

REFLECTIONS ON PRACTICE | PEER REVIEWED

Vibrational Music Therapy with D/deaf clients

Russ C. Palmer¹, Stina Ojala^{1,2*}

¹ Andante research group, Tampere University, Finland

² Department of Computing, University of Turku, Finland

* Contact: stina.ojala@utu.fi

Received 26 July 2021; Accepted 5 October 2022; Published 1 November 2022

Editors: Maren Metell, Hiroko Miyake, Andrew Dell'Antonio, Alyssa Hillary Zisk

Reviewer: Zoe Kalenderidis

Abstract

D/deaf clients¹ perceive music through their bodies. The music therapist needs various methods to appreciate these sensations. It is necessary to examine the instruments from a vibrational perspective. Also, listening to the client is more important than speaking. This article focuses on how non-verbal methods are more appropriate when working with clients who have a hearing loss. Vibrosensoric approach to music combined with touch-based communication methods (social-haptic communication) enhances a positive client response. As a deafblind music therapist, musical vibrations play an important role for me as well as for the client during a therapy process. Background noise and spoken language can sometimes mask the perception of musical tones from different types of instruments. Speech with music within the GIM session renders the client unable to follow either music or storyline. This distorts the sounds in hearing aid devices. Therefore, the instrument selection within the therapy session needs to be considered from a vibratory aspect. Musical tones from the instruments can be felt in different parts of the body. In this case, the focus is not on how an instrument sounds but more on the vibrational sensations it produces.

Keywords: vibroacoustic therapy; vibrosensoric experience; cochlear implants; D/deafness; social-haptic communication

Introduction

Music therapists who have clients with deafness have sometimes encountered challenges. This client group consists of people using hearing aids, cochlear implants, or a combination of both or neither. The variation in the terminology used in the article highlights the individual clients' choices of terminology of identity and the diversity of the music therapy

clientele (please see endnote 1). The clients may use sign or spoken language or other communication methods (Darrow, 1995), which may not always be fully understood within the music therapy profession. This may be a barrier to the music therapy process. Simultaneous use of speech and music can sometimes be confusing for the client, as it may result in distortions or overloading in the soundscape. Additionally, there might be a need for using simpler sentence structures to make it easier for the client to understand what they should do within the music therapy session. Speech may not be enough but the therapist may need to use a more flexible and holistic approach. This can include sign language, signs, gestures, or touch-based approaches, such as social-haptic communication methods (Lahtinen, 2008). All of these are applicable to clients who are able to see, whereas for a person with deafblindness, a more hands-on approach may be more appropriate.

This article also focusses on how the author's own experience as a deafblind music therapist plays an important role in assessing ranges of vibrations produced by the music to the client. Perhaps sometimes instead of listening to music through our ears we need to open our bodies to feeling the vibrations to achieve our goals in the therapy process. This is of paramount importance when working with clients who are more sensitive to vibrations. Being deafblind can sometimes assist in focusing on the vibrational qualities of music. This can be defined as switching of senses (Palmer et al., 2017, p. 181). A hands-on approach may also help in assessing the emotional state of the client and brings the therapist closer to them as opposed to observing at a distance. This could provide shortcuts to client's emotional responses in comparison to asking questions. Direct contact to the client by touch on the shoulder enables one to feel the emotional responses of the client when listening to music or during an interactive session.

Disability and Co-operation

Any therapist who has a disability may be able to appreciate the problems the client has to face in reality when they belong to the same minority group. This does not mean the therapist with a disability would not be able to function as a therapist, but in reality they may do things in a different way which might not be appreciated by non-disabled therapists in the field. Through teamwork between disabled and non-disabled therapists it is possible to create a more interactive process where both parties may gain knowledge and experience from each other. Trying to get this message across since having been qualified as a music therapist with deafblindness has been a challenging and gradual process. Recently the discipline has started to open up and become more flexible in appreciating and accepting disabled therapists and recognising their abilities and contribution.

