sup>(8,11,19,19,21)</sup> concluded that there is no relevant difference on the results of both types of intervention, especially in what refer to the severity of the symptoms of autism.

The direct association between the number of training hours and the results of the intervention program, related as successful, is mentioned by 12 papers, with a total of 182 participants. Just one study<sup>(22)</sup> with six participants concluded that an intervention program with one hour per week produced satisfactory results. Other ten papers with a total of 453 participants, compared the results of ABA intervention programs to different therapeutic proposals and didn't identify significant differences in the results.

## CONCLUSION

This review compiled a relevant number of articles describing studies and other literature reviews about an intervention proposal that is frequently mentioned as the only therapeutic approach with scientifically proven results with ASD individuals. The number of journals reviewed and their broad thematic focus indicate the impartiality of the research. Studies that compared ABA approach with other proposals lead to the same conclusions of other literature reviews, i.e., there is not enough evidence to corroborate ABA's preponderance over other alternatives.

The search for intervention procedures that are efficient, socially relevant and economically viable is essential to the improvement of the services provided to ASD individuals. However, the analysis of the material indicate that, before any intervention proposal can be considered better or more efficient than others, there is still the need for more controlled studies, with relevant number of participants and clearly defined inclusion criteria and tools to the assessment of the results.

The option for a therapeutic method or procedure should be based on clear information about its principles, techniques and expected results, and also about the available alternatives. We hope that this review help the SLP to make choices that are increasingly based on scientific evidence, even if it means that there are no single answers that can be used to all ASD individuals. This process must include

providing information and orientation to families about the available alternatives, their advantages and limitations.

*\*FDMF was responsible by data gathering and writing of the paper; CAHA collaborated with data gathering, revision and formatting of the paper.*

## REFERENCES

- Callahan K, Shukla-Mehta S, Magee S, Wie M. ABA versus TEACCH: the case for defining and validating comprehensive treatment models in autism. *J Autism Develop Disord.* 2010;40:74-8.
- Vismara LA, Rogers S. Behavioral treatments in Autism Spectrum Disorder: what do we know? *Annu Rev Clin Psychol.* 2010;6:447-68.
- Sulzer-Azaroff B, Fleming R, Tupa M, Bass R, Hamad C. Choosing objectives for a distance learning behavioral intervention in autism curriculum. *Focus Autism Other Dev Disabl.* 2008;23:29-36.
- Klintwall L, Gillberg C, Bölte S, Fernell E. The efficacy of intensive behavioral intervention for children with autism: a matter of allegiance? *J Autism Dev Disord.* 2012;42(2):139-40.
- Eldevik S, Hastings RP, Jahr E, Hughes JC. Outcomes of behavioral intervention for children with autism in mainstream pre-school settings. *J Autism Dev Disord.* 2012;42(2):210-20.
- Kroeger K, Sorensen R. A parent training model for toilet training children with autism. *J Intellect Disabil Res.* 2010;54(6):556-67.
- Barbera ML. The experiences of "autism mothers" who become behavior analysts: a qualitative study. *J Spe Lang Path Apl Behav Anal.* 2009;4(1):56-73.
- Hayward D, Eikeseth S, Gale C, Morgan S. Assessing progress during treatment for young children with autism receiving intensive behavioral interventions. *Autism.* 2009;13(6):613-33.
- Grindle CF, Hastings RP, Saville M, Hughes JC, Huxley K, Kovshoff H, et al. Outcomes of a behavioral education model for children with autism in a mainstream school setting. *Behav Modif.* 2012;36(3):298-319.
- Boyd BA, McDonough SG, Bodfish JW. Evidence-based behavioral interventions for repetitive behaviors in autism. *J Autism Dev Disord.* 2012;42(6):1236-48.
- Paul R, Campbell D, Gilbert K, Tsiouri I. Comparing spoken language treatments for minimally verbal preschoolers with autism spectrum disorders. *J Autism Dev Disord.* 2013;43(2):418-31.
- Kasari C, Paparella T, Freeman S, Jahromi L. Language outcome in autism: randomized comparison of joint attention and play interventions. *J Consult Clin Psychology.* 2008;76(1):125-37.
- Odom SL, Boyd BA, Hall LJ, Hume K. Evaluation of comprehensive treatment models for individuals with autism spectrum disorders. *J Autism Dev Disord.* 2010;42(2):425-36.
- Cebula KR. Applied behavior analysis programs for autism: sibling psychosocial adjustment during and following intervention use. *J Autism Dev Disord.* 2012;42(4):847-62.
- Reichow B. Overview of meta-analyses on early intensive behavioral intervention for young children with autism spectrum disorders. *J Autism Dev Disord.* 2012;42(3):512-20.
- Haely C, Kenny M, Leader K, O'Connor J. Three years of intensive applied behavior analysis: a case study. *J Early Intens Behav Interv.* 2008;5(1):4-23.
- Barnes-Holme D, Murphy C. Establishing derived manding for specific amounts with three children: an attempt at Synthesizing Skinner's Verbal Behavior with relational frame theory. *Psychol Rec.* 2009;59(1):75-9.
- Fernell E, Hedvall Å, Westerlund J, Carlsson LH, Eriksson M, Olsson MB, et al. Early intervention in 208 Swedish preschoolers with autism spectrum disorder. A prospective naturalistic study. *Res Dev Disabil.* 2010;31(3):790-99.

19. Peters-Scheffer H, Didden P, Mulders C, Korzilius H. Low intensity behavioral treatment supplementing preschool services for young children with autism spectrum disorders and severe to mild intellectual disability. *Res Dev Disabil*. 2010;31(6):1678-84.
20. Gutman G, Greenfield R, Rao P. Effect of a motor-based role-play intervention on the social behaviors of adolescents with high-functioning autism: multiple-baseline single-subject design. *Am J Occup Therapy*. 2012;66(5):529-38.
21. Reed C, Osborne M. Impact of severity of autism and intervention time-input on child outcomes: comparison across several early interventions. *Brit J Spec Educ*. 2012;39(3):130-6.
22. Vismara LA, Colombi C, Rogers S. Can one hour per week of therapy lead to lasting changes in Young children with autism? *Autism*. 2009;13(1):93-115.