



# Sounds and The Spectrum

The Benefits of Music for People with Autism Spectrum Disorder (ASD)

# Sounds and the Spectrum: The Benefits of Music for People with Autism Spectrum Disorders

Music is universally recognized as promoting feelings of well-being and improved mental health in people of all ages. For this reason, music therapy is becoming an increasingly popular form of holistic, alternative therapy and is used in hospices, care homes, residential homes, schools, and rehabilitation centers all over the world to great positive effect. Music can help those who are experiencing loneliness, mental ill-health, and degenerative conditions such as dementia by enabling them to 'reconnect' with the world around them and by encouraging them to communicate with others in a non-verbal way. Playing musical instruments and engaging in music therapy has been proven to significantly improve communication for those living with a wide range of disabilities and health conditions and it should be no surprise that numerous studies have concluded that there is a strong positive correlation between exposure to music and improved well-being for individuals with autism spectrum disorder (ASD).

## What is Autism Spectrum Disorder (ASD)?

According to the most recent edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), autism spectrum disorder is definable as a set of 'persistent difficulties with social communication and social interaction', combined with 'restrictive and repetitive patterns of behaviors, activities, or interests' (including sensory behavior), which have been present since early childhood.<sup>1</sup> The DSM-5 further elaborates that individuals with autism spectrum disorder experience these difficulties and patterns to the extent that they 'limit and impair everyday functioning'. In recent literature (as laid out in the DSM-5), earlier terms such as 'autistic disorder', 'Asperger disorder', 'pervasive developmental disorder' and 'childhood disintegrative disorder' have been replaced by the term 'autism spectrum disorder', or 'ASD'. ASD's characteristics of being defined a certain set of behaviors and its place as a 'spectrum disorder' mean that it affects individuals differently and to varying degrees. ASD affects the development of the social, verbal, and cognitive abilities of the individual, meaning that a person living with autism spectrum disorder often finds it difficult to communicate with others, particularly neurotypical people. ASD is a developmental disability and is therefore not something that can be outgrown or 'cured': ASD is not an illness or a medical condition; it is a developmental disability with significant social, behavioral and communication challenges, and many have argued to be an example of neurodiversity. Neurodiversity — a term primarily credited to sociologist Judy Singer in 1998 — challenges the dominant idea that things currently defined as 'neurodevelopmental disorders' (including ASD) are 'pathological', and instead put forward the idea of a 'social model of disability', which argued that societal barriers are the main factor that disables people with neurodevelopmental disorders such as ASD, and that more inclusive social models were necessary in order to assist people to live more easily with ASD and other neurodevelopmental disorders.<sup>2</sup> This idea has gained huge amounts of traction in recent years, but has also attracted criticism.

Particularly, Pier Jaarsma and Stellan Welin have reflected upon the necessity outlined by many to pay attention to distinctions between what they call 'high functioning autists' and 'low functioning autists', arguing that the concept of neurodiversity tends to neglect or underestimate the extreme difficulties that some 'low functioning autists' experience. Therefore, they explain how the embrace of autism as 'natural variation' of neurotypical brain functioning may ultimately act as a barrier to certain people accessing the levels of care and support that they require.<sup>3</sup> However, both inside the 'pathological' and 'neurodiverse' schools of thought in relation to ASD advocacy, there is a general consensus that the right support, in the right ways, at the right time can make an enormous and critical difference to people's lives, enabling them to connect with others and with themselves, and even (in many cases) to generate an understanding of ASD that allows people to embrace and celebrate some of its unique and positive aspects.

The number of people diagnosed with autism spectrum disorder has rapidly increased over recent years and it is now

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<sup>1</sup> American Psychiatric Association. 'Autism spectrum disorder.' *Diagnostic and Statistical Manual of Mental Disorders*. 5<sup>th</sup> edition, 2013.

<sup>2</sup> Singer, Judy. *Odd People In: The Birth of Community Amongst People on the Autism Spectrum: A Personal Exploration on a New Social Movement based on Neurological Diversity*. Honours Thesis, The University of Technology (Sydney), 1998.

<sup>3</sup> Jaarsma, Pier and Stellan Welin. 'Autism as a Natural Human Variation: Reflections on the Claims of the Neurodiversity Movement.' *Health Care Analysis*, vol. 20, no. 1, 2011. pp. 20-30.

thought that one in sixty-eight Americans<sup>4</sup> and one in one hundred people in the UK<sup>5</sup> have been identified as being on the autistic spectrum. It is worth remembering that autism spectrum disorder does not just affect the lives of the individuals who have the condition, but it also impacts their families. Taking these figures into account, this means that autism is a part of everyday life for more than 4 million people in the United States, with many more individuals going undiagnosed. Diagnosis is often crucial for allowing people with autism to access the support that enables them to achieve their full potential, but research suggests that there are many obstacles to this. Recent literature on the subject especially shown how autism can often manifest differently across different genders, and how this often leads to misdiagnosis or delayed diagnosis in women and girls particularly, thus prohibiting them from being able to access support as easily as their male counterparts.<sup>6</sup> Studies have found that this is due to a number of both nosological and cultural factors, and is quite possibly furthered by gendered tendencies towards 'camouflaging' (a behavioral coping strategy for concealing ASD symptoms, particularly performed by women and girls), differing phenotypes, psychiatric co-morbidities, and various continuing effects of residual sexism in medical – including psychiatric and neurological – research and practice.<sup>7</sup>

