Chapter 22: Additional needs and disability in musical learning: Issues and pedagogical considerations

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Abstract

This chapter considers the musical participation and learning of children and adults who have additional support needs. "Additional needs" are understood here as applying to disabled and non-disabled people, with disability thus considered part of a broad spectrum of human functioning. The historical backcloth to disabled people's engagement with music is discussed, disability causes and categories explained, reflections given on the connotations of commonplace terminology, and published disability models explored. General considerations for the participation, teaching and learning of disabled people are also illustrated, including e.g. the ramifications of health conditions, confidence and self-identity, level of dependence in mobility, access to physical spaces and resources, assistive technologies, music pedagogy, schooling, and the training of teachers, etc. before turning to a specific pedagogical example relating to visually impaired learners. Furthermore, through the example of a prototype digital technology to bridge an ensemble conductor and blind or partially sighted performer, the chapter also argues that, although technologies are creating new ways for disabled people to integrate into musical experiences in society, developmental processes can easily overlook their specific needs.

Keywords: Additional needs in music; music and disability; social and medical models of disability; music pedagogy, learning and disability; visual impairment and music; blind and partially sighted musicians; assistive technologies

This chapter explores issues, literature and music pedagogy when working with learners with additional support needs. Additional needs are considered broadly to include those who are disabled and non-disabled. The former group is the primary focus however. Given the multiplicity of health conditions and experiences of disability, the discussion merely aims to spur reader's reflections. Another essential caveat is that teaching should be specific to the particular needs of individuals and groups, but factoring in health conditions, individual capacities, personal circumstances, and so on. Readers are thus encouraged to explore the list of suggested readings at the end of the chapter.

"Additional needs" are first defined. The chapter then explores disability causes and categories before turning to commonplace models. Next Fautley and Daubney (2018) illustrate how additional needs in music are culturally situated thus applying to wider populations. General themes in disabled people's musical lives are subsequently provided

before discussing an example of disability and music (i.e. visual impairment). Finally, some reflections are offered.

ADDITIONAL NEEDS

An "additional need" occurs when learning cannot occur effectively through, for example, teacher-pupil interactions, resources, and strategies *customarily* used with the general population. This applies to some people society considers non-disabled, but particularly to the disabled. Additional needs in music are not merely about teaching practices, training and resources though, but concern deeper issues such as how society frames disability, wider experience and the learner's confidence, even travel and a learner's mobility.

REFLECTING ON DISABILITY

Causes and categories

Causes

Causes of disability are: *genetic* (e.g., ocular albinism, cystic fibrosis, etc.); *environmental*, resulting from injury, disease, or infection (e.g., meningitis leading to a learning disability); *ageing* (e.g., age-related macular degeneration, arthritis); and sometimes the causes are *unknown*. These are non-discrete with complex interactions, as one's genetics affect how we respond to environmental factors (e.g., our diets), sometimes resulting in debilitating health issues (e.g., a stroke, or diabetes).

Categories

Categories of disability are: *sensory* (e.g., impacting on hearing or vision), *physical* (e.g., the absence, poor development or inability to use a body part, including issues relating to the musculoskeletal or respiratory systems), *neurological* (i.e., atypical brain and nervous system functioning affecting bodily movement), *cognitive* (affecting how a person perceives and understands), *intellectual* (affecting thought processes, e.g., problem-solving and judgment, memory, communication and learning, with these being part of wider cognition), and *psychiatric* (i.e., concerned with emotions and/or how thought processes adversely affect behaviours).

Disability can also be *episodic*, as in some mental illness, or *lifelong*. It can be stratified by whether or not it is a *congenital* condition (i.e., it appears in the pre-natal child or in the first months of life, as in Down syndrome or cerebral palsy).

Some disabilities are not easily perceived by others (e.g., consider a person hiding poor visual acuity or dyslexia) and assistive devices can be discrete (a prosthetic limb, implant, or hearing aid). Fearing stigmatization, a disabled person may withhold declaring his or her circumstances (formally or informally), so there are *hidden disabilities*. These do not appear on statistical reports, go unseen by support services, and can be overlooked by educators.

The *International classification of functioning, disability and health* (ICF) (WHO, 2001; also see WHO, 1992, 1996)[1] proposes three interconnected areas of disability: "impairments" or issues with the body's structure; "activity limitations" (e.g., affecting eating, walking, or mobility); and "participation restrictions" (e.g., challenges with accessing education, experiencing employment discrimination, or underemployment, etc). Disability occurs where all three areas are affected (WHO, 2011) due to the person's physical, neurological, cognitive, intellectual or psychiatric functioning. This applies to a limited number of a society's members (it is low incidence) so warrants formal recognition as atypical (i.e., often there is registration by medical practitioners). Disabilities occur in all ethnicities, cultural groups and nations. The World Health Organization estimates "About 15% of the world's population lives with some form of disability, of whom 2–4% experience significant difficulties in functioning" (WHO, 2020, no page numbers).