The co-operation between disabled and non-disabled therapists may offer opportunities to cater for a more varied clientele with additional insights in, for example, functional or device-oriented adaptations needed for the therapy sessions. Furthermore, the disabled therapists have intrinsic knowledge from their own lived experience as well as a possibility to offer both peer support outside the core of the session and act as a role model so that one can be a fully qualified and practicing professional despite being disabled. Perhaps the most fruitful professional output will be the result of a multidisciplinary environment and working in pairs.

D/deafness¹

Background noise or loud reverberation can sometimes distort the real, true sound of the music being created or played back, especially if a client is using hearing aids. Here, a

music therapist using either hearing aid devices or cochlear implants, such as one of the authors, has an intrinsic benefit of automatically using more comfortable volume settings. Furthermore, in some cases the hearing aid devices may need to be adjusted to lower volume due to so-called sound overload. However, some hearing aid devices and cochlear implants do allow manual control whereas others may be manufactured with automatic volume settings only. This can sometimes hinder the full adaptability of music being created during the session. Therefore, it is advisable for the therapist to do things in a sequence: first give instruction, and only then start to interact individually or in a group setting. Also, it is more beneficial to ask questions after the music has stopped. This will give the session additional structure. Otherwise, the situation may become more stressful than relaxing or therapeutic. That is, one should avoid speaking when music is being played or created. Clients using cochlear implants, who may have greater options for sound pre-processing, still struggle with similar situations. This, however, varies from one person to another and the therapist should take that into account when planning a therapy session for a client with deafness.

Clients who do not use hearing aid devices but use either sign languages or other sign-based methods may not encounter sound overload problem in a similar fashion, but their perception focusses on the vibrations on and through their body. Sensitivity to vibrations differs from person to person and therefore vibration intensity should be monitored. A good rule-of-thumb for the therapist is to try it yourself, and be aware of the vibrations in the environment. Some of us are innately more sensitive to vibrations than others. Checking the vibratory environment may form one integral part of the planning for the therapy session. Here it may be advisable to take off the shoes as this will increase the sensitivity to vibrations through the floor. Vibrations are relayed stronger through wooden than concrete floor materials. Also, please be aware that the heavy traffic outside also creates strong and low vibrations which in turn may confuse the vibratory environment.

The degree of useful and residual hearing is individual. Similarly, the levels of hearing in lower and higher frequencies may vary. The therapist may not have access to medical information, but it is worth asking for the related hearing levels from the client, or if they are a child, a parent or a teacher, or relying on written information from other professionals (Boothroyd, 1980). Overall, the clients will rely more on visual information when playing an instrument, but it is not the same as experiencing the instrument through your body (see also Evelyn Glennie as cited in Walker, 2020). Some clients rely mainly on the vibrations and visual cues from music being played or created in an interactive therapy session.

Clients with deafness experience music through vibrations wherever they are. However, their sensitivity to vibrations may vary according to their bodies and vibrational awareness (Palmer et al., 2017). Clients who do not use hearing aid devices may be more sensitive to vibrations than those who do. It may help the client to concentrate on how music feels on their body if they can decrease their hearing aid device volume or even switch them off. This is sometimes referred to as switching of senses. That is, one becomes more aware and more able to concentrate on the vibratory environment when the other senses, including hearing and sight, are switched off (Palmer et al., 2017). This is one of the advantages one may benefit from if one has deafblindness. A similar effect, but to a lesser extent, is to concentrate on listening to music and close one's eyes in the process.

For example, when playing a guitar in a music therapy session it would be appropriate to let the client touch the guitar on the head or the soundbox to enable them to feel the vibrations from the instrument directly. This also applies to using pre-recorded music, and in that case, the client may benefit from holding a balloon near to the sound source or actually touching the speakers to feel the vibrations that are produced by the music (Figures 1 and 2)(Fulford, 2011; Palmer et al., 2017; for more on vibratory patterns, please see Hannukainen et al., 2006; Stanciu et al., 2019).



