The Use of Combined Therapies or Complementary Tools in Rehabilitation in Different Conditions in Autism

O Uso de Terapias Combinadas ou Complementares na Reabilitação em Diferentes Condições no Autismo
El Uso de Terapias Combinadas o Complementarias en Rehabilitación En Diferentes Condiciones en el Autismo

RESUMO
Introdução: O transtorno do espectro autista apresenta grande heterogeneidade clínica. No Brasil, há prevalência de 1 em 38 crianças, o que corresponde a cerca de 2,4 milhões de indivíduos com o transtorno. Foi considerando a escolha do tratamento que deve ser adequada e o grande número de publicações sobre o uso combinado de terapias e ferramentas complementares, na reabilitação, é que viemos propor esse estudo. Os nossos objetivos foram avaliar os resultados de pesquisas obtidos pelo uso de terapias combinadas no tratamento de sintomas considerados alvos da psicologia, fornecer uma discussão sobre a escolha terapêutica e situar melhor os pesquisadores ou psicólogos quanto ao estado da pesquisa. **Métodos:** Trata-se de um estudo de revisão bibliográfica integrativa, portanto, realizamos busca de artigos em bancos de dados eletrônicos, como SciELO, PubMed, Scopus e Web of Science, recorrendo aos descritores, aos critérios de inclusão e exclusão. **Resultados:** Selecionamos 88 artigos, mas apenas 52,3% foram incluídos. Em seguida, categorizamos os artigos pelos assuntos destacados, como heterogeneidade clínica, prevalência do TEA, treinamento parental e terapia única / terapias combinadas ou ferramentas complementares. **Discussão:** A eficácia do uso de terapias tradicionais em conjunto com terapias complementares, perece variar dependendo das características das populações e heterogeneidade clínica. Além disso, os estudos pouco revelam detalhes das intervenções, como dosimetrias, estratégias ou contribuições de cada uma das terapias. **Conclusão:** As intervenções multidisciplinares mostram eficácia com fornecimento de tratamento integrado, mas destacamos que, embora haja muitas variações, o uso de terapias combinadas para tratar alterações relacionadas com alvos próprios da psicologia são essenciais.
DESCRITORES: Transtorno do Espectro Autista; Terapias; Terapia Comportamental; Ferramentas Complementares; Reabilitação.

ABSTRACT
Introduction: Autism spectrum disorder presents great clinical heterogeneity. In Brazil, there is a prevalence of 1 in 38 children, which corresponds to approximately 2.4 million individuals with the disorder. Considering the need for appropriate treatment choices anda the large number of publications on the combined use of therapies and complementary tools in rehabilitation, we proposed this study. Our objectives were to evaluate the research results obtained through the use of combined therapies in the treatment of symptoms considered targets of psychology, to provide a discussion on therapeutic choice, and to better situate researchers or psychologists regarding the state of research. **Methods:** This is an integrative literature review study; therefore, we searched for articles in electronic databases such as SciELO, PubMed, Scopus, and Web of Science, using descriptors and inclusion and exclusion criteria. **Results:** We selected 88 articles, but only 52.3% were included. We then categorized the articles by highlighted topics such as clinical heterogeneity, prevalence of ASD, parental training, and single therapy/combined therapies or complementary tools. **Discussion:** The effectiveness of using traditional therapies in conjunction with complementary therapies appears to vary depending on population characteristics and clinical heterogeneity. Furthermore, the studies reveal little detail about the interventions, such as dosimetries, strategies, or contributions of each therapy. **Conclusion:** Multidisciplinary interventions show effectiveness with the provision of integrated treatment, but we emphasize that, although there are many variations, the use of combined therapies to treat alterations related to specific psychological targets is essential.
DESCRIPTORS: Autism Spectrum Disorder; Therapies; Behavioral Therapy; Complementary Tools; Rehabilitation.