Learning difficulties

In the UK and North America, the term Specific Learning Difficulty (SpLD, sometimes Specific Learning Disability) is used (see e.g., LDAA, 2019; NCLD, 2014; RCP, 2020). Conditions include: dyscalculia, or issues with mathematical processing; dysgraphia, or problems with the fine motor skills affecting writing; dyspraxia, or difficulty organizing motor tasks and thoughts (e.g., troubling hand-eye coordination); ADHD (Attention Deficit Hyperactivity Disorder), affecting concentration, attention, and sometimes including impulsivity and hyperactivity; and dyslexia, affecting processing written language, causing problems with reading comprehension, writing and spelling (e.g., mixing up multisyllabic words, spelling errors, missing vowels, etc.). Literature suggests that musical participation has various benefits for those with SpLDs (e.g., see Ockelford, 2000; Oglethorpe, 2002; Overy, 2000, 2003).

The UK's National Health Service (NHS) distinguishes between mild, moderate or Severe Learning Difficulties (SLDs, see NHS, 2018) stating that adults in the lower two tiers can live independently but take longer to learn new skills. Profound and Multiple Learning Difficulties (PMLDs) occur where a person has an SLD and other disabilities that "significantly affect their ability to communicate and be independent" (NHS, 2018, no page numbers). The NHS estimates 1.5 million UK citizens with a learning disability and 350,000 people with an SLD (NHS, 2018). The estimated 2018 UK population[2] was 66,435,600 (ONS, 2019), suggesting 2.26% of the population has a learning disability of some type and 0.53% an SLD (also see Ockelford, 2000 for UK statistics). In 2017–18, the number of US students, 3–21 years, who received special education in schooling was seven million, or 14%, with 34% of these with an SLD (NCES, 2020).

[1] The 2001 ICF has aimed "…to provide a unified and standard language and framework for the description of health and health-related states" and this includes "…components of health and some health-related components of well-being (such as education and labour)" (WHO, 2001, p. 3).

[2] This is the latest Office for National Statistics (ONS) data available for the UK population released on 26 June 2019.

Terminology and deficits

"*Dis*-abled" (with its opposite "able-bodied"), "*dys*-function", "visually *impaired*" (and various associated terms such as "sight-*impairment*", "*partially*-sighted") are used here. These are suggestive of a deficit viewpoint, that is, focussing on what a person *cannot do*. It seems more productive to consider what a person *can do* musically or otherwise under the right circumstances. These terms are only used here because they are widespread, with, for example, "visually impaired" officially part of UK registration; and they are recognizable to readers. All humans have different levels of capability in boundless domains, such that they are "*differently*-abled". Disability is, therefore, an equally valid part of humanity's spectrum. Someone with severe autism, for instance, can be an exceptionally good musician as in the autistic savant Derek Paravicini (Ockelford, 2007, 2008), whereas a non-disabled person can have meagre capabilities. Limitations too are a normal part of human maturation:

> Almost everyone will be temporarily or permanently impaired at some point in life, and those who survive to old age will experience increasing difficulties in functioning. Most extended families have a disabled member, and many non-disabled people take responsibility for supporting and caring for their relatives and friends with disabilities. (WHO, 2011, p. 3)

Selected models

There are various disability models:

Religious model

The religious model considers disability either a punishment or test of faith from God. In some cultural groups and historical periods, this stems from personal sin, that of a family member, or due to an ancestor's misdemeanour. Special dispensations have sometimes been attached, for example increased religious wisdom or that a human capacity is heightened (e.g., hearing, musicianship) in the absence of the fully-functioning body. In historical traditions of the visually impaired there have been: blind Ukrainian minstrels, c. 1850–1930, thought to be "repositories of tradition and culture…disseminators of the word of God and a major source of folk historical and religious information" (Kononenko, 1998, p. 3); from medieval times, a tradition of blind Japanese musicians including biwa hōshi lute priests associated with Shintoism (see De Ferranti, 2009; Groemer, 2012; Isaki, 1987; Lubet, 2011); and blind musicians in tribal cultures in Sierra Leone (Ottenberg, 1996). Disabled people with seemingly extraordinary musical abilities form an historical backcloth to the identities of today's disabled people, with some of this cultural script manifested through the marketing of successful disabled musicians (see Baker & Green, 2017).[3] Where disability can be hidden by performers, this "…involves the choices that a disabled person must make

