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Multifaced therapies in the care of children with Autism Spectrum Disorder- A literature review

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Abstract

Autism is an abnormality in functioning that influences how people interact with others, communicate, learn new things and behave. According to the WHO, autism already occurs in 1 in 100 children. Although it affects people of all ages it is mostly diagnosed in children. This makes the essence of autism management to support the child's development. Autism Syndrome Disorder (ASD) has become a target of research and interest in modern medicine, especially psychiatry pediatrics and psychology. Help and support during the development of a child with ASD have big influence in alleviating symptoms and developing functioning. The multitude of modern therapies makes it available to provide comprehensive care for the child. According to a recent analysis, therapies such as music therapy have positive effects. They can boost a child's communication, interpersonal, social and language skills. They improve the child's overall functioning which converts into his quality of life in adulthood. The profits of occupational or individual therapies are a new case in the context of people with ASD. It requires more extensive randomized studies, but it offers great hope and optimism for the improvement of therapies and a multifaceted support system for children with ASD.

Keywords: Autism, ASD, Art therapy, Music therapy, Play therapy, Biofeedback.

Main text:**Material and methods:**

In our article, we tried to use English databases such as PubMed, Google Scholar, Cochrane and PubMed Central. We selected the articles according to keywords such as Autism, ASD, music therapy, art therapy, play therapy, animal therapy, biofeedback, and therapy. The articles we used were published from 2018-2023.

Results:

Music Therapy

Music therapy is an increasingly used form of therapy for children with ASD. This fact results from the search for newer and more effective forms of therapy for children with this disorder. More and more extensive and new research provides moderately reliable results that music therapy can help children with ASD in their everyday functioning. Mainly by reducing the severity of autism symptoms. Taking into account that this type of intervention rarely caused side effects.[1] There is no evidence of the impact of music therapy on verbal and non-verbal communication. But it has a positive impact on everyday functioning and social skills. [2] In children with ASD, music therapy has a positive impact on behavioral, emotional and social problems in children with ASD. However, most studies are carried out on small samples, so new, large studies on randomized groups are extremely important. This therapy has great prospects, but requires in-depth research. [3]

Art Therapy

Art therapy is a widely used method of support for patients not only with diseases such as schizophrenia, depression or personality disorders, but is also used in patients with ASD. This therapy uses visual arts, film, and books during the therapeutic process. Picture books seem to be important in the therapy of children with ASD. And they seem to be extremely helpful in the therapy of such children. [4] The impact of art therapy is noticeable on communication skills, interpersonal relationships, and language skills. The child's work with books requires concentration from him and close control and cooperation from the teacher. The work gives hope for the development of appropriate books, thanks to which children will be able to use appropriate teaching aids. Art therapy based on painting is a method that brings benefits, especially in terms of abstract thinking, imagination and interpersonal skills. There is also a noticeable impact on adaptive skills and greater involvement in expressing emotions, mainly negative ones, safely, which increases self-awareness. [5]

However, attention should be paid to research conducted on a group of 13 children from the Kurdistan Region, which contradicts the previous statements. They deny the positive impact of art therapy on children with ASD. [6] The classes consisted largely of cutting out shapes and coloring pictures. Children were assessed using the Social Responsiveness Scale on the day the classes began and a week after they ended. No positive effect of therapy has been demonstrated in children with severe and moderate ASD. However, the study should be conducted on a larger group of children and over a longer period of time. [6]

Play therapy

Play therapy is a method that enables the improvement of social and communication skills in children, strengthens parental integration, and enhances the bond between the child and the parent. This therapy can be conducted in various ways, does not entail significant side effects, and, on the contrary, has many benefits. [7] A notable example is intensive child-centered play therapy (CCPT), during which children with ASD exhibited a significant reduction in behavioral symptoms and core symptoms, primarily encompassing issues such as aggression, attention problems, and impulse control compared to the control group. [8] One of the most popular play therapy methods is DIR-floortime. Home-based floortime improved the daily functioning skills of children, their emotional functioning, and communication. It also demonstrated that being a child-centered approach, if initiated early, it can be extremely significant in improving emotional and social development, including parent-child interactions. [9]

3i therapy (intensive developmental play therapy)

3i therapy is a type of therapy based significantly on play. There was a noticeable improvement in reducing the severity of ASD symptoms. In addition, attention was paid to the reduction of stereotypical behaviors and the improvement of communication with others. Mainly observed in terms of motivation and acquiring the ability to establish contacts with other people. For children with ASD, any improvement in this area is extremely important for their functioning in society. Children became more willing to interact non-verbally, make eye contact with other interlocutors and share attention with others. [10] Looking at children with ASD and moderate to severe intellectual disability, 3i therapy also made it easier to function in similar aspects of life. Improvements were particularly noted in the areas of perceptual skills, social abilities, and communication skills. This made it possible to reduce the severity of autism symptoms. This effect was achieved after approximately 2 years of therapy. [11]

