**White Paper review on Case Study as it pertains to Autism, Aspergers, and Related Disorders**

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# Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that affects communication, social interaction, and behavior. According to the Centers for Disease Control and Prevention (CDC), ASD affects approximately 1 in 54 children in the United States. ASD has multifactorial causes, including genetic, environmental, and immunological factors. The etiology of ASD is complex, and there is currently no known cure for the disorder. However, early detection, intervention, and individualized treatment can help individuals with ASD achieve their full potential. This white paper will examine the case study provided, explore traditional and non-traditional medical and scientific approaches to treating ASD, and evaluate the benefits of nutrition and natural approaches and supplements.

# Case Study Analysis

The case study presented a 13-year-old male patient with ASD who experienced sleep disturbance, unclear speech, and a lack of interest in the world other than video games. The patient's ASD reportedly started after his last vaccine at 18 months of age. The treatment approach involved using two proprietary blends (No.1 and No.2) with a gradual increase in dose until reaching the full dose (Burnette, 2020). The results demonstrated a marked improvement in the patient’s symptoms following treatment, including enhanced sleep quality, clearer speech, reduced nighttime bedwetting, greater engagement in physical activities, and noticeably calmer behavior. The case study highlights the potential benefits of a non-traditional approach to treating ASD. The use of proprietary blends and natural supplements can be effective in addressing the underlying causes of ASD. However, it is important to note that the claim that vaccines cause

ASD is not supported by scientific evidence. The current scientific consensus is that vaccines are safe and effective in preventing infectious diseases, and no evidence suggests that vaccines cause ASD.

# Traditional medical approaches

Traditional medical approaches to treating ASD include pharmacological interventions and behavioral therapies. Pharmacological interventions involve the use of medications to manage the symptoms of ASD, such as irritability, hyperactivity, and aggression. Medications commonly used to treat ASD include antidepressants, antipsychotics, and stimulants. However, the use of pharmacological interventions in treating ASD is controversial, as there is limited evidence to support their efficacy and safety in children with ASD. Behavioral therapies are a cornerstone of traditional medical approaches to treating ASD. These therapies aim to improve communication, social interaction, and behavior in children with ASD. Behavioral therapies include applied behavior analysis (ABA), cognitive-behavioral therapy (CBT), and social skills training (Loth, 2016). ABA is a data-driven approach that focuses on shaping behavior through positive reinforcement. CBT is a psychotherapeutic approach that aims to change negative thoughts and behaviors. Social skills training focuses on improving social interaction and communication skills.

Autism Spectrum Disorder (ASD) is a developmental disorder that affects social communication, interaction, and behavior. Traditional approaches to managing ASD aim to address the symptoms and support the overall development of the patient. These approaches include behavioral and educational interventions, pharmacological interventions, and supportive therapies. Behavioral and Educational Interventions: Behavioral and educational interventions aim to improve the patient's social communication and behavior by addressing specific goals and objectives

Applied Behavioral Analysis (ABA) is a commonly used intervention that involves breaking down complex behaviors into smaller parts and teaching them step by step. ABA focuses on positive reinforcement to increase desirable behaviors and decrease undesirable behaviors. It is effective in improving social communication and behavior in children with ASD.

Speech therapy is another commonly used intervention to improve the patient's communication skills (Constantino & Charman, 2016). Speech therapists work with patients to improve their ability to express themselves through spoken language, as well as their ability to understand and interpret verbal language. Occupational therapy focuses on developing the patient's fine motor skills, sensory processing, and daily living skills. These interventions aim to improve the patient's independence and overall functioning. Social skills training is another important aspect of behavioral and educational interventions. Social skills training teaches patients how to interact with others appropriately, recognize social cues, and develop meaningful relationships. Social skills training may involve role-playing, group activities, or individualized coaching.

**Pharmacological Interventions:** Pharmacological interventions often address specific symptoms associated with ASD, such as anxiety, depression, or hyperactivity. Antipsychotic medications such as risperidone and aripiprazole are commonly used to treat irritability and aggression in patients with ASD (Damiano et al., 2014). These medications work by blocking the effects of dopamine, a neurotransmitter involved in mood and behavior regulation. Antidepressant medications such as fluoxetine and sertraline may be used to treat symptoms of depression and anxiety in patients with ASD. These medications increase certain neurotransmitters, such as serotonin, in the brain. Stimulant medications such as methylphenidate and dextroamphetamine may be used to treat symptoms of hyperactivity and impulsivity in patients with ASD. These medications work by increasing the levels of dopamine and norepinephrine in the brain.

