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REOPENING THE CONVERSATION BETWEEN MUSIC PSYCHOLOGY AND MUSIC THERAPY: A SURVEY OF INTERDISCIPLINARY ATTITUDES

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ALTHOUGH THE FIELDS OF MUSIC PSYCHOLOGY and music therapy share many common interests, research collaboration between the two fields is still somewhat rare. Previous work has identified that disciplinary identities and attitudes towards those in other disciplines are challenges to effective interdisciplinary research. The current study explores such attitudes in music therapy and music psychology. A sample of 123 music therapists and music psychologists answered an online survey regarding their attitudes towards potential interdisciplinary work between the two fields. Analysis of results suggested that participants' judgements of the attitudes of members of the other discipline were not always accurate. Music therapists indicated a high degree of interest in interdisciplinary research, although in free text answers, both music psychologists and music therapists frequently characterized music therapists as disinterested in science. Music therapists reported seeing significantly greater relevance of music psychology to their own work than did music psychologists of music therapists. Participants' attitudes were modestly related to their reported personality traits and held values. Results overall indicated interest in, and positive expectations of, interdisciplinary attitudes in both groups, and should be explored in future research.

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MUSIC PSYCHOLOGY AND MUSIC THERAPY are terms that represent two complex and distinct but related fields. The lay person might be forgiven for assuming the terms are synonymous, but professionals in both fields might struggle to give more than a cursory definition of the other, despite seemingly obvious overlaps. It is reasonable to question

whether this state of affairs has yielded missed opportunities for contact and collaboration between these disciplines, and whether such collaboration is a worthwhile goal.

Anglada-Tort and Sanfilippo (2019) define music psychology as “the scientific study of the psychological processes through which music is perceived, created, responded to, and incorporated into everyday life” (p. 1). Music psychology is certainly a proverbial broad church (we use the term here as an umbrella term inclusive of systematic musicology, music cognition, and other closely related fields) the far edges of which test the definitions of what can reasonably be classed as both “music” and “psychology.” Its diversity reflects both the variety of relationship between human and music, and the number of temporal and spatial scales at which these can be examined, from the molecular to the cultural. We create, perceive, interpret, respond to, choose, use, like, dislike, and identify with music on a daily basis. These behaviors influence and are influenced by our functioning on biological (Chanda & Levitin, 2013; Koelsch, 2011; Thoma et al., 2013), psychological (Juslin & Västfjäll, 2008; Rentfrow, Goldberg, & Levitin, 2011; Saarikallio & Erkkilä, 2007), social (Carlson, Burger, & Toiviainen, 2018; Cross, 2014; Tarr, Launay, & Dunbar, 2016) and cultural (Cross, 2008; Egermann, Fernando, Chuen, & McAdams, 2015; Himberg & Thompson, 2011; Kirschner & Ilari, 2014) levels.

As with many other sciences, the origins of music psychology have been cited as belonging to the Ancient Greeks, with Aristotle theorizing about the physical properties of sound around 350 BCE (Schick, 2004; Yost, 2015). Chinese texts about music theory from 433 BCE have been found (Bagley, 2005), and Chinese legend has it that pitch was standardized into twelve tones by applying correct ratios to the cutting of bamboo pipes more than 2500 BCE. The point is not who got there first, but that as humans our desire to understand how music works using math and science is long-held and widespread. Similarly, the invention of music therapy has been credited to those industrious Ancient Greeks (Byers, 2016), but music has been associated with rituals of healing probably since prehistoric times (e.g., Aigen, 1991). Thus, when we speak about music

psychology and music therapy, although we are referring to discrete disciplines of study and practice that have arisen in the last hundred and fifty years or so, these should not be confused with the invention of either the methodological study of music or its application to human wellbeing.

Skipping over medieval metaphysics, a reasonable point in time to place the start of the modern discipline of music psychology is with the dawn of Experimental Psychology and specifically of psychoacoustics, and a reasonable figure with whom to associate this is Hermann von Helmholtz (1821–1894), whose 1863 book *On the Sensations of Tone as a Physiological Basis for the Theory of Music* explored the perception of pitch and its relationship to sound frequency. The laws and limits of human perception of pitch and timbre, the perception and production of meter and rhythms, and ability to synchronize a finger tap with a given beat kept scientists busy for the next century (Bagley, 2005; Repp, 2005; Schick, 2004). Leman and Schneider (1996) describe the history of systematic musicology in similar terms, additionally highlighting the role of phenomenological, introspective, and cross-cultural research.

The first academic conference specific to music psychology was organized in 1972 in the United Kingdom, followed the next year by the establishment of the journal *Psychology of Music* (Anglada-Tort & Sanfilippo, 2019). Anglada-Tort and Sanfilippo (2019) provide a useful picture of the growth of the research field between 1973 and 2017 through a review of literature published in three discipline-specific journals, noting a growth rate of 11% and a noticeable increase in the early 2000s in multi-authored papers, suggesting that music psychology research may be growing more collaborative and is taking place in larger research groups and departments. Currently several professional organizations exist for music psychology, including the Society for Music Perception and Cognition (SMPC), the Society for Education, Music and Psychology Research (SEMPRE), the European Society for the Cognition of Music (ESCOM), and the International Conference on Music Perception and Cognition (ICMPC), which organize regular professional conferences, where topics include music neuroscience, music developmental psychology, music in health and well-being, music and movement, and computational analysis of acoustic signals, among many others.

Many definitions of music therapy exist, with varying degrees of overlap and conflict. Perhaps the most thorough treatment of this challenging definition has been done by Kenneth Bruscia (2014), whose book *Defining Music Therapy* has undergone substantial revisions in

its second and third editions; the appendix of the latter includes than 100 published definitions of the practice. He currently defines music therapy as, “a reflexive process, wherein the therapist helps the client to optimize the client’s health, using various facets of music experience and the relationships formed through them as the impetus for change” (Bruscia, 2014, p. 36). He further notes that the discipline includes practice, theory, and research.

It is much more challenging to point to a definite beginning of music therapy as a modern discipline. A number of texts highlight the early and ancient origins of music therapy as a concept and practice (e.g., Bonde, 2019; Horden, 2017; Thaut, 2015) suggesting that music therapy may be more conscious of its relationship with its distant past than is music psychology. While it is hazardous to refer to general consensus in music therapy, we can at least say a common and often accepted starting point for modern music therapy is the nineteenth century, especially its later half (e.g., Byers, 2016; Davis & Hadley, 2015). Modern incarnations of music therapy developed independently in multiple locations, often in psychiatric institutions, schools and institutions for the disabled, or as part of the convalescence of World War veteran, with the fundamental focus of using music in practical ways to lessen and relieve human suffering (Byers, 2016). Early pioneer and in the music therapy Eva Vescelius wrote that, “Disease is unrhythmical, health is rhythmical, for rhythm is a fundamental law of the universe” (1918, p. 378). In the United States, she and Isa Maud Ilsen founded early societies promoting “Music Therapeutics” and “Music in Hospitals” respectively, while Harriot Ayer Seymore founded the National Foundation of Music Therapy in 1941, not long before Juliette Alvin and Mary Priestley would develop music therapy in Europe (Byers, 2016). The first undergraduate training course in “musicotherapy” was taught by British musician Margaret Anderton at Columbia University in 1918, which focused on practical skills in patient care.

Despite music therapy’s many notable mothers, it is somewhat telling that the title of “father of music therapy” has been used, at least in the United States, for educational psychologists E. Thayer Gaston (American Music Therapy Association, n.d.a.), who might more accurately be called the father of music therapy research. Gaston spent much of his career developing a “scientifically plausible theory of music therapy” (Johnson, 1981), and established a graduate program at the University of Kansas for this purpose. It is worth noting that, compared to the gender distribution of music therapy as a whole, men are still overrepresented

while women are under-represented in positions of research and academic power (Edwards & Hadley, 2007). In 1958, Gaston published his book *Music in Therapy*, which focused on music as a biological human behavior. In the same year, musician Paul Nordoff and special education teacher Clive Robbins began a 17-year collaboration, working with severely disabled children with music, and developing a method known as Creative Music Therapy or Nordoff-Robbins Music Therapy.

Just as music psychology was at first closely tied to experimental psychology, music therapy was influenced by movements within clinical psychology, with schools such as Freudian psychodynamics, psychoanalytical, and humanistic psychology each manifesting music therapy incarnations (Abrams, 2015; Hanser, 2015; Isenberg, 2015; Jacobsen, Pederson, & Bonde, 2019). As with psychology, Skinnerian Behaviorism was particularly characteristic of American approaches to music therapy (Bonde, Trondalen, & Wigram, 2019). Other practitioners and theorists have defined a great many models that are specific to music therapy. *The Oxford Handbook of Music Therapy*, published in 2015, includes chapters no less than eleven different models of music therapy, including Community Music Therapy, Resource-Oriented Music Therapy, Field of Play, and Vocal Psychotherapy. However, still more models, including psychodynamic and behavioral music therapy are reported as being used worldwide, as are models that require specialized training such as Neurologic Music Therapy (NMT) or Neonatal Intensive Care (NICU) Music Therapy (Kern & Tague, 2017). This diversity of practice further extended by the individualized nature of music therapy to meet specific needs of a given client, and by the fact that many therapists report integrating multiple approaches into their practice (Kern & Tague, 2017).

While plurality and breadth of practice are largely seen as strengths in the music therapy profession, Streeter (2006) has noted a darker side to the proliferation of music therapy “brands,” namely their relationship competitiveness and fundamentalism, which in turn she relates to a greater need for feminism within the field. Nevertheless, music therapy has, like music psychology, grown to include a broad swath of practices, approaches, and philosophies. Unlike a majority of music psychology research, however, music therapy also deals with human diversity; Kern and Tague (2017) report 45 different populations served by music therapists worldwide including clients of all ages with autism spectrum disorders (ASD), Alzheimer’s disease, cancer, stroke, substance abuse disorders, hearing impairments, schizophrenic disorders, and depression.

While it may be a statement of the blindingly obvious that these two disciplines have much in common, it unfortunately does not follow that collaborative work between the two has naturally arisen. In 1980 at City University London, music therapist Leslie Bunt and music psychologist Ian Cross initiated a series of regular interdisciplinary seminars, resulting in a 1988 article with music psychologist Eric Clarke and music therapist Sarah Hoskyns summarizing some points of discussion between the two fields. Challenges of collaboration raised included the lack of common vocabulary and existence of jargon in both fields, a perceived resistance in music therapists to quantitative methodologies, and the necessity for music therapists to work freely and in complex, natural environments, while music psychology’s concerns veer towards control and reductionism (Bunt, Cross, Clarke, & Hoskyns, 1988).

In the ensuing years, a small number of collaborative efforts between the two fields have nevertheless been made. Vink (2001) described the relationship between music psychology research into music and emotion and current music therapy practice. A 2015 special topic in *Frontiers in Human Neuroscience* focused on dialogue between music therapy and neuroscience; this included a conversation between music therapist Wendy Magee and music psychologist Lauren Stewart, which revealed the authors’ perception that many potential benefits of collaboration remain untapped. They noted challenges that echo those noted by Bunt et al. (1988), including a conflict between therapy’s need for individualized interactions and a preference for group-level design in non-therapy research (Magee & Stewart, 2015). Swijghuisen Reigersberg (2017) has additionally explored the potential value of applied ethnomusicology arts, health and wellbeing research. In recent years, small number of collaborations research studies on both clinical and non-clinical topics have included both music psychologists and music therapists (Erkkilä et al., 2021; Garrido, Eerola, & McFerran, 2017; Keeler et al., 2015; Van den Tol, Edwards, & Heflick, 2016), but such collaboration appears to make up only a small proportion of published research.