DOI: 10.36489/saudecoletiva.2025v16i102p18002-18021

RESUMEN

Introducción: El trastorno del espectro autista presenta una gran heterogeneidad clínica. En Brasil, la prevalencia es de 1 de cada 38 niños, lo que corresponde a aproximadamente 2,4 millones de personas con este trastorno. Considerando la necesidad de tratamientos adecuados y el gran número de publicaciones sobre el uso combinado de terapias y herramientas complementarias en rehabilitación, nos propusimos este estudio. Nuestros objetivos fueron evaluar los resultados de las investigaciones obtenidas mediante el uso de terapias combinadas en el tratamiento de síntomas considerados objetivos de la psicología, generar una discusión sobre la elección terapéutica y brindar a los investigadores y psicólogos una mejor perspectiva del estado actual de la investigación. **Métodos:** Se trata de una revisión integrativa de la literatura; por lo tanto, se buscaron artículos en bases de datos electrónicas como SciELO, PubMed, Scopus y Web of Science, utilizando descriptores y criterios de inclusión y exclusión. **Resultados:** Seleccionamos 88 artículos, pero solo se incluyó el 52,3%. Posteriormente, categorizamos los artículos según temas destacados como la heterogeneidad clínica, la prevalencia del TEA, la formación de padres y la terapia única/terapias combinadas o herramientas complementarias. **Discusión:** La efectividad del uso de terapias tradicionales junto con terapias complementarias parece variar según las características de la población y la heterogeneidad clínica. Además, los estudios aportan pocos detalles sobre las intervenciones, como la dosimetría, las estrategias o las contribuciones de cada terapia. **Conclusión:** Las intervenciones multidisciplinarias muestran efectividad al proporcionar un tratamiento integrado, pero enfatizamos que, si bien existen muchas variaciones, el uso de terapias combinadas para tratar alteraciones relacionadas con objetivos psicológicos específicos es esencial.

DESCRIPTORES: Trastorno del Espectro Autista; Terapias; Terapia Conductual; Herramientas Complementarias; Rehabilitación.

RECEIVED: 10/10/2025 **APPROVED:** 10/27/2025

How to cite this article: Carvalho HS, Campos ACS, Brant LEV. The Use of Combined Therapies or Complementary Tools in Rehabilitation in Different Conditions in Autism. Saúde Coletiva (Brazilian Edition) [Internet]. 2025 [cited year month day];16(102):18002-18021. Available from: DOI: 10.36489/saudecoletiva.2025v16i102p18002-18021

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INTRODUCTION

Autism Spectrum Disorder (ASD) stems from a combination of genetic and environmental causes[1]. The 2022 Demographic Census, released by the Brazilian Institute of Geography and Statistics (IBGE), showed that 2.4 million Brazilians reported having been diagnosed with ASD. This number represents 1.2% of the population aged 2 years and older. The prevalence of the diagnosis was higher among men (1.5%) than among women (0.9%)[2].

The diagnosis of ASD is defined based on the identification of persistent deficits in communication or social interaction; restricted and repetitive patterns of behavior; and impairments in daily routine development due to the presence of symptoms that generally appear early in life[1] . ASD can be classified into three levels of severity based on social communication and restrictive and stereotypical behaviors: level 1 – requires support; level 2 – requires substantial support; and level 3 – requires very substantial support[3]. Although there are core or shared symptoms among individuals diagnosed with ASD, there is great clinical heterogeneity[1,4].

Anatomical and pathological changes in individuals with ASD are noted through connectivity that appears to be greater between neurons at short distances in the brain and reduced connectivity at long distances[4,5]. These changes may represent the basis of complex patterns of in-

teractions between perceptual and social systems. Reduced integration of sensory, cognitive, and motor systems may lead to social deficits and the emergence of restricted behaviors [5]. Distinct difficulties in social interaction and communication can be verified through deficits in socio-emotional reciprocity, variations in the interaction between expressive/receptive languages, and low interest in peers [6,7]. Repetitive and restricted behaviors are observed in repetitive hand movements, the use of objects or stereotypical speech, behavioral inflexibility, selective eating, excessive attachment to routines, and difficulties with transitions between activities [6,7]. Another aspect that presents with changes is related to sensory perception. There may be hypo- or hyperactivity to sensory stimuli, as in some cases where individuals are indifferent to pain or temperature, and in other cases, with greater reactivity to these stimuli[6,7]. Children with ASD may exhibit difficulties concentrating on anything other than what is causing the greatest sensory reaction, and may even stop interacting with someone[6,7].

