

The use of music as an educational intervention for children with autistic spectrum disorder (ASD)

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Abstract

This study considers the way in which music is currently used as an intervention both therapeutically and within the classroom in mainstream and special education, and asks whether it has further potential to enhance learning for children with autistic spectrum disorder (ASD). It includes a review of the recent literature regarding the use of music with children with ASD and suggests interventions that are measured against current diagnostic categories. Interventions considered address difficulties and differences within the areas of social interaction, communication, understanding and imagination. The concept of musical 'special interests' of children with ASD being harnessed to enhance learning is also considered.

Keywords: Autistic Spectrum Disorder, Education, Intervention, Music, Music Therapy.

Prelude

'Music is the regulator of my nervous system, the shelter for my frazzled mind.' So writes the autistic poet Romkema (2002: 60). The idea of music as a therapeutic intervention is not new, stretching at least as far back as David's use of the harp to alleviate the rages of King Saul in the Old Testament (1 Samuel 16:23). In these examples the therapeutic purpose seems to be one of mood regulation, but recent studies into the concept of music as an intervention with particular reference to the teaching of children with autistic spectrum disorder (ASD) detail the efficacy of music as a possible tool to aid social, communication and emotional development, and to increase speed of learning and retention.

Autism: a brief overview of diagnostics

Autism is described by the National Autistic Society (2013) as a lifelong developmental disability. Debates about both causes and criteria continue, as what has now become known as the autistic spectrum (Wing 1996) encompasses people with the widest possible range of ability and disability. Even within a spectrum, however, much debate still exists. Previously, conditions such as Williams's syndrome, fragile X, pervasive developmental disorder (PDD) as well as PDD-NOS (not otherwise specified), and semantic language disorder, which all present with both similarities and subtle differences to autism, led Bishop (1989) to devise a model of a continuum between autism, Asperger's syndrome and semantic-pragmatic disorders. The difficulty then in arriving at a definition of autism, with agreed diagnostic criteria is an ongoing one, subject to regular revisions. The use of a broader set of criteria, inclusive of Asperger's syndrome, began in the 1990s with the International Classification of Diseases –10th Revision (ICD-10; World Health Organization 1992) accepting that autism should be seen as a spectrum. DSM-V (American Psychiatric Association 2013) went on to remove specific diagnostic labels such as Asperger's syndrome, but also reflects the idea of a spectrum. Any interventions created for children with ASD would therefore be expected to address the agreed main areas of difficulty, namely social interaction and communication, and understanding and imagination.

Intervention: from behaviourist to therapeutic

There is a widely held belief that early intervention is crucial when working with children with ASD (Jones 2006). There is no shortage of practitioners or intervention packages available, as the growth of numbers of children diagnosed as having ASD (Fombonne, 2001) has led to increased

demand and supply; but there is a distinct lack of consensus about their effectiveness. Increased numbers of children being withdrawn from school and educated at home (Parsons & Lewis 2010), high levels of exclusion (House of Commons Education and Skills Committee on SEN 2006), and reports of social difficulties leading to bullying (Humphrey & Symes 2010) have led to growing disquiet about educational provision for children with ASD, particularly when they are educated within mainstream schools. Possible interventions purporting to support children with ASD with communication and social interaction difficulties range widely from strict behaviourist approaches to a variety of therapeutic standpoints. At one end of this continuum, advocates of behavioural therapy such as applied behavioural analysis (ABA) have gone so far as to suggest that all children with autism should have intensive behavioural intervention (Keenan 2007), while an opposing view is recommended by experts such as Moyes (2002). She advocates a more child-centred approach where a child's 'autistic behaviours' are seen not as undesirable, and something they should be trained out of, but as an important and instructive form of communication to be understood and worked with. Both DfES (Department for Education and Skills) guidance (Jones 2006) and Parsons et al (2011) call for more research on interventions currently used within schools and at home with children with ASD.

Music as intervention

The effectiveness of music as a specific intervention has been equally difficult to measure. Some research regarding the use of music as a learning intervention for children with ASD is new, although, as previously mentioned, the idea of music as therapy reaches back far into history. Recent studies (Pavlicevic & Trevarthen 1989; Bhatara et al 2009; Raglio et al 2011) have also shown that music can address some of the difficulties encountered by children with autism, such as social interaction, communication, emotional responsiveness, and even imagination and rigidity of thought, and these claims will be discussed in the light of the interventions suggested.