Germane to the question of what good might come of a more concerted effort to undertake such collaboration are the issues currently faced by the research branch of music therapy in general. Although music therapy has produced a large body of small-scale studies and developed a rich tradition of qualitative research, the growing demands of evidence-based practice (EBP) have challenged music therapy, raising debate about whether and how the processes of music therapy can be quantified and what impact quantitative research may have on

practice. Though broadly in favor of EBP and quantitative research, Wigram and Gold, (2012) caution that “The impact of strict-EBM and EBP protocols may have a tendency to undermine healthcare and pull practitioners away from humanistic roots,” (p. 168). Less ambivalent, Aigen (2015) describes EBP as an existential threat to the profession of music therapy, painting a worst-case scenario in which, “. . . music therapists lose the ability to alter interventions in the moment, and they become forced to adhere to strict, predetermined protocols” (p. 18). In other parts of music therapy’s varied ranks, Cochrane reviews of the effectiveness of music therapy with several populations, including those with autism, schizophrenia, and acquired brain injury have been published (Geretsegger, Elefant, Mössler, & Gold, 2014; Geretsegger et al., 2017; Magee, Clark, Tamplin, & Bradt, 2017). These generally indicate possible benefits of music therapy, though a bit more than half of the evidence used is ranked as low or very low quality, and the rest is of moderate quality. That is, although research is promising there is substantial room and need for improvement.

Nevertheless, a degree of discomfort with quantitative methodologies persists, particularly as many music therapists point to the therapeutic relationship as a key element in their work (Kern & Tague, 2017) and sometimes balk at the notion that this could be quantified. Ansdell (2014) writes that seeing relationship as the key element in music therapy “is to locate the work within a wider whole that is humanistic, non-material, and qualitative” (p. 812), while Aigen (2015) argues that, as a mechanism of therapeutic change, relationship “cannot be validated, because it is too variable, too individual” (p. 17). Music therapy as a field is thus in a complex and somewhat delicate position regarding quantitative research, in a world where healthcare funding increasingly demands it.

This issue was thrown into relief recently, when a long-awaited, multi-site, randomized control trial of the effects of improvisational music therapy on the social functioning of children with autism spectrum disorders (ASD) failed to show any benefits of music therapy over standard care (Bieleninik et al., 2017). Janzen and Thaut (2018) responded by suggesting that music therapy for autism could improve by adopting the methods of neurologic music therapy (which have proven notably effective for those with acquired brain injury and other neurological problems, and which generally follow strict protocols, see Thaut & Volker, 2014). Turry, writing from a perspective of Nordoff-Robbins music therapy (which puts a greater emphasis of improvisation and creativity), argued that the study’s main

weakness was the lack of attention to and measurement of the therapeutic relationship (Turry, 2018). In this vein, a follow-up study was conducted using the same data, in which it was hypothesized that the quality of the therapeutic relationship would predict the outcome of therapy. Results, however, not only failed to support this hypothesis, but ratings of the quality of the therapeutic relationship were significantly negatively correlated with the severity of the children’s autism; that is, children with less severe autism were rated as having a better therapeutic relationship within music therapy sessions (Mössler, Schmid, Aßmus, Fusar-Poli, & Gold, 2020).

While surely an uncomfortable result for champions of the therapeutic relationship as the key mechanism in music therapy, the authors of said study laudably discuss this finding candidly as pointing to ways that therapeutic practice could be improved alongside discussion of the need for improved research methods. This provides an important illustration of why, although it is certainly true that some aspects of music therapy processes and the therapeutic relationship are best described qualitatively. Subjective understanding alone is not sufficient either for those who fund treatment or, more importantly, those receiving it; clinicians are not immune to common forms of cognitive bias (Klein & McColl, 2019; Macdonald & Mellor-Clark, 2015), and, as described by early humanist psychologist Carl Rogers (1961/2008), it is unlikely that any therapeutic relationship exists without “unknown flaws, imperfections, blind spots” (p. 210).

However, music therapy need not choose between unsatisfying reductionism and unsatisfying lack of objectivity. New solutions are suggested by the research work that has been done in music psychology in the decades since Bunt et al. (1988) discussed the challenges to collaboration. The advent of computational resources capable of handling highly dimensional data has allowed researchers studying neural responses to music begin to use naturalistic music stimuli in studies rather than more easily controlled (but less ecologically valid) MIDI recordings or sine waves (e.g., Alluri et al., 2012; Cong et al., 2013; Omigie, Lehongre, Navarro, Claude, & Samson, 2019), and to understand the neural processing of music in terms of networks rather than regions of interest (e.g., Moorthigari, Carlson, Toiviainen, Brattico, Alluri, 2020). Similarly, those studying motor responses to music have begun to analyze complex, whole-body movements (e.g., Burger, 2013; Toiviainen, Luck, & Thompson, 2010) and tackle the challenges of analyzing movement in social settings (e.g., Carlson et al., 2018; Solberg & Jensenius, 2017); music performance as a social behavior is also being studied (e.g., Novembre,

Ticini, Schütz-Bosbach, & Keller, 2014). Researchers have additionally used indirect (e.g., Tarr, Launay, Cohen, & Dunbar, 2015) and direct (e.g., Keeler et al., 2015; Nilsson, 2009) measure of how neurohormones respond to musical engagement. Even individuality can, in some modalities, be quantified; Carlson, Saari, Burger, and Toiviainen (2020), for example, used computational analysis of free, spontaneous dance movement to identify individual dancers at a rate of over 90%.

In short, music psychology research now has at its disposal many more research paradigms, technologies, and analysis techniques suited specifically to dealing with complex, individualistic behaviors and physiological responses in naturalistic settings. It seems inarguable that music psychology is better equipped to meet the challenges inherent to music therapy research than it was thirty years ago, and, by following this direction of research, to enrich its own base of understanding musical processes and experiences in complex and diverse contexts. These advances particularly offer new possibilities for music therapy research that elucidates process as opposed to outcome; greater understanding of the physiological, neurological, motoric, and biochemical mechanism that underly changes that take place in music therapy sessions may even improve music therapy practice. A recent example of this is found in Sharda et al. (2018), who demonstrated that music therapy improves auditory-motor connectivity in children with autism. In the advent of individualized medicine and precision psychology, however, these advances may also offer music therapy relevant and accepted outcome measures in the not too distant future (Bzdok & Meyer-Lindenberg, 2018; Fernandes et al., 2017; Topol, 2014; Torres et al., 2016).

Interdisciplinary collaboration is, however, its own challenge. It has long been a buzz word and idea that has been both applauded and maligned (Hyer, Fairchild, Abraham, Mezey, & Fulmer, 2000; Pierce, 1999). Interdisciplinarity has implications for teaching, research, and practice in a variety of fields (Chettiparamb, 2007) and connotes the crossing of boundaries between disciplines (Friman, 2010) for purposes such as knowledge aggregation and unification or for the application of usually incommensurable means towards a common goal (Karlqvist, 1999). Almost inherent to interdisciplinary work are challenges of communication across discipline boundaries and reconciling differences in approach and philosophy; to put it plainly, the challenges of getting people from different backgrounds to work together productively. Osbeck and Nersessian (2017) frame the problem of the “inescapable psychological factors” (p. 207) of interdisciplinarity in terms of

epistemic identities, a concept dealing with what an individual or a culture within a discipline considers to be good evidence, and what is considered good data and good analysis.

Positioning, a key idea in describing interdisciplinarity for Osbeck and Nersessian (2017), is drawn from sociology research. It refers to an interactionist, dynamic approach to understanding social conflict and discourse, in which participants within an interaction do not fulfill static roles but define themselves and each other relative to one another. In introducing the idea, Davies and Harre (1982) provide an example dialogue in which a man and a woman work through conflicting views about a mutual experience through defining and redefining themselves and each other in terms of power over and responsibility for the situation (whose idea it was to go for a walk, whether someone was “dragged” or chose to participate). Osbeck and Nersessian provide examples from their study of researchers working in an interdisciplinary biomedical engineering lab, with computer modelers describing the biologists as “mathematically challenged” and narrow minded, while the biologists describe the modelers as impractical and not knowing “how to ask the right question” (pp. 247–248). The authors note the importance of such statements to identity in terms of defining belongingness and differentiation (p. 239), advocating an approach to interdisciplinarity that accepts and meets these challenges through encouraging active engagement and education between collaborating disciplines rather than writing such statements off as bad attitudes.

Understanding how music therapists and music psychologists position one another, as well as their overall perceptions and expectations of interdisciplinary research, thus seems to be an essential first step in making a serious attempt to strengthen both fields through collaboration. The aim of the current study, therefore is to explore the questions of 1) what are the attitudes of professionals and students in both fields regarding potential interdisciplinary research, and 2) whether there is evidence of any differences between music therapists and music psychologists in individual differences such as personality traits and values that may influence the success of future collaborative efforts. As the authors were aware of no previous empirical studies about this topic, no formal hypotheses were formulated.

Method

PARTICIPANT RECRUITMENT

Participants were recruited from professional e-mail lists including those disseminated by the European

Society for the Cognition of Music (ESCOM), the International Conference of Students of Systematic Musicology (SysMus), and the British Association of Music Therapists (BAMT). Participants were free and encouraged to forward the survey to lab members and colleagues who may not have received other e-mails. The survey was also shared using social media pages relevant to music psychology and music therapy, e-mailed to professional contacts of the first author, and shared on personal social media pages by several prominent professionals in both fields. Because the survey was shared using electronic means, it was not possible to track exactly how many potential participants it reached or to estimate a response rate. The survey was completed by 123 participants, 100 of whom completed the entire survey, while the remaining 23 completed only the first part of the survey. As this first part included questions about interdisciplinary attitudes, which was considered the most important part of the survey, these partial responses were retained for analysis.

MEASURES

Participants were presented with demographic questions and questions about their experience in their professional field regarding populations and research measures. This was followed by a series of eight, six-point Likert-scale questions about their interest in, and attitude towards, potential collaboration with the other discipline as appropriate, depending on whether they indicated their profession as being in music therapy or music psychology. For example, participants who indicated working in music psychology were asked to rate their agreement using the six-point Likert scale with statements such as “I am interested in collaborating with music therapists” and “Music therapy is relevant to my research,” while those who indicated working in music therapy were asked to rate their agreement with statements such as “I am interested in collaborating with music psychologists” and “Music psychology is relevant to clinical music therapy.” In some cases, both cohorts were asked to rate identical questions, such as, “Music therapy is generally based on sound scientific research,” and “I think collaboration between music therapy and music psychology would be fruitful for both fields.” These questions were developed by the authors for the purposes of the current exploratory study only. One music therapy doctoral student and one music psychology doctoral student additionally read and gave feedback in the development of the questions.

Following these questions, participants were given the opportunity to respond freely to the question of what potential challenges and benefits they saw in

interdisciplinary work between music psychology and music therapy.

In addition to demographic information and questions related to interdisciplinary research, the survey included several pre-existing self-report measures of individual difference, specifically the Ten Item Personality Inventory (TIPI) (Gosling, Rentfrow, & Swann, 2003). This inventory measures traits defined by the Five Factor Model (FFM) of personality, namely Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism, which has been widely validated over several decades (John & Srivastava, 1999; McCrae, 2009).

Participants also filled out the Revised Dogmatism Scale RDS (Shearman & Levine, 2006). The concept of dogmatism, or rigidity of beliefs, as a cognitive style with individual differences was initially developed by Rokeach in 1960, who developed an initial 40-item unidimensional scale that has been variously revised and updated. Sherman and Levine’s (2006) revision and confirmatory factor analysis of the scale deals with previous criticisms such as the length of the measure and the lack of reverse-score items, resulting in a 23-item scale in which participants rate their agreement with statements such as, “There is a single correct way to do most things,” and “Different points of view should be encouraged” on a five-point scale.

Finally, participants were asked to fill out the Twenty Item Values Inventory (TwIVI) (Sandy, Gosling, Schwartz, & Koelkebeck, 2017), an abbreviation of the 40-item Portrait Values Questionnaire developed by Schwartz et al. (2001). Previous work has found that values are related to, but distinct from, personality traits. The TwIVI measures ten values: Conformity, Tradition, Benevolence, Universalism, Self-direction, Stimulation, Hedonism, Achievement, Power, and Security, by asking participants to rate their self-perceived similarity with characters described in such ways as, “S/he thinks it’s important that every person in the world be treated equally. S/he believes everyone should have equal opportunities in life.” Ratings are on a six-point scale, and each of the ten values is evaluated with two questions. Due to systemic variation in how people generally report values, each participants’ score is additionally mean-centered against his or her own mean score, as recommended by the test-developers.