In addition to genetic complexity and environmental interaction, the occurrence of other health conditions also contributes to clinical heterogeneity in ASD[1] . Sleep disturbances, gastrointestinal problems, obesity, and allergies, when present in children with ASD, can become an even greater problem due to communication difficulties[8,9] . Avoidant and restrictive eating habits are considered a condition that affects the quality of life of people with ASD and are not necessarily related to the diagnosis[9]. Among the most common psychological conditions in ASD is intellectual disability, which affects about 30%–70% of individuals[10]. Another common diagnosis is Attention Deficit Hyperactivity Disorder (ADHD) in individuals with ASD[11]. Studies involving the coexistence of these two disorders show controversial data, with some indicating that approximately 16% of individuals with ASD also have ADHD, while others report that this number is higher, reaching 60%[11,12]. Anxiety disorders, depression, schizophrenia, and obsessive-compulsive disorder are also on the list of possible diagnoses in individuals with ASD[12]. In fact, adults with ASD may develop anxiety and depression due to difficulties in social interactions[13,14].

With advances in knowledge about the mechanisms underlying ASD symptoms, many complementary therapies and tools have been developed [1,15,16]. There are a large number of studies dedicated to the development of therapeutic strategies, ranging from behavioral interventions to the use of combined therapies, including those of a technological nature[1,15,16]. Studies on the use of traditional therapies in conjunction with complementary therapies demonstrate advances in treatment methods, social inclusion, and improved quality of life [17].

Considering the importance of choosing a treatment that is consistent with the clinical heterogeneity of ASD, in addition to the large number of published studies involving the application of combined therapies or complementary tools, we propose an integrative literature review study. Our objective was to evaluate the results of studies involving the use of such therapies and tools in order to provide recent information on these strategies and discuss their effectiveness on targets investigated by psychology. Thus, we hope to better inform researchers and psychologists about the status of research addressing the use of therapies and provide a comprehensive discussion on the most effective integrated or complementary therapeutic choice.

METHODOLOGY

The methodology of this integrative literature review was designed to identify relevant and recent articles on the use of therapies in the treatment of ASD. Therefore, we searched for articles in different electronic databases, including SciELO, PubMed, Scopus, and Web of Science. The choice of databases was based on their scope and relevance in the areas of health, neuroscience, psychology, and technology. The descriptors were defined based on the main concepts related to the study topic, using combinations of keywords such as: "Autism spectrum disorder"; "Therapies"; "Behavioral therapy"; "Complementary tools"; "Rehabilitation." To meet the objectives of our study, we established as inclusion criteria the content of titles and abstracts that had an interface with different symptoms in ASD and treatment approaches. This procedure was adopted to avoid studies with themes focused on neuropsychological assessment, speech therapy, or others. In addition, articles published from 2002 to 2025 were included. Empirical studies, systematic reviews, and meta-analyses were considered eligible. As for exclusion criteria, articles that dealt only with the diagnosis of ASD, case studies, opinion articles, and studies that did not present empirical data were excluded. The selection of articles was carried out by three independent evaluators who first reviewed the titles and abstracts and then analyzed the articles in their entirety.