## The Benefits of Music for People with ASD.<sup>8</sup>

Music stimulates both hemispheres of our brain and this is, in part, why it has been used so effectively in therapeutic contexts and interventions for supporting people with autism spectrum disorders. Research has indicated that music education and music therapy are linked to improved cognitive function<sup>9</sup> and increased language development from an early age.<sup>10</sup> Music therapy has also been proven to have a positive effect on an individual's ability to interact positively with those around them.<sup>11</sup> Due to the characteristics of ASD involving the impact that it often has on an individual's inability to communicate and socially interact easily with others, music can be an extremely effective tool for aiding with communication and processing, particularly in the processing and communication of emotions and states of mind. Various studies have been conducted over recent years examining the impact of music and musical therapeutic activities on autistic people in particular. One study, conducted in 2019 by Gheetha Bharathi and colleagues at Bharathiar University in India, examined the potential role of music therapies in enabling and accelerating the development of oral-motor synchronization and coordination in autistic individuals. This development can help greatly with the development of early communication skills, which some toddlers and young children with ASD are observed to struggle with, as a result of ASD's links with sensory dysfunction, especially in early childhood.<sup>12</sup> Bharathi and colleagues make the important observation that 'although ASD children with expressive language deficits are found to have motor and oral-motor impairments which are closely linked with speech production, fluency and clarity, language deficits are not described as a significant feature of ASD in DSM-V'.<sup>13</sup> Explaining that 'listening to music and rhythmic patterns improves

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<sup>4</sup> 'The Benefits of Music Therapy for Autistic Children.' *Nurse Journal*, 26 Oct 2021. <https://nursejournal.org/community/the-benefits-of-music-therapy-for-autistic-children/>

<sup>5</sup> National Autistic Society. 'What is Autism?' *The National Autistic Society*, 2022. <https://www.autism.org.uk/advice-and-guidance/what-is-autism>

<sup>6</sup> Driver, Bethany and Verity Chester. 'The presentation, recognition and diagnosis of autism in women and girls.' *Advances in Autism*, vol. 7, no. 3, 2021. <https://doi.org/10.1108/AIA-12-2019-0050>

<sup>7</sup> Green, Renée M. et al. 'Women and Autism Spectrum Disorder: Diagnosis and Implications for Treatment of Adolescents and Adults.' *Current Psychiatry Reports*, vol. 21, article no. 22, 2019. <https://doi.org/10.1007/s11920-019-1006-3>

<sup>8</sup> In autism and ASD advocacy circles and surrounding scientific and social scientific literature, some individuals prefer to use the term 'autistic people' as opposed to 'people with autism'. This is due to an understanding of autism as an example of neurodiversity – something inherent to identity and something to wear openly and proudly – rather than mapping autism as something pathological and medical; an illness or condition under which there is a so-called 'normal' person (Jaarsman and Welin). These perspectives tend to come from the neurodiversity movement. Others, meanwhile, prefer to use the term 'people with autism' as a way in which to combat through terminology the ways in which people with autism have historically been (and still are today, in many ways) 'othered', afforded fewer rights, and discriminated against as a result of their disability. For the purpose of this paper, we utilise both terms interchangeably out of respect for and understanding of both schools of thought in ASD and autism advocacy communities.

<sup>9</sup> Schellenberg, E. 'Music and Cognitive Abilities.' *Current Directions in Psychological Science*, 2005. p. 317-320.

<sup>10</sup> Legg, R. Using Music to Accelerate Language Learning: An Experimental Study. *Research in Education*, 2009. p. 82.

<sup>11</sup> Netherwood, C. *Music To Your Ears*. Australian Parents, 2007. p. 64.

<sup>12</sup> Bharathi, Gheetha et al. 'The potential role of rhythmic entertainment and music therapy intervention for individuals with autism spectrum disorders.' *Journal of Exercise Rehabilitation*, vol. 15, no. 2, 2019. pp. 180-186. <https://doi.org/10.12965/jer.1836578.289>

<sup>13</sup> Ibid.



attention in children with ASD, which may be a sign of improved sensory integration<sup>14</sup> — as various previous studies have shown — they frame music therapies involving rhythm as a hugely helpful and still underdeveloped field for providing support in developing sensorimotor regulation in children and individuals with autism, enabling progress in developing attention spans, social integration and participation, speech and language development, and emotional self-regulation: an idea supported by various studies.<sup>1516</sup>

Amparo V. Marquez-Garcia and colleagues from Simon Fraser University in BC, Canada recently conducted a review of existing literature on studies done about the positive effects of various music therapies on individuals with ASD.<sup>17</sup> They observe various patterns of improvement across a series of studies completed over the last two decades, but due to their focus on empirical data, they conclude that more research and more reproducible methods are necessary in order to make clear statements about the long-term impacts of music therapies for autistic individuals.<sup>18</sup> Another review of recent studies, this time conducted by Hanna Mayer-Benarous and colleagues, observed that both Educational Music Therapy (EMT) and Improvisational Music Therapy (IMT) were extremely beneficial techniques produce encouraging results for children presenting with ASD and other neurodevelopmental disorders (NDDs), both in terms of assisting developments in speech production and in encouraging increased capacity for social functioning.<sup>19</sup> This is why musical instruments such as Percussion Play's 'Duo' for example are particularly beneficial for those with autism because the instrument allows for close social interaction but without forcing close physical proximity. The players can interact with each other in a safe space without the need for direct eye contact.

Playing musical instruments impacts the brain as a whole, stimulating both the right and left, the analytical and the artistic hemispheres of the brain, which, as researcher Jenny Yoon notes, increases an individual's overall intellectual capacity more than any other bilateral activity.<sup>20</sup> For an individual with autism, this is incredibly important as one common feature of autistic spectrum disorders is that the left and right areas of the brain can in some areas become detached, or out of sync with each other. In practice, this often means that some areas — such as those relating to the normalized modes and methods of communication, including speech, language, socio-emotional processing and eye-contact — are caused to ultimately end up underdeveloped (or, perhaps, differently developed). Playing musical instruments stimulates the autistic brain to make new connections and strengthens existing ones; this can result in improved mental health and increased cognitive ability for people with autism engaging in musical play activities.