Lego-therapy

Lego therapy, as one of the types of play therapy, is a topic that is still not fully researched. A 2020 study by Levy and Dunmuir that examined six young men with ASD showed benefits. It showed a positive impact on their behavior and their social skills. The small study group was problematic. These results significantly suggest that Lego therapy may be effective in improving their social skills, but this requires further research. [12] This therapy has benefits in terms of individual and group therapy. It has the advantages of providing children with fun and reducing symptoms. This topic still requires clinical research and has many limitations. [13]

Biofeedback Therapy

Biofeedback therapy is a type of therapy that uses increasingly developed computerization. This method, through specialized computer technology, enables individual units to learn and influence the characteristics of brain waves. The use of Microsoft Kinect consoles or the Wii platform enabled real-time monitoring of balance and posture during play, or rather, an exercise session. Which, as it turned out, not only brought benefits to children in reducing symptoms, but also provided joy while playing. Children with ASD reported that this training was a pleasant and motivating group training for them. A good response to reported problems with postural stability was crucial. [14] A reduction in the severity of autism symptoms and an improvement in balance, including postural fluctuations, could be seen among children with ASD undergoing biofeedback therapy. These studies were conducted on a group of adolescents (13–17 years old). Studies on this group of children, in addition to reducing symptoms, also showed changes in other brain areas than in the control group of children without ASD. This encourages further research that focuses on key areas. Especially if we focus on conduction in the superior cerebellar peduncle, where key areas could be observed in the context of symptom improvement in children with ASD. [15] Game-based Neurofeedback therapy brought both benefits and fun, and above all, it was highly effective. This therapy was likely associated with improvements in emotional, behavioral and cognitive functions. It had a significant impact on increasing the number of tasks performed. Improvement in recognizing emotions or spontaneous responses was associated with improvement in everyday life.[16]

Robot Assisted Autism Therapy

As we all know, helping a child with ASD should be multi-profile therapeutic work. Late work shows that a new form of therapy could be working with an especially adapted robot. Robot-Assisted Autism Therapy (RAAT) is a new promptly developing field. As research shows, the use of humanoid or zoomorphic robots in therapy advances social skills, communication, and recognizing and understanding the emotions of other people. [17] The investigation raises further questions and issues that require more investigation - whether the behavior of children with ASD towards robots, e.g. disbelief and attempts to cheat, will convert to that of real people. Other studies have proven the development of communication and social skills by working with robots in different environments (such as home, school, or a laboratory), while denying that the therapy has an impact on motor and emotional outcomes. [21] Age was found to be in charge of the success of such an intervention - therapy is more effective in younger children. As you can see, such a new field as RAAT requires further analysis. [22] In 2023, in Hong Kong, researchers studied the effect of interaction with a humanoid robot on phonetic entrainment in children with ASD and typically developed (TD). [21] The study involved 14 children with ASD and 12 TDs whose second language was English. The interaction with the robot consisted of a 'spot the difference' game between four pictures. The study revealed that autistic children had much more difficulty with phonetic entrainment, even in a more controlled situation, than TD children. This study demonstrates the possible chance of using interaction with a humanoid robot to assess the sophistication and deficits in phonetic entrainment in children with ASD. Children with more advanced language abilities, social behavior and lower ASD symptom severity initiate more cooperation with humanoid robots as well as adults. [19] This shows that children's individual abilities, especially their language skills, impact their interest in social interaction. These individual characteristics of children should be taken into account when designing new robots for therapy work. On the other hand, some researchers point to the potential risks and lack of evidence for the use of humanoid robots in schools, for example. [20] There is no clear evidence of the validity of their use in the classroom to advance learning outcomes in children with ASD. Researchers emphasize the need for extensive research on verifying the benefits of children with ASD working with robots, particularly in the context of learning. The current findings point out that there will not be a one-size-fits-all result for robotics in working with children with autism in the future. Robot therapy can also encourage more physical activity. A 2020 study examined the interaction of children from two groups (TD - children with typical development, and ASD - children with autism syndrome) in a dance game with a robot and an assistant. [23]

It was observed that TD children were more willing to cooperate with the assistant, while ASD children cooperated with the robot. This indicates an interesting direction for the future development of RAAT - using it to increase physical activity in children with ASD. Another study suggests that in physical activity, children with ASD go for it when the robot takes the lead in dancing, rather than when it mimics the child's movements. [24] There are suggestions that joint physical activity with a robot is a good direction for RAAT development. However, it requires further in-depth research.