[3] Baker and Green's (2017) visually impaired respondents either found benefits in a "disabled identity as a musician" or were uncomfortable with it, wishing instead to have their musicianship assessed on an equal footing to sighted counterparts (also see 2018).

to conceal or reveal features of his or her body and the assumptions an audience might make…" (Howe, 2016, p. 2).[4]

Reified historic-religious lore affects some music educators' vision of appropriate pedagogy. Specialist teachers working with the visually impaired have pointed to learners' aural skills being above the norm thus making playing by ear appropriate (Baker & Green, 2017).[5] They have downplayed using notation (Braille, adapted stave notation, etc.). For some children, this reduces future access points to certain musical genres (i.e., wherein notation and faithful representation of scores are necessary); or integration into predominantly sighted ensemble contexts where notation is used (e.g. classical orchestras, some bands, etc.). Despite research on cortical plasticity in the blind (Melcher & Zampini, 2011), or on a higher incidence of absolute pitch (Hamilton et al., 2004; Dimatati et al., 2012; Welch, 1988), it seems myopic to suppose that every blind person has elite aural abilities as the basis for discarding other viable pedagogical approaches.

Medical model

The medical model (see Beaudry, 2019; Pfeiffer, 2000, 2003; Smart, 2004) considers disability a human defect or failure resulting from a health condition, disease or trauma. Disability is inherently abnormal. It assumes that medical treatment or intervention (i.e., to cure, ameliorate and rehabilitate) are ways to address a person's insurmountable limitations vis-à-vis society. Medical professionals or social services are placed in an empowered position over those deemed helpless or needy. Ableist terms like "handicapped" (implying "cap in hand", begging and dependent) come from this model (Creamer, 2009).

Social model

The social model emerged in the 1960s and 70s and challenged the medical view (Beaudry, 2019; Barnes & Mercer, 2004; Craddock, 1996; Bunbury, 2019; Dorenlot, 2005; Gilliard et al., 2005; also see Abramo, 2012; Pickard, 2019 and Purtell, 2013, on music education). Disability no longer resided *in* a person's body but, instead, *outside* it. Poor organization by and of society (e.g., through policy, the built environment, institutional and financial resourcing, etc.) were blamed for challenges faced by disabled people (Beaudry, 2019). This contended that everyone should be given equal life chances with disability being seen as a positive identity, like race, cultural or religious group. According to the social model, society actively "…disables people with impairments, and therefore any meaningful solution must

[4] Howe (2016) discusses this point in relation to: the deaf percussionist, Evelyn Glennie; the one-handed flautist, Chevalier Rebsomen (Lancaster & Spohr, 2008); the one-handed pianists, Géza Zichy, Paul Wittgenstein, Cor de Groot, Leon Fleisher and Gary Graffman (Howe, 2010); and trumpeter, Clarence Adoo, who is paralysed below the shoulders.

[5] Another reason for improvisation and "oral traditions" [sic] (McLucas, 2010) being in people's minds are traditions and scholarship on blind musicians in early ragtime, blues and jazz, e.g. Tom Bethune a.k.a. "Blind Tom" Wiggins (1849–1908), John William "Blind" Boone (1864–1927), Lemon Jefferson (1893–1929), and the vocal ensemble The Blind Boys of Alabama (see e.g., Fuqua, 2011, Gray, 2008, Harrah, 2004, Rowden, 2009). Blind musicians are also notable in more recent jazz and popular music, e.g. George Shearing (Shearing and Shipton, 2005), Art Tatum (Lester, 1994), Ray Charles (Charles and Ritz, 1978; Evans, 2005) and Stevie Wonder (Williams, 2002; Ribowsky, 2010).

be directed at societal change rather than individual adjustment and rehabilitation" (Barnes et al., 2010, p. 163).