Music therapists were also presented with the Evidence Based Practice Questionnaire (EBPQ) (Upton & Upton, 2006). The EBPQ is a 24-item measure, originally developed for nurses. It consists of twenty-four questions, the first six questions evaluate Practice of EBP, which includes questions such as, “How often have you formulated a clearly answerable question as the beginning of

TABLE 1. Respondent Demographics ($n = 123$)

Gender	Female 91 (74%)	Male 32 (26%)					
Education	Bachelors 25 (20.3%)	Masters 64 (52%)	PhD 34 (27.6%)				
Profession	MP Researcher 35 (28.5%)	MP Student 16 (13%)	MP Educator 3 (2.4%)	MT Clinician 51 (41.5%)	MT Researcher 9 (7.3%)	MT Educator 5 (4.1%)	MT Student 4 (3.3%)
Age Range	18-24 7 (5.7%)	25-34 54 (43.9%)	35-44 25 (20.3%)	45-54 21 (17.1%)	55-64 12 (9.8%)	65+ years 4 (3.2%)	
Experience	1-3 years 33 (26.8%)	3-5 years 21 (17.1%)	5-10 years 31 (25.2%)	10-20 years 17 (13.8%)	20+ years 21 (17.1%)		
Nationality	EU 44 (35.8%)	UK 10 (8.1%)	N. America 54 (43.9%)	S. America 5 (4.1%)	Australia 7 (5.7%)	All Others 2 (2.4%)	
Country of Education	EU 47 (38.2%)	UK 21 (17.1%)	N. America 47 (38.2%)	All Others 8 (6.5%)			

the process towards filling this gap?"; four questions evaluate Attitude towards EBP, which includes rating agreement with statements such as "Evidence-Based practice is a waste of time"; and fourteen questions evaluate Knowledge/Skills of EBP, which includes self-rating of skills such as "Research skills" and "Ability to analyze critically evidence against set standards." This was not present to participants who identified themselves as music psychologists, as the EBPQ is designed for practitioners, not professional researchers.

PROCEDURE

The survey was administered using Survey Gizmo (www.surveygizmo.eu). Participants were informed via an introduction page about the nature of the research, that their data would be kept private and used anonymously and that the research would comply with all EU data protection laws. They provided consent by ticking a box, and were informed of their right to withdraw consent to participate at any time. These procedures followed ethical guidelines of the University of Jyväskylä, wherein voluntary, anonymous survey data of healthy adults not involving sensitive information, such as medical histories, does not require a formal ethical review.

After providing their informed consent, participants provided demographic information and answered questions about their experience in their field. This section was followed by the questions regarding interdisciplinary attitudes, which were followed by the self-report measures of individual differences; only those who indicated they were involved in the field of music therapy were present with the EBPQ.

At the end of the survey, participants were given the opportunity to provide further comments on the topic if

they so desired. Data were analyzed using SPSS (v. 26) and MATLAB (R2018A).

Results

PARTICIPANTS

Participants' demographics are displayed in Table 1. All demographics are for the full group of responders ($n = 123$) unless otherwise indicated. The largest proportion of responders reported being either clinical music therapists ($n = 51$) or music psychology researchers ($n = 35$), with the next largest groups being music psychology students ($n = 16$) and music therapy researchers ($n = 9$). Overall, of the 123 participants who completed the first part of the survey, a total of 69 were working or studying in the field of music therapy, while 54 were working or studying in the field of music psychology. Of the 100 participants who completed the entire survey, 50 were working in music psychology and 50 were working in music therapy. Of these the majority were female ($n = 75$), which was also the case in the group of 23 who responded to only the first part of the survey ($n = 16$).

Comparing participants between the music therapy and music psychology fields, the former had a greater gender imbalance (78.3% female) than the latter (68.5% female), although this difference was not statistically significant $\chi^2(1, N = 123) = 1.49, p > .05$. The participants in music psychology were younger (81.5% younger than 45) than those in music therapy (60.9% younger than 45), but this difference was not statistically significant, $\chi^2(6, N = 123) = 8.66, p = .19$. There were significant differences between the groups in distribution of education, $\chi^2(2, N = 123) = 14.05, p < .001$, with the majority of those in the music therapy field

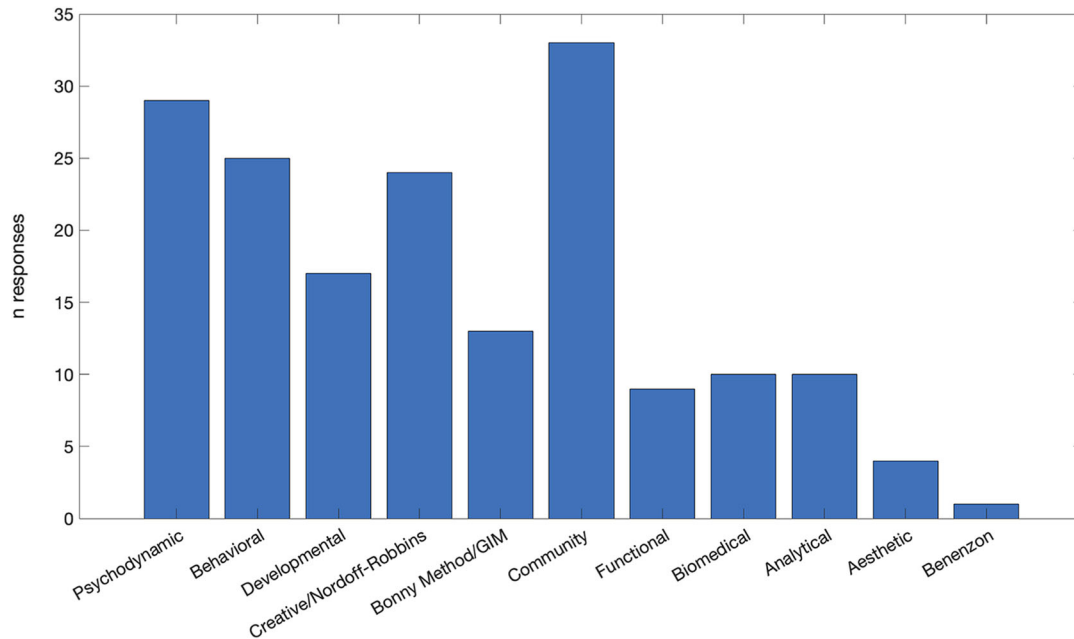


FIGURE 1. Music therapy approaches in which participants reported having training.

(59.4%) held master's degrees, followed by bachelor's (26.1%) and PhDs (14.5%). Those in the music psychology field most frequently held PhDs (44.4%), followed by master's (42.6%) and bachelor's (13%).

The two fields had significantly different profiles regarding years of professional experience $\chi^2(4, n = 123) = 11.97, p = .02$. Those in music therapy more often reported many years of experience than those in music psychology, with 24.6% reporting 20 or more years of experience, compared to only 7.4% of those in music psychology. However, for both professions, a significant number of participants reported between one and three years of experience, 29% and 24.1% for music therapy and music psychology respectively. This was the largest portion of responses for music therapy, while the largest portion of music psychologists, 31.5%, reported having between 5 and 10 years of experience. Music therapists reported having been trained in a variety of approaches, shown in Figure 1.

The most respondents indicated being trained in Community music therapy, followed by Psychodynamic, Nordoff-Robbins, Behavioral, and NMT models. In an optional free answer space, participant also indicated training in non-listed methods, including Family-centered care, Narrative Music Therapy and Resource-oriented music therapy.

Music Psychologists represented a fairly wide range of specializations, as show in Figure 2. The most frequently reported areas of research were Music Perception, Music

and Movement, Music and Emotion, and Music and Brain. In an option free answer space, participants further specific also indicated research in non-listed topic areas, including audio-visual interactions, digital musical instruments, and music-learning in nonmusicians. Overall, both Music Therapists and Psychologists seemed to broadly represent their fields, both of which are highly diverse.

To further clarify participants' backgrounds and knowledge of research, all participants were additionally asked about the specific methods they had used in the past to gather data, in either research or clinical contexts, the results of which can be seen in Figure 3.

In a clinical context, data gathering may take place during the assessment process, in which a client's level of functioning is appraised prior to treatment, as well as throughout the therapy process in order to track change or progress towards a discrete goal. Music Therapists and Music Psychologists were given identical options in this question. Results showed that the use of both pre-existing and self-developed questionnaires was a popular method for both groups. Interview, observation, and video data were used more by Music Therapists than Music Psychologists, while Music Psychologists were more likely to use perceptual ratings, motion capture, heart-rate monitoring and various types of neuroimaging.

To further explore participants' backgrounds and experiences, both Music Therapists and Music Psychologists were asked with which clinical populations they

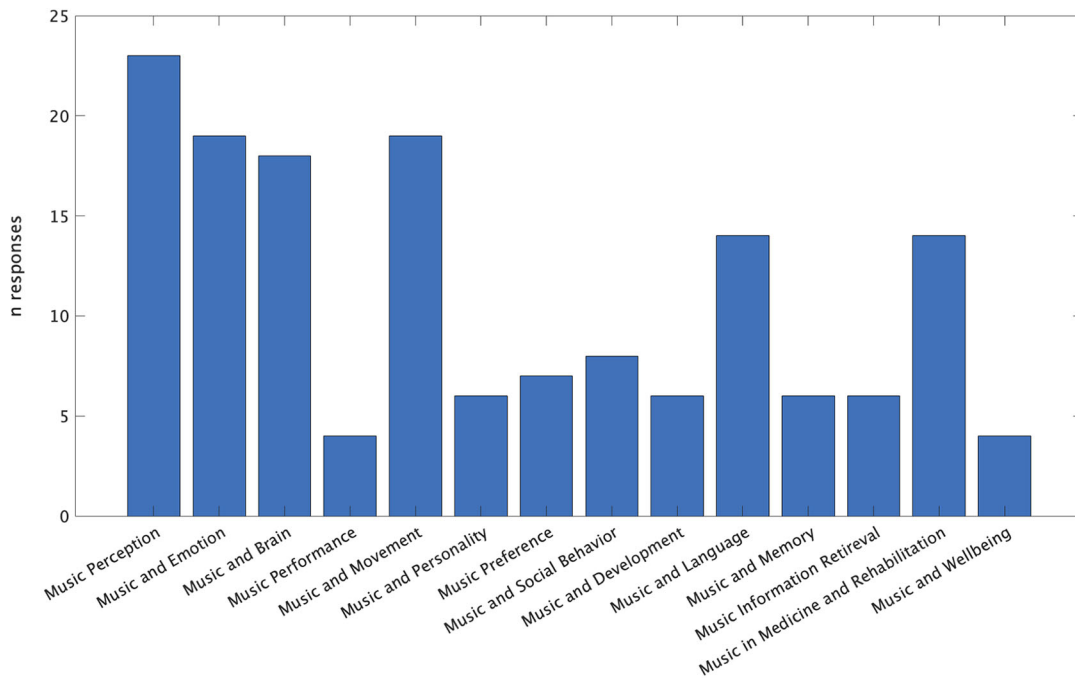


FIGURE 2. Music psychologists' areas of research.