**Supportive Therapies:** Supportive therapies aim to improve the patient's overall functioning and quality of life. Sensory integration therapy is a type of therapy that aims to improve the patient's ability to process sensory information. This therapy may involve swinging, jumping, and spinning to help patients regulate their sensory input. Animal-assisted therapy involves using animals like dogs or horses to improve the patient's social communication and behavior. This therapy may involve grooming, walking, or playing with the animal. Music therapy involves using music to improve the patient's communication skills, emotional regulation, and social interaction. This therapy may involve singing, playing instruments, or listening to music.

Traditional approaches to managing ASD aim to address the symptoms and support the overall development of the patient. Behavioral and educational interventions, pharmacological interventions, and supportive therapies effectively manage symptoms and improve overall functioning. These approaches may be used alone or in combination to develop a comprehensive and individualized treatment plan for patients with ASD. It is important to consult with a healthcare provider to determine the most appropriate treatment plan for each patient based on their needs and symptoms.

# Non-Traditional Medical Approaches

Non-traditional medical approaches to treating ASD include alternative therapies, complementary therapies, and integrative medicine. Alternative therapies include interventions not part of mainstream medicine, such as chelation therapy, hyperbaric oxygen therapy, and secretin therapy (France et al., 2018). These therapies are not supported by scientific evidence and may pose risks to children with ASD

Complementary therapies are interventions used with traditional medical approaches, such as acupuncture, massage, and yoga. These therapies may provide some benefits in managing the symptoms of ASD, such as anxiety and sleep disturbance. However, the evidence supporting the efficacy of complementary therapies in treating ASD is limited. Integrative medicine is an approach that combines traditional medical approaches with natural and holistic approaches to healthcare (McLay et al., 2016). Integrative medicine may involve the use of natural supplements, nutrition, and mind-body techniques to manage the symptoms of ASD. Integrative medicine aims to address the underlying causes of ASD and promote overall health and well-being.

Non-traditional medical and scientific approaches, also known as complementary and alternative medicine (CAM), encompass a broad range of healthcare practices and treatments not part of conventional Western medicine (Gandhi & Klein, 2014). These approaches aim to treat the whole person, not just the symptoms of a specific illness and may involve various modalities, such as herbal medicine, acupuncture, chiropractic care, massage therapy, mindfulness meditation, and yoga. The use of non-traditional medical and scientific approaches has grown in popularity over the past few decades, with many individuals seeking out these modalities for a variety of reasons, such as dissatisfaction with conventional medical treatments, desire for more natural or holistic approaches, or the belief that non-traditional approaches may provide a more personalized and integrative approach to healthcare. Herbal medicine is a common non-traditional medical approach using plants or plant extracts to treat illnesses or improve overall health (France et al., 2018). Various cultures have used many herbs for their medicinal properties for centuries.

For example, St. John's Wort is often used to treat depression, while echinacea is commonly used to boost the immune system. However, it is important to note that herbal medicines can have potential risks and interactions with conventional medications and should always be used under the guidance of a qualified healthcare provider.

Acupuncture is another popular non-traditional medical approach originating in China over 2,000 years ago. It involves the insertion of thin needles into specific points on the body, intending to balance the flow of energy, or qi, throughout the body (Berg, 2021). Acupuncture is commonly used to treat pain, headaches, and anxiety, among other conditions. Chiropractic care is a non-traditional medical approach that focuses on the musculoskeletal system, particularly the spine, and its effect on overall health. Chiropractors use manual techniques to adjust the spine and other joints to relieve pain and improve mobility. Chiropractic care is often used to treat back pain, neck pain, and headaches.

Massage therapy is another non-traditional medical approach that involves the manipulation of soft tissues, such as muscles and tendons, to improve circulation, reduce tension, and promote relaxation. Massage therapy is commonly used to treat stress, anxiety, and musculoskeletal pain.

Mindfulness meditation and yoga are non-traditional approaches focusing on the mind- body connection, intending to promote relaxation and reduce stress. Mindfulness meditation involves focusing on the present moment and developing awareness of one's thoughts and mmotions. At the same time, yoga combines physical postures, breathing techniques, and meditation to promote overall health and well-being.

Other non-traditional medical approaches include naturopathy, which focuses on using natural remedies and therapies to promote healing, and energy healing modalities, such as Reiki, which aims to balance the body's energy fields. While non-traditional medical and scientific approaches can provide valuable benefits, it is important to note that these modalities should not be used as a substitute for conventional medical treatments. Working with qualified healthcare providers is important to ensure the safe and effective integration of non-traditional approaches into an overall healthcare plan. Additionally, it is important to be aware of potential risks and interactions with conventional medications and to discuss any non-traditional approaches with a healthcare provider before use.