Table 1 compares the three models:

	RELIGIOUS	MEDICAL	SOCIAL
Disability comes from…	God (i.e. as a test of faith, punishment)	*the* abnormal body	*outside* the disabled person's body
Disability is…	abnormal	abnormal	a positive identity, part of the spectrum of human functioning
A more equitable life comes from…		treatment, rehabilitation, adaptations, or acceptance of deficit	reorganization of society (the built environment, policy and funding, etc.)
Disability means…	dispensations, specialness, pity	fitting in	being accommodated in society

Table 1. The religious, medical and social models of disability compared

PEDAGOGICAL CONSIDERATIONS

The school music curriculum: Distinguishing disability from additional support needs

Fautley and Daubney (2018) reflect that "…sometimes in music education we treat social capital – or lack thereof – as a *hidden disability*, and seem to do very little about it" (p. 220). They blame society for forming music curricula that cause some able-bodied children's lack of attainment terming this, casually, a "hidden disability". Belonging to a minority ethnic, cultural group, or disempowered social class mean encountering exclusory practices and disadvantage. This goes unnoticed compared to "visible" disabilities:

> Inclusion…is sadly sometimes the "feel-good factor" for the audience…the nice children with disabilities enjoying themselves singing, the boy in a wheelchair playing a keyboard, the girl on crutches playing the guitar. …Music education has contained within it all sorts of exclusory practices which have nothing to do with being physically disabled whatsoever. …In England…GCSE and A-Level [national school examinations] …most benefit children who play a Western classical instrument. …they privilege students whose socio-economic background is one where they bring

> with them into the classroom a store of cultural capital". (Fautley & Daubney, 2018, p. 219)

The argument is that affluent middle-class people of European heritage are more likely to comprehend, value, feel motivated by and attain in a school music curriculum rooted in Euro-centric classical traditions. They may have substantially more prior knowledge of its logic, theory, terminology, notation and the manipulative skills of performing it sourced from privately-funded instrumental lessons. Contrariwise, the economically weak, immigrants and diaspora groups with different prized musical-cultural backgrounds are placed at a disadvantage. The basis of this sociological argument is Young's (1971, 2008) view that Western governments, curriculum designers and teachers (i.e., through the enacted curriculum) perpetuate curriculum knowledge that supports their own stronger social categories whilst marginalizing others (also see Green, 1988 and Philpott, 2010, on music education).

The able-bodied schoolchildren Fautley and Daubney (2018) claim have "hidden disabilities" certainly do experience sustained, systematic disadvantage. There is a "participation restriction" (i.e., trouble accessing the music curriculum). However, they do not have "activity limitations" or "impairments" specifically resulting from atypicality in their bodies to class as "disabled" according to the WHO (2001) classification. Neither race nor ethnicity can be deemed "disabilities" too, nor can class, for the same reason.

Some general considerations for disability and music

Table 2 illustrates additional support considerations for music educators working with disabled learners. These are not specific to particular health conditions or meant to be exhaustive.

PHYSICAL ENVIRONMENTS	
Mobility and travel (getting to musical learning experiences)	• Independent vs. dependent mobility • Where the learner lives (proximity to musical or music learning experiences)
The built environment (accessibility, movement around it)	• Induction loops, ramps, accessible doorways, removal of trip hazards, etc. • Distraction and sensory obstructions (intangibles)
Educational organization	• Special school, mainstream school, or a unit within the latter (and access to appropriate teaching and resources) • Integration and social skills in the learner
THE LEARNER	

Medical condition	• Health condition and implications for responding to music, manipulative abilities and instruments, aims, etc.
Identity	• Background, stigma, confidence and self-esteem • (In)ability to articulate specific needs
Complex health and social care needs	• Care needs, time and financial pressures (prioritization of learning music or otherwise)
THE TEACHER AND SCHOOL	
Aims and expectations	• Specialist knowledge and the teacher's expectations • Implications of the particular disability for the aims of music education • "Reasonable adjustments"
Training and awareness	• Awareness of e.g. conditions, pedagogies, formats, assistive technologies, support systems • Recognition of "hidden disabilities" (non-diagnosed or undeclared) • Availability of training
RESOURCES	
Teaching resources	• Score media (physical, digital) • Accessible text (as above) • Assistive technologies • Music production technologies
Curricula, pedagogy and developmental frameworks	• Published research and scholarship
Time	• Time to acquire appropriate formats • Time for the learner to digest the above
Money	• Funding (personal and the priorities of schools, governments, etc.)

Table 2. Disability, music teaching and learning

Access to a musical learning or participation experience begins with getting to it (see Table 2, "Physical environments"). Where the disabled participant is on the spectrum from completely dependent to entirely independent in his or her mobility is significant. Dependency is not purely about the person's physical condition or society's resourcing and adaptations, but also about his or her life experiences and confidence. Indeed "… critics of the social model hold that its focus on oppression fails to attend to the body and impairments as subjectively experienced…" (Beaudry, 2019, p. 6; also see French, 1993).

