

Improvisation, Music Listening, and Debilitating Disorders: A Narrative Review of the Promise of Music Therapy in Addressing Issues of Communication, Emotion, and Neurology

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Abstract

Although music therapy has been used in numerous ways to address a wide variety of pathologies, the scientific consensus on its efficacy is far from certain. In the hopes of focusing further on music therapy research, this article makes a distinction between active and passive music therapy and how the two types of music therapy have been used to treat disorders of communication, mood and anxiety, and neurological impairment. After a preliminary understanding of music therapy was established with several overview books, a variety of articles were chosen by the researcher that show claims for and against the efficacy of music therapy. All sources were found and acquired through Schaffer Library databases at Union College between September 5th, 2018 and November 14th, 2018. The author reviewed examples of each type of music therapy, including scientific case studies, observational studies, quasi-experiments, and systematic reviews. The studies' findings and shortcomings were discussed leading to the conclusion that future music therapy research must attempt to maximize sample size and experimental controls. In addition, music therapy would benefit if the effect of music was tested on healthy populations. Music therapy represents another possible tool in relieving significant distress.

Key Words:

Music therapy, active, passive, combined, significant pathology

Music therapy (MT) is a field that has certainly struggled for acceptance. As MT is more focused on clinical cases than making empirical findings, concrete scientific data demonstrating its effectiveness is lacking; however, there are many enlightening cases and some experiments that show strong promise for the field. Indeed, many scientific writings describe music's flexible therapeutic potential to be used in a wide breadth of pathologies, including those of a behavioral, psychological, and neurological nature (Aigen, 2014b, p. 18 & 49; Wigram, Saperston, & West, 2009; Davis, Gfeller, & Thaut, 2008, p. 127 & 167). With numerous potential applications, many

different methods of therapy have been conceived. These methods fall into two main categories: active and passive (sometimes referred to as receptive). Active refers to any MT that involves the client creating music whereas passive refers to any MT in which the client listens to music. Both therapies have merit for a variety of pathology cases.

Introduction

In general, MT involves the use of music, including listening, composing, and creating, for therapeutic purposes. The therapeutic potency of music may exist due to the strong innate effect it has on the brain (Davis, et al., 2008, p. 154-5 & 167;

Creighton, 2011; Tomaino, 2013). Indeed, music in all forms, playing and listening, causes activation in the pathways for motor control, memory, affective processing, and executive functioning. A music therapist, trained in both counseling and music, harnesses the effect of music in many diverse and flexible ways (Wigram et al., 2009; Aigen, 2014b, p. 18). Therapy sessions can