Mobile Games

Mobile games is a type of therapy that can be used both individually and in pairs. Using the game provides both the opportunity to have fun and the opportunity to develop social skills. The impact can be observed mainly in terms of reducing anxiety and stress. Stress is often associated with communication limitations among children. [25] This is still an area that has not been fully explored, but it is very promising. A good example is the smartphone game GuessWhat. This game enabled significant improvement in the social relations and socialization of these children. This is also a good option when there are difficulties in care that limit access to treatment. [26]

Animal therapy

Animal-assisted interventions are an increasingly useful type of therapy for children with ASD. Therefore, more and more research is being conducted to assess the effectiveness of this therapy in the context of cognitive abilities and social behavior. [27] The approach to the role of animals in this therapy is diverse. They can play a therapeutic role, reducing children's difficult experiences, acting as amplifiers and having a strengthening effect. The most frequently used species in AAI are dogs, followed by horses. [28] Children with chronic diseases, including ASD, are particularly susceptible to dog-assisted therapy. Attention should be paid to the not yet fully understood and appreciated the role of dogs in the development of children. You can notice a particularly lower level of anxiety in contact with the environment. Greater motivation to undertake various educational and therapeutic activities, as well as increased confidence. [29] A 16-week therapy involving therapeutic horse riding allowed for significant improvement in communication skills and social skills. Mainly, a positive effect could be observed in terms of social interactions, self-control in social interactions, and communication. [27] This therapy, in addition to improving areas such as social communication, social awareness and social motivation.

The possible impact on behaviors such as aggression, irritability, or speech impairment was also examined. Insufficient evidence was found for equine-assisted equestrian therapy. [30] Dolphin-Assisted Therapy (DAT) has been studied to improve social and communication skills in children with Autism Spectrum Disorder. Benefits were noticed, particularly in gestures and the frequency of vocalizations towards others. This made it possible to establish that dolphins can support aspects of communication in children with this condition. [31]

Hydrotherapy

Hydrotherapy includes any activity using water. The results of a study in a group of children with ASD between the ages of 6 and 12 indicate that the therapy has a positive effect on well-being. [32] After a 4-week therapeutic intervention, individual parameters were measured and improvements in thinking and attention problems, reduced anxiety and depression were found. There is reason to believe that hydrotherapy has a positive effect on improving social skills and performance in children with ASD. [33]

Conclusion:

In our article, we summarized research on the effects of some non-pharmacological treatments for children with autism spectrum disorders. We mainly analyzed the impact of art therapies, art therapy and music therapy. We took into account various types of play therapy (in particular 3i therapy and Lego therapy), as well as increasingly common therapies related to generally understood computer sciences. Therapy based on biofeedback, robotics, or video games. Not forgetting about more natural methods such as hydrotherapy or animal therapy. Different therapies target different areas of dysfunction in children with ASD. It is important to remember that these children struggle with various problems daily. The more research and knowledge there is about the mechanisms of therapy, the more it can largely contribute to the reduction of symptoms. Preliminary research on music therapy has shown a positive impact on social skills and overall functioning. But it has not been shown to work in other areas. The authors often stated that the subject of particular types of therapy requires deeper analysis or research on a larger group of children with ASD. Similarly, other therapies, such as art therapy, have shown improvements in communication and interpersonal skills. These features are extremely important for the continued functioning of people with ASD in society. Many benefits have been derived from research related to biofeedback, robots, and therapies based in various ways on play. In some studies, play therapy, both individual and group, showed a tendency to reduce aggressive behavior and improve the ability to control emotions.

We should also not forget about animal therapy, where the participation of animals is extremely important. The participation, mainly of dogs and horses, increased children's opportunities for proper development and reduced autism symptoms. Most of the therapies we analyzed still require further research. Studies often analyze larger research groups to reduce possible limitations in the research conducted and for a more detailed analysis of this topic.

Disclosures

Author's contribution

Conceptualization: Mateusz Sztybór, Gabriela Nowak; Methodology: Monika Maleszewska, Karen Głogowska; Formal analysis: Mikołaj Wojtas, Julia Piątkiewicz; Investigation: Wojciech Kopacz, Aleksandra Żmijewska; Writing - rough preparation: Maria Krzyżanowska, Marcin Kapica; Writing - review and editing: Mateusz Sztybór, Gabriela Nowak; Supervision: Gabriela Nowak, Mateusz Sztybór.

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