Assistive technologies may be important too (e.g., a wheelchair, a white cane, an iPhone or Braille GPS device, etc.). Where the learner lives in relation to available opportunities needs consideration (i.e., in a rural area, a city, in a residential school, etc.). Travel may bring challenges for the wheelchair user boarding a bus, or the blind person needing to be guided from a platform to a station entrance. Barriers encountered in transit signal deficiencies in societal adaptations espoused through the social model (Barnes et al., 2010; Beaudry, 2019). On arrival, there is the resourcing of rooms to consider (with e.g. induction loops, accessibility ramps for wheelchairs, etc.), with some modifications possible from those organizing activities (e.g. the removal of trip hazards, adjusting lighting for learners with photophobia, etc.). There may be intangibles too, such as distracting noise coming from other rooms when working with learners with ADHD or dyslexia.

Where a child is educated (e.g., in a special school, in the mainstream, or a unit within a mainstream school, etc.) may affect his or her adjustment and social skills. This also augurs for access to teachers with specialist knowledge and special resources required (e.g., assistive technologies, or adapted text or musical formats, etc.). Since the 1960s children with visual impairments have been increasingly educated in mainstream schools whilst by making "reasonable adjustments" (see e.g. McCall, 1997 on the United Kingdom, Ruddock & Bishop, 2006 on Australia, Atkin et al., 2003 on Canada, and the IDEA, 1997 on the USA). Baker and Green's (2017) special school teachers, and some blind and partially sighted musicians argued that: children could be isolated, become bullied, and thus disengage from music in the mainstream; there were insufficient resources; and teachers were poorly trained. Yet, arguing to the contrary, some participants countered that healthy social adjustment best occurred in the mainstream.

The type and extent of the disabled person's condition will affect the musical learning aims, whether or not learning is cognizant, and thus how he or she engages (see Table 2, "The learner"). Disability may affect the person's ability to hold and manipulate an instrument, and what type of instrument he or she can play (if at all). The One-Handed Woodwinds programme at the University of Nebraska (Kearney) has sought to increase access to instruments with a prototype toggle-key saxophone designed by Jeff Stelling; and paralyzed former trumpet player Clarence Adoo has been performing with Headspace, an electronic instrument controlled by head movements and an air column.[6] Life experiences will shape the person's self-identity, confidence and willingness to engage. So, where cognitive and intellectual conditions do not impede a person's ability to articulate specific needs to educators, confidence may be a barrier (see e.g. Baker & Green, 2017). Disabled learners can also have complex health and social care circumstances soaking up substantial time and money thus adversely affecting musical participation.

Realistic aims for music education must be considered in light of the type and severity of the disability (see Table 2, "The teacher and the school"). For children with PMLD

[6] On the One-Handed Woodwinds programme, see http://www.unk.edu/academics/music/unk-one-handed-winds-program.php (accessed 3 January 2020). On Clarence Adoo and Headspace, see https://www.youtube.com/watch?v=Npg4SvIWsAc (both accessed 3 January 2020).

music might simply be "…for the pleasurable sensory and emotional responses [it] can engender" (Ockelford, 2000, p. 202), or, for those mainstreamed, alternatively about the learner acquiring aesthetic awareness, or social skills, or about producing a highly skilled instrumental performer or creative musician. The Sounds of Intent[7] developmental framework was developed by the University College London, Roehampton University and the Royal National Institute of the Blind (Voyajolu & Ockelford, 2016; Welch et al., 2009). This begins with "unconscious musical responses" before proceeding to "making simple patterns in sound intentionally through repetition or regularity" arriving at "communicating through expressive performance, with increasing technical competence". So, it addresses those with PMLD as much as, for example, savants with exceptional capabilities.

Music educators, schools and others must also be willing to make "reasonable adjustments" as affirmed in law (see e.g. Atkin et al. 2003; Australian Government, 2020; IDEA, 1997; New Zealand Parliamentary Counsel Office, 2020; Ruddock & Bishop, 2006; UK Government, 2020). Sadly, many school music teachers, community musicians, and private instrumental teachers lack knowledge of the ramifications of health conditions, support mechanisms, adapted score formats, and assistive technologies for music.