## The Impacts of Music on Children with Autism

Children with autism can often experience considerable difficulties with interacting socially with others and music encourages reciprocal communicative behavior which can empower a child to understand, overcome and manage these difficulties. By introducing an instrument into the autistic child's environment, the child has an opportunity to initially connect with the instrument in a non-threatening, non-pressurized way which means that opening up to others who are also interacting with the instruments becomes part of the organic process of communication that was begun by communicating with the instrument. As is well documented, musical engagement is a universal language that operates across linguistic, cultural, and social barriers and is hugely effective at breaking down all sorts of obstacles to normalized versions of communication, both

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<sup>14</sup> Ibid.

<sup>15</sup> LaGasse, A. B., & Hardy, M. W. 'Considering rhythm for sensorimotor regulation in children with autism spectrum disorders.' *Music Therapy Perspectives*, 31, no. 1, 2013. pp. 67–77. <https://doi.org/10.1093/mtp/31.1.67>

<sup>16</sup> Benson, Jeryl D. et al. 'The Effect of Sensorimotor Strategies on Attention and In-Seat Behavior in Preschoolers with Autism Spectrum Disorder: A Pilot Study', *Journal of Occupational Therapy, Schools, & Early Intervention*, vol. 13, no. 3, 2020. pp. 236–249. <https://doi.org/10.1080/19411243.2020.1732262>

<sup>17</sup> Marquez-Garcia, Amparo V. et al. 'Autism Spectrum Disorder: A Systematic Review.' *Review Journal of Autism and Developmental Disorders*, vol. 9, 2022. pp. 91–107. <https://doi.org/10.1007/s40489-021-00246-x>

<sup>18</sup> Ibid.

<sup>19</sup> Mayer-Belarous, Hanna et al. 'Music Therapy for Children With Autistic Spectrum Disorder and/or Other Neurodevelopmental Disorders: A Systematic Review.' *Frontiers in Psychiatry*, April 2021. <https://doi.org/10.3389/fpsy.2021.643234>

<sup>20</sup> Yoon, Jenny N. *Music in the Classroom: Its Influence on Children's Brain Development, Academic Performance, and Practical Life Skills*. M.A. Thesis, Biola University, 2000.

verbal and non-verbal. For this reason, musical play is very well suited to many of the needs of autistic children because the very nature of music is often able to capture and maintain their attention in a way that other mediums may not to the same extent. Playing musical instruments can therefore assist the child to navigate, comprehend and participate in socially situations more easily, alleviate negative emotions and distress reactions, and helps to reinforce desired responses.

One study, conducted by researcher Caroline E. Stephens in 2008, concluded that children chose to participate in 'reciprocal imitation' of the researcher within the musical play routine and whilst engaged in the activity demonstrated increased levels of attention.<sup>21</sup> Beginning from an understanding that one of the characteristics of ASD is its impact upon attention spans and abilities to maintain concentration, this study sought to examine whether rhythmic musical engagement and specifically musical imitation of autistic children within child-led social learning environments. The study, though it had mixed results, ultimately suggested that one of the benefits of playing music for children with autism is demonstrably increased socialization – including spontaneous social engagement – in addition to improved communication.<sup>22</sup> The following year, another related study was carried out, this time conducted by researchers Jinah Kim, Tony Wigram, and Christian Gold.<sup>23</sup> This randomized trial compared the psychosocial impacts of improvisational music therapy (IMT) with toy play sessions in children with autism spectrum disorders. The study concluded that improvisational music therapies ultimately produced 'increased compliance and markedly more and longer events of 'joy', 'emotional synchronicity' and 'initiation of engagement' behaviors compared with toy play'.<sup>24</sup> Using DVD analysis, the study observed much greater overall social motivational engagement with the therapist in improvisational musical therapy sessions compared with during toy play sessions. Because playing musical instruments requires turn-taking and playing alongside others, it imparts social regulation skills in a safe and fun environment. This process of imparting these skills, habits and tools, as research has shown, can be incredibly important and beneficial for the development of socialization abilities and capacities for children with autism spectrum disorders, especially in their earlier years.<sup>25</sup> More recent research has confirmed these earlier scientific positions. One review, conducted in 2021 by Nidhi Amonkar and colleagues, showed that 'strong... evidence' existed to support the idea of music therapy's benefits for improved socialization, behavioral-affective, sensorimotor, and cognitive systems and skills in autistic children compared with other forms of Creative Movement Therapies (CMT).<sup>26</sup>

Part of the reason why music therapy is used so effectively to help younger children, older children, and adolescents with autism spectrum disorders is that music empowers children to learn how to relate each other. Other family members can participate and in addition to the sensory stimulation of the music, the child is also able to experience dance, the social dynamic of learning an instrument, and to explore rhythm. All this can help to motivate the child to follow more impulsive play patterns that will engage the whole of their brain and body. Due to certain brain deficits in multimodal integration –stemming from long-distance brain under-connectivity – children with autism spectrum disorders may normally find impulsiveness and spontaneity when it comes to activities and socialization more challenging than neurotypical children, and playing musical instruments such as those produced by Percussion Play, both in group and individual music therapeutic settings, can encourage and facilitate brain development and wiring in these areas.