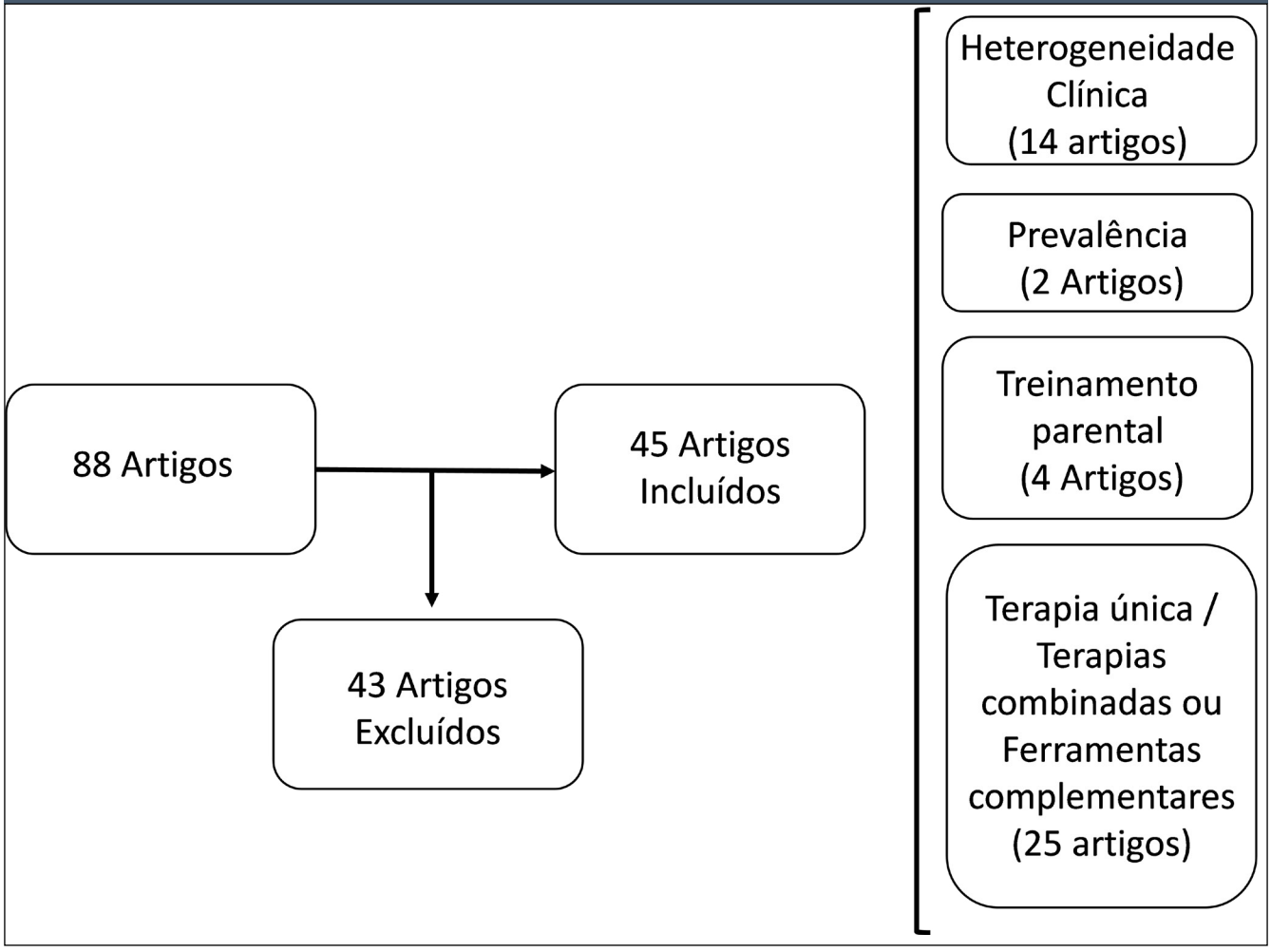
RESULTS

In the present study, we selected 88 articles from the search of articles using the database and keywords. After analyzing the titles and abstracts, we recognized that only 46 articles met the inclusion criteria. From there, we distributed the selected articles

DOI: 10.36489/saudecoletiva.2025v16i102p18002-18021

into categories according to the most prominent themes: Clinical heterogeneity 30.3%; Prevalence 4.0%; Parental training 8.7%; Single therapy/ Combined therapies or complementary tools 57% (Fig. 1). In addition, in order to facilitate the articulation of information or comparisons of data between the selected articles, we categorized the information found in each article, such as characteristics of the study population, objectives of the therapies used, and results found.

Fig. 1 Distribution of selected articles organized into categories.