Music and the disabled may involve specialist teaching resources (see Table 2, "Resources") including, for instance, appropriate score formats for dyslexic learners, large-print or modified stave notation for some partially sighted people, or digital or physical Braille for some blind people. Some may use assistive technologies (e.g., magnification software, a refreshable Braille display, screen reader software [JAWS, NVDA], or a Braille embosser, etc.). Computers can be used: to access text documents or webpages, with screen readers assisting both the visually impaired and dyslexics (see e.g. Dawson et al., 2018); or they can be used to interact with mainstream music production software (e.g., with a Digital Audio Workstation or engraving software). Various approaches are described in Baker and Green (2017) in relation to visually impaired people. Usage rests on: the learner's capacities; parents', carers' and music teachers' knowledge; and the learner's background. Time is also a resource: perhaps the additional time to produce and acquire adapted score formats, or for the learner to digest them. Braille music, as an example, is tactile, linear format with component lines in a piano texture not notated one above the other as customary. Re-compositing these is time-consuming. An overarching resource is funding however, as this relates to many of the considerations in Table 1, including travel, teacher training, resourcing, or the purchase of assistive technologies.

An example of music and disability: Visual impairment

Visually Impaired Musicians' Lives

[7] The Sounds of Intent website can be found at http://www.soundsofintent.org/ (accessed 8 November 2019). The project was supported by the Esmée Fairbairn Foundation and the Amber Trust.

The Visually Impaired Musicians' Lives project[8] (Baker & Green, 2017) explored blind and partially sighted musicians' experiences broadly, including history and identity, assistive technologies, schooling and Braille use (also see Baker, 2014; Baker & Green, 2016, 2018). Data were collected from 27 countries through an international online survey and detailed life history interviews, with 231 respondents overall and input from over 400 stakeholders.[9] Visually impaired musicians and learners, but also specialist music teachers contributed interviews. The World Health Organization has estimated 285 million people globally had visual impairments in 2010 (many through cataracts, refractive errors, myopia or hyperopia) of whom 39 million were blind, with 90% of these cases in developing countries and 82% of the blind aged 50 years and over (WHO, 2007; also see WHO, 2013).

Although Baker and Green's (2017) project encompassed a wide variety of sight conditions and pedagogical approaches, the musicians did not have SLDs or PMLDs (with visual impairments). Thus, it is representative of a particular visually impaired learner type; on PMLD and music, see Ockelford (2000, 2007, 2008) or Voyajolu and Ockelford (2016).

Music pedagogy and the visually impaired

On pedagogy, several themes were identified: *high differentiation*; *light*; *touch*, *language use*; and *gesture*.

High differentiation was needed due to the plethora of sight conditions encountered.[10] For instance, some learners had some functional vision (e.g., light perception used to navigate around rooms, or they could read a score with magnification software, etc.) but had poor acuity, whereas others had non-functional light perception, or were completely blind (with no light perception). Dependence in mobility was various too, affecting movement around and the arrangement of teaching spaces. Approaches rested on score media (Braille, large print, modified stave notation, etc.) or its absence (i.e., playing by ear), assistive technologies (e.g., computers with screen reader software, hardware devices, optical or software magnification, embossed Braille, etc.) and on resourcing and pupils' backgrounds. Louisa Maddison,[11] a specialist music teacher, noted how classes of children with many different needs made for a demanding, specialist role.

Paradoxically, light was a significant consideration. Loss of contrast when light shone from a window through semi-translucent large-print paper scores disrupted some low-vision learners. Equally, intense light suddenly shining through windows challenged those with

[8] The Visually Impaired Musicians' Lives project was funded by the UK's Arts and Humanities Research Council, 2013–15, at University College London (Ref. AH/K003291/1). David Baker was the Principal Investigator and Lucy Green Co-Investigator. This was supported by major stakeholders (e.g. the Blind and Low Vision Network New Zealand, the European Blind Union, the National Braille Press, US, the Royal National Institute of Blind People, UK, Vision Australia, the World Blind Union, etc.). Additional interviews were conducted across India through the Baluji Music Foundation's British Council and Arts Council England Re-Imagine India grant in 2016 (Grant ref. 29237470).

[9] On biographical, life history and narrative research methods, see e.g.: Armstrong (1987), Bertaux (1981), Barrett and Stauffer (2009, 2012), Goodson and Sikes (2001), and Sparkes (1994).

[10] For a general discussion of disability, differentiation and music, see Darrow (2003).

[11] Louisa Maddison is the music teacher at the Royal Blind School in Edinburgh, Scotland.

photophobia. Light, its intensity, or the placement of pupils in relation to it needed to be considered. Simply raising light levels in teaching spaces to help the visually impaired was naïve.

The importance of touch was underscored albeit part of all children's musical learning. Some visually impaired students could not see the mouth shape to produce a particular sound when singing, or the correct posture when holding an instrument, or the momentum of a finger when pressing a piano key. Educators' demonstrations meant agreeing boundaries with pupils, parents or carers, considering Child Protection policies and sometimes transcending uncomfortable boundaries.