# Scientific approaches

Scientific approaches to treating autism spectrum disorder (ASD) involve evidence-based interventions studied and tested in clinical trials. These interventions aim to improve communication and social interaction and reduce repetitive behaviors in individuals with ASD. Here are some examples of scientific approaches to treating ASD:

# Applied Behavior Analysis (ABA)

ABA is a type of therapy that focuses on improving behavior through positive reinforcement. This approach involves breaking down behaviors into smaller parts and rewarding the child for exhibiting positive behaviors (Alves et al., 2020). For example, if a child with ASD is working on eye contact, the therapist may reward them with praise or a small toy every time they make eye contact (Roane et al., 2016). ABA is effective in improving communication and social interaction in children with ASD. Several studies have demonstrated the effectiveness of ABA in treating ASD (Yu et al., 2020).

For example, a study published in the Journal of Applied Behavior Analysis found that children with ASD who received ABA therapy showed significant improvements in communication, social skills, and adaptive behavior compared to children who did not receive ABA therapy (Mohammadzaheri, 2014). Another study published in the Journal of Autism and Developmental Disorders found that ABA therapy effectively improved social skills and decreased problem behaviors in children with ASD.

# Speech Therapy

Speech therapy can help improve communication skills in individuals with ASD. This approach focuses on developing language skills, such as vocabulary and grammar, as well as nonverbal communication skills, such as body language and facial expressions. Several studies have shown that speech therapy can improve communication skills in individuals with ASD (Sourvinos et al., 2021). For example, a study published in the Journal of Speech, Language, and Hearing Research found that speech therapy improved language comprehension and production in children with ASD. Another study published in the Journal of Autism and Developmental Disorders found that speech therapy effectively improved communication skills in children with ASD.

# Occupational Therapy

Occupational therapy focuses on developing skills needed for daily living, such as self- care, social skills, and motor coordination. This approach may involve exercises to improve fine and gross motor skills, sensory integration therapy, and social skills training.

Several studies have demonstrated the effectiveness of occupational therapy in treating ASD. For example, a study published in the Journal of Autism and Developmental Disorders found that occupational therapy improved social and daily living skills in children with ASD.

Another study published in the American Journal of Occupational Therapy found that occupational therapy improved fine motor skills and handwriting in children with ASD. **Medications**

Medications may be used to treat specific symptoms of ASD, such as anxiety, depression, or hyperactivity. For example, selective serotonin reuptake inhibitors (SSRIs) may be prescribed to treat anxiety and obsessive-compulsive behaviors, while stimulants may be used to treat hyperactivity. Several studies have demonstrated the effectiveness of medications in treating specific symptoms of ASD (Tyszka, 2021). For example, a study published in the Journal of Autism and Developmental Disorders found that SSRIs effectively reduced anxiety symptoms in children with ASD (Hernández, 2020). Another study published in the Journal of Child and Adolescent Psychopharmacology found that stimulant medication effectively reduced hyperactivity symptoms in children with ASD.

# Dietary Interventions

Some studies suggest that certain dietary interventions may help improve symptoms of ASD. For example, some children with ASD have been found to have deficiencies in certain nutrients, such as omega-3 fatty acids and vitamin D (Sathe et al., 2017). Supplementation with these nutrients may help reduce symptoms (Winburn et al., 2014). Additionally, some studies suggest that removing certain foods, such as gluten and casein, from the diet may help reduce symptoms. While some studies have shown positive results with dietary interventions, more research is needed to fully understand their effectiveness in treating ASD (F Marti, 2014). It is important to consult with a healthcare professional before changing a child's health.

# Benefits of nutrition for the case

The importance of proper nutrition cannot be overstated, particularly for individuals with Autism Spectrum Disorder (ASD) who may have difficulty processing certain nutrients or have dietary restrictions due to sensory issues (Field 2014). In the case study, the patient's symptoms began after his last vaccine at 18 months of age, suggesting his immune system may have been affected. Therefore, supporting his immune system with a healthy diet can improve his overall health and reduce his symptoms.

One important nutrient for individuals with ASD is vitamin D. Research has shown that vitamin D deficiency is more common in individuals with ASD compared to neurotypical individuals, and supplementing with vitamin D has been shown to improve symptoms such as irritability, hyperactivity, and repetitive behaviors. Vitamin D is also essential for cell regeneration and has neuroprotective actions, making it crucial for overall brain health (Saad et al., 2018). In addition to vitamin D, omega-3 fatty acids are also important for brain health and may help reduce symptoms of ASD. Studies have shown that supplementing with omega-3s can improve cognitive function and reduce hyperactivity and irritability in individuals with ASD. Foods high in omega-3s include fatty fish, such as salmon and sardines, chia seeds, and flaxseeds.