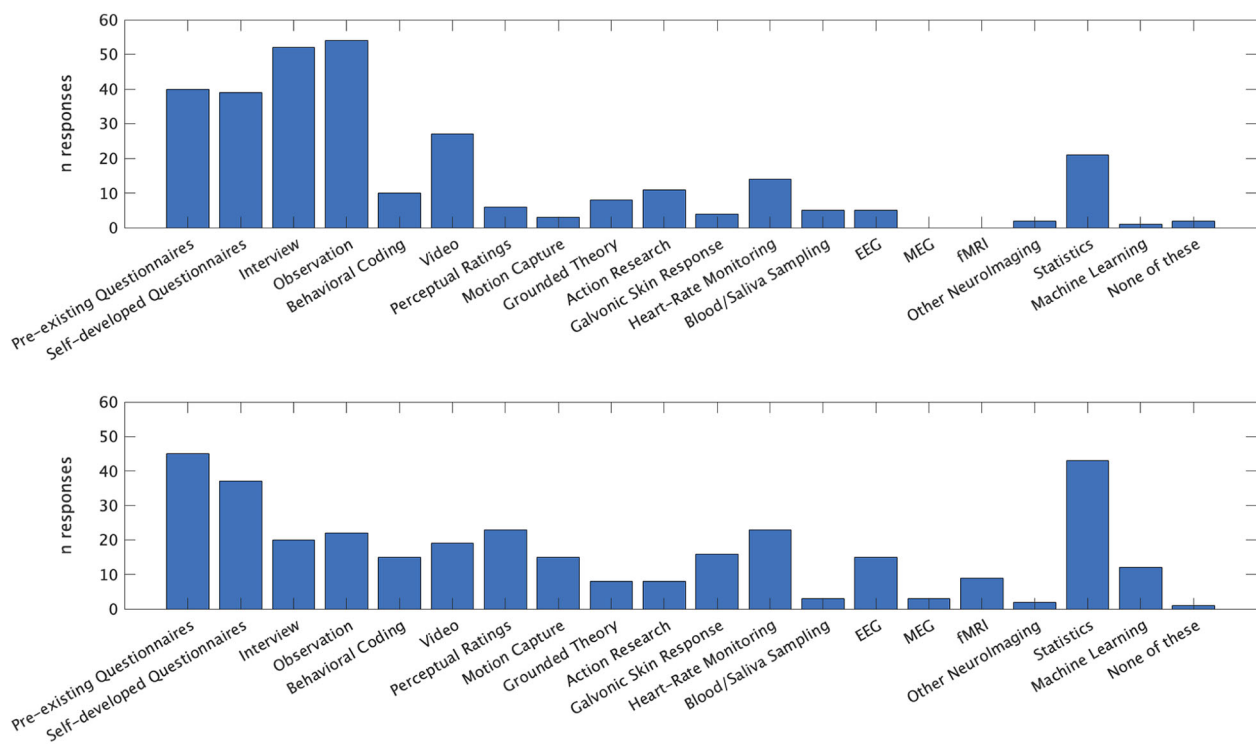


FIGURE 3. Data-gathering methods reported having been used by music therapists and music psychologists respectively.

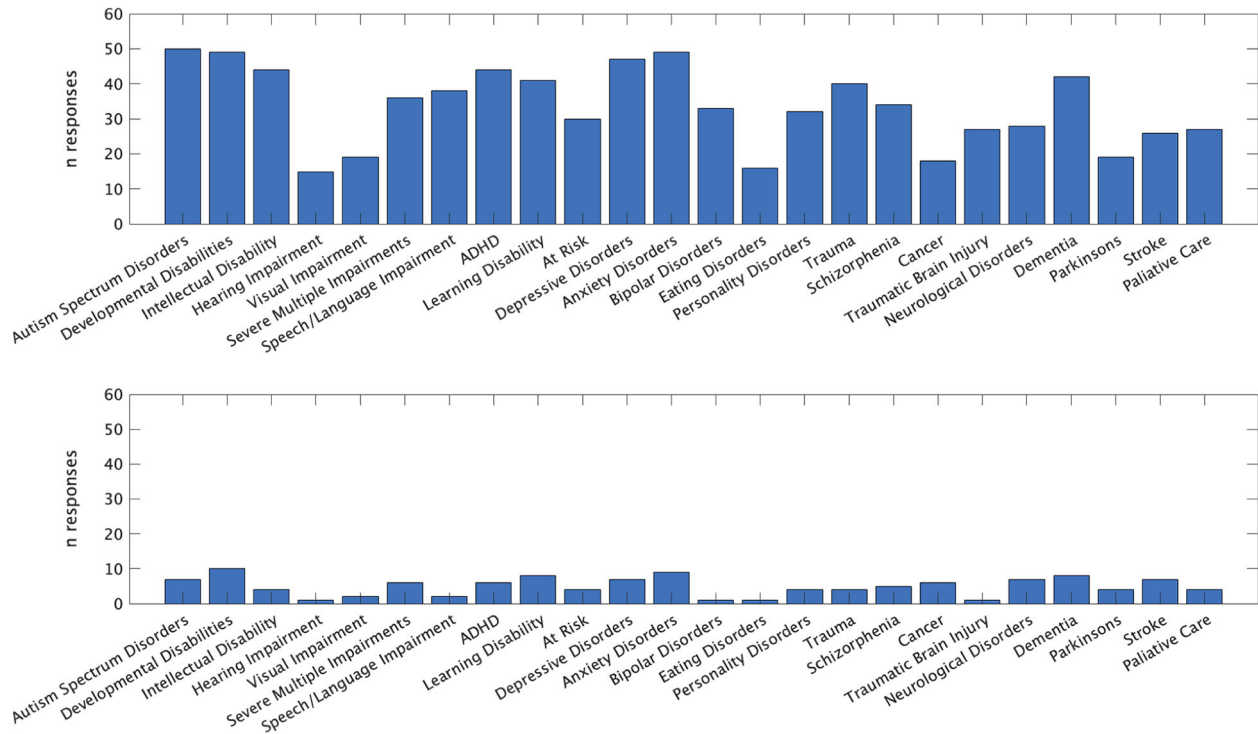


FIGURE 4. Participants' reported experience with various clinical populations.

had professional experience, the results of which are shown in Figure 4.

Unsurprisingly, Music Therapists reported notably more experience with diverse clinical populations, but some Music Psychologists also reported experience with clinical populations, particularly including developmental disabilities, anxiety disorders and dementia. Music Therapists reported experience with all listed clinical populations, although comparatively few had worked with people with hearing or visual impairments, eating disorders or cancer.

INTERDISCIPLINARY OPINIONS AND ATTITUDES

Music Therapists' and Music Psychologists' responses to the eight questions specifically about collaboration and perception of one another's fields are shown in Figure 5.

Independent sample *t*-tests revealed significant differences between the two groups on a number of questions. Slightly higher levels of interest in music psychology were reported by Music Therapists ($M = 5.12$, $SD = 1.32$) than by Music Psychologists in music therapy ($M = 4.33$, $SD = 1.51$), $t(121) = -3.01$, $p < .01$. Music Therapists also rated music psychology as more relevant to their work ($M = 5.17$, $SD = 1.12$) than Music Psychologists rated music therapy ($M = 4.31$, $SD = 1.51$),

$t(121) = -3.61$, $p < .0001$. Regarding knowledge of each other's field, Music Therapists rated themselves as slightly more knowledgeable ($M = 3.90$, $SD = 1.27$) of music psychology than did Music Psychologists of music therapy ($M = 3.35$, $SD = 1.59$), $t(119) = -2.06$, $p < .05$. Finally, Music Therapists were more strongly in agreement with the statement that music therapy is based on sound scientific research ($M = 4.39$, $SD = 1.51$) than were Music Psychologists ($M = 3.58$, $SD = 1.24$), $t(119) = -3.16$, $p < .01$. Figure 5 provides greater detail regarding these differences by depicting the distribution of answers over the six-point Likert scale.

MEASURES OF INDIVIDUAL DIFFERENCE

None of the measures of individual difference (TIPI, TwIVI, or DOG) scales showed significant skewness or kurtosis. Independent sample *t*-tests revealed a few significant differences between the two groups on a few scales. Higher levels of Neuroticism were reported by Music Psychologists ($M = 3.47$, $SD = 1.33$) than by Music Therapists ($M = 2.7$, $SD = 1.21$), $t(103) = 3.05$, $p < .01$. Music Psychologists rated Tradition lower as a value on the TwVI ($M = -1.90$, $SD = .94$) than did Music Therapists ($M = -1.38$, $SD = 1.13$), $t(98) =$

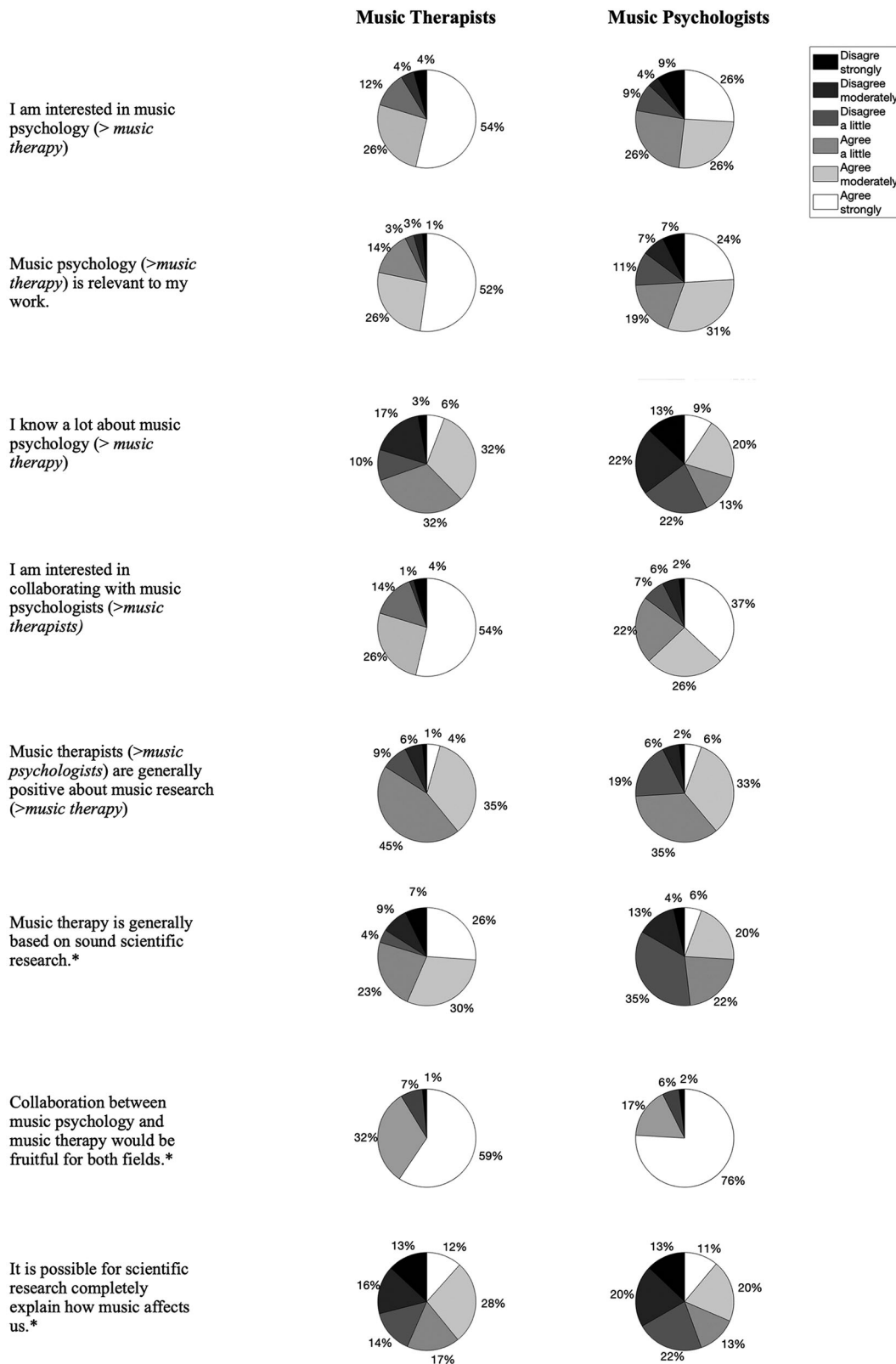


FIGURE 5. Responses to question about interdisciplinary research given by both music therapists and music psychologists. * = Question was identical for both groups.