## The Benefits of Music for Improved Communication

The very nature of music and musical therapies as complex and multi-faceted mean that they are extremely well suited to having multisystem psychological effects on individuals with autism spectrum disorders. Specifically, musical play awakens the sensorimotor domains – the process of receiving sensory messages (sensory input) and producing a response (motor output) – as well as having positive developmental effects on the social communication, cognitive/attentional, and behavioral/affective

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<sup>21</sup> Stephens, C. E. 'Spontaneous Imitation by Children with Autism during a Repetitive Musical Play Routine' *Autism* (2008) 12(6), 645-671

<sup>22</sup> Ibid.

<sup>23</sup> Kim, Jinah, Tony Wigram and Christian Gold. 'Emotional, Motivational and Interpersonal Responsiveness of Children with Autism in Improvisational Music Therapy.' *Autism*, vol. 13, no. 4, 2009. pp. 389-409.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

<sup>26</sup> Amonkar, Nidhi et al. 'Effects of Creative Movement Therapies on Social Communication, Behavioral-Affective, Sensorimotor, Cognitive, and Functional Participation Skills of Individuals With Autism Spectrum Disorder: A Systematic Review.' *Frontiers in Psychiatry*, 18 November 2021. <https://doi.org/10.3389/fpsy.2021.722874>

(emotional) domains in individuals with autism spectrum disorders.<sup>27</sup> There are many proven ways in which exposure to music and musical instruments benefits children with autism; these include:

- **Improved communication** – music can aid with learning and developing speech, language, articulation, and in non-verbal older children, can aid with sign language learning as well as use of Electronic Alternative and Augmentative Communication (AAC) devices such as Yes/No apps on an iPad or something more complex like a Dynavox system.
- **Social skills development** such as greetings, turn-taking, shared attention, and eye contact.
- **Self-expression** – this is particularly powerful for children who are non-verbal, but also extremely useful for lower-functioning children with autism who have extreme difficulties in making themselves understood.
- **Behavioral skills** – learning to participate and take turns and copying the behavior of others.
- **Motor skill development** – both fine and gross motor skills.
- **Social-emotional skills** – singing songs that empower children to recognize and identify feelings can help to combat emotional dysregulation and allow children to feel more in control of their emotions.
- **Sensory regulation** – the use of rhythm and instrument play can help a child feel organized and grounded.
- **Academic goals** – incorporating rhyme and rhythm to enable children to memorize information more easily can help them with recall and examinations.<sup>28</sup>

Music, as many observe, is especially useful as a therapy form for managing the challenging impacts of ASD on autistic children compared with some other therapies (including other alternative and creative therapies). This is due, in part, to the strengths in music processing that have been consistently observed in children with autism since the earliest studies on and descriptions of ASD.<sup>29</sup> Particularly, researchers have reported participants with ASD to have greater musical skills such as absolute pitch, melodic memory and contour-processing than their neurotypical counterparts,<sup>30 31 32</sup> as well as enhanced brain responses to song vs. speech in fronto-temporal brain regions,<sup>33 34</sup> and active emotional responses to music.<sup>35</sup> In non-verbal children, music therapy and playing musical instruments allow communication without language and foster creative self-expression. This, in turn, can lead to the development of verbal communication and improved language skills. There have been many studies that support the view that exposure to music helps develop language skills in children with autism. For example, in 2010 the *Journal of Music Therapy* published research by A.H. Lim<sup>36</sup> that proved that music training was as effective as

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<sup>27</sup> Ibid.

<sup>28</sup> Judd, Ryan. 'How Does Music Therapy Benefit Children with Autism?' *The Rhythm Tree*, 17 June 2015. <https://www.therhythmtree.com/video-blog/entry/how-does-music-therapy-benefit-children-with-autism>

<sup>29</sup> Kanner, L. 'Autistic disturbances of affective contact.' *Nerv. Child*, vol. 2, 1943. pp. 217–250.

<sup>30</sup> Molnar-Szakacs, I. & Heaton, P. 'Music: a unique window into the world of autism.' *Annals of the New York Academy of Sciences*, vol. 1252, no. 1, 2012. pp. 318–324.

<sup>31</sup> Quimet, T., Foster, N. E. V., Tryfon, A. & Hyde, K. L. 'Auditory-musical processing in autism spectrum disorders: a review of behavioral and brain imaging studies.' *Annals of the New York Academy of Sciences*. Sci. 1252, no. 1, 2012. pp. 325–331.

<sup>32</sup> Quintin, E.-M., Bhatara, A., Poissant, H., Fombonne, E. & Levitin, D. J. 'Processing of musical structure by high-functioning adolescents with autism spectrum disorders.' *Child Neuropsychology*, vol. 19, no. 3, 2013. pp. 250–275.

<sup>33</sup> Lai, G., Pantazatos, S. P., Schneider, H. & Hirsch, J. 'Neural systems for speech and song in autism.' *Brain*, vol. 135, 2012. pp. 961–975.

<sup>34</sup> Sharda, M., Midha, R., Malik, S., Mukerji, S. & Singh, N. C. 'Fronto-temporal connectivity is preserved during sung but not spoken word listening, across the autism spectrum.' *Autism Research*, vol. 8, no. 2, 2015. pp. 174–186.

<sup>35</sup> Caria, A., Venuti, P. & de Falco, S. 'Functional and dysfunctional brain circuits underlying emotional processing of music in autism spectrum disorders.' *Cerebral Cortex*, vol. 21, no. 12, 2011. pp. 2838–2849.