There are a number of reasons for advocating the use of music as an intervention for children with ASD. One of these is the idea of building

interventions on the strengths and interests of the children concerned, both in order to reward progress in behaviour and learning and as a motivational tool (Moyes 2002). Cosden et al (2006) add that strength-based assessments focusing on the abilities, interests and competencies of children with ASD are not only motivational, bringing a sense of accomplishment and self-esteem to both the young person concerned and their family, but can also prompt educators to look beyond mediating the perceived deficits of the child concerned, and enable both the child and their family to develop a better quality of life.

Several research studies which indicate that children with ASD can be particularly responsive to music, and in many cases perform equally as well as other typically developing children of their age, have led experts to go so far as to suggest that music may be 'a spared domain of cognitive processing in ASD' (Bhatara et al 2009: 376). Responsiveness to and understanding of music with children with ASD roughly corresponds to that of their typically developing peers (Heaton et al 1999; Bhatara et al 2009). Several studies acknowledge the enthusiasm and responsiveness towards musical stimuli expressed by children with ASD (Simpson & Keen 2011), while others have found no significant difference in their rhythmic awareness compared to typically developing children of the same age (Thaut 1988). Two studies (Applebaum et al 1979; Heaton et al 2008), have in fact found superior abilities in identifying pitch, and, even after taking into account the higher than average numbers of children with ASD with absolute pitch (Miller 1999), children with ASD scored more highly than typically developing peers on pitch discrimination tests when asked to detect the shape of a melody. The tests conducted by Heaton et al (2007) used the same melodies transposed into different keys, so that the ability to detect changes could not be based simply on the aural memory of a given series of notes, but on detection of the exact melody shape as a whole and any changes within it. This test is particularly significant as it demonstrates the ability to process music at both a local and global level (Heaton et al 2007). This skill could have the potential to be developed in the light of the tendency of children with ASD to focus on narrow and limited special interests, and potentially challenges the theory

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that children with autism will focus on detail rather than perceive and comprehend the whole (Frith 1989). The idea of weak central coherence is also challenged by Mottron et al (2000). That study also agrees with the Bhatara et al (2009) study in its assertion that music can be a spared domain of processing by suggesting that enhanced processing of 'elementary physical properties of incoming stimuli, as found previously in the visual modality, may also exist in the auditory modality' (Mottron et al 2000: 1057).

Music therapy

Music therapy for children with ASD, although established since the 1970s (Nordoff and Robbins 1977), is, however, far from reaching agreement over measurable success criteria. Many advocates of music therapy claim that the therapist and the patient create a relationship dialogue in sound and music without the need for verbalisation (Raglio et al 2011). Music therapy purports to address social interaction, communication and emotional responsiveness, as the relationship built with the therapist creates what Stern (2004) has described as moments of meeting reminiscent of the dyad between mother and child (Raglio et al 2011), thus building the possibilities of increased social interaction. This notion of the re-creation of parent-and-child-like bonding is supported by the use of vocalising within the therapy room, where the therapist echoes the sometimes pre-verbal sounds offered by the child (Stern 1985, 2004; Trevarthen & Aitken 2001). The difficulties of communication are further met through music therapy, as the use of non-verbal communication and improvising using vocal sounds and musical instruments bypass the potential barrier of language, and free the child to open 'a communicative channel with the music therapist' (Raglio et al 2011: 126). The music therapy discussed in the Raglio study is both child-centred and improvisatory, enabling the child to have a free unscripted mode of communication. It is this very process of musical improvisation and spontaneity that 'creates new mental schemes' and 'new emotional mental sets' (Raglio et al 2011: 127) that can lead to change, thus addressing another of the documented difficulties associated with autism, that of understanding and imagination. This claim of 'new mental sets', which have the potential for new learning and improved social functioning of a person with ASD, is an impressive

one, which has aroused both fierce support and considerable critique. Raglio et al (2011) go on to explain that the process of co-creation in making music, particularly that which is improvised, creates relationship, and the process of sharing, turn-taking and mutual engagement with another addresses difficulties of social communication and interaction. Additionally, proponents of music therapy for people with ASD claim that it can 'regulate anxiety' (Trevarthen & Aitken 2001). The use of improvisation in music therapy too is notable, in that it has the potential to challenge received wisdom on poverty of imagination and rigidity of behaviour within people with ASD (Wing & Gould 1979).