Probiotics and prebiotics may also be beneficial for individuals with ASD. The gut-brain axis is a bidirectional communication between the gut microbiota and the central nervous system. Research has shown that imbalances in the gut microbiota can contribute to symptoms of ASD. Probiotics and prebiotics can help restore a healthy balance of gut bacteria and improve gut health. Fermented foods such as yogurt and kefir are good sources of probiotics, while prebiotic foods include garlic, onions, and bananas.

Certain nutrients may also help support the body's detoxification system, which can be impaired in individuals with ASD. The MTHFR gene mutation affects the body's ability to process folic acid and is more common in individuals with ASD. Supplementing with methylated forms of folate and vitamin B12 can help support the body's detoxification pathways.

Finally, it is important to consider any potential food sensitivities or allergies that may be contributing to symptoms of ASD (Guiducci et al., 2022). Gluten and dairy are common allergens and sensitivities in individuals with ASD, and eliminating these foods from the diet may improve symptoms such as gastrointestinal issues and irritability.

Overall, nutrition is essential in supporting the health and well-being of individuals with ASD (Guiducci et al., 2022). By focusing on nutrient-dense foods and supplementing with key nutrients, individuals with ASD may be able to reduce their symptoms and improve their overall quality of life. However, it is important to work with a qualified healthcare professional to ensure that any dietary changes or supplements are appropriate for the individual's specific needs and do not interact with any medications they may be taking.

# Benefits of natural approaches

In addition to nutritional interventions, natural approaches can also benefit individuals with autism spectrum disorder (ASD). These approaches focus on using natural remedies and techniques to support overall health and well-being, to reduce symptoms associated with ASD.

One natural approach that has shown promise in improving symptoms of ASD is the use of essential oils. Essential oils are derived from plants and contain compounds that can have therapeutic effects on the body (Fraguas et al., 2019). Some essential oils studied for their potential benefits in ASD include lavender, frankincense, and peppermint. These oils can be used topically or diffused in the air and have been shown to improve sleep, reduce anxiety and hyperactivity, and improve mood.

 Another natural approach that has gained popularity in recent years is mindfulness and meditation practices. These techniques involve focusing on the present moment and using deep breathing and relaxation exercises to reduce stress and anxiety. For individuals with ASD who may experience sensory overload or heightened anxiety, mindfulness and meditation can be a helpful tool in managing symptoms. Research has shown that mindfulness-based interventions can improve social communication and reduce repetitive behaviors in individuals with ASD.

In addition to essential oils and mindfulness practices, dietary interventions can also be considered a natural approach to managing symptoms of ASD. Certain foods and food additives have been linked to increased hyperactivity and irritability in individuals with ASD. Eliminating these foods from the diet and replacing them with nutrient-dense whole foods can significantly impact overall health and well-being. Additionally, supplements such as probiotics and omega-3 fatty acids have been shown to improve gut health and reduce inflammation, positively impacting ASD symptoms.

Finally, alternative therapies such as acupuncture and chiropractic care may also benefit individuals with ASD. These therapies focus on improving the body's overall function and can help to reduce symptoms such as anxiety and sensory overload. Acupuncture has been shown to improve sleep and reduce hyperactivity in individuals with ASD, while chiropractic care can help to improve spinal alignment and reduce inflammation throughout the body. While natural approaches may not work for everyone with ASD, they can be a helpful complement to traditional therapies and medications. As with any treatment approach, it is important to work with a healthcare professional to ensure that the chosen interventions are safe and effective for the individual.

# Benefits of supplements in the Case Study

Supplements can be a valuable addition to the treatment plan for individuals with autism spectrum disorder (ASD). In the case study presented, the patient experienced significant improvements using two proprietary blends of supplements. While not all supplements may be effective for every individual with ASD, some supplements have been shown to have potential benefits.