Figure 1. Holding a balloon in front of the speaker, either between palms (l) or with fingertips (r).



Figure 2. Touching a loudspeaker either on top (l) or in the front of it (r).

It may also be possible to explore the dynamic range of the instruments from soft to loud, but this should not be uncomfortable to the touch. Similarly to hearing, frequency levels of vibrations change the feel of the sound. Too loud sounds will cause sound overload and distortion to the hearing aid devices as well as be uncomfortable to the touch. Similarly, if the sound is too soft the details of the music may be hidden to touch and hearing levels. The therapist should check all equipment before the actual therapy session starts as a part of the therapy preparation process.

Vibrosensoric Experience

Vibrosensoric experience refers to the way people with deafness perceive both vibrations and the acoustical sound of instruments when listening to music (Palmer & Ojala, 2016). This means that the clients are able to feel and sense the musical tones and vibrations being played at that particular moment in the environment, be it in a concert hall, music room or during a face-to-face music therapy session. In addition, if using pre-recorded music, it may be appropriate to use a conventional music hi-fi centre, so that the client can explore the vibrations coming from the speakers and in the environment. Furthermore, this experience can be enhanced by holding a balloon between hands, either touching the speaker (Figure 1), feeling the vibrations in the air or conveyed by the different furnishings in the room (Palmer et al., 2017). This can include, for example, gym balls, bean bags or wooden chairs or tables, especially on a wooden floor. You can also use a so-called resonance board or box, which will enhance the vibrations further. If one uses a portable speaker system, the client may want to feel it close to their body when the music is playing. Vibrations with particular frequencies are felt in specific areas of the body (Skille & Wigram, 1995). There are various wireless speaker-type devices available that allow them to be handled in various ways touching the body. The therapist may be able to set up an individual playlist for the client, for example through a laptop or a smart tablet.

If a client experiences a live concert, it may be possible for them to feel the vibrations from the instrument, such as a guitar, by placing the hand on the headstock or the base of the guitar body, but this method needs a firm co-operation between the musician and the therapist. Balloons may be used if the client is holding it in their hands in the front of the guitar to amplify the tonal vibrations in the air. Some clients who do not use hearing aid devices may benefit from using wooden kitchen utensils or similar to feel the instrument or musical performance (Figure 3). You can also use a cushion with a low-tone frequency amplifier, which can be connected wirelessly to a computer and felt through the body (Figure 4).



Figure 3. A direct contact to a cello.



Figure 4. A vibroacoustic cushion behind a person's back.

Social-Haptic Communication

A combination of many communication methods may be most beneficial when working with clients with deafness. There may be additional professionals present within the session, such as a communicator guide or an interpreter. However, there are ways for the music therapist to interact directly with the client, even when the client has deafblindness, that is, hearing loss with additional visual challenges.

Music sets the scene and atmosphere in music therapy setting and as such, it should be given time to be appreciated. Should a need arise to give instructions or feedback, speech may disrupt the flow that music creates and therefore touch-based communication method might be more suitable, especially when working with clients with deafness and/or blindness. One option is to use so-called social-haptic communication, where context-specific messages (haptics) are relayed through touch (Lahtinen, 2008). After initial agreement to use touch to communicate, touch messages are a direct communication option between the therapist and client, even when music is playing without the need of an additional person (an interpreter, a communicator-guide, or a family member) in the therapy session. These messages include feedback (yes/no), instructions (left, right; start, stop), and messages related to music (rhythm, dynamics and texture; Figure 5) and are always context-dependent (Lahtinen, 2008; for more on musical haptics, please see Palmer & Ojala, 2011; Palmer et al., 2012). In this way, the therapy session encompasses all the senses to therapeutic use of music.



Figure 5. Two musical haptics; pitch on the arm and instrumentation on the hand.