The Impact of music therapy

Measuring the impact of music therapy on the lives and educational development of people with ASD has been found to be extremely difficult (Gold et al 2006). One approach, taken by Pavlicevic & Trevarthen (1989), attempts to measure the emotional involvement and responsiveness of the child, whereas Raglio et al (2006) devised an assessment tool, the 'Musical Therapy Coding Scheme', which measured four elements of the child's behaviour: non-verbal communication, verbal communication, eye contact and facial expression and sonorous musical communication. With these rigorous attempts to itemise and measure the elements of the therapy, Raglio et al feel able to claim that the quality of 'sonorous-musical communication... diverges from the autistic communication' (Raglio et al 2011: 136). They go on to describe increased physical contact, eye contact and high levels of emotional involvement. Despite this, however, they acknowledge the small sample involved in their study and the need for further research. Studies that have attempted to draw together the impact of the use of music therapy for people with ASD (Whipple 2004) have been criticised for trying to measure interventions that were too diverse to be comparable (Gold et al 2006). The Gold et al study itself is overwhelmingly positive about the potential for music therapy to develop skills of turn-taking, sharing, interaction and communication. It also notes that the use of improvisation within music therapy begins to break down the repetitive and rigid patterns of expression and starts to develop the potential for spontaneity and moments of genuine interaction

(Gold et al 2006). Rolvsjord et al (2005) also note that therapy is by its very nature difficult to evaluate, and strategies which attempt to do so can be so intrusive as to threaten the substance of the intervention itself.

Many of the studies of interventions used for children with ASD have been criticised for not testing how well skills learned in one context can be generalised into other aspects of the child's life. Some of the claims for music therapy cited above assert the improved levels of communication between therapist and client, but the question of whether these skills exist only within the therapy room, or can be evidenced in other aspects of the child's life and interactions, is paramount. Evidence of the generalisation of increased communication and interaction following music therapy can be found in an anecdotal account of a mother's joy at hearing her five-year-old son speak for the first time, and how his learning to sing has given the family a shared means of communication (Stow 2014). This echoes the result of an earlier study (Edgerton 1994) which shows significant increase in the communicative behaviours of children with ASD during a ten-week period of music therapy, although these behaviours were not maintained after therapy finished. Even if, as anecdotal evidence and most studies seem to suggest, music therapy can be of benefit to children with ASD, any intervention that requires one-to-one sessions with highly trained specialists may prove to be prohibitively expensive and unlikely to be offered universally.

Music as an intervention for learning

The potential for using music as a teaching intervention, as opposed to one that is strictly therapeutic, however, has also been the subject of recent studies, as it appears to offer cautious optimism in support for learning within the classroom in addition to the development of social interaction and communication. Small randomised control trials (RCTs) using songs as teaching aids showed children with ASD made considerable gains in learning and retaining words (Buday 1995), while Brownell (2002) measured the effectiveness of social stories with a behavioural goal, where some children had their stories made into a song, while others were just read to them. The effectiveness of the sung stories in achieving

the behavioural goal far outweighed the success of those without the addition of singing.

Simpson & Keen's (2011) review of musical interventions for children with ASD addresses the three areas of communication, socialisation and behaviour. Many of the studies concerned are based on one-to-one interventions, and necessitate the involvement of trained music therapists, although others offer more hope for general application within schools and at home, as they do not require a high standard of musical expertise. Two studies (Buday 1995; Simpson & Keen 2010) targeting communication skills used music as an adjunct to existing communication systems used in school, with teachers and other staff singing words as well as signing them. While the Buday (1995) study indicated higher levels of engagement and improved learning of signing and spoken words, it failed to indicate whether the skills were maintained over time, or generalised into other contexts. In the Simpson & Keen study, some retention of learnt words and signing was apparent after the study had finished, but these skills did not appear to be transferable to other contexts. It seems apparent, however, that it is the use of music specifically, rather than just sound therapy, which leads to increased participation and retention of communication skills, however short-lived. An experiment using Tomatis sound therapy to amplify higher-frequency sounds and lessen those of lower frequencies in order to focus listening on language had no appreciable effect (Corbett et al., 2008).