One supplement that has received attention for its potential benefits in ASD is probiotics. The gut microbiome has been linked to various health issues, including mental health conditions. Research suggests that individuals with ASD may have an imbalance in their gut microbiome, which could contribute to their symptoms. Probiotics, beneficial bacteria that support gut health, have been found to improve symptoms in some individuals with ASD. A study published in the Journal of Autism and Developmental Disorders found that a probiotic supplement improved symptoms such as irritability, hyperactivity, and stereotypy in children with ASD. Another study published in the same journal found that a probiotic supplement reduced gastrointestinal symptoms in children with ASD. Another supplement that has shown promise in improving symptoms in individuals with ASD is omega-3 fatty acids. Omega-3s are essential fatty acids that play a crucial role in brain health. Studies have found that omega-3 supplementation may improve cognitive function and behavior in children with ASD (Babinska et al., 2020). A controlled trial published in the Journal of Child Neurology found that omega-3 supplementation improved hyperactivity, stereotypy, and socialization in children with ASD. Magnesium is another supplement that may benefit individuals with ASD. Magnesium is involved in over 300 biochemical reactions in the body, including those involved in brain function.

Studies have found that children with ASD may have lower magnesium levels in their blood compared to typically developing children. A randomized, double-blind, placebo- controlled trial published in the Journal of Child Neurology found that magnesium supplementation improved social interaction and stereotypy in children with ASD.

In addition to these supplements, vitamin D may also benefit individuals with ASD. Vitamin D is essential for bone health and has been found to have a range of other health benefits, including supporting brain function (Doenyas, 2018). Studies have found that individuals with ASD may have lower vitamin D levels than typically developing individuals. A randomized, double-blind, placebo-controlled trial published in the Journal of Child Psychology and Psychiatry found that vitamin D supplementation improved symptoms such as irritability, hyperactivity, and social withdrawal in children with ASD.

It is important to note that supplements should not be used as a replacement for traditional medical treatments and therapies for ASD. However, they can be a valuable addition to a comprehensive treatment plan. It is also important to speak with a healthcare provider before starting any new supplement regimen, as supplements can interact with medications and may not be appropriate for everyone. In the case presented, using two proprietary blends of supplements led to significant improvements in the patient's symptoms. While the exact composition of these blends is unknown, it is possible they contained some of the supplements discussed above. The patient's improved sleep, decreased nighttime disturbances, improved bladder control, and increased interest in physical activities could be attributed to the supplements' effects on gut health, brain function, and overall well-being.

Therefore, supplements can be a valuable addition to the treatment plan for individuals with ASD. Probiotics, omega-3 fatty acids, magnesium, and vitamin D are some supplements that have shown potential benefits in improving symptoms in individuals with ASD. However, it is important to speak with a healthcare provider before starting any new supplement regimen and to use supplements as part of a comprehensive treatment plan that includes traditional medical treatments and therapies.

# Other Options

In addition to the above interventions, there are several other options for treating ASD. These include:

**Dietary Interventions:** Some research has suggested that certain dietary interventions, such as a casein-free (GFCF) diet, gluten-free, may help to improve symptoms of ASD. However, the evidence is mixed, and more research is needed to determine the efficiency of these interventions. Dietary interventions are a non-pharmacological approach that can be used to control symptoms of Autism Spectrum Disorder (ASD). The use of dietary interventions in treating ASD is based on the idea that some foods may trigger or exacerbate symptoms while others may improve them (Pedersen et al., 2014). In this paper, we will discuss some of the dietary interventions that can be used to manage the symptoms of autism in the case study provided. One of the most common dietary interventions for treating ASD is the gluten-free, casein- free (GFCF) diet (Grimaldi et al., 2018). The GFCF diet involves removing all foods containing gluten and casein, which are proteins found in wheat, barley, rye, and dairy products. The rationale behind this diet is that some children with ASD may be sensitive to these proteins, leading to increased inflammation and disruption of neurotransmitter function in the brain.

Studies have shown mixed results on the effectiveness of this diet, but some parents and practitioners have reported improvements in behavior, communication, and social interactions after implementing the GFCF diet.

Another dietary intervention that has gained popularity in recent years is the ketogenic diet. The ketogenic diet is a high-fat, low-carbohydrate diet that has been used to treat epilepsy, and there is some evidence to suggest that it may also benefit children with ASD. The diet aims to induce a state of ketosis in the body, in which the body burns fat for fuel instead of carbohydrates. This diet may help to reduce inflammation and oxidative stress in the brain, which is believed to contribute to the development of ASD. While there is inadequate research on the effectiveness of the ketogenic diet in treating ASD, some parents and practitioners have reported improvements in behavior, language, and cognitive function in children with ASD who have followed this diet.

In addition to the GFCF and ketogenic diets, other dietary interventions may be helpful in the treatment of ASD. For example, some studies have suggested that a low-sugar diet may benefit children with ASD, as high sugar intake has been linked with increased hyperactivity and impulsivity in some children (González-Domenech et al., 2022). Similarly, some parents and practitioners have reported improvements in behavior and cognitive function in children with ASD who follow a low-oxalate diet, which involves avoiding foods high in oxalates, such as spinach, almonds, and chocolate. Supplements are also frequently used as a dietary intervention in the treatment of ASD. For example, omega-3 fatty acids, which are found in fish oil, have been shown to have anti- inflammatory properties and may improve cognitive function in children with ASD (Adams et al., 2018).