DISCUSSION

Choosing appropriate approaches or therapies for the intervention plan is a decisive step for the effectiveness of treatment. Studies show that the heterogeneity of symptoms in autism and comorbidities can be better treated through interventions that combine therapies or even make use of complementary tools[1,15,16]. There are several therapies such as Applied Behavior Analysis (ABA), Early Start Denver Model (Denver) therapy, educational interventions such as Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH), therapeutic interventions focused on specific skills such as Speech Therapy, Occupational Therapy, among others[1,15,16]. In addition, there is the use of technological tools, such as assistive technology through the use of Augmentative and Alternative Communication (AAC) devices and virtual reality (VR)[1,15,16].

The heterogeneity in language performance in individuals with ASD can range from the absence of speech to frequent deficits during its functional use for communication[18] . A study comparing ABA interventions associated with the Verbal Behavior Milestones Assessment and Placement Program (ABA VB) protocol to

DOI: 10.36489/saudecoletiva.2025v16i102p18002-18021

measure verbal skills and ABA VB incorporated into music in two groups of children with ASD showed that both interventions were effective in producing the four verbal operants in ABA: command, tact, echolalia, and intraverbal[19].The results also indicated that ABA VB training incorporated into music was more effective in echoic production, and training with ABA VB alone showed greater effectiveness in tact production[19]. It is known that there is a correlation between intense musical activity and neuroplasticity[20]. A study on the importance of music therapy as a form of treatment highlighted that musical practice favors the development of areas of the frontal lobe, temporal lobe, and corpus callosum, in addition to increasing connections between the frontal and temporal lobes in both hemispheres, activating areas associated with language and emotion[20]. A randomized clinical trial with 100 pairs of mothers and children diagnosed with ASD, conducted at a school in China, included two groups: one with children treated only with ABA intervention and the other with joint ABA and music therapy intervention. After intervention, the latter group of children showed the best results in the development of sensory skills, social interactions, physical movements, and language performance[21]. In addition, mothers who received music therapy showed a reduction in dysfunctional interactions with their children, lower overall stress, significant improvement in family functioning, and increased levels of hope compared to the control group[21]. Activities involving art therapy are also associated with better development of motor coordination, concentration, communication, reduced anxiety levels, and improved self-esteem[22] . A literature review dedicated to identifying categories of benefits from the application of art therapy in children with ASD confirmed that there are benefits in the development of the expression of feelings and emotions, in the teaching-learning process, in the development of social skills, and in the improvement of parental relationships[22].

Randomized clinical trials in a meta-analysis study involving 555 children with ASD and comparing ABA, Denver, and PECS (Picture Exchange Communication System) therapies showed promising results in socialization, communication, and expressive language[23]. On the other hand, no significant effects were found on receptive language, adaptive behavior, daily living skills, IQ (verbal and nonverbal), restricted and repetitive behavior, motor skills, and cognition[23].

Some studies propose the application of ABA therapy associated with equine therapy, arguing the importance of a comprehensive approach, addressing the different needs of those undergoing rehabilitation[23,24]. Results from a study that examined the effects of different doses of therapeutic riding, with applications 1, 3, and 5 times/week, in children aged 6 to 8 years with ASD, showed that higher doses caused significant improvements in spontaneous verbal communication of desires/needs and the utterance of 3 or more words([24]) .A meta-analysis study also showed promising results from equine therapy combined with ABA, with improvements in motor development, sensory integration, psychological skills, speech therapy skills, and social skills, in addition to evidence of a reduction in disruptive, problematic, or dysfunctional behaviors[23]. Although this study yielded relevant results, there was no clarity regarding the intervention plans, strategies, or contributions of each of the therapies[23].

A study proposing intervention sessions using exercises from the Padovan Method of Neurofunctional Reorganization (MPRN) in children with trisomy 21 and comorbidity with ASD showed important results with the emergence of vocalizations, canonical babbling, reduplicated babbling, and acquisition of first words after the sessions[18]. The results suggested that there was structuring and restructuring of areas of the temporal, parietal, and frontal lobes, favoring language acquisition[18]. A systematic review that sought to obtain evidence to support the recommendation of the Padovan Method of neurofunctional reorganization, involving 98 publications evaluated for eligibility, only four studies and 14 case reports were identified as appropriate for analysis. The duration of the reported interventions varied widely between two days and two years, but results demonstrated advances in the development of functionalities. Thus, it was concluded that the Padovan Method is a holistic therapeutic approach that is viable for contributing to the relief of symptoms in a wide range of disorders; however, the development of new programs and their validation, as well as additional research are necessary[25].