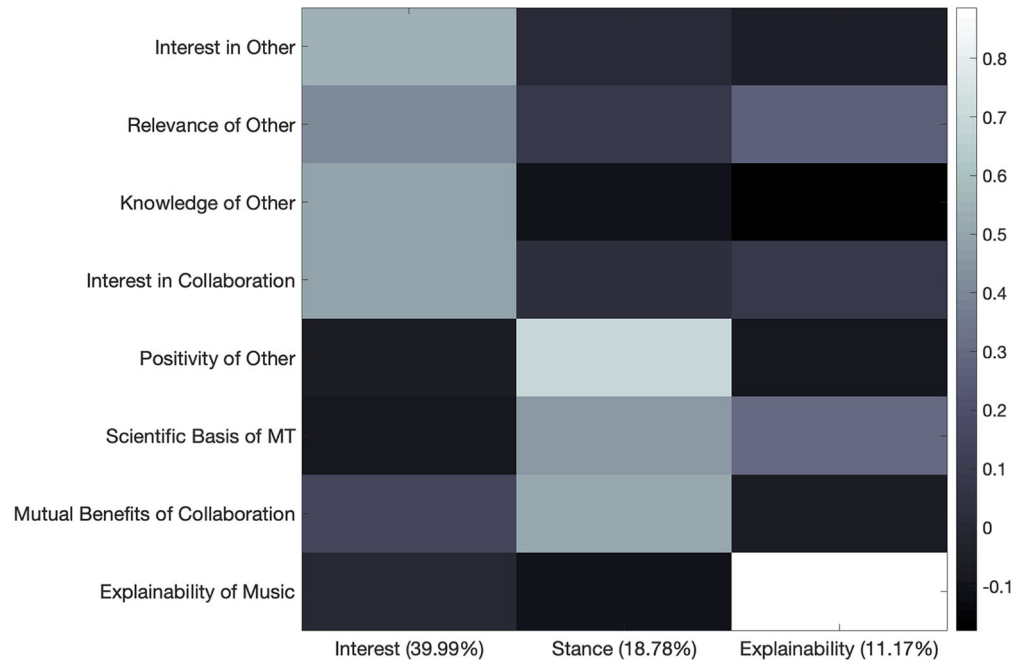


FIGURE 6. Varimax rotated PCA solution for seven questions regarding interdisciplinary interest and attitudes.

-1.89 , $p = .05$. However, Music Psychologists gave slightly higher ratings than Music Therapists for Self-Direction, ($M = 1.39$, $SD = .69$) and ($M = 1.04$, $SD = .97$), respectively, $t(98) = 2.57$, $p < .05$, and Hedonism, ($M = .29$, $SD = .87$) and ($M = -.12$, $SD = .89$), respectively, $t(98) = 2.51$, $p < .05$.

FURTHER EXPLORATORY STATISTICAL ANALYSIS

Further statistical analysis of these results was undertaken in an exploratory manner. Though the relatively small sample size in combination with the completion of multiple comparisons means these results should be taken as tentative, they are reported here to provide grounds for further discussion and guidance for future research into this novel topic.

Checks for normality revealed moderate negative skewness for the first, second, and fourth questions specific to interdisciplinary attitudes. However, the seventh question (whether collaboration would be mutually beneficial) was highly negatively skewed, suggesting strong agreement with the statement from nearly all participants with little variation. Therefore, question seven was removed from further analysis, as it was unlikely to provide further insight. After this, principal component analysis (PCA) using varimax rotation was performed on these questions in order to further understand the data and reduce dimensionality, if possible. Examination of the scree plot revealed a sharp

drop-off of explanatory power after three factors. The first three factors were found to explain 75.25% of variance and can be seen in Figure 6. PC1 explained 42.15% of variance and included high loadings for the first four questions regarding interest in, perceived relevance, perceived knowledge, and interest in collaboration with the other field. PC2 explained an additional 20.03% of the variance and included high loadings for perceived positivity of the other field towards the participant's own field, perceived scientific basis of music therapy, and a moderately high loading for perceived scientific explainability of music.

While the third component explained an additional 12.4% of variance, it was largely comprised of a high loading for the question regarding perceived possibility for science to fully explain the effects of music. This factor also included a high negative loading for perceived positivity of the other field towards one's own. Given the relatively small sample

size and the exploratory nature of the current analysis, it was decided to retain only PC1 and PC2 for further comparison. PC1 was labeled "Interest," while PC2 was labeled "stance."

Correlation analysis showed a few moderate significant correlations between participants' PC scores and individual difference scores, which can be seen in Table 2. Correlation analysis was done both for the group as a whole, and for Music Therapists and Music

TABLE 2. Pearson Correlation Coefficients For Significant Correlations Between Measures of Individual Difference and Interdisciplinary PC

	Interest (PC1)	Stance (PC2)
Whole Group		
TIPI-A (<i>n</i> = 105)	.23*	
TIPI-N (<i>n</i> = 105)	-	.33*
MPs		
TIPI-A (<i>n</i> = 53)	-	.31*
TwIVI-B (<i>n</i> = 50)	.30*	
MTs		
TIPI-A (<i>n</i> = 52)	-	.28*
TwIVI-T (<i>n</i> = 50)	-.29*	

Note: TIPI-A = Agreeableness; TIPI-N = Neuroticism; TwIVI-B = Benevolence; TwIVI-T = Tradition **p* < .05

Psychologists separately. Sample sizes are noted as not all participants completed these questionnaires fully. Only significant correlations are shown.

Most of the correlations found were positive. However, there was a negative correlation for Music Therapists between TWVI Tradition scores and Interest. Therapists' EBQ scores did not correlate significantly with their Interdisciplinary Interest or Stance scores.

DESCRIPTIVE ANALYSIS OF FREE ANSWERS

Participants' free text answers regarding potential interdisciplinary collaboration were also analyzed for content. Thirty-four Music Psychologists (62%) and 44 Music Therapists (63%) provided free answers to the question, "What are the potential challenges and potential benefits you would expect from collaborative research with music psychologists (> music therapists)?" A directed approach to content analysis was used, in which open coding was performed, guided by the research questions of clarifying the perceived challenges and benefits (Hsieh & Shannon, 2005). Analysis of answers was also guided by an *a priori* interest in positioning statements; that is, generalized descriptions of what members of a discipline think or are like, as this has previously been identified as a crucial aspect of interdisciplinary collaboration (Osbeck & Nersessian, 2017). Figure 7 provides an overview of the identified themes and the number of times each theme appeared in the data. It is notable that several themes (knowledge, research pragmatics, and methodologies) were mentioned by various participants in relation to both challenges and benefits of interdisciplinary collaboration.

Examples of further statements related to identified themes can be seen in Table 3.

Potential challenges brought up by both groups included difficulties with communication due to

differences in terminology and jargon between disciplines, as well as due to differences in priority and intention. Lack of knowledge of the other field was also frequently mentioned, sometimes generally and sometimes in the form of personal statements of the participants' own lack of knowledge. The blurring of discipline boundaries was raised as a concern chiefly by music therapists, several noting that it would not be appropriate for music psychology researchers to conduct music therapy research without appropriate music therapy training. Methodological challenges were raised by both groups, noting the trade-off between ecological validity and control.

Both groups suggested that a benefit would be increased scientific support for music therapy, while others suggested that the scientific benefits might be mutual, with music therapists being able to offer insights into higher order phenomenon as well as providing a basis for developing knowledge about music experiences and behaviors in non-typical populations, such as those with disabilities or mental illness. Mutual understanding and respect between disciplines was mentioned by both groups as a potential benefit of collaboration. Others considered more pragmatic concerns, such as the pooling of financial resources, as well as the distribution of expertise such that those "trained to do research can do actual research" while those "trained to do therapy can do therapy" (MT).

In three cases, themes were mentioned by at least one participant as a challenge and at least one other participant as a benefit. For example, while "Knowledge" was regarded as a challenge in terms of Music Therapists noting their lack of knowledge of the work of Music Psychologists as well as Music Psychologists' lack of knowledge about clinical populations but was also listed as a strength when perceived of as "overlapping domain knowledge" (MP). "Methodologies" were seen as a potential challenge in terms of finding appropriate methodologies for music therapy, but also as a strength in terms of expanding the range of research methods and study design practices available to both fields. "Resources" for research, namely time and funding, were suggested as a potential strength in that such resources could be pooled, and a potential weakness in that, for example, "a clinical setting requires heavier procedures when it comes to ethics, etc." (MP).

The majority of statements identified as positioning statements were about music therapists rather than music psychologists, even those coming from music therapists. Nearly all such statements were disparaging. Examples of such statements are given in Table 4. Music therapists were described as being ignorant of,

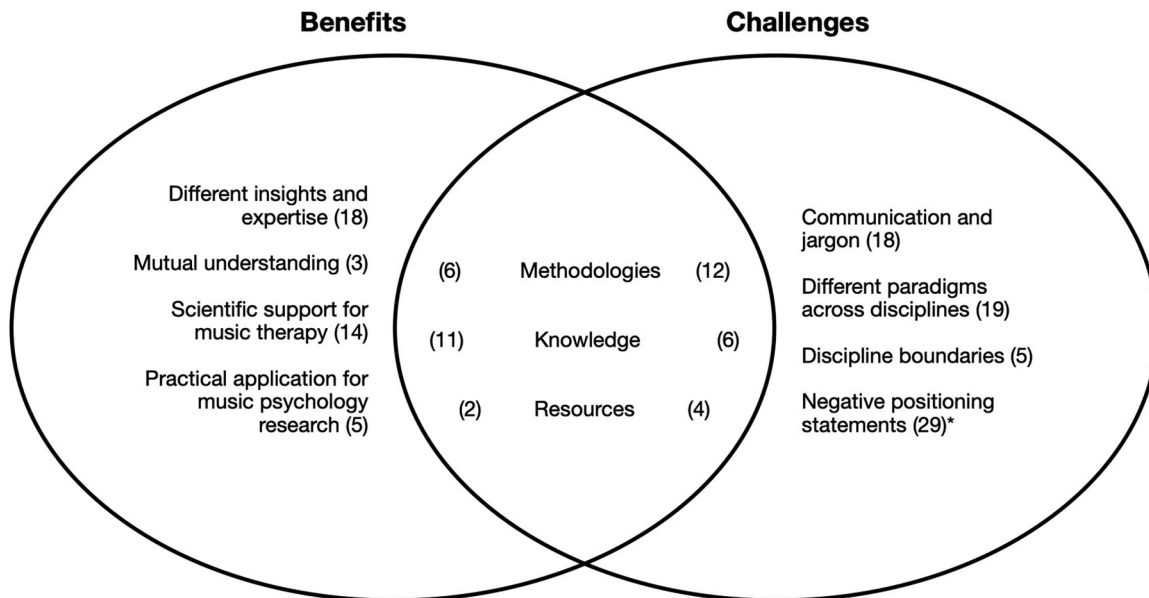


FIGURE 7. Overview of themes identified in free-text answers (number of instances in parentheses). *Negative positioning statements represent an a priori focus for the current analysis.