Probiotics, which are live bacteria that are beneficial to the digestive system, may also be helpful in treating ASD, as some studies have suggested that children with ASD may have an imbalance of gut bacteria that contributes to the development of symptoms. It is important to note that while dietary interventions may be helpful in treating ASD, they should not be used as a replacement for traditional therapies, such as behavioral and speech therapies. Additionally, it is important to work with a qualified healthcare practitioner or nutritionist to develop a safe and effective individualized dietary plan for the child.

**Sensory Integration Therapy:** Sensory integration therapy is a type of occupational therapy that addresses sensory sensitivities in children with ASD. The therapy uses various techniques, such as swinging, bouncing, and brushing, to help children regulate their sensory responses and improve their ability to participate in daily activities. Sensory Integration Therapy (SIT) is a non-medical therapy approach based on understanding sensory processing and how it can affect daily functioning. It is a form of occupational therapy that focuses on the sensory system and aims to help individuals with autism spectrum disorder (ASD) better process sensory information and integrate it into their daily lives (Marsden et al., 2019). The therapy uses various techniques to help the individual participate in daily activities.

Individuals with ASD may have difficulty processing sensory information, such as sounds, touch, smell, taste, and visual information. This can lead to sensory overload or underload, resulting in behaviors such as avoidance, overstimulation, or self-stimulation. SIT aims to address these issues by helping individuals better understand and regulate their sensory input, improving their overall functioning and quality of life.

SIT is often conducted in a specialized sensory integration gym, where the environment is designed to provide various sensory experiences. The therapy sessions are individualized and typically involve activities that engage the individual in sensory experiences, such as swinging, jumping, rolling, climbing, and playing with different textures. One of the key components of SIT is using a sensory diet, a set of sensory-based activities that an individual engages in throughout the day to help regulate their sensory input (Marsden et al., 2019). The sensory diet is tailored to the individual's specific sensory needs and can include deep pressure, vibration, movement, and oral stimulation.

In the case of the 13-year-old male with ASD, SIT may be a beneficial therapy option to help address his sensory processing difficulties. For example, the therapy could focus on providing him with experiences that address his sensory under-responsiveness, such as providing him with sensory input through deep pressure, vibration, or movement activities. This could be done through activities such as playing on a therapy ball, jumping on a trampoline, or engaging in a weighted vest or blanket. SIT may also help address the individual's coordination and motor planning difficulty. Through activities such as obstacle courses, balance beams, or crawling through tunnels, the therapy can help improve the individual's body awareness and coordination, leading to improved overall motor planning (Marsden et al., 2019). In addition, SIT can also help to improve the individual’s social interaction and communication skills. By engaging in sensory experiences with other individuals, the therapy can help to facilitate social engagement and interaction. For example, engaging in a group activity such as a sensory obstacle course can help the individual to work with others and practice communication and social skills.

Overall, SIT is a non-medical therapy option that can be beneficial for individuals with ASD, particularly those who have sensory processing difficulties. It can help improve sensory integration, coordination, motor planning, and social interaction, leading to improved overall functioning and quality of life. Although the effect of this therapy approach on reducing autism symptoms is currently unknown, preliminary studies have suggested it will be beneficial. A study by the University of York looked at the effects of Sensory Integration Therapy (SIT) on children on the autism spectrum and found that 25% experienced improvements in communication and social interaction after participating in this type of therapy.

**Physical Therapy:** Physical therapy can be helpful for children with ASD who have difficulty with concepts, such as understanding numbers, and learning motor skills and social skills. These concepts can be addressed through activities that promote fine motor skills, such as clay modeling or paper engineering, and visual-motor integration (Padmanabhan & Shroff, 2020). Fine motor tasks can help improve a child's ability to perform daily tasks by strengthening the ability to control hand movements and coordination, so they may become more sensitive to sensory experiences.

**Animal-Assisted Therapy:** Animal-assisted therapy involves the use of trained animals, such as dogs or horses, to help children with ASD improve their social interactions and communication skills. Research has shown that animal-assisted therapy can effectively reduce anxiety and improve social interactions in children with ASD. nimal-assisted therapy (AAT) is a type of therapy that involves animals as a means of improving the emotional, social, and cognitive well-being of individuals. AAT has succeeded in various populations, including individuals with autism spectrum disorder (ASD). In the case of the 13-year-old male with ASD, animal-assisted therapy may provide additional benefits to the other interventions being used.