Effective language meant verbalizing information the learner could not otherwise receive. This augured for behaviour management, for instance the ineffectiveness of raising an eyebrow in disapproval, or needing to explain distractions such as the sound of someone entering class. Respondents also noted commonplace metaphor of sight in relation to music: "a dark timbre", "an angular motif", "a flowing melody", or "a bright tone". There could be conceptual gaps in understanding, particularly with the youngest, congenitally blind learners. They would not have immediate understanding without verbal explanations or tactile demonstrations.

Participants also commented on sighted people's physical gesturing to signal, for example: approval at a good performance, perhaps a smile, or, for playing more softly, an index finger against the lips. There was a need to vocalize the meaning in gestures such as these.

Facilitating ensemble participation with a haptic technology

Baker et al. (2019) explored how a conductor's gestures might be conveyed to a visually impaired person to support ensemble participation.[12] Human-Computer Interaction (HCI) studies have investigated "sonification" and "haptification" (see e.g. Blattner et al., 1989; Brewster & Brown, 2004; Csapó et al., 2015). Sonification entails substituting information received thorough sight with auditory communication, with synthetic verbal instruction or patterns of tones. Haptification parallels this process through tactile means.[13] The endeavour, a collaboration with Sian Edwards and Kakou electronic engineers,[14] concentrated on haptification. A Bluetooth ring was developed for a sighted conductor which communicated with a haptic vest worn and tested by five visually impaired musicians (all adults with non-functional light perception; two woodwind players, two singers and a guitarist). The vest comprised a 20-by-20 matrix of vibration controllers (Linear Resonance

[12] This work was supported by a University College London "seed corn" grant (Ref. REC 905).

[13] HCI authors refer to "earcons" (Blattner, Sumikawa and Greenberg, 1989), i.e. sonification as an abstract pattern of tones, "tactons", or the tactile equivalent (Brewster and Brown, 2004) and "hapticons" (Csapó et al., 2015). These convey information about a computer interaction to the visually impaired.

[14] Professional conductor Sian Edwards has worked e.g. with the English National Opera, the London Sinfonietta, at Glyndebourne and at the Royal Opera House, Covent Garden. Kakou is not-for-profit organization seeking to raise disabled musicians' participation, see http://www.kakou.org.uk/ (accessed 20 July 2017).

Actuators, or LRAs) similar to those in smartphones.[15] It tracked a conductor's gestures (right arm only) in two dimensions across the wearer's chest (Figure 1). The device sought to close a sensory "gap" for these performers who regularly participated in conducted ensembles. The integration of visually impaired instrumental musicians into predominantly sighted ensembles has connotations for equality of opportunities in schools, informal learning and community contexts.

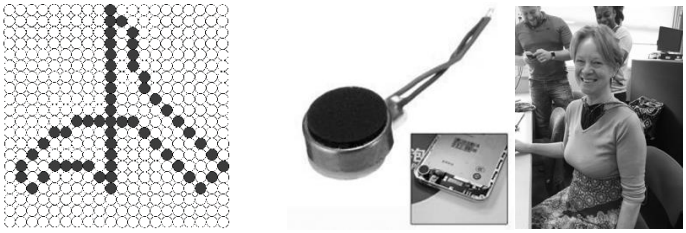

Figure 1. Left to right: Graphic representation of the LRA matrix and a conductor's gesture, an LRA and the haptic vest

Experimentation showed that two-dimensional representations of a conductor's swing were less effective for keeping the musicians in time, particularly as the tempo changed, than a single pulsating controller. Participants commented that, for those congenitally blind with no experience of seeing conductors, the demands were too high for decoding gestures for tempo and metre, let alone understanding interpretive characterization. More abstract signals, or "hapticons", were thought a more effective solution, but starting with the visually impaired performer's specific needs for cues in the music. Attempting to transfer what sighted people see (i.e., in momentum, size and direction of arm movements) was considered a "sighted perspective" on technology development, ableist and potentially "…another way in which disabled people are marginalized" (Baker et al., 2019, p. 311).