In this fashion, social-haptic communication is one way of ensuring a more equal power balance within the music therapy session and to acknowledge the implications of how deafness may relate to a person's sensory adaptations to the world. During a session the therapist needs to allow time for the responses as they may be delayed due to the hearing status. This requires careful observation of non-verbal communication and reactions, which may be subtle and not obvious. There is also a cultural tendency to guess what's being said, which can lead to misunderstandings.

Speaking when the music is playing disrupts the flow, so one has to allow space and time for speech and music in a sequence, not at the same time. Furthermore, it is important to have suitable lighting conditions, so that the client is able to follow lip reading or visual cues of interaction within a session (Robbins & Robbins, 1980). The client may rely on pure vibrations from music, and it may be advisable for the therapist to apply extra-linguistic methods for alerting attention, such as flicking the lights, giving touch messages, foot-tapping, or even a specific drum beat. If there is a sign language interpreter or a communicator-guide present, they are able to make the communication easier and to follow the cues from the therapist to anticipate the next action, reaction or stage in the therapeutic process. If the client has additional challenges with vision, then social-haptic communication will become the main source of interaction within the music therapy session, as the client cannot rely on visual or spoken cues either. That also offers a direct feedback option between the therapist and the client.

Musical Instruments with Vibrational Qualities

When using different instruments, one needs to analyse how they can be felt and heard by the clients. For example, there is less point in playing a high pitch instrument for a client with high frequency loss as they will not be able to gain a full experience of hearing those instruments properly. Nevertheless, a vibrosensory experience via a balloon helps the client to become aware of music texture and melody within the higher frequencies. However, the vibrations in higher frequencies are less prominent than the middle and low range frequency vibrations. The most popular instruments used in music therapy are piano,

guitar and percussion instruments. One needs to take care of the music being focussed on the appropriate tonal ranges (Palmer et al., 2017). You can vary the range you play by transposing the music you are using according to the individual needs. Another consideration when planning a music therapy session is to rearrange the music to be used for the individual client to accommodate their functional hearing levels (so-called residual hearing; Boothroyd, 1980). Melody sequences can be clarified with transposing them to the hearing range of the client. After the initial familiarisation period one can continue with using the original score or sheet music.

Some percussion instruments produce deep vibrational tones that can be felt through the body. These include djembe, bodhrán (Irish) and kettle drums, tone bars, and vibraphones, but a drum kit may need to be dampened to avoid overloading either the hearing or the vibrational sensations through the body (Fulford et al., 2011; see also Syke 2009). Shekere (West African) or maracas are slightly higher in their tones and sharper in their vibrations. Double bass, electric bass guitar and the low range on an acoustic guitar produce mellow vibrations. Access to an orchestral session with all the instruments would allow the client to become more familiar with how the instruments sound and feel. For example, feeling the vibrations from a concert harp can be very soothing for a client. This will all depend on the access to the facilities. The Indonesian gamelan instruments from Bali and Java have very good vibrational sound qualities, the Javanese gongs and metallophones are mellow in their vibrational qualities than Balinese ones (Heaton, 1994). Some gamelan instruments create many overtones, which can be slightly confusing for the clients with deafness but they are still worth a try.

Background Noise

If conducting band work or group sessions where the client is involved in the creative process, they may need to adjust their hearing aid devices accordingly so that their sound levels are not drown out, as that would make their participation difficult. Furthermore, the positioning of the client in relation to the other musicians is an important factor to be able to feel the rhythm from the bass guitar and/or the drum set. If the client is singing with other band members, one might consider using a hat which would enable them to hear their own voice easier when playing together (Tuominen et al., 2014). The hat also helps with balancing the acoustics from the other instruments being played. Another important factor is to be able to see the other members in the group in order to communicate and synchronise together as their hearing may need to be supported by the visual cues.