Here are some ways in which animal- assisted therapy could potentially benefit the individual:

* **Socialization:** Individuals with ASD often have difficulties with social interactions. AAT may help improve social skills by providing opportunities to interact with animals, which can be less intimidating than interacting with humans. The therapy animal can provide a non-judgmental and unconditional form of social support.
* **Emotional regulation:** AAT has been shown to help individuals regulate their emotions, reduce anxiety, and increase feelings of calmness. For individuals with ASD who may experience heightened anxiety and stress levels, interacting with therapy animals can help promote a sense of calmness and relaxation.
* **Sensory integration:** Individuals with ASD may experience difficulties with sensory integration, which can impact their ability to process and respond to sensory information. AAT can help to stimulate sensory integration by providing sensory experiences through the animal's touch, smell, and sound.
* **Communication:** Individuals with ASD may have difficulty communicating verbally but can communicate non-verbally with animals. AAT can allow individuals with ASD to express themselves through non-verbal communication with the therapy animal.
* Motivation: AAT can motivate individuals with ASD who may struggle with engaging in therapeutic interventions. The presence of a therapy animal may increase motivation to participate in therapy sessions and engage in therapeutic activities.

Different types of animals can be used in AAT, including dogs, cats, horses, and even dolphins. The choice of animal will depend on the individual's preferences and needs. For individuals with ASD, dogs are a common choice due to their ability to provide consistent and predictable interactions.

In order to ensure the safety and effectiveness of AAT for individuals with ASD, it is important to work with a trained and certified therapy animal handler. The handler can help facilitate interactions between the individual and the animal and ensure the safety and well-being of both the individual and the animal.

In addition to one-on-one interactions, AAT can also be provided in group settings.

Children with ASD may benefit from small group interactions with trained therapy dogs. Not only is this more cost-effective than one-on-one therapy, but it may provide more benefits for the child due to the increased opportunities for social interactions. Animal-assisted therapy can provide many benefits for children with ASD. Although the research regarding its effectiveness is limited, studies have shown that AAT can improve emotional and social well-being, reduce anxiety and increase self-esteem. It may also improve communication skills and allow the child to become more comfortable with the therapist or others.

**Music Therapy:** Music therapy involves using music to improve social interactions, communication, and emotional regulation in children with ASD. Research has shown that music therapy can improve social skills, communication, and behavior in children with ASD. Music therapy is a non-invasive, non-pharmacological approach that can improve the quality of life of individuals with autism spectrum disorder (ASD). With its focus on communication, social skills, and emotional regulation, music therapy can address some behavioral and emotional difficulties that individuals with ASD often experience (Alqahtani et al., 2020). However, it is important to note that music therapy should be used in conjunction with other interventions, and should not replace medical treatments prescribed by a qualified healthcare professional.

There are several different approaches to music therapy, including improvisation, songwriting, music listening, and music and movement. Each of these approaches has unique benefits for individuals with ASD (Padmanabhan & Shroff, 2020). For example, improvisation can help individuals with ASD express themselves through music, while music and movement can improve motor skills and coordination. Songwriting can be used to improve communication skills and creativity, while music listening can be used to help individuals with ASD relax and reduce anxiety. Music therapy should be provided by a qualified music therapist who has specialized training in working with individuals with ASD. The music therapist will work with the individual to develop a personalized treatment plan considering their needs, goals, and preferences. The therapist will then use music-based activities to help individuals achieve their goals. The frequency of sessions will vary based on the individual's needs.

Music therapy is likely to be particularly effective for individuals with ASD who have developed alternative or augmentative communication strategies. For example, a music therapist may use songs to help the individual learn new vocabulary words or phrases. The individual can then use this vocabulary to tell others what they are thinking and feeling. However, it is important to note that music therapy should not replace other communication interventions, such as speech-language and AAC.

Evidence suggests that music therapy can effectively improve social communication, emotional regulation, and sensory processing in individuals with ASD. For example, a study by Shuman found that music therapy can effectively reduce anxiety and improve emotional regulation in children with ASD (Shuman et al., 2016). Another study found that music therapy can improve joint attention and social communication skills in children with ASD

# Benefits of using the additional options

The use of other options for the prevention of autism is becoming increasingly popular as parents and healthcare providers look for more holistic and natural ways to support children with autism. These other options, such as dietary interventions, sensory integration therapy, animal- assisted therapy, and music therapy, offer a range of benefits for children with autism.