Other studies using music as an aid to socialisation focused on both improving engagement with other people, and teaching and developing the understanding of emotions. In one study (Katagiri 2009), participants were given pictures and dialogue describing emotions, accompanied by either recorded music or songs, with text and music composed specifically to reflect the emotion being taught. The results show the use of background music as most effective in supporting the children to understand which emotion was being shown. Although this study has been criticised (Simpson & Keen 2011) for not recording whether the skills learned were generalised into real-life situations, its relative simplicity points to the possibility of an intervention that requires little musical training other than the sourcing of musical

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excerpts which have clear emotional identity. Another musical intervention (Kern & Aldridge 2006), managed successfully by staff with no musical training, included the use of music and song in play, resulting in more positive interaction between children with ASD and their peers. Kim et al (2009) compared the effects of music in play with those of improvisational music therapy when measuring eye contact, emotional synchronicity and turn-taking, and found that music therapy scored significantly higher. This echoes some of the claims made earlier for music therapy.

One of the issues for children with ASD being educated within a mainstream school can be the effects of difficulties with imagination, empathy and understanding the motivations of others, a deficit explained by Baron-Cohen et al as a lack of 'theory of mind' (1985: 37). Other studies such as Quintin et al (2011) and Bhatara et al (2009) both use music to measure emotional perception in children with ASD, and offer potential for development in this difficult area of learning and understanding. Quintin et al (2011) used music and picture recognition of emotions, whilst Bhatara et al (2009) used musical soundtracks to accompany cartoon figures, with the results that children with ASD scored equally as well as control groups. The idea of using music as an aid to understanding emotions has been proposed by Allen & Heaton (2010) as a potential educational tool to alleviate the difficulties children with ASD have with alexithymia. Bhatara et al (2009) also suggest using music as a soundtrack to help children with ASD recognise and gain a deeper understanding of emotions, and it is relatively easy to see how these ideas could be adapted and used within the curriculum.

Sensory stimuli

The concept of a therapeutic and educational intervention based on music for children with ASD may initially seem contra-indicated, as the high prevalence of sensory impairment within this group is well documented (Baranek et al 2005). Atypical reactions to sensory stimuli are often the first indicators of autism and can be noted during the first two years of a child's life (Dahlgren & Gillberg 1989). Many of the studies mentioned here have acknowledged that hypersensitivity to sound could have the effect of making children with ASD intolerant to music (Bhatara et al 2013),

or have an effect on the genre of music that they are prepared to listen to, although Baranek et al (2005) note that auditory hypersensitivity tends to be alleviated as children grow up. Nonetheless, there is considerable evidence that there are some physical differences in the hearing of children with ASD, from increased prevalence of hearing loss (Klin 1993) and ear infections (Chin et al 2013), hyperacusis (Stiegler & Davis 2010) and even the ability to hear sounds out of the average range of human hearing (Plaisted et al 2003). All these factors may have some bearing on the use of music as both a therapeutic and teaching intervention, yet equally compelling is the obvious responsiveness to music from many children with ASD noted initially by Kanner (1943), and the evidence to date that interest in and enjoyment of music is at least as powerful as that of typically developing children and adolescents (Bhatara et al 2013).