Vibroacoustics and Physioacoustics

Vibroacoustics concentrates on vibrational elements only—despite acoustics in the name—as the low tones used within the paradigm are below actual human hearing threshold. The vibratory effect of sound becomes very tangible when you are in a rock concert and the concert literally rocks you (for more on whole body listening, please see Glennie, 2015).

Vibroacoustics originated in Norway, the UK and Finland back in the 1980s through pioneers Olav Skille, Tony Wigram and Petri Lehikoinen. The idea was to use various music facilities to enhance the experience of feeling music and to relax the body using low tone frequencies. In some cases these were combined while in other approaches they were treated separately. For example, Olav Skille developed a music bath, which allowed clients to experience music and low tone frequencies around their bodies (for example Skille, 1989; Wigram & Skille, 1995). Olav Skille and Tony Wigram both designed a vibroacoustic bed from the same principles, but the final products were slightly different. Otto

Romanovski composed music for the Skille design. Tony Wigram's work at Harperbury Hospital in the UK focused on low tone frequencies through specially designed loudspeakers connected to a vibroacoustic bed (Wigram, 1996; Wigram & Dileo, 1997). Both Skille and Wigram were working with clients with cerebral palsy, hearing impairment and profound learning disabilities. At the same time, other people were developing vibroacoustic floors in the Nordic countries, where a person could stand, dance or sit down usually in a dedicated room (www.russpalmer.com). Petri Lehtikoinen developed a physioacoustic chair based on Olav Skille's principles, which has been used by music therapists around the world, and in sports rehabilitation and muscle toning as a part of physiotherapy programmes in the US, the UK and Scandinavia (Lehtikoinen, 1997). This uses low tone frequencies with a specific software distributing the low tone frequencies to different areas of the body (Hooper, 2001).

Some vibroacoustic floors are currently being used in various venues in, for example, Norway, including a special purpose-built floor in a church at Signo, Andebu, where people can feel the music coming through their feet. There is also a portable version called Tactile Sounds System² (TTSS), which has four modular units connected together, that can be rearranged to a floor or a bed depending on the needs of the client (Chamberlain & Bowen, 2006). TTSS is then connected to a music hi-fi system. These vibroacoustic and physioacoustic facilities can be a useful tool for clients with deafness, as they allow the client to feel music through their bodies. Music to be used can be created online, on-site, you can use microphone to enhance the sound of the individual instruments, or the music can be pre-recorded.

Identity and Empowerment

People with deafness sometimes lack self-confidence and may have cross-over identities between the D/deaf and hearing world and have to rely on mix of communication methods. This can lead to difficulties in interacting with others because their identity is different. Sometimes they may feel excluded and may want to withdraw from the world. This is even more so if one has deafblindness, such as Usher's syndrome, where the changes in the hearing and vision are gradual. In addition, some clients may find it difficult to accept these changes and it may affect their mental health. In these occasions the therapist may have to adapt some of the psychodynamic and behavioural music therapy approaches. These may be expressed and created through the music therapy processes. The clients may be self-conscious about their disability but music therapy process can assist them to become more at peace with themselves (Janata, 2009). These are some of the psychoanalytical behaviours which can be explored within the music therapy processes with the so-called Priestley model (Wigram et al., 2002). One possibility is to explore the human voice. This can be done through song, projection and experimenting with voice dynamic control. Here the client should be at ease enough not to worry about how they sound. This may be achieved within the Nordoff-Robbins framework model (Robbins & Robbins, 1980; Wigram et al., 2002). Relaxing the speaking muscles helps with voice control and that in turn helps with building self-confidence.

This music therapy-based approach of combining tools from the Priestley and Nordoff-Robbins models could present a further asset in the hearing-related rehabilitation programmes as a part of a multi-disciplinary framework including audiologists, speech and language therapists, and music therapists. The clients will need to be able to express their needs in relation to their soundscape. This can only be accomplished in co-operation with audiologists. For example, within a cochlear implant switch-on process, some of the automatic features of the cochlear implants may have to be switched off to provide manual control for changing soundscapes.