TABLE 3. Examples of Statements Given By Both MTs and MPs About the Potential Challenges and Benefits of Collaboration

Category	Theme	Example statement(s)
Challenges	Discipline boundaries	<ul style="list-style-type: none"> “Music psychologists treating patients without music therapy training is my biggest concern.”
	Communication	<ul style="list-style-type: none"> “[Music therapists] may also approach a topic with different terminology and concepts, which requires some translation.”
	Knowledge	<ul style="list-style-type: none"> “I feel many of the music science researchers I talk to have vague ideas that their work can have clinical applications“ but have no idea about the day to day realities of working with clinical populations”
	Methodologies	<ul style="list-style-type: none"> “I am unsure exactly what music psychologists do.” “[A challenge is] difficulty with confounding variables in clinical contexts, potentially general difficulties doing quantitative research in music therapy [. . .]” “Achieving scientific rigor through standardization of treatment would be a challenge.”
Benefits	Scientific support for MT	<ul style="list-style-type: none"> “[A benefit is] elevating music therapy’s acceptance as a verified treatment option to health professionals and [the] public.” “Benefits would be that [music therapy] interventions could be more targeted and research-based.”
	Pooling expertise	<ul style="list-style-type: none"> “The benefit of having someone from another field who uses different methods, tools, etc. can promote well thought-out study designs, encourage alternative explanations for phenomena and lead to more concise definitions between the fields.”
	Resources	<ul style="list-style-type: none"> “Music therapists don’t often have time or money to do research so music psychologists could aid us in that way.”
	Mutual Respect	<ul style="list-style-type: none"> “[A benefit is] better understanding of each other’s disciplines. Hopefully greater acceptance especially of music therapists by music psychologists.”

uninterested in, and even hostile towards quantitative research, as well as being biased in conducting research. Discipline boundaries were raised regarding music

therapists, who were described as “territorial” or “defensive” and unaccepting of research not involving music therapists directly. Music psychologists, on the other

TABLE 4. Examples of Positioning Statements Given By Participants

Writer's Profession	Example statement
MP	<ul style="list-style-type: none"> • “Many music therapists have little respect for quantitative methods.”
MP	<ul style="list-style-type: none"> • “Based on previous interactions with one well-known music therapist, I have been given the impression that they did not see the value of basic science research.”
MT	<ul style="list-style-type: none"> • Music science folks don't seem in practice to value the lived clinical experiences that music therapists can bring. On the other hand, music therapists are very ignorant of music psychology research and have few ideas of translational applications to clinical work.”
MP	<ul style="list-style-type: none"> • “While a therapist is interested in specific outcomes for a patient, a researcher would be more motivated to find insights that are generalizable.”
MT	<ul style="list-style-type: none"> • “I am apprehensive about music psychologists and their perspectives on music therapy, based upon some prominent researchers and the lack of credibility given to MT as a whole.”
MT	<ul style="list-style-type: none"> • “I believe a lot of things happen in music therapy without us being able to put it into words. The moment is meaningful in itself without trying to make theories about it. I imagine that this might be difficult for the music psychologist to comprehend.”
MT	<ul style="list-style-type: none"> • “[A challenge is] MTs lack of acceptance of related fields utilizing music, MT community policing the use of music and demanding that a music therapist be involved in any music research.”
MP	<ul style="list-style-type: none"> • “Music therapy [has a] extremely strong confirmation bias in its practitioners, students, researchers and research.”

hand, were described as being uninterested in, and ignorant of, music therapy and possibly unable to understand music therapy.

Discussion

The current article represents the first formal publication dealing with issues specific to interdisciplinary collaboration between music therapy and music psychology in several decades, and to the authors' knowledge the first attempt to directly quantify the opinions of professionals and students in the fields through an online survey. Overall, participants broadly represented the diversity of both fields as they stand within Western industrialized nations, although non-Western and developing countries were not well represented. As expected, music psychologists reported more experience with a variety of research methodologies, while music therapists reported more experience with clinical populations. It is important to note, however, that neither group completely monopolized either area of experience. Music therapists reported more experience than music psychologists with interview and observation, in line with the idea of the importance of qualitative methods of understanding in the field. However, it should be noted that the majority of music therapy participants identified themselves as clinicians rather than researchers. These numbers should therefore not be considered fully representative of the research branch of music therapy. That said, it is arguably more important to understand the experiences and abilities of clinical music therapists in terms of data collection, given that

given that collaborative work should include clinicians as well as researchers. The involvement of working clinicians in interdisciplinary research is of notable importance in ensuring that any results from said research is relevant, practical, and applicable for music therapists, to avoid knowledge becoming lost in research-practice gaps (Huzair, Borda-Rodriguez, Upton, & Mugwagwa, 2013; MacDermid & Graham, 2009; Scurlock-Evans, Upton, & Upton, 2014).

Opinions from both groups regarding the potential for interdisciplinary collaboration were generally positive. While this may in part reflect a self-selection bias in the sampling (participants already interested in and positive about collaboration may have been more likely to answer the survey), these results do suggest that the necessary motivation to pursue such work is present in some level within both fields. Music therapists rated their levels of interest in music psychology and their perceptions of its relevance to their work significantly more highly than did music psychologists. While these results may reflect more eagerness from the side of music therapy to collaborate than from music psychology, it is worth bearing in mind that music therapists also rated themselves as significantly lower in Neuroticism than did music psychologists. As Neuroticism comprises a tendency to experience negative affect, the results may reflect dispositional difference in that music therapists may have been predisposed to evaluate the questions from a positive affective state. Music therapists also rated their knowledge of music psychology more highly than music psychologists rated their knowledge of music therapy, which may be explained

by the slightly older and more experienced cohort of music therapists. However, a number of music therapy training programs in Europe require music therapy students to take courses in music psychology, music neuroscience, and research techniques (Stegemann, Schmidt, Fitzhum, & Timmermann, 2016), while in the United States the American Music Therapy Association requires a course in music psychology for all music therapy bachelor degree programs (American Music Therapy Association, n.d.b.), such that music therapists often receive more training in music psychology than the reverse.

Even considering selection bias, music therapists' high ratings of interest in collaboration with music psychologists would seem to belie the many statements given in free answers, from both music psychologists and music therapists, suggesting that music therapists lack interest in or respect for quantitative methods and basic research. The quantitative results suggest that such statements do not accurately represent the entirety of the music therapy field. It seems likely that some music therapists indicated their own interest in interdisciplinary collaboration in response to Likert scale questions, while voicing doubts about the interests of music therapists in general in the free-text answers. While it is hardly news that broad stereotyping is a poor way to conceptualize a group of people, the quantitative results suggest that there is more motivation for collaborative research in the music therapy field as a whole than is assumed (assumptions being evident from the free text answers).

Although a range of individual differences were tested, it is worth noting that there were very few significant differences between the two groups, again suggesting that perceived differences do not necessarily reflect reality. In the current sample, at least, it is particularly noteworthy that neither group reported significantly greater levels of dogmatism than the other, although free text answers suggest the expectation that music therapists would be more likely to have rigid belief structures. In one case, a music psychologist references a personal encounter with a "well-known" music therapist from which the participant concluded that basic research is not valued by music therapists. In another, a music therapist notes that their perception of music psychologists as being dismissive of music therapy is based on "some prominent researchers." A tentative explanation for the discrepancy in between negative perceptions as seen in such positioning statements and the generally positive attitudes expressed through questionnaire responses is that individuals who are more dogmatic may be more vocal about their

opinions and epistemic values, leading to skewed perceptions of music therapists' and music psychologists' attitudes as a whole. That both cases refer to an individual perceived to be distinguished in their field may suggest as well that dogmatism is associated with professional success or perceived professional success, but this would require further research to clarify.

Principal component analysis of answers regarding collaboration revealed two main components: Interest and Stance. The former included perceived relevance of the other field and eagerness to collaborate, the latter included perceived positivity of members of the other discipline towards one's own, as well as the perceived scientific basis for music therapy. There was a significant positive correlation between Agreeableness and Interest in the whole group, and between Agreeableness and Stance in both groups when considered separately. There was also a positive correlation between Interest and valuing of Benevolence in music psychologists specifically, suggesting that music psychologists who are more interested in helping others are more likely to be interested in music therapy, and a negative correlation between music therapists' valuing of Tradition and their interest in collaboration. However, it is important to note that in general, analysis did not reveal many significant influences of individual differences in personality or values on Interest and Stance, and no relationship was found between music therapists' opinions and practices concerning Evidence Based Practice and either factor. These results overall suggest that, in reality, difference of personality and general values and attitudes between music psychologists and music therapists are probably minor.

Osbeck and Nersessian (2017) noted changes in perspectives of biologists and computational modelers about each other's disciplines after their participation in a month-long course in the others' topic. Participants described the development of intuition and changes in opinion about the topics, leading the authors to suggest that even this relatively short period of training to be useful in developing functional interdisciplinary relationships. This could certainly be one option to address some of the potential challenges to collaboration raised by participants, such as lack of knowledge about the other discipline, and difficulty with communication related to discipline-specific terminology. Given that music psychologists reported feeling less knowledgeable about music therapy than therapists did of music psychology, such educational opportunities may be particularly important for music psychologists interested in collaborating with music therapists. Issues related to discipline boundaries may also be indirectly mitigated

by such education, as music psychologists may become more aware of the legal and professional concerns of therapists in terms of delivering therapeutic treatment to study participants, while music therapists may be more empowered to articulate their own position in relation to basic scientific research. Methodological challenges related to researching music therapy may not be easily resolved, but as previously discussed, new methodological and technological developments in music psychology research may allow for increased ability to adequately meet these challenges and may even allow music therapy to emerge as an early leader in movements towards individualized medicine and precision psychiatry (Bzdok & Meyer-Lindenberg, 2018; Torres et al., 2016).

It is worth noting that, in nearly all relevant free answers, and admittedly in the current discussion as well, the assumed character of interdisciplinary collaboration is one of music psychology helping and strengthening music therapy research. This is largely explained by music therapy as a field including a research branch (Bruscia, 2014) in a way that music psychology does not include a therapy branch, rather than any particular merits of either field, but need not be the case that collaborative efforts are one-sidedly beneficial. Helping others is a sufficient and worthy impetus to pursue study of music-related experiences, behaviors, and responses in individuals with illness or disability, but it should not be forgotten that such research has the potential to produce results with relevance to our understanding of music in general. Studies of individuals with amusia have, for example, contributed notably to our knowledge of music cognition (Peretz, Champod, & Hyde, 2003; Phillips-Silver et al., 2011), as has work related to cochlear implants (McDermott, 2004). Studies of children with dyslexia have provided insights into relationships between music, particularly rhythm, and language perception (Huss, Verney, Fosker, Mead, & Goswami, 2011; Overy, 2003; Thomson, Fryer, Maltby, & Goswami, 2006). Many music

therapists in the current study reported experience with clients with autism spectrum disorders (ASD), which is defined in terms of difficulty with social functioning but also motor control and development (Gilotty, Kenworthy, Wagner, Sirian, & Black, 2002; Trevarthen & Delafield-Butt, 2013; Zachor, Ilanit, & Itzhak, 2010). Both of these areas of functioning relate to the concept of entrainment within music psychology (Phillips-Silver, Aktipis, & Bryant, 2010), meaning that better understanding of how music is processed and experienced in ASD could lead to important insights about sensorimotor and affective entrainment, and the relationship between the two.

A number of limitations of the current study should be noted. First, the sample size for this study was quite small, and further research incorporating larger sample sizes is needed to gain a clearer picture and to corroborate current results. Other types of data are not easily accessible via online survey, such as interview data or, perhaps most relevantly, ethnographic data derived from actual collaborative work between music psychologists and music therapists. These data could provide substantially broader understanding of the challenges and benefits of such work. However, as this study is the first known to the authors to explore these questions empirically in relation to music psychology and music therapy specifically, the current paper nevertheless offers a valuable contribution from which further research can follow.

Considering these points in the context of the current study results, it seems clear that there are grounds for further exploration and discussion of increased interdisciplinary collaboration between music psychology and music therapy. The challenges of such work, while not inconsiderable, are also not insurmountable, particularly if research-informed approaches to interdisciplinarity are deliberately pursued. The authors hope that this study represents a useful first step in this direction, towards a future of closer connections between these two distinct but indisputably related disciplines.