<sup>36</sup> Lim, A. H. 'Effect of "developmental speech and language training through music" on speech production in children with autism spectrum disorders.' *Journal of Music Therapy*, vol. 47, no. 1, 2010. pp. 2–26.

speech training for improving the vocabulary and speech production of children with autism. Lim's study then went on to demonstrate that a greater benefit was seen in the 'lower functioning' children in particular after participation in the music training. In 2014, a review of the effects of music therapy for those on the autistic spectrum emphatically concluded that music therapy can 'help to enhance non-verbal communication skills' and 'can contribute to increasing social adaptation skills in children with ASD'.<sup>37</sup> It is clear therefore that music can play a significant role in improving the communication skills of children with autism spectrum disorders and this is why outdoor musical instruments such as those produced by Percussion Play can be so valuable to the individual child, their family, friends, or caregivers, and the settings in which they are placed.

## Musical Play and Early Intervention in ASD

These benefits are perhaps at their most effective and empowering for children with autism spectrum disorders – particularly 'lower functioning' children – when utilised within particular timeframes. Amongst certain scientific communities, there is a widespread understanding that if autism is diagnosed early in childhood, interventions that can be put into place are more effective in the long term for that individual and their families to enable long-term easier communication, socio-emotional processing, sensorimotor development and more. This is because early intervention can impact many areas of a child's life whilst the brain is still developing and constantly rewiring incredibly quickly. ASD is characterised partially by altered brain-connectivity, both over-connectivity and under-connectivity (specifically under-connectivity of fronto-temporal and cortico-subcortical networks and over-connectivity of sensory networks).<sup>38</sup> With early intervention, contemporary research suggests, it is possible to stimulate alterations in connections in order to make communication, socialization, emotional regulation and sensorimotor development more manageable for autistic children. According to a study by Koegel, non-verbal children with autism spectrum disorders are more likely to gain speech skills the earlier that the intervention begins.<sup>39</sup> Koegel's study goes even further and states that 'children who are completely nonverbal who begin intervention in the early preschool years are far more likely to become verbal than children who begin intervention over the age of 5 years'.<sup>40</sup>

Research into early interventions has shown that if very young children with autism are exposed to gentle play, musical activities, and non-invasive games then a supportive environment where children and parents can bond in a healthy way can be established<sup>41</sup>. Incredibly, The National Institute of Child Health states that: 'with early intervention, between 3% and 25% of children with autism make so much progress that they are no longer on the autism spectrum when they are older'.<sup>42</sup> Research has also shown that children with autism benefit from the earliest interventions possible,<sup>43</sup> and Louise Kaczmarek from the University of Pittsburgh School of Education has stated that the most successful intervention strategies are those that integrate 'developmental and/or relationship-based techniques with those of applied behavior analysis'.<sup>44</sup> These types of interventions are usually play-based and parent-facilitated and music therapy is often used because of its proven benefits to communication and social interaction and the ease with which it can be accessed by even very young children. A more recent 2015 study<sup>45</sup> found that when very young children with autism were given the opportunity to access music within their kindergarten setting, all of the children showed improvement in their attention and social engagement.

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<sup>37</sup> Geretsegger, Monika et al. 'Music therapy for people with autism spectrum disorder.' *Cochrane Database of Systematic Reviews*, June 2014. <https://doi.org/10.1002/14651858.CD004381.pub3>

<sup>38</sup> Sharda, M., Tuerk, C., Chowdhury, R. et al. 'Music improves social communication and auditory-motor connectivity in children with autism.' *Transl Psychiatry*, vol. 8, article no. 231, 2018. <https://doi.org/10.1038/s41398-018-0287-3>

<sup>39</sup> Koegel L K, 'Interventions to facilitate communication in autism.' *J. Autism Dev. Disord.* vol. 30, no. 5, 2000. pp. 383-91.

<sup>40</sup> Ibid.

<sup>41</sup> Nurse Journal. 'The Benefits of Music Therapy for Autistic Children.' *Nurse Journal*, October 26, 2021. <https://nursejournal.org/community/the-benefits-of-music-therapy-for-autistic-children/>

<sup>42</sup> Helt et al 'Can children with autism recover? If so, how?' *Neuropsychological Review*, vol. 18, no. 4, 2008. pp. 339-66.

<sup>43</sup> The National Research Council. *Educating Children with Autism*, The National Academies Press, 2001.

<sup>44</sup> Kaczmarek, L. 'The Benefits of Early Intervention for Children with Autism.' *PittEd: School of Education Magazine*, University of Pittsburgh, February 2014.

<sup>45</sup> Vaiouli et al. *Autism*, vol. 19, no. 1, 2015. pp. 73-83.

## The Effects of Music on Families of Children with Autism

For those families who have access to them, outdoor musical instruments such as the ones created by Percussion Play hold a very special place. The instruments provide a way for families to have fun together whilst strengthening the bonds of communication between parents, grandparents, siblings, and children. In a 2005 issue of *Music Therapy Perspectives*, Allgood reported that parents responded positively to family-based music therapy in autism spectrum disorder interventions and reported new insights about themselves and their children.<sup>46</sup> In fact, more recently, in a 2012 study,<sup>47</sup> music therapy resulted in the highest parent social validity rating of all the treatments offered and was also the treatment most preferred by parents. Music therapy is especially suited to families because everyone, regardless of age or musical ability, can play instruments and often have fun whilst doing so, thus alleviating and easing some of the stress responses sometimes caused by more mainstream talking therapies. For the child with autism, the pressure and expectations are lifted, and new ways can be found for the child to respond to and communicate non-verbally their family meaningfully, often without the need for eye-contact or explicit bodily conversation.