Singing along in a karaoke style, learning the lyrics, and even singing together with an instrument will again help with the confidence-building process. The music therapist needs to listen to the client's needs in order to work out and improvise the therapy process suitable for them. The therapist may have to speak clearly, slower, facing the client as they may have to lip read. A client with deafness needs to see the therapist's face when speaking. One should also take care not to make the client feel intimidated. The therapy process here resembles teamwork and cooperation. The best way to start the therapy process is to explore the instruments the client is comfortable with, or may take an interest in. This may not be so easy to identify within the 2–3 first sessions. The building up of trust may take longer for the client as the communication needs more time and they may not fully accept their own identity either.

The possible misunderstandings or miscommunications need to be addressed within the first sessions. In order to establish the client's hearing levels, it may be appropriate to explore different instruments to find out the most beneficial ones for the therapy process. This needs to be considered as part of the creative therapy process (the Nordoff-Robbins model and the Alvin model; Wigram et al., 2002) and not to let the hearing levels be an issue. One has to consider that clients have a constant battle in everyday life with their non-functional hearing. In some cases, they may even be looked down upon because they are different. This is due to the fact that deafness is an invisible disability and human nature does not always allow tolerance or compassion. This in turn can cause the clients to walk away from the situation or become withdrawn. Trying to put all things together is a fine balancing act in therapy as well. Using the instruments with vibrational rather than acoustic qualities requires the therapist to use a more flexible approach combining vibrational and acoustic elements together. Furthermore, using a hat gives the client a way of self-monitoring in singing and monitoring the instruments in group work session (Tuominen et al., 2014). Additionally, they have to choose their positions in the group in order to benefit from both lip reading, visual cues and the best possible acoustic and vibrational input from instruments. That also may help to build up their self-confidence and self-esteem. Through the music sessions the therapist should be able to identify the clients' assets and interaction methods to help them to develop their musicality further. Psychologically this will help them to bring out the unidentified and masked individual qualities.

Conclusions

We have tried to analyse the issues connected to deafness, which are invisible most of the time. When working with such clients, one has to focus on the vibrational and specific soundscapes benefitting the client most, in adapting the vibrosensoric approach in music therapy. There may be additional vibroacoustic facilities to enhance the therapy process. It is advisable to be able to use a multidisciplinary approach and to combine different aspects from various music therapy models.

One has to remember that having a hearing loss or being D/deaf does not mean the music should be louder, but it all depends on how the vibrations of the music can be felt through the body. At the same time, it is about developing the client's musicality to the best of their abilities. For example, some clients with hearing aid devices may be able to develop their singing and musical potential if their devices are properly adjusted by their audiologists. This requires co-operation between the audiologists and music therapists, as there are many areas which can help the client to become more socially active in society. At the same time the therapy process helps to build confidence and general well-being. As such, music therapy would be a good asset to the rehabilitation programmes for the clients with deafness.

Maybe this forum and time calls for introspection on disability awareness: How aware are we on various disabilities? How would we include a disabled therapist in our working environment and what type of adjustments would we be willing and able to do for that to succeed? What if a non-disabled colleague becomes disabled by an unforeseen accident or illness? Would our attitude towards that colleague change somehow? Those questions are not only for the music therapy profession but they also need to be addressed more widely in society as no person is perfect. Furthermore, there are the repercussions from the recent pandemic and the increasing mental health issues world-wide. However, that is not in the scope of this article but calls for a specific article addressing questions related to mental health issues.

Take-Home Messages for the Therapists

It is important for the therapist to become more aware of the vibrational qualities in music and how they can be felt. This includes the creative processes in music making and interaction within music. It is more about how the musical vibrations can be felt than hearing or listening to music. In other words, let the music speak more, so be concise and short in your instructions and rely more on the creative process in for example music making. Maybe the most fruitful working environment would be to have a disabled and non-disabled therapist working together?