References

- ABRAMS, B. (2015). Humanistic approaches. In B. L. Wheeler (Ed.), *Music therapy handbook* (2nd ed.). Guilford Press.
- AIGEN, K. (1991). The voice of the forest: A conception of music for music therapy. *Music Therapy*, 10(1), 77–98. <https://doi.org/10.1093/mt/10.1.77>
- AIGEN, K. (2015). A critique of evidence-based practice in music therapy. *Music Therapy Perspectives*, 33(1), 12–24. <https://doi.org/10.1093/mtp/miv013>
- ALLURI, V., TOIVAINEN, P., JÄÄSKELÄINEN, I. P., GLERAN, E., SAMS, M., & BRATTICO, E. (2012). Large-scale brain networks emerge from dynamic processing of musical timbre, key and rhythm. *NeuroImage*, 59(4), 3677–3689.
- AMERICAN MUSIC THERAPY ASSOCIATION (n.d.a). *The history of music therapy*. <https://www.musictherapy.org/about/history/>

- AMERICAN MUSIC THERAPY ASSOCIATION (n.d.b) *Professional requirements for music therapists*. www.musictherapy.org/about/require
- ANGLADA-TORT, M., & SANFILIPPO, K. R. M. (2019). Visualizing music psychology: A bibliometric analysis of Psychology of Music, Music Perception, and Musicae Scientiae from 1973 to 2017. *Music and Science*, 2, 1–18. <https://doi.org/10.1177/2059204318811786>
- ANSDELL, G. (2014). Yes, but, no, but: A contrarian response to Cross (2014). *Psychology of Music*, 42(6), 820–825. <https://doi.org/10.1177/0305735614544189>
- BAGLEY, R. (2005). The prehistory of Chinese music theory. *Proceedings of the British Academy*, 131(1989), 41–90. <https://doi.org/10.5871/bacad/9780197263518.003.0002>
- BIELENINIK, Ł., GERETSEGG, M., MÖSSLER, K., ASSMUS, J., THOMPSON, G., GATTINO, G., ET AL. (2017). Effects of improvisational music therapy vs enhanced standard care on symptom severity among children with autism spectrum disorder: The TIME-A randomized clinical trial. *Journal of the American Medical Association*, 318(6), 525–535. <https://doi.org/10.1001/jama.2017.9478>
- BONDE, L. O. (2019). Music therapy: A historical perspective. In I. N. Jacobsen, S. L. Bonde, L. O., & Pedersen (Eds.), *A comprehensive guide to music therapy*. (2nd ed., pp. 17–28). Jessica Kingsley Publishers.
- BONDE, L. O., TRONDALEN, G., & WIGRAM, T. (2019). Cognitive-behavioural music therapy. In S. Jacobson, I. N. Pederson, & L. O. Bonde (Eds.), *A comprehensive guide to music therapy: Theory, clinical practice, research and training*. (2nd ed., pp. 183–185). Jessica Kingsley Publishers.
- BRUSCIA, K. E. (2014). *Defining music therapy* (3rd ed.). Barcelona Publishers.
- BUNT, L., CROSS, I., CLARKE, E., & HOSKYN, S. (1988). A discussion on the relationships between music therapy and the psychology of music. *Psychology of Music*, 16, 62–70. <https://doi.org/10.1177/0305735688161006>
- BURGER, B. (2013). *Move the way you feel: Effects of musical features, perceived emotions, and personality on music-induced movement*. Retrieved from https://jyx.jyu.fi/dspace/bitstream/handle/123456789/42506/978-951-39-5466-6_vaitos07122013.pdf?sequence=1
- BYERS, K. L. (2016). *A history of the music therapy profession*. Barcelona Publishers.
- BZDOK, D., & MEYER-LINDENBERG, A. (2018). Machine learning for precision psychiatry: Opportunities and Challenges. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 3(3), 223–230. <https://doi.org/10.1016/j.bpsc.2017.11.007>
- CARLSON, E., BURGER, B., & TOIVIAINEN, P. (2018). Dance like someone is watching. *Music and Science*, 1, 205920431880784. <https://doi.org/10.1177/2059204318807846>
- CARLSON, E., SAARI, P., BURGER, B., & TOIVIAINEN, P. (2020). Dance to your own drum: Identification of musical genre and individual dancer from motion capture using machine learning from motion capture using machine learning. *Journal of New Music Research*, 0(0), 1–16. <https://doi.org/10.1080/09298215.2020.1711778>
- CHANDA, M. L., & LEVITIN, D. J. (2013). The neurochemistry of music. *Trends in Cognitive Sciences*, 17(4), 179–193. <https://doi.org/10.1016/j.tics.2013.02.007>
- CHETTIPARAMB, A. (2007). *Interdisciplinarity: A literature review* (J. Canning, Ed.). The Interdisciplinary Teaching and Learning Group.
- CONG, F., ALLURI, V., NANDI, A. K., TOIVIAINEN, P., FA, R., ABU-JAMOUS, B., ET AL. (2013). Linking brain responses to naturalistic music through analysis of ongoing EEG and stimulus features. *IEEE Transactions on Multimedia*, 15(5), 1060–1069. <https://doi.org/10.1109/TMM.2013.2253452>
- CROSS, I. (2008). Musicality and the human capacity for culture. *Musicae Scientiae*, 12(1_suppl), 147–167. <https://doi.org/10.1177/1029864908012001071>
- CROSS, I. (2014). Music and communication in music psychology. *Psychology of Music*, 42(6), 809–819. <https://doi.org/10.1177/0305735614543968>
- DAVIES, B., & HARRE, R. O. M. (1982). Positioning: The discursive production of selves. *Journal Of the Theory of Social Behaviors*, 20(1), 43–63.
- DAVIS, W., & HADLEY, S. (2015). A history of music therapy. In B. L. Wheeler (Ed.), *Music Therapy handbooktherapy handbook* (2nd ed.). Guilford Press.
- EDWARDS, J., & HADLEY, S. (2007). Expanding music therapy practice: Incorporating the feminist frame. *Arts in Psychotherapy*, 34(3), 199–207. <https://doi.org/10.1016/j.aip.2007.01.001>
- EGERMANN, H., FERNANDO, N., CHUEN, L., & MCADAMS, S. (2015). Music induces universal emotion-related psychophysiological responses: Comparing Canadian listeners to Congolese Pygmies. *Frontiers in Psychology*, 6(JAN), 1–9. <https://doi.org/10.3389/fpsyg.2015.00341>
- ERKKILÄ, J., BRABANT, O., HARTMANN, M., MAVROLAMPADOS, A., ALA-RUONA, E., SNAPE, N., ET AL. (2021). Music therapy for depression enhanced with listening homework and slow paced breathing: A randomised controlled trial. *Frontiers in Psychology*, 12(February). <https://doi.org/10.3389/fpsyg.2015.00341>
- FERNANDES, B. S., WILLIAMS, L. M., STEINER, J., LEBOYER, M., CARVALHO, A. F., & BERK, M. (2017). The new field of “precision psychiatry.” *BMC Medicine*, 15(1), 1–7. <https://doi.org/10.1186/s12916-017-0849-x>
- FRIMAN, M. (2010). Understanding boundary work through discourse theory: Inter/disciplines and interdisciplinarity. *Science Studies*, 23(2), 5–19.

- GARRIDO, S., EEROLA, T., & McFERRAN, K. (2017). Group rumination: Social interactions around music in people with depression. *Frontiers in Psychology*, 8(MAR). <https://doi.org/10.3389/fpsyg.2017.00490>
- GERETSEGGER, M., ELEFANT, C., MÖSSLER, K. A., & GOLD, C. (2014). Music therapy for people with autism spectrum disorder. *Cochrane Database of Systematic Reviews*, 2016(3). <https://doi.org/10.1002/14651858.CD004381.pub3>
- GERETSEGGER, M., MÖSSLER, K. A., BIELENINIK, L., CHEN, X. J., HELDAL, T. O., & GOLD, C. (2017). Music therapy for people with schizophrenia and schizophrenia-like disorders. *Cochrane Database of Systematic Reviews*, 2017(5). <https://doi.org/10.1002/14651858.CD004025.pub4>
- GILLOTY, L., KENWORTHY, L., WAGNER, A. E., SIRIAN, L., & BLACK, D. O. (2002). Adaptive skills and executive function in autism spectrum disorders. *Child Neuropsychology (Neuropsychology, Development and Cognition: Section C)*, 8(4), 241–248. <https://doi.org/10.1076/chin.8.4.241.13504>
- GOSLING, S. D., RENTFROW, P. J., & SWANN, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, 37(6), 504–528.
- HANSER, S. (2015). Cognitive-behavioral approaches. In B. L. Wheeler (Ed.), *Music therapy handbook* (2nd ed.). Guilford Press.
- HIMBERG, T., & THOMPSON, M. R. (2011). Learning and synchronising dance movements in South African songs - Cross-cultural motion-capture study. *Dance Research*, 29(2), 305–328. <https://doi.org/10.3366/drs.2011.0022>
- HORDEN, P. (2017). *Music as medicine: The history of music therapy since antiquity*. Routledge.
- HSIEH, H.-F., & SHANNON, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288 DOI: 10.1177/1049732305276687
- HUSS, M., VERNEY, J. P., FOSKER, T., MEAD, N., & GOSWAMI, U. (2011). Music, rhythm, rise time perception and developmental dyslexia: Perception of musical meter predicts reading and phonology. *Cortex*, 47(6), 674–689. <https://doi.org/10.1016/j.cortex.2010.07.010>
- HUZAIR, F., BORDA-RODRIGUEZ, A., UPTON, M., & MUGWAGWA, J. T. (2013). An interdisciplinary and development lens on knowledge translation. *Science and Public Policy*, 40(1), 43–50. <https://doi.org/10.1093/scipol/scs119>
- HYER, K., FAIRCHILD, S., ABRAHAM, I., MEZEY, M., & FULMER, T. (2000). Measuring attitudes related to interdisciplinary training: Revisiting the Heinemann, Schmitt and Farrell “attitudes toward health care teams” scale. *Journal of Interprofessional Care*, 14(3), 249–258.
- ISENBERG, C. (2015). Psychodynamic approaches. In B. L. Wheeler (Ed.), *Music therapy handbook* (2nd ed., pp. 398–728). Guilford Press.
- JACOBSEN, S., PEDERSON, I. N., & BONDE, L. O. (2019). *A comprehensive guide to music therapy: Theory, clinical practice, research and training* (2nd ed.). Jessica Kingsley Publishers.
- JANZEN, T. B., & THAUT, M. (2018). Rethinking the role of music in the neurodevelopment of autism spectrum disorder. *Music and Science*, 1, 205920431876963. <https://doi.org/10.1177/2059204318769639>
- JOHN, O. P., & SRIVASTAVA, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of Personality: Theory and Research*, 2(510), 102–138. <https://doi.org/citeulike-article-id:3488537>
- JOHNSON, R. E. (1981). E. Thayer Gaston: Leader in scientific thought on music in therapy and education. *Journal of Research in Music Education*, 29(4), 279–286.
- JUSLIN, P. N., & VÄSTFJÄLL, D. (2008). Emotional responses to music: The need to consider underlying mechanisms. *Behavioral and Brain Sciences*, 31(05), 559–575.
- KARLQVIST, A. (1999). Going beyond disciplines: The meanings of interdisciplinarity. *Policy Sciences*, 32(4), 327–337.
- KEELER, J. R., ROTH, E. A., NEUSER, B. L., SPITSBERGEN, J. M., WATERS, D. J. M., & VIANNEY, J. M. (2015). The neurochemistry and social flow of singing: Bonding and oxytocin. *Frontiers in Human Neuroscience*, 9(September), 1–10. <https://doi.org/10.3389/fnhum.2015.00518>
- KERN, P., & TAGUE, D. B. (2017). Music therapy practice status and trends worldwide: An international survey study. *Journal of Music Therapy*, 54, 255–286. <https://doi.org/10.1093/jmt/thx011>
- KIRSCHNER, S., & ILARI, B. (2014). Joint drumming in Brazilian and German preschool children: Cultural differences in rhythmic entrainment, but no prosocial effects. *Journal of Cross-Cultural Psychology*, 45(1), 137–166. <https://doi.org/10.1177/0022022113493139>
- KLEIN, J., & MCCOLL, G. (2019). Cognitive dissonance: How self-protective distortions can undermine clinical judgement. *Medical Education*, 53(12), 1178–1186. <https://doi.org/10.1111/medu.13938>
- KOELSCH, S. (2011). Toward a neural basis of music perception - A review and updated model. *Frontiers in Psychology*, 2(JUN), 1–20. <https://doi.org/10.3389/fpsyg.2011.00110>
- LEMAN, M., & SCHNEIDER, A. (1996, September). Origin and nature of cognitive and systematic musicology: An introduction. In *Joint International Conference on Cognitive and Systematic Musicology* (pp. 11–29). Springer.
- MACDERMID, J. C., & GRAHAM, I. D. (2009). Knowledge translation: Putting the “practice” in evidence-based practice. *Hand Clinics*, 25(1), 125–143. <https://doi.org/10.1016/j.hcl.2008.10.003>
- MACDONALD, J., & MELLOR-CLARK, J. (2015). Correcting psychotherapists’ blindsidedness: Formal feedback as a means of overcoming the natural limitations of therapists. *Clinical Psychology and Psychotherapy*, 22(3), 249–257. <https://doi.org/10.1002/cpp.1887>
- MAGEE, W. L., CLARK, I., TAMPLIN, J., & BRADT, J. (2017). Music interventions for acquired brain injury. *Cochrane Database of Systematic Reviews*, 2017(1). <https://doi.org/10.1002/14651858.CD006787.pub3>