Conclusion

No one intervention has the answer, and alongside the latest research and understanding about the nature of autism and how autistic children learn, children with ASD have individual differences, strengths and challenges which also need to be an integral part of any teaching plan for them. The nature of inclusion within mainstream schools should mean that the school environment can be flexible enough to meet the needs of the child (Ainscow 1997), and that using the 'strengths and special interests and finding ways to enhance their self-esteem, increase their motivation and create a healthy, emotional well-being' (Jones 2006: 546) should be the aim of educators of all children. This child-centred approach, which suggests that teachers and adults be less directive and be prepared to some extent to follow the agenda of the child in terms of teaching and learning styles, forms part of the DfES good practice guidance on the education of children with ASD (Jones 2006). This does, however, sit with some tension against the standards agenda of the government and Ofsted (Ainscow et al 2006), in which the drive for ever higher test and exam results, particularly for those children educated within mainstream schools, can challenge the notion of more flexible teaching and the ideal of teachers allowing 'more time given for the child to respond' (Jones 2006: 546). As previously stated, the idea of music

as therapy is far from new, but the full extent of its potential as a teaching tool has yet to be evaluated. Nonetheless despite the obvious need for further work and research in this area (Heaton & Allen 2009; Raglio et al 2011), the evidence for the use of music as both a therapeutic and teaching tool and its potential to be used as a child-centred intervention seems conclusive. As has been explained in the studies mentioned, music has the potential to overcome barriers of communication, develop skills of social interaction, give children and young people a sense of enjoyment and belonging, and challenge some of the rigidity of thoughts and behaviours associated with ASD. As Heaton & Allen (2009: 323) have asserted, 'being autistic need be no barrier to an individual's experiencing a full and deep enjoyment of music', and it is this harnessing of interests and enthusiasm, whatever they may be, which has the potential to enable teachers, friends and family to teach, interact and enhance communication with children with ASD.

References

- Ainscow, M. (1997). 'Towards inclusive schooling'. *British Journal of Special Education*, 24(1), 3-6.
- Ainscow, M. et al (2006). 'Inclusion and the standards agenda: negotiating policy pressures in England'. *International Journal of Inclusive Education*, 10(4-5), 295-308.
- Allen, R. & Heaton, P. (2010). 'Autism, music, and the therapeutic potential of music in alexithymia'. *Music Perception: An Interdisciplinary Journal*, 27(4), 251-61.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders*, 5th edn (DSM-5). Arlington, VA: American Psychiatric Publishing
- Applebaum, E., Egel, A. L., Koegel, R. L. & Imhoff, B. (1979). 'Measuring musical abilities of autistic children'. *Journal of Autism and Developmental Disorders*, 9, 279-85.
