



The Importance of Music for Emotion Processing in Children with Autistic Spectrum Disorder



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Opinion

People with Autistic Spectrum Disorder (ASD), including high functioning ASD, often have difficulties in identifying and sympathizing with emotions and intentions in others [1]. As a consequence, ASD is often characterised by difficulties in social and interpersonal communication [2]. It has been shown that it is difficult for people with ASD to identify emotions represented in facial expressions [3,4], in affective speech [3,5], in non-verbal vocal expressions [6] and in body movements [3,7]. This difficulty for emotion processing in ASD individuals is associated with abnormal brain activity when compared with neurotypical people, e.g., ASD individuals show less fusiform gyrus and amygdala activity when viewing facial expressions with emotional content [8], and unusual superior temporal and inferior frontal gyrus activation when listening to speech [9,10].

People with ASD often enjoy music listening, are affected emotionally by music, and are usually musically talented [11]. Previous studies have shown that individuals with ASD process melodic information (i.e., contour and intervals) in the same way as neurotypical people [12], and that they are better at pitch processing [13] and show superior pitch memory [13,14]. Notably, studies have also shown that individuals with ASD are able to correctly identify emotions in music just as well as neurotypical individuals [15,16]. Previous studies have found that ASD individuals listened to music as often as people without ASD because they feel emotionally affected by it [17]. Furthermore, it has been shown that the physiological responses to music in ASD individuals are the same as for neurotypical people [18]

and previous studies have observed preserved neural activity for music processing in children with ASD [19]. ASD individuals recruit brain regions involved in processing of emotion and reward when they listen to happy and sad music, in the same way as neurotypical people do [16].

The fact that people with ASD are sensitive to and affected emotionally by music in the same way as neurotypical people provides a window of opportunity to use music as a tool for improving the emotional processing in ASD individuals and reducing their difficulties in social and interpersonal communication. In the past, music interventions have been proved to be effective for treating some medical and emotional conditions by using melodies, rhythm, and movement [20]. Therapists have attempted to take advantage of the musical sensitivity and abilities of ASD individuals to compensate for the social interaction deficits [21]. Despite music interventions being widely used for treating neurological and cognitive disorders [22], its application and evaluation for improving social skills in ASD [23,24] remains an open area. Most of the research on using music as an intervention for ASD has centred in communication behaviours [25], but other more recent approaches have been proposed. For instance, Ramirez et al. [26] explore the potential usefulness of music as a tool for improving ASD children's emotion recognition in facial expressions. By exposing children with ASD to facial expressions with different emotions with and without emotion-matching background music, emotion identification improvement was measured both in terms of verbal response accuracy (perceived emotion), and brain (EEG) activity response

(induced emotion). Comparison of the children's verbal responses at the end of the intervention showed a significant improvement compared to their responses at the beginning of the intervention, and their emotional states computed from their EEG data were higher correlated with the presented visual stimuli [27].

Taking into account the results of previous studies on using music as an intervention for ASD, it is clear that music can be an extremely useful non-invasive tool for improving the difficulties in social and interpersonal communication suffered by individuals with ASD.