A literature review study that investigated ways to develop logical-mathematical reasoning in children with ASD highlighted contributions from TEACCH in promoting communication, social, and comprehension skills; ABA therapy in improving skills and reducing problematic behaviors; Floor time, which favored emotional regulation and the development of intellectual skills; and PECS in teaching functional communication[26]. Another study aimed at investigating, identifying, and describing mathematics teachers' knowledge about the relationship between the use of Digital Information and Communication Technologies (DICT) and pedagogical resources in mathematics learning highlighted that the most relevant activities were

DOI: 10.36489/saudecoletiva.2025v16i102p18002-18021

those with playful characteristics, with concrete support materials and digital games[27]. Results showed that such activities are capable of creating personalized environments that favor the acquisition of mathematical knowledge, such as colors and sounds, which are part of the interests of children with ASD[27].

Khaleeq et al. (2025) conducted a study on anxiety treatments in children with ASD, comparing groups of participants who received standard cognitive behavioral therapy (CBT); BIANCA (Integrated Bases for Autonomy in Communication and Interaction in Autism) intervention, which combines ABA Therapy and TEACCH Therapy; CBT intervention adapted for ASD; Coping Cat intervention (CBT for children aged 7 to 13); group CBT intervention in school or hospital settings; and Multimodal Anxiety and Social Skills Intervention[28]. The results showed that CBT adapted for children with ASD was the most effective intervention in developing functionalities, although comparisons were made between very different interventions, dosages, and durations[28] . An intervention program based on games and meditation sought to improve emotional regulation and social interaction skills in children with ASD. The program consisted of seven sessions, each dealing with content such as awareness, body exploration, breathing, mindfulness in daily life, self-care, and learning. After two months of activities, it was found that children learned to manage their emotions, identify changes in thoughts, control their breathing, and satisfy their social interaction needs[29].

A review study involving interventions based on different categories of games, such as structured play, role-playing, puzzles, digital games, and therapist-designed play, showed improvements in social skills, social behavior, and cognitive skills in children and adolescents with ASD[30]. There were no statistically significant differences in the effects on language skills, anxiety, and parental stress[30]. A survey of educational apps conducted in a study that highlighted the importance of language and cognition apps—MITA and Picto TEA, used in pedagogical interventions—showed benefits in memorization and communication[31]. It was even concluded that schools could rely on such technological tools to benefit the teaching-learning process of children with ASD[31]. Another study also showed that MITA is effective in improving language and cognition in children with autism, and Picto Tea, an app based on Augmentative and Alternative Communication (AAC), promotes the development of daily communication[32].

Results from a study that evaluated the effects of interventions involving a serious game (a digital solution that combines educational and informational intentions with a learning environment) in children with ASD or ADHD and parental training showed positive effects on the performance of daily routines in children with ASD and ADHD. In participants with ADHD, the serious game with parental training or parental training alone showed efficacy, while for children with ASD, favorable effects were found only after the application of the intervention involving the serious game in conjunction with parental training[33].

Different technological tools, including educational software, mobile applications, and augmentative and alternative communication devices, can be used to support the learning and socialization of children with ASD. A study investigating the role of technology in the educational inclusion of children with ASD showed significant improvements in communication, social skills, and academic performance[34]. On the other hand, it is important to note that lack of financial resources and resistance to change are strong impediments to the use of technology. Furthermore, when considering the need for school inclusion, collaboration between educators, families, and professionals is essential to maximize the benefits of technology in inclusion[34] .

A study on technologies for educating students with ASD, aimed at analyzing the learning process through educational robotics kits and virtual reality glasses, showed promising results, reinforcing the importance of using such tools in the inclusion of autistic children[35]. In view of advances in technology and brain-computer interfaces (BCIs), a research study focused on creating a mind-controlled game. To this end, 21 children participated in the study and underwent two sessions per week of game practice lasting 30 to 40 minutes for two months. The game, called MemoTea, consists of quickly memorizing images by creating relationships between the image and the sequence of cards, and it promoted gains in concentration, attention, and logical reasoning[36].