- Baranek, G. T., Parham, L. D. & Bodfish, J. W. (2005). 'Sensory and motor features in autism: assessment and intervention'. In *Handbook of autism and pervasive developmental disorders*, vol. 2, 3rd edn, 831-57.
- Baron-Cohen, S., Leslie, A. M. & Frith, U. (1985). 'Does the autistic child have a "theory of mind"?'. *Cognition*, 21(1), 37-46.
- Bhatara, A. K., Quintin, E. M., Heaton, P., Fombonne, E. & Levitin, D. J. (2009). 'The effect of music on social interaction in adolescents with autism spectrum disorders'. *Child Neuropsychology*, 15(4), 375-96.
- Bhatara, A., Babikian, T., Laugeson, E., Tachdjian, R. & Sininger, Y. S. (2013). 'Impaired timing and frequency discrimination in high-functioning autism spectrum disorders'. *Journal of Autism and Developmental Disorders*, 43(10), 2312-28.
- Bishop, D. V. (1989). 'Autism, Asperger's syndrome and semantic-pragmatic disorder: where are the boundaries?'. *International Journal of Language & Communication Disorders*, 24(2): 107-21.
- Brownell, M. D. (2002). 'Musically adapted social stories to modify behaviours in students with autism: four case studies'. *Journal of Music Therapy*, 39, 117-44.
- Buday, E. M. (1995). 'The effects of signed and spoken words taught with music on sign and speech imitation by children with autism'. *Journal of Music Therapy*, 32, 189-202.
- Chin, R. Y., Moran, T. & Fenton, J. E. (2013). 'The otological manifestations associated with autistic spectrum disorders'. *International Journal of Pediatric Otorhinolaryngology*, 77(5), 629-34.
- Corbett, B. A., Shickman, K. & Ferrer, E. (2008). 'The effects of Tomatis sound in children with autism'. *Journal of Autism and Developmental Disorders*, 38, 562-6.
- Cosden, M., Koegel, L. K., Koegel, R. L., Greenwell, A. & Klein, E. (2006). 'Strength-based assessment for children with autism spectrum disorders'. *Research & Practice for Persons with Severe Disabilities*, 31(2).
- Dahlgren, S. O. & Gillberg, C. (1989). 'Symptoms in the first two years of life'. *European Archives of Psychiatry and Neurological Sciences*, 238(3), 169-74.
- Edgerton, C. L. (1994). 'The effect of improvisational music therapy on the communicative behaviours of autistic children'. *Journal of Music Therapy*, 31(1), 31-62.
- Fombonne, E. (2001). 'Is there an epidemic of autism?'. *Pediatrics*, 107, 411-12.
- Frith, U. (1989). 'A new look at language and communication in autism'. *International Journal of Language & Communication Disorders*, 24(2), 123-50.
- Gold, C., Wigram, T. & Elefant, C. (2006). 'Music therapy for autistic spectrum disorder'. *Cochrane Database of Systematic Reviews*, 2, CD004381.
- Heaton, P. & Allen, R. (2009). 'With concord of sweet sounds...'. *Annals of the New York Academy of Sciences*, 1169(1), 318-32.
- Heaton, P., Hermelin, B. & Pring, L. (1999). 'Can children with autistic spectrum disorders perceive affect in music? An experimental investigation'. *Psychological Medicine*, 29(6): 1405-10.
- Heaton, P., Williams, K., Cummins, O. & Happé, F. G. (2007). 'Beyond perception: musical representation and on-line processing in autism'. *Journal of Autism and Developmental Disorders*, 37(7), 1355-60.
- Heaton, P., Hudry, K., Ludlow, A. & Hill, E. (2008). 'Superior discrimination of speech pitch and its relationship to verbal ability in autism spectrum disorders'. *Cognitive Neuropsychology*, 25, 771-82.