About the Authors

Russ C. Palmer, International music therapist and vibroacoustic therapy practitioner. He is part of the Andante/Social-haptic Communication research group at Tampere University, Finland. He is one of the developers of social-haptic communication and the use of haptics in everyday life with his wife Dr. Riitta Lahtinen. He is a singer-songwriter and musician who has published a music CD and a DVD. He has been involved in the development of a portable music floor known as the Tac-Tile Sounds System™ with Sheffield Hallam University. His academic publications focus on musical perception, vibrations and hearing aid devices as well as social-haptic communication and its variations. In music therapy his main focus is with dual-sensory impaired clients and he encourages people who are losing their hearing and sight to experience and feel musical vibrations. He gives international presentations as a hearing and visually impaired music therapist and wears two cochlear implants. He was advisor for two EU- projects: SUITCEYES (smart clothes) and the haptice dictionary within ERASMUS. For more information: www.russpalmer.com

Stina Ojala, PhD, bioinformatics, speech scientist. She is a researcher at the Department of Computing, University of Turku, Finland. Her academic interests include speech, signing, languages, linguistics, music, acoustics and vibrations. She is also a speech-to-text interpreter for people with hearing loss or deafblindness. She has published a wide range of articles on speech, language, communication and accessibility.

DVD References

Celen, Riia. (2009). *Syke – Rytmin ilo löytyy jokaisesta* [Pulse – The Joy of Rhythm Is Within Us All] [Film on DVD]. University of Arts: Helsinki, Finland.
<https://viittomakielinenkirjasto.fi/video/syke-rytmin-ilo-loytyy-jokaisesta/>

Internet Resources

<http://www.russpalmer.com>

Notes to consider
Face the client when giving instructions
Speak clearly and slowly
Allow time for the delayed responses
Feel the music

ORCID

Stina Ojala  <http://orcid.org/0000-0001-8803-8342>

References

- Boothroyd, A. (1980). Audiological considerations in music with the Deaf. In C. Robbins, & C. Robbins (Eds.), *Music for the Hearing Impaired and other special groups – A resource manual and curriculum guide* (pp. 1–24). Magnamusic-Baton.
- Chamberlain, P., & Bowen, C. (2006). Designers' use of the artefact in human-centred design. In J. Clarkson, & P. Robinson (Eds.), *Designing accessible technology* (pp. 65–74). Springer.
- Darrow, A. (1995). Music therapy for hearing impaired clients. In T. Wigram, B. Saperston, & R. West (Eds.), *The art and science of music therapy: A handbook* (pp. 363–384). Harwood Academic Publishers.
- Fulford, R., Ginsborg, J., & Goldbart, J. (2011). Learning not to listen: The experiences of musicians with hearing impairments. *Music Education Research*, 13(4), 447–464. <https://doi.org/10.1080/14613808.2011.632086>
- Glennie, E. (2015). *Hearing essay*. Retrieved Nov 27, 2021 from <https://www.evelyn.co.uk/essays/>
- Hannukainen, A., Lukkari, T., Malinen, J., & Palo, P. (2006, Aug 30–31). *Formants and vowel sounds by the Finite Element Method*. The Phonetics Symposium, Helsinki, Finland, pp. 24–33.
- Heaton, J. (1994). A Storm of Bronze: Gamelan – The enchanted music of Java and Bali. In S. Broughton, M. Ellingham, D. Muddyman, & R. Trillo (Eds.), *the Rough Guide to World Music* (pp. 417–425). Penguin Books Ltd.
- Hooper, J. (2001). An introduction to vibroacoustic therapy and an examination of its place in music therapy practice. *British Journal of Music Therapy*, 15(2), 69–77.
- Janata, P. (2009). Music and the self. In R. Haas, & V. Brandes (Eds.), *Music that works. Contributions of biology, neurophysiology, psychology, sociology, medicine and musicology* (pp. 131–143). Springer-Verlag.
- Lahtinen, R. (2008). *Haptics and haptemes: A case study of developmental process in social-haptic communication of acquired deafblind people* [Doctoral dissertation]. University of Helsinki, Finland. A1 Management UK, 2008.
- Lehikoinen, P. (1997). The physioacoustic method. In T. Wigram, T., & C Dileo (Eds.), *Music vibration and health* (pp. 209–215). Jeffrey Books.