There are no boundaries with music in music therapies – especially improvisational music therapies involving spontaneous playing of musical instruments and music making – and no rules, which means that there is no ‘right’ or ‘wrong’ way to access the instruments. For these reasons, each family can use music and musical instruments in a way that suits their individual needs and preferences. A recent 2013 report in an issue of *Child: Care, Health and Development* concluded that the results of research into family-centered music therapy are truly astounding and indicate a significant positive effect on social interaction and the parent-child relationship, especially when offered to the families of severely autistic or lower-functioning children aged between 3-5 years old.<sup>48</sup> This has since been further confirmed in a 2019 study conducted by Laura Blauth, which considered the impact of combined family music therapies and parent counselling for children with autism spectrum disorders, and ultimately reported ‘improved child wellbeing and [for parents and children] an improved ability to recognise and celebrate their children’s strengths’.<sup>49</sup> Blauth’s analyses of quality-of-life scales pre- and post-intervention indicated that alterations in participants’ quality of life were significantly more positive in the music therapy group than in the control group. Overall, the study provided extremely positive preliminary support for the use of music therapies in conjunction with parent counselling to enhance resilience in young children with ASD and their families.<sup>50</sup>

## The Benefits of Outdoor Play for Children with Autism Spectrum Disorders

Being outside, even if only for a short time, has benefits for both our mental and physical health, and in the case of children with autism, the positive effects of being outdoors can be significant. One study into the type of community-based inclusive playgrounds that Percussion Play create concluded that embedded music therapy sessions in an outdoor environment can ‘improve children’s peer interaction’.<sup>51</sup> Additional research from the journal *Frontiers in Integrative Neuroscience* concluded that movement is critical to many areas of functioning and so providing an environment where an individual can move in an unrestricted and unselfconscious way, such as in an outdoor playground, can stimulate overall growth in areas such as cognition, behavior, social skills, and communication,<sup>52</sup> which would be very beneficial for individuals with autism. One study,

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<sup>46</sup> Allgood, N. *Music Therapy Perspectives*, vol. 23, no. 2, 2005. pp. 92-99.

<sup>47</sup> Saylor, S et al. *Journal of Applied Behavior Analysis*, vol. 45, no. 1, 2012. pp. 185-90.

<sup>48</sup> Thompson, G.A et al. ‘Family-centred music therapy to promote social engagement in young children with severe autism spectrum disorder: a randomized controlled study.’ *Child: Care, Health and Development*, 2013. pp. 840-852.

<sup>49</sup> Blauth, Laura. *Music therapy and parent counselling to enhance resilience in young children with autism spectrum disorder: a mixed methods study*. Doctoral thesis, Anglia Ruskin University, 2019.

<sup>50</sup> Ibid.

<sup>51</sup> Kern, P., Aldridge, D. ‘Using Embedded Music Therapy Interventions to Support Outdoor Play of Young Children with Autism in an Inclusive Community-Based Child Care Program.’ *Journal of Music Therapy*, vol. 43, no. 4, 2006. pp. 270-294.

<sup>52</sup> Coast Music Therapy. ‘How Music Helps Autism.’ *Coast Music Therapy*, 2016. <http://www.coastmusictherapy.com/how-music-helps/autism-research/>



conducted by Chang & Chang in 2018, reported seven primary benefits to being outdoors for children with autism. These were promotion of communication, emotion, cognition, interaction, physical activity, and decreasing autistic sensitivity.<sup>53</sup> More recently, a 2021 study involving two special educators and five autistic children which examined the impact of learning outdoors at school for children with autism had extremely positive results. The study sought to address the problem that autistic children tend to have a more difficult school experience, due to the ways in which autistic characteristics tend to present themselves, and the ways in which schools in their current setup are not often easily able to assist with or cater to these needs. As the study notes, this can lead to increases in mental health issues, behavioral issues and additional support needs for children presenting with ASD. Other recent literature, such as Bradley and Male's 2017 qualitative study on the impact of time spent outdoors at forest school on four autistic children aged 6-8 and their parents garnered similarly positive results. The study reported several important benefits, such as increased socialization (development of friendships), challenges and risk-taking, experiences of success and learning outcomes.<sup>54</sup> In 2016, Zachor and colleagues employed quantitative methods to look at the ways in which an outdoor adventure program enabled positive experiences and reduced difficult symptoms for children with autism spectrum disorders: ultimately finding large benefits on and improvements in the autistic children involved in the study when compared with those in the control group.<sup>55</sup> In 2019, another similar qualitative study, this time carried out by Li and colleagues in China – which interviewed caregivers of autistic children – identified various sensorimotor, social, and emotional benefits of being outdoors in nature for autistic children compared with those in their control group.<sup>56</sup> Clearly, recent research demonstrates that there are manifold positive impacts of spending time outdoors – whether in learning, social or play environments (or any combination of the above) – specific to children with autistic spectrum disorders, and this is an area which might enable autistic children to grow their communication, social, sensorimotor and emotional skills much more easily, whilst managing and decreasing levels of overstimulation and stress.

## The Power of Percussion Play

The outdoor musical instruments created by Percussion Play are diverse and accessible to everyone and make perfect additions to any setting, particularly gardens and social spaces in schools, nurseries, care homes, nursing homes, hospices, and hospitals, where they can be used and enjoyed by all who encounter them. By combining the positive impacts of being outdoors with the many clear benefits of musical play and musical therapies, they facilitate possibilities for learning, communication, socialization, fun, and connection. The instruments created by Percussion Play encourage interaction and communication and some of the instruments, such as The Duo, have been specially designed to enable those with autistic spectrum disorders to engage with the instruments in a way that empowers them to find joy and connection with others. The Duo is a distinctive metallophone which can be played by up to four players. Eye contact can present difficulty and discomfort for many people with autistic spectrum disorders, particularly 'lower functioning' individuals, with many only able to process one sensory system at a time. The curved design of the Duo was created in order to allow two people to interact and make music together without the need to look directly at each other: allowing them to concentrate entirely on the auditory process, comfortably and in their own space.