- MAGEE, W. L., & STEWART, L. (2015). The challenges and benefits of a genuine partnership between music therapy and neuroscience: A dialog between scientist and therapist. *Frontiers in Human Neuroscience*, 9(May), 1–4. <https://doi.org/10.3389/fnhum.2015.00223>
- MCCRAE, R. R. (2009). The five-factor model of personality traits: Consensus and controversy. In P. J. Corr & G. Matthews (Eds.), *The Cambridge handbook of personality psychology* (pp. 148–161). Cambridge University Press. <https://doi.org/10.1017/CBO9780511596544.012>
- MCDERMOTT, H. J. (2004). Music perception with cochlear implants: A review. *Trends in Amplification*, 8(2), 49–82. <https://doi.org/10.1177/108471380400800203>
- MOORTHIGARI, V., CARLSON, E., TOIVIAINEN, P., BRATTICO, E., & ALLURI, V. (2020, September). Differential effects of trait empathy on functional network centrality. In M. Mahmud, S. Vassanelli, M. S. Kaiser, & N. Zhong (Eds.), *International Conference on Brain Informatics* (pp. 107–117). Springer.
- MÖSSLER, K., SCHMID, W., AßMUS, J., FUSAR-POLI, L., & GOLD, C. (2020). Attunement in music therapy for young children with autism: Revisiting qualities of relationship as mechanisms of change. *Journal of Autism and Developmental Disorders*. <https://doi.org/10.1007/s10803-020-04448-w>
- NILSSON, U. (2009). Soothing music can increase oxytocin levels during bed rest after open-heart surgery: A randomised control trial. *Journal of Clinical Nursing*, 18(15), 2153–2161. <https://doi.org/10.1111/j.1365-2702.2008.02718.x>
- NOVEMBRE, G., TICINI, L. F., SCHÜTZ-BOSBACH, S., & KELLER, P. E. (2014). Motor simulation and the coordination of self and other in real-time joint action. *Social Cognitive and Affective Neuroscience*, 9(8), 1062–1068. <https://doi.org/10.1093/scan/nst086>
- OMIGIE, D., LEHONGRE, K., NAVARRO, V., CLAUDE, A., & SAMSON, S. (2019). Neuro-oscillatory tracking of low- and high-level musico-acoustic features during naturalistic music listening: Insights from an intracranial electroencephalography study. *Psychomusicology: Music, Mind and Brain*, (2001), 5–10.
- OSBECK, L. M., & NERSESSIAN, N. J. (2017). Epistemic identities in interdisciplinary science. *Perspectives on Science*, 25(2), 226–260. <https://doi.org/10.1162/POSC>
- OVERY, K. (2003). Dyslexia and music: From timing deficits to musical intervention. *Annals of the New York Academy of Sciences*, 999, 497–505. <https://doi.org/10.1196/annals.1284.060>
- PERETZ, I., CHAMPOD, A. S., & HYDE, K. (2003). Varieties of musical disorders. *Annals of the New York Academy of Sciences*, 999(1), 58–75. <https://doi.org/10.1196/annals.1284.006>
- PHILLIPS-SILVER, J., AKTIPIS, C. A., & BRYANT, G. A. (2010). Entrainment: Foundations of rhythmic movement. *Music Perception*, 28(1), 3–14. <https://doi.org/10.1525/mp.2010.28.1.3>
- PHILLIPS-SILVER, J., TOIVIAINEN, P., GOSSELIN, N., PICHÉ, O., NOZARADAN, S., PALMER, C., & PERETZ, I. (2011). Born to dance but beat deaf: A new form of congenital amusia. *Neuropsychologia*, 49(5), 961–969. <https://doi.org/10.1016/j.neuropsychologia.2011.02.002>
- PIERCE, S. J. (1999). Boundary crossing in research literatures as a means of interdisciplinary information transfer. *Journal of the American Society for Information Science*, 50(3), 271–279. [https://doi.org/10.1002/\(sici\)1097-4571\(1999\)50:3<271::aid-asi10>3.3.co;2-d](https://doi.org/10.1002/(sici)1097-4571(1999)50:3<271::aid-asi10>3.3.co;2-d)
- RENTFROW, P. J., GOLDBERG, L. R., & LEVITIN, D. J. (2011). The structure of musical preferences: A five-factor model. *Journal of Personality and Social Psychology*, 100(6), 1139–1157.
- REPP, B. H. (2005). Sensorimotor synchronization: A review of the tapping literature. *Psychonomic Bulletin and Review*, 12(6), 969–992.
- ROGERS, C. (2008). *On becoming a person: A therapist's view of psychotherapy*. Robinson. (Original work published 1961)
- ROKEACH, M. (1960). *The open and closed mind: Investigations into the nature of belief systems and personality systems*. Basic Books.
- SAARIKALLIO, S., & ERKKILÄ, J. (2007). The role of music in adolescents' mood regulation. *Psychology of Music*, 35(1), 88–109.
- SANDY, C. J., GOSLING, S. D., SCHWARTZ, S. H., & KOELKEBECK, T. (2017). The development and validation of brief and ultra-brief measures of values. *Journal of Personality Assessment*, 99(5), 545–555. <https://doi.org/10.1080/00223891.2016.1231115>
- SCHICK, A. (2004). History of psychoacoustics. *Proceedings of 18th International Congress on Acoustics (ICA), Kyoto Acoustical Science and Technology for Quality of Life*, 5, 3759–3762.
- SCHWARTZ, S. H., MELECH, G., LEHMANN, A., BURGESS, S., HARRIS, M., & OWENS, V. (2001). Extending the cross-cultural validity of the theory of basic human values with a different method of measurement. *Journal of cross-cultural psychology*, 32(5), 519–542.
- SCURLOCK-EVANS, L., UPTON, P., & UPTON, D. (2014). Evidence-based practice in physiotherapy: A systematic review of barriers, enablers and interventions. *Physiotherapy (United Kingdom)*, 100(3), 208–219. <https://doi.org/10.1016/j.physio.2014.03.001>
- SHARDA, M., TUERK, C., CHOWDHURY, R., JAMEY, K., FOSTER, N., CUSTO-BLANCH, M., ET AL. (2018). Music improves social communication and brain connectivity outcomes in children with autism. *Translational Psychiatry*, 8(1), 30352997. <https://doi.org/10.1093/annonc/mdy139/4983109>
- SHEARMAN, S. M., & LEVINE, T. R. (2006). Dogmatism updated: A scale revision and validation. *Communication Quarterly*, 54(3), 275–291. <https://doi.org/10.1080/01463370600877950>

- SOLBERG, R. T., & JENSENIUS, A. R. (2017). Pleasurable and intersubjectively embodied experiences of electronic dance music. *Empirical Musicology Review*, 11(3–4), 1–17.
- STEGEMANN, T., SCHMIDT, H. U., FITZHUM, E., & TIMMERMANN, T. (2016). *Music therapy training programmes in Europe: Theme and variations*. Reichert Verlag.
- STREETER, E. (2006). What are we doing to ourselves? The branding of music therapy in academia. In S. Hadley (Ed.), *Feminist perspectives in music therapy* (pp. 355–366).
- SWIJGHUISEN REIGERSBERG, M. E. (2017). Collaborative music, health, and wellbeing research globally: Some perspectives on challenges faced and how to engage with them. *Journal of Folklore Research*, 54(1–2), 133–159. <https://doi.org/10.2979/jfolkrese.54.2.06>
- TARR, B., LAUNAY, J., COHEN, E., & DUNBAR, R. (2015). Synchrony and exertion during dance independently raise pain threshold and encourage social bonding. *Biology Letters*, 11(November), 0–3. <https://doi.org/10.1098/rsbl.2015.0767>
- TARR, B., LAUNAY, J., & DUNBAR, R. I. M. (2016). Silent disco: Dancing in synchrony leads to elevated pain thresholds and social closeness. *Evolution and Human Behavior*, 37(5), 343–349. <https://doi.org/10.1016/j.evolhumbehav.2016.02.004>
- THAUT, M. (2015). Music as therapy in early history. *Progress in Brain Research*, 217, 43–158.
- THAUT, M., & VOLKER, H. (Eds.) (2014). *Handbook of neurologic music therapy*. Oxford University Press.
- THOMA, M. V., LA MARCA, R., BRÖNNIMANN, R., FINKEL, L., EHLERT, U., & NATER, U. M. (2013). The effect of music on the human stress response. *PLoS ONE*, 8(8), 1–12. <https://doi.org/10.1371/journal.pone.0070156>
- THOMSON, J. M., FRYER, B., MALTBY, J., & GOSWAMI, U. (2006). Auditory and motor rhythm awareness in adults with dyslexia. *Journal of Research in Reading*, 29(3), 334–348. <https://doi.org/10.1111/j.1467-9817.2006.00312.x>
- TOIVIAINEN, P., LUCK, G., & THOMPSON, M. R. (2010). Embodied meter: Hierarchical eigenmodes in music-induced movement. *Music Perception*, 28(1), 59–70. <https://doi.org/10.1525/mp.2010.28.1.59>
- TOPOL, E. J. (2014). Individualized medicine from prewomb to tomb. *Cell*, 157(1), 241–253. <https://doi.org/10.1016/j.cell.2014.02.012>
- TORRES, E. B., ISENHOWER, R. W., NGUYEN, J., WHYATT, C., NURNBERGER, J. I., JOSE, J. V., ET AL. (2016). Toward precision psychiatry: Statistical platform for the personalized characterization of natural behaviors. *Frontiers in Neurology*, 7(Feb), 1–16. <https://doi.org/10.3389/fneur.2016.00008>
- TREVARTHEN, C., & DELAFIELD-BUTT, J. T. (2013). Autism as a developmental disorder in intentional movement and affective engagement. *Frontiers in Integrative Neuroscience*, 7, 49. <https://doi.org/10.3389/fnint.2013.00049>
- TURRY, A. (2018). Response to effects of improvisational music therapy vs. enhanced standard care on symptom severity among children with autism spectrum disorder: The TIME-A randomized clinical trial. *Nordic Journal of Music Therapy*, 27(1), 87–89. <https://doi.org/10.1080/08098131.2017.1394902>
- UPTON, D., & UPTON, P. (2006). Development of an evidence-based practice questionnaire for nurses. *Journal of Advanced Nursing*, 53(4), 454–458. <https://doi.org/10.1111/j.1365-2648.2006.03739.x>
- VAN DEN TOL, A. J. M., EDWARDS, J., & HEFLICK, N. A. (2016). Sad music as a means for acceptance-based coping. *Musicae Scientiae*, 20(1), 68–83. <https://doi.org/10.1177/1029864915627844>
- VESCELIUS, E. A. (1918). Music and health. *The Music Quarterly*, 4(3), 376–401.
- VINK, A. (2001). Music and emotion: Living apart together: A relationship between music psychology and music therapy. *Nordic Journal of Music Therapy*, 10(2), 144–158. <https://doi.org/10.1080/08098130109478028>
- WIGRAM, T., & GOLD, C. (2012). The religion of evidence-based practice: Helpful or harmful to health and wellbeing? In R. MacDonald, G. Kreutz, & L. Mitchell (Eds.), *Music, health, and wellbeing* (pp. 164–182). <https://doi.org/10.1093/acprof:oso/9780199586974.003.0013>
- YOST, W. (2015). Psychoacoustics: A brief historical overview. *Acoustics Today*, 11(3), 46–53.
- ZACHOR, D. A., ILANIT, T., & ITZCHAK, E. B. (2010). Autism severity and motor abilities correlates of imitation situations in children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 4(3), 438–443. <https://doi.org/10.1016/j.rasd.2009.10.016>