- Palmer, R., Lahtinen, R., & Ojala, S. (2012). Musical experience and sharing musical haptics. *Procedia – Social and Behavioral Sciences*, 45, 351–358.
<https://doi.org/10.1016/j.sbspro.2012.06.571>
- Palmer, R., & Ojala, S. (2011, November 4). Basic musical haptics [seminar]. *Proceedings of Music for All*. Retrieved Nov 27, 2021 from
<https://matskut.helsinki.fi/bitstream/handle/123456789/176/MfA%202011%20Stina%20Ojala.pdf?sequence=6>
- Palmer, R., & Ojala, S. (2016). Feeling music vibrations: A vibrosensoric experience. *Proceedings of BNAM2016*. KTH, Stockholm, Sweden.
- Palmer, R., Skille, O., Lahtinen, R., & Ojala, S. (2017). Feeling vibrations from a hearing and dual-sensory impaired perspective. *Music & Medicine*, 9(3), 178–183.
- Robbins, C., & Robbins, C. (1980). *Music for the Hearing Impaired and other special groups: A resource manual and curriculum guide*. Magnamusic-Baton.
- Skille, O. (1989). Vibroacoustic therapy. *Music Therapy*, 8, 61–77.
- Skille, O., & Wigram, T. (1995). The effects of music, vocalisation and vibration on brain and muscle tissue: Studies in vibroacoustic therapy. In T. Wigram, B. Saperston, & R. West (Eds.), *The art and science of music therapy: A handbook* (pp. 23–57). Harwood Academic Publishers.
- Stanciu, M. D, Vlase, S., & Marin, M. (2019). Vibration analysis of a guitar considered as a symmetrical mechanical system. *Symmetry*, 11, 727.
<https://doi.org.10.3390/sym11060727>
- Tuominen, H. T, Palmer, R., Korhonen, I., & Ojala, S. (2014). Evidence-based study on performance environment for people with and without cochlear implants (CI). *Proceedings of BNAM2014*, Tallinn, Estonia.
- Walker, K. (2020). *How did Beethoven compose when he was deaf? We asked Evelyn Glennie how she feels sound*. Retrieved March 20, 2022 from
<https://www.cpr.org/2020/09/28/how-did-beethoven-compose-when-he-was-deaf-we-asked-evelyn-glennie-how-she-feels-sound/>
- Wigram, T., & Dileo, C. (Eds). (1997). *Music vibration and health*. Jeffrey Books.
- Wigram, T., Pedersen, I.N., & Bonde, L.O. (2002). *A comprehensive guide to music therapy*. Jessica Kingsley Publishers.
- Wigram, T., Saperston, B., & West, R. (Eds). 1995). *The art and science of music therapy: A handbook*. Harwood Academic Publishers.
- Wigram, T. (1996). *The effect of vibroacoustic therapy on clinical and non-clinical populations*. Jessica Kingsley Publishers.

¹ Terminology use in the article is as follows:

D/deafness refers to either deafness or hearing loss. As such, it is used as an umbrella term without additional connotations with regards to power and client-first attitude. The choice of a particular definition is dependent on the focus group in question. The capital D in the word Deaf refers to predominantly sign language users while the lower case d in the word deaf refers to a group of people who use spoken language and may use various types of hearing aid devices. The definitions used throughout the article refer to the individual clients' personal cultural identities. You choose the words according to the person you are talking to and depending on the cultural situation you are in.

² Russ C. Palmer was involved in the development of the Tac-Tile Sounds System™ but has no financial interest related to this product.