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<sup>53</sup> Chang, Yuan-Yu and Chang, Chun-Yen. *The Benefits of Outdoor Activities for Children with Autism*, 2018.

<sup>54</sup> Bradley, K., and Male, D. 'Forest School Is Muddy and I like it': Perspectives of Young Children with Autism Spectrum Disorder, Their Parents and Educational Professionals. *Educ. Child Psychol.* vol. 34, no. 2, 2017. pp. 80-93.

<sup>55</sup> Zachor, D. A., Vardi, S., Baron-Eitan, S., Brodai-Meir, I., Ginossar, N., and Ben-Itzhak, E. 'The Effectiveness of an Outdoor Adventure Programme for Young Children with Autism Spectrum Disorder: A Controlled Study.' *Dev. Med. Child. Neurol.* vol. 59, 2016. pp. 550-556. doi:10.1111/dmcn.13337

<sup>56</sup> Li, D., Larsen, L., Yang, Y., Wang, L., Zhai, Y., and Sullivan, W. C. 'Exposure to Nature for Children with Autism Spectrum Disorder: Benefits, Caveats, and Barriers.' *Health & Place*, vol. 55, 2019. pp. 71-79. doi:10.1016/j.healthplace.2018.11.005

## References

Allgood, N. *Music Therapy Perspectives*, vol. 23, no. 2, 2005. pp. 92-99.

American Psychiatric Association. 'Autism spectrum disorder.' *Diagnostic and Statistical Manual of Mental Disorders*. 5<sup>th</sup> edition, 2013.

Amonkar, Nidhi et al. 'Effects of Creative Movement Therapies on Social Communication, Behavioral-Affective, Sensorimotor, Cognitive, and Functional Participation Skills of Individuals With Autism Spectrum Disorder: A Systematic Review.' *Frontiers in Psychiatry*, 18 November 2021. <https://doi.org/10.3389/fpsy.2021.722874>

Benson, Jeryl D. et al. 'The Effect of Sensorimotor Strategies on Attention and In-Seat Behavior in Preschoolers with Autism Spectrum Disorder: A Pilot Study', *Journal of Occupational Therapy, Schools, & Early Intervention*, vol. 13, no. 3, 2020. pp. 236-249. <https://doi.org/10.1080/19411243.2020.1732262>

Bharathi, Gheetha et al. 'The potential role of rhythmic entrainment and music therapy intervention for individuals with autism spectrum disorders.' *Journal of Exercise Rehabilitation*, vol. 15, no. 2, 2019. pp. 180-186. <https://doi.org/10.12965/jer.1836578.289>

Blauth, Laura. *Music therapy and parent counselling to enhance resilience in young children with autism spectrum disorder: a mixed methods study*. Doctoral thesis, Anglia Ruskin University, 2019.

Bradley, K., and Male, D. 'Forest School Is Muddy and I like it': Perspectives of Young Children with Autism Spectrum Disorder, Their Parents and Educational Professionals. *Educ. Child Psychol.* vol. 34, no. 2, 2017. pp. 80-93.

Caria, A., Venuti, P. & de Falco, S. 'Functional and dysfunctional brain circuits underlying emotional processing of music in autism spectrum disorders.' *Cerebral Cortex*, vol. 21, no. 12, 2011. pp. 2838-2849.

Chang, Yuan-Yu and Chang, Chun-Yen. *The Benefits of Outdoor Activities for Children with Autism*, 2018.

Geretsegger, Monika et al. 'Music therapy for people with autism spectrum disorder.' *Cochrane Database of Systematic Reviews*, June 2014, <https://doi.org/10.1002/14651858.CD004381.pub3>

Coast Music Therapy. 'How Music Helps Autism.' *Coast Music Therapy*, 2016. <http://www.coastmusictherapy.com/how-music-helps/autism-research/>

Driver, Bethany and Verity Chester. 'The presentation, recognition and diagnosis of autism in women and girls.' *Advances in Autism*, vol. 7, no. 3, 2021. <https://doi.org/10.1108/AIA-12-2019-0050>

Green, Renée M. et al. 'Women and Autism Spectrum Disorder: Diagnosis and Implications for Treatment of Adolescents and Adults.' *Current Psychiatry Reports*, vol. 21, article no. 22, 2019. <https://doi.org/10.1007/s11920-019-1006-3>

Helt et al. 'Can children with autism recover? If so, how?' *Neuropsychological Review*, vol. 18, no. 4, 2008. pp. 339-66.

Jaarsma, Pier and Stellan Welin. 'Autism as a Natural Human Variation: Reflections on the Claims of the Neurodiversity Movement.' *Health Care Analysis*, vol. 20, no. 1, 2011. pp. 20-30.

Judd, Ryan. 'How Does Music Therapy Benefit Children with Autism?' *The Rhythm Tree*, 17 June 2015. <https://www.therhythmtree.com/video-blog/entry/how-does-music-therapy-benefit-children-with-autism>

Kanner, L. 'Autistic disturbances of affective contact.' *Nerv. Child*, vol. 2, 1943. pp. 217-250.

Kaczmarek, L. 'The Benefits of Early Intervention for Children with Autism.' *PittEd: School of Education Magazine*, University of Pittsburgh, February 2014.