References

1. Frith U, Hill E (2003) *Autism: Mind and brain*. Oxford University Press.
2. APA (2013) *Diagnostic and Statistical Manual of Mental Disorders*. (5th edn), Arlington, VA: American Psychiatric Publishing.
3. Philip RCM, Whalley HC, Stanfield AC, Sprengelmeyer R, Santos IM, et al. (2010) Deficits in facial, body movement and vocal emotional processing in autism spectrum disorders. *Psychol Med* 40: 1919-1929.
4. Baron-Cohen S, Ring HA, Bullmore ET, Wheelwright S, Ashwin C, et al. (2000) The amygdala theory of autism. *Neurosci Biobehav Rev* 24: 355-364.
5. Golan O, Baron-Cohen S, Hill JJ, Rutherford MD (2007) The reading the mind in the voice test-revised: a study of complex emotion recognition in adults with and without autism spectrum conditions. *J Autism Dev Disord* 37: 1096-106.
6. Heaton P, Reichenbacher L, Sauter D, Allen R, Scott S, Hill E (2012) Measuring the effects of alexithymia on perception of emotional vocalizations in autistic spectrum disorder and typical development. *Psychol Med* 42: 2453-2459.
7. Hadjikhani N, Joseph RM, Manoach DS, Naik P, Snyder J, et al. (2009) Body expressions of emotion do not trigger fear contagion in autism spectrum disorder. *Soc Cogn Affect Neurosci* 4: 70-78.
8. Corbett BA, Carmean V, Ravizza S, Wendelken C, Henry ML, et al. (2009) A functional and structural study of emotion and face processing in children with autism. *Psychiatry Res* 173: 196-205.
9. Eigsti IM, Schuh J, Paul R (2012) The neural underpinnings of prosody in autism. *Child Neuropsychol* 18: 600-617.
10. Eyley LT, Pierce K, Courchesne E (2012) A failure of left temporal cortex to specialize for language is an early emerging and fundamental property of autism. *Brain* 135(Pt 3): 949-960.
11. Kanner L (1943) Autistic disturbances of affective contact. *Nervous Child* 2: 217-250.
12. Heaton P (2005) Interval and contour processing in autism. *J Autism Dev Disord* 35: 787-793.
13. Heaton P (2003) Pitch memory, labelling and disembedding in autism. *J Child Psychol Psychiatry* 44: 543-551.
14. Stanutz S, Wapnick J, Burack J (2014) Pitch discrimination and melodic memory in children with autism spectrum disorder. *Autism* 18: 137-147.
15. Heaton P, Allen R, Williams K, Cummins O, Happe F (2008) Do social and cognitive deficits curtail musical understanding? Evidence from Autism and Down Syndrome. *Br J Dev Psychol* 26: 171-182.
16. Caria A, Venuti P, de Falco S (2011) Functional and dysfunctional brain circuits underlying emotional processing of music in autism spectrum disorders. *Cereb Cortex* 21: 2838-2849.
17. Allen R, Hill E, Heaton P (2009b) 'Hath Charmsto Soothe...': an exploratory study of how high-functioning adults with ASD experience music. *Autism* 13: 21-41.
18. Tammy D Allen, Ryan C Johnson, Kaitlin M Kiburz, Kristen M Shockley (2013) Work-Family Conflict and Flexible Work Arrangements: Deconstructing Flexibility. *Personnel psychology* 66(2): 345-376.
19. Sharda M, Midha R, Malik S, Mukerji S, Singh NC (2015) Fronto-temporal connectivity is preserved during sung but not spoken word listening, across the autism spectrum. *Autism Res* 8: 174-186.
20. Geretsegger M, Elefant C, Mössler KA, Gold C (2014) Music therapy for people with autism spectrum disorder. *Cochrane Database Syst Rev* 6: CD004381.
21. Vaiouli P, Grimmet K, Ruich LJ (2015) "Bill is now singing": joint engagement and the emergence of social communication of three young children with autism. *Autism* 19: 73-83.
22. Paul A, Sharda M, Singh NC (2012) Effect of music instruction on cognitive development: A review. *J Indian Inst Sci* 92: 441-446.
23. Molnar-Szakacs I, Heaton P (2012) Music: A unique window into the world of autism. *Ann NY Acad Sci*: 1252: 318-324.
24. Ronna S Kaplan, Anita Louise Steele (2005) An analysis of music therapy program goals and outcomes for clients with diagnoses on the autism spectrum. *J Music Ther* 42(11): 2-19.
25. Finnigan E, Starr E (2010) Increasing social responsiveness in a child with autism: A comparison of music and non-music interventions. *Autism* 14: 321-348.
26. Ramirez-Melendez R, Matamoros E, Hernandez D, Mirabel J, Sanchez E, et al. (2022) Music-Enhanced Emotion Identification of Facial Emotions in Autistic Spectrum Disorder Children: A Pilot EEG Study. *Brain Sci* 12: 704.
27. Fitch WT (2005) The evolution of music in comparative perspective. *Ann NY Acad Sci* 1060: 29-49.



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