DISCUSSION

The social and medical models discussed at the beginning of this chapter are reductionist: "The main advantage of a reductionist view seems to be that it targets specific issues (e.g., medical care *or* social oppression) and draws policymakers' attention to them" (Beaudry, 2019, p. 6). However, many factors affect the musical participation of disabled people (e.g., the physical environment, medical conditions and identity, the educator's knowledge and aims, and resources, including time and money); but not all reside either in the body or can be blamed entirely on others in contemporary society. These encompass historical-cultural scripts, life experiences and disabled people's personalities and confidence. Fautley and Daubney (2018) also raise culturally-related support needs impacting musical learners, whether disabled or not. The social model brings to our attention inadequacies in teacher

[15] Further details of the hardware used in this project can be found in Baker, Fomukong-Boden and Edwards (2019): The ring comprised an accelerometer and gyroscope transmitting via Bluetooth to a 20-by-20 vibration matrix of 10mm Linear Resonant Actuators (LRAs).

training, and poor resourcing, and the medical view recognizes encumbrance from health and the body, but perhaps we might also look to disabled music participants' accounts as insiders. In doing so, we might adopt a mixed model with disability "an inability or limitation in performing socially defined roles and tasks expected of an individual within a sociocultural and physical environment" (Nagi, 1965, p. 315). However, scholarship in this arena, including on music pedagogy and participation, is highly challenged by the variety of health conditions and disabilities, multifarious individual circumstances, inaccessible groups and because some disability is very low incidence.

Propagation of music and assistive technologies means rapid expansion in possible musical approaches for disabled people (see Baker & Green, 2017; also see e.g. Adkins et al., 2013; Collins, 1992; Rush, 2015; Stimpson, 1995). Benefits are subdued by the high differentiation needed and specialist training required for educators. Averse to the social model, technologies also sometimes attempt to reproduce able-bodied people's perceptual mechanisms whilst overlooking disabled users' needs. Rather than society adapting to new musical approaches, adapted instruments or repertoire, the disabled person is forced to adapt.

Music is the right of every person. It is accessible to those with SpLDs, sensory impairments, even the severest learning challenges. Ockelford (2000), for example, calls for "…children with SLD and PMLD [to] have access to a rich variety of listening experiences, both within school and beyond, to enable their listening skills to develop…for the pleasurable sensory and emotional responses music can engender" (p. 202). Music's structural properties produce non-encultured human responses, which are present in new-born babies, as well as associations through experience (Hargreaves, 1986). These are even "…evolving in many children with severe or profound learning difficulties" (Ockelford, 2000, p. 202). Those holding an inclusive, lifelong vision for musical engagement cannot lay blame on the disabled person for any absence of opportunity. Unfortunately, disability often "…disrupts and exposes ingrained [sic] societal prejudices…for a 'constructed normalcy,' blithely enabling some bodies while disabling others" (Howe, 2016, p. 1).

Reflective questions

1. How is musical participation in education and the community affected by disability?
2. Do the terms used in relation to disabled people have connotations for musical participation (e.g. "*dis*ability", "*dys*function", "impairment", "handicapped", etc.)?
3. How might society change to integrate disabled people and their musical engagement better, and what are disabled people's responsibilities in terms of adapting to available opportunities?

Suggestions for further reading

Baker, D. and Green, L. (2017). *Insights in sound: Visually impaired musicians' lives and learning.* In G. Ansdell & T. DeNora (Eds.) *Music and change: Ecological perspectives series*. Routledge.

Baker, D., and Green, L. (2018). Disability arts and visually impaired musicians in the community. In L. Higgins, and B.-L. Bartleet (Eds.), *Oxford handbook of community music*. Oxford University Press.

Baker and Green's book (2017) provides a broad discussion of blind and partially-sighted musicians' lives, including issues relating to music pedagogy, musical approaches, technologies and media, schooling and identity. Baker and Green (2018) also explore the experiences of visually impaired musicians as community music participants.

DiBernardo Jones, J. (2016). Imagined hearing: Music-making in deaf culture. In B. Howe, S. Jensen-Moulton, N. Lerner, & J. Straus (Eds.), *The Oxford handbook of music and disability studies* (pp. 1-20). Oxford University Press. https://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199331444.001.0001/oxfordhb-9780199331444 https://doi.org/10.1093/oxfordhb/9780199331444.013.3

Referring to the creative works and performances of deaf musicians, DiBernardo Jones (2016) looks at deaf musical culture and its practices.

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Reifinger, J. L. (2019). Dyslexia in the music classroom: A review of literature. *Update: Applications of Research in Music Education*, *38*(1), 9-17.

Reifinger's (2019) literature review is a helpful starting point for studies on dyslexia, with Oglethorpe (2002) describing in layperson's terms how this particular SpLD affects learning to play a musical instrument.

Straus, J. N. (2011). *Extraordinary measures: Disability in music*. Oxford University Press.

Straus (2011) explores the concepts surrounding disability and its impact on composers, performers, listeners and other music participants.

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