Kern, P., Aldridge, D. 'Using Embedded Music Therapy Interventions to Support Outdoor Play of Young Children with Autism in an Inclusive Community-Based Child Care Program.' *Journal of Music Therapy*, vol. 43, no. 4, 2006. pp. 270-294.

Kim, Jinah, Tony Wigram and Christian Gold. 'Emotional, Motivational and Interpersonal Responsiveness of Children with Autism in Improvisational Music Therapy.' *Autism*, vol. 13, no. 4, 2009. pp. 389-409.

Koegel L K, 'Interventions to facilitate communication in autism.' *J. Autism Dev. Disord.* vol. 30, no. 5, 2000. pp. 383-91.

Lai, G., Pantazatos, S. P., Schneider, H. & Hirsch, J. 'Neural systems for speech and song in autism. *Brain*, vol. 135, 2012. pp. 961-975.

LaGasse, A. B., & Hardy, M. W. 'Considering rhythm for sensorimotor regulation in children with autism spectrum disorders.' *Music Therapy Perspectives*, 31, no. 1, 2013. pp. 67-77. <https://doi.org/10.1093/mtp/31.1.67>

Legg, R. Using Music to Accelerate Language Learning: An Experimental Study. *Research in Education*, 2009. p. 82.

Li, D., Larsen, L., Yang, Y., Wang, L., Zhai, Y., and Sullivan, W. C. 'Exposure to Nature for Children with Autism Spectrum Disorder: Benefits, Caveats, and Barriers.' *Health & Place*, vol. 55, 2019. pp. 71-79. doi:10.1016/j.healthplace.2018.11.005

Lim, A. H. 'Effect of "developmental speech and language training through music" on speech production in children with autism spectrum disorders.' *Journal of Music Therapy*, vol. 47, no. 1, 2010. pp. 2-26.

The National Research Council. *Educating Children with Autism*, The National Academies Press, 2001.

Marquez-García, Amparo V. et al. 'Autism Spectrum Disorder: A Systematic Review.' *Review Journal of Autism and Developmental Disorders*, vol. 9, 2022. pp. 91-107. <https://doi.org/10.1007/s40489-021-00246-x>

Mayer-Belarus, Hanna et al. 'Music Therapy for Children With Autistic Spectrum Disorder and/or Other Neurodevelopmental Disorders: A Systematic Review.' *Frontiers in Psychiatry*, April 2021. <https://doi.org/10.3389/fpsy.2021.643234>

Molnar-Szakacs, I. & Heaton, P. 'Music: a unique window into the world of autism.' *Annals of the New York Academy of Sciences*, vol. 1252, no. 1, 2012. pp. 318-324.

National Autistic Society. 'What is Autism?' *The National Autistic Society*, 2022. <https://www.autism.org.uk/advice-and-guidance/what-is-autism>

Netherwood, C. *Music To Your Ears*. Australian Parents, 2007. p. 64.

Nurse Journal. 'The Benefits of Music Therapy for Autistic Children.' *Nurse Journal*, October 26, 2021. <https://nursejournal.org/community/the-benefits-of-music-therapy-for-autistic-children/>

Ouimet, T., Foster, N. E. V., Tryfon, A. & Hyde, K. L. 'Auditory-musical processing in autism spectrum disorders: a review of behavioral and brain imaging studies.' *Annals of the New York Academy of Sciences*. Sci. 1252, no. 1, 2012. pp. 325–331.

Quintin, E.-M., Bhatara, A., Poissant, H., Fombonne, E. & Levitin, D. J. 'Processing of musical structure by high-functioning adolescents with autism spectrum disorders.' *Child Neuropsychology*, vol. 19, no. 3, 2013. pp. 250–275.

Saylor, S et al. *Journal of Applied Behavior Analysis*, vol. 45, no. 1, 2012. pp. 185-90.

Schellenberg, E. 'Music and Cognitive Abilities.' *Current Directions in Psychological Science*, 2005. p. 317-320.

Singer, Judy. *Odd People In: The Birth of Community Amongst People on the Autism Spectrum: A Personal Exploration on a New Social Movement based on Neurological Diversity*. Honours Thesis, The University of Technology (Sydney), 1998.

Sharda, M., Tuerk, C., Chowdhury, R. et al. 'Music improves social communication and auditory-motor connectivity in children with autism.' *Transl Psychiatry*, vol. 8, article no. 231, 2018. <https://doi.org/10.1038/s41398-018-0287-3>

Sharda, M., Midha, R., Malik, S., Mukerji, S. & Singh, N. C. 'Fronto-temporal connectivity is preserved during sung but not spoken word listening, across the autism spectrum.' *Autism Research*, vol. 8, no. 2, 2015. pp. 174–186.

Stephens, C. E. 'Spontaneous Imitation by Children with Autism during a Repetitive Musical Play Routine' *Autism* (2008) 12(6), 645-671

Thompson, G.A et al. 'Family-centred music therapy to promote social engagement in young children with severe autism spectrum disorder: a randomized controlled study.' *Child: Care, Health and Development*, 2013. pp. 840-852.

Vaiouli et al. *Autism*, vol. 19, no. 1, 2015. pp. 73-83.

Yoon, Jenny N. *Music in the Classroom: Its Influence on Children's Brain Development, Academic Performance, and Practical Life Skills*. M.A. Thesis, Biola University, 2000.

Zachor, D. A., Vardi, S., Baron-Eitan, S., Brodai-Meir, I., Ginossar, N., and Ben-Itzhak, E. 'The Effectiveness of an Outdoor Adventure Programme for Young Children with Autism Spectrum Disorder: A Controlled Study.' *Dev. Med. Child. Neurol.* vol. 59, 2016. pp. 550–556. doi:10.1111/dmcn.13337