A large meta-analysis study on the effects of different pharmacological and non-pharmacological interventions to treat irritability in ASD showed different results when considering only parental training interventions. In this study, three parental training programs were evaluated, and the parental training that adopted the Parental Training Manual of the Pediatric Psychopharmacology Research Units (RUPP) was the only one that showed significant results[37]. Still considering the importance of parental training, results from another study that investigated whether parental intervention actually promotes functional gains in children with ASD showed improvements in positive behaviors/social skills, maladaptive behaviors, and language/

DOI: 10.36489/saudecoletiva.2025v16i102p18002-18021

communication[38].

Sleep disorders are also very common in children and adolescents (40-86%), especially in individuals with ASD[39]. Poor sleep quality or shorter sleep duration has been shown to be related to greater social communication impairments, rates of stereotypical behaviors, and the emergence of nonfunctional routines[40]. In addition, it is well known that aggressive behavior may be linked to sleep problems in children with ASD[41]. Some symptoms or neurobehavioral characteristics of ASD may contribute to sleep disorders, such as emotional dysregulation, fixation on daytime events, inability to understand social cues related to sleep, anxiety, hyperstimulation, and sensory processing problems[42]. A study on sleep disorders in typically developing children and adolescents and in individuals with ASD showed that 94% of children who received treatment with combined therapies had clinically significant improvements in nighttime sleepiness and awakening[39,43]. The therapies used involved establishing routines adapted to the child's age or particularities and specific behavioral strategies, including fading bedtime, gradual extinction, positive reinforcement of adapted behaviors, and parental education([39,43]) ·Non-pharmacological treatments are widely used to treat sleep quality; however, there is insufficient evidence of their effectiveness, and there is even controversy[44]. Nevertheless, studies reinforce the importance of counseling parents to implement good sleep habits and the use of behavioral techniques[44].The behavioral approach should be chosen according to parental preferences, as there is no conclusive evidence that one technique is more effective than another[44].

As it would be impossible to address all conditions and treatments, we chose to discuss, lastly, the condition of intellectual disability (ID), which affects approximately 30% to 70% of children with ASD[45]. Even though it is not part of the core set of symptoms or necessary for the diagnosis, ID represents one of the challenges for the development of skills and autonomy, requiring individualized strategies. There are numerous intervention programs that seek to reduce core symptoms in children with ASD; however, most do not target ID as a symptom[45]. One study investigated the results of a Personalized and Inclusive Program for Autism-Tours (TIPA-T) applied to children with severe ASD and ID. The individual neurofunctional intervention, which sought to access the roots of social communication through structured sequences of "social play," showed significant improvements in cognitive and socioemotional skills after the intervention[45]. All children who participated, except one, showed improvements in at least one social domain, and 78% showed improvements in four social domains[45]. Autism symptoms, assessed in individual settings, decreased significantly with therapy, showing a reduction observed in 85% of children, while in group settings, they decreased by more than 60%[45].

Finally, we recognize the effectiveness of multidisciplinary interventions using traditional therapies and combined therapies or those that include complementary tools in the treatment of ASD. The use of combined and complementary therapies that seek to achieve specific psychological goals, such as parental training, music therapy, art therapy, among others, also contributes to providing more comprehensive support.

CONCLUSION

More methodologically rigorous research is needed to determine the potential of interventions based on combined therapies or complementary tools. The combination of ABA with music therapy for parents and children can alleviate ASD symptoms in children and reduce stress in mothers. Different technological tools, including educational software, mobile applications, and augmentative and alternative communication devices, can be important in supporting the learning and socialization of children with ASD. Virtual reality has transformative potential when used to support the development of social skills in children with autism. However, the widespread use of this technology suffers from barriers to access, economic conditions, and the necessary professional training. Multidisciplinary interventions have proven effective in providing integrated treatment, but we also emphasize that the use of combined therapies to treat changes related to specific psychological targets is essential.

DOI: 10.36489/saudecoletiva.2025v16i102p18002-18021

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