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- House of Commons Education and Skills Committee on SEN (2006). *Special Educational Needs*. London: Stationery Office.
- Humphrey, N. & Symes, W. (2010). 'Perceptions of social support and experience of bullying among pupils with autistic spectrum disorders in mainstream secondary schools'. *European Journal of Special Needs Education*, 25(1), 77–91.
- Jones, G. (2006). 'Department for Education and Skills/ Department of Health good practice guidance on the education of children with autistic spectrum disorder'. *Childcare, Health and Development*, 32(5), 543–52.
- Kanner, L. (1943). 'Autistic disturbances of affective contact'. *Nervous Child*, 2(3), 217–50.
- Katagiri, J. (2009). 'The effect of background music and song texts on the emotional understanding of children with autism'. *Journal of Music Therapy*, 46, 15–31.
- Keenan, M. (2007). *Meeting the needs of families living with children diagnosed with autism spectrum disorder*. Coleraine: University of Ulster.
- Kern, P. & Aldridge, D. (2006). '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*, 43, 270–94.
- Kim, J., Wigram, T. & Gold, C. (2009). 'Emotional, motivational and interpersonal responsiveness of children with autism in improvisational music therapy.' *Autism*, 13, 389–409.
- Klin, A. (1993). 'Auditory brainstem responses in autism: brainstem dysfunction or peripheral hearing loss?' *Journal of Autism and Developmental Disorders*, 23(1), 15–35.
- Miller, L. K. (1999). 'The savant syndrome: Intellectual impairment and exceptional skill.' *Psychological Bulletin*, 125, 31–46.
- Mottron, L. et al (2000). 'Local and global processing of music in high-functioning persons with autism: beyond central coherence?' *Journal of Child Psychology and Psychiatry*, 41(8), 1057–65.
- Moyes, R. (2002). *Addressing the challenging behaviour of children with high-functioning autism/Asperger syndrome in the classroom: a guide for teachers and parents*. London: Jessica Kingsley Publishers.
- National Autistic Society (2011). 'Classroom and playground: support for children with autistic spectrum disorders'. Online: <http://www.autism.org.uk/working-with/education/educational-professionals-in-schools/lessons-and-breaktimes/education-classroom-and-playground-support-for-children-with-autism-spectrum-disorders.aspx> [accessed 21 April 2014]
- National Autistic Society (2013). *Autism and Asperger's syndrome: an introduction*. Online: <http://www.autism.org.uk/about-autism/autism-and-asperger-syndrome-an-introduction.aspx> [accessed 21 April 2014]
- Nordoff, P. & Robbins, C. (1977). *Creative music therapy: individualized treatment for the handicapped child*. New York, NY: John Day.
- Parsons, S. & Lewis, A. (2010). 'The home-education of children with special needs or disabilities in the UK: views of parents from an online survey'. *International Journal of Inclusive Education*, 14(1), 67–86.
- Parsons, S. et al (2011). 'International review of the literature of evidence of best practice provision in the education of persons with autistic spectrum disorders'. *European Journal of Special Needs Education*, 26(1), 47–63.
- Pavlicevic, M. & Trevarthen, C. (1989). 'A musical assessment of psychiatric states in adults'. *Psychopathology*, 22(6), 325–34.
- Plaisted, K., Saksida, L., Alcántara, J. & Weisblatt, E. (2003). 'Towards an understanding of the mechanisms of weak central coherence effects: experiments in visual configural learning and auditory perception'. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 358(1430), 375–86.
- Quintin, E. M., Bhatara, A., Poissant, H., Fombonne, E. & Levitin, D. J. (2011). 'Emotion perception in music in high-functioning adolescents with autism spectrum disorders'. *Journal of Autism and Developmental Disorders*, 41(9), 1240–55.
- Raglio, A., Traficante, D. & Oasi, O. (2006). 'A coding scheme for the evaluation of the relationship in music therapy sessions'. *Psychological Reports*, 99(1), 85–90.
- Raglio, A., Traficante, D. & Oasi, O. (2011). 'Autism and music therapy: intersubjective approach and music therapy assessment'. *Nordic Journal of Music Therapy*, 20(2), 123–41.
- Romkema, C. (2002). *Embracing the sky: poems beyond disability*. Philadelphia, PA: Jessica Kingsley Publishers.
- Rolvjord, R., Gold, C. and Stige, B. (2005). 'Research rigour and therapeutic flexibility: rationale for a therapy manual developed for a randomised controlled trial'. *Nordic Journal of Music Therapy*, 14, 15–32.
- Simpson, K. & Keen, D. (2010). 'Teaching young children with autism graphic symbols embedded within an interactive song'. *Journal of Developmental and Physical Disabilities*, 20, 165–77.
- Simpson, K. & Keen, D. (2011). 'Music interventions for children with autism: narrative review of the literature'. *Journal of Autism and Developmental Disorders*, 41(11), 1507–14.
- Stern, Daniel N. (1985). *The interpersonal world of the infant: a view from psychoanalysis and developmental psychology*. New York: Basic Books.
- Stern, D. (2004). *The present moment in psychotherapy and everyday life*. London: Norton & Company.
- Stiegler, L. N. & Davis, R. (2010). 'Understanding sound sensitivity in individuals with autism spectrum disorders'. *Focus on Autism and Other Developmental Disabilities*, 25(2), 67–75.

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Stow, N (2014). 'Mum's joy as five-year-old son who suffers from autism speaks for first time'. Online: <http://www.dailyrecord.co.uk/news/local-news/> [accessed: 21 April 2014]

Thaut, M. (1988). 'Measuring musical responsiveness in autistic children: a comparative analysis of improvised musical tone sequences of autistic, normal, and mentally retarded individuals'. *Journal of Autism and Developmental Disorders*, 18, 561–71.

Trevarthen, C. & Aitken, K.J. (2001). 'Infant intersubjectivity: research, theory, and clinical applications'. *Journal of Child Psychology and Psychiatry*, 1: 3–48.

Whipple, J. (2004). 'Music in intervention for children and adolescents with autism: a meta-analysis'. *Journal of Music Therapy*, 41, 90–106.

Wing, L. (1996). 'Autistic spectrum disorders'. *British Medical Journal*, 312(7027), 327–28.

Wing, L. & Gould, J. (1979). Severe impairments of social interaction and associated abnormalities in children: epidemiology and classification. *Journal of Autism and Developmental Disorders*, 9(1), 11–29.

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