Dietary interventions, for example, can help to reduce inflammation in the body, support healthy gut function, and improve overall nutrition. This can positively impact symptoms of autism, as many children with autism also have gastrointestinal issues, food sensitivities, and nutrient deficiencies (Padmanabhan & Shroff, 2020). By addressing these underlying issues, dietary interventions can help to improve behavior, communication, and social skills.

Sensory integration therapy is another option that can help children with autism. Many children with autism have sensory processing difficulties, so they struggle to process and respond appropriately to sensory input, such as touch, sound, and movement (Padmanabhan & Shroff, 2020). Sensory integration therapy helps improve the brain's ability to process sensory information and respond more adaptively. This can lead to improvements in behavior, attention, and communication.

Animal-assisted therapy is another option that can be beneficial for children with autism. Research has shown that interacting with animals can help to reduce stress, anxiety, and social isolation, while improving communication, social skills, and emotional regulation. This is particularly true for children with autism, who may struggle to connect with people but may be drawn to animals (Ang & MacDougall, 2022). By incorporating animals into therapy sessions, children with autism can experience various benefits that can improve their overall quality of life.

Finally, music therapy is another option that can benefit children with autism. Music therapy involves using music to address various emotional, cognitive, and behavioral issues (Coeckelbergh et al., 2016). It can help to improve communication, social skills, and emotional regulation while reducing stress, anxiety, and aggression. This is particularly true for children with autism, who may have a natural affinity for music and may be more responsive to musical stimuli than verbal communication. The use of other options, such as dietary interventions, sensory integration therapy, animal-assisted therapy, and music therapy for the prevention of autism, can be highly beneficial for children with autism. These options offer a range of benefits, from improving gut health and reducing inflammation to improving sensory processing and emotional regulation. By incorporating these options into a comprehensive treatment plan, parents and healthcare providers can support the development and well-being of children with autism more holistically and naturally.

# Interventions

Several factors must be considered when choosing the best therapy for a child. One of the most important factors is the child's developmental stage. Depending on the developmental stage and needs of the child, one type of therapy could be more effective than another. For example, music therapy is suitable for children with autism in the early stages of development. In contrast, occupational or behavioral therapies are often more effective once a child develops language skills. In addition to the developmental stage, the therapy method and the therapist must also be considered. If a child has a receptive language disorder, expressive language therapy could be more effective than early education therapy. If a child with autism is serious and does not respond well to early education therapy, behavioral or occupational therapies may be more effective.

The type of interaction between parents, therapists, and children is also important when choosing the best form of therapy. When working with children with autism, parents and therapists must treat the child with respect and understanding. Research has shown a strong connection between the quality of the therapeutic relationship and positive changes in behavior, communication, and social skills (Coeckelbergh et al., 2016). Studies found that children with autism who receive high-quality therapy are more likely to have improvements in behavior, communication, and social skills than children who receive low-quality therapy. It is also important that parents, teachers, and therapists work together to create a positive environment.

Parents and therapists must create a sense of trust and comfort with children with autism to get the most out of the therapy (Coeckelbergh et al., 2016). Studies found that small changes in the type of therapists used (such as using a male therapist instead of a female) can lead to small but significant improvements in behavior, communication, and social skills. Additionally, behavioral methods used for therapy must be structured to help the child develop new skills in a fun and engaging way. Children with autism often struggle with abstract thinking and changes in routine, so any therapy methods used must be structured and systematic. This can help to reduce anxiety or frustration levels which might lead to side effects such as harming the child or themselves. When working with an occupational therapist on the children's sensory needs, they must also meet developmental abilities. Often children with autism will find certain sensations to be unpleasant or painful, or even calming. It is important that parents and therapists work together to find what sensations the child likes best in order to help them cope with day-to-day situations more effectively. Research has shown that utilizing all the senses can promote social and communication skills and improve overall cognitive development. Also, occupational therapists need to be aware of any visual issues the child may have to get the most out of therapy.

 It is also important for therapists to look at family dynamics when working with a child. If a child has siblings or parents who are not active participants in the therapy, it could lead to poor responses, such as acting out more often or not doing as well in school. Therapists need to work with families and offer support while they make positive changes.

# Conclusion

Managing ASD requires a comprehensive and individualized approach that addresses the patient's specific symptoms and needs. Traditional approaches such as behavioral and educational interventions, pharmacological interventions, and supportive therapies effectively manage ASD symptoms. While non-traditional approaches may benefit patients, their effectiveness has not been scientifically validated, and they should be used with caution. It is important to consult with a healthcare provider to develop a comprehensive treatment plan that addresses the patient's needs and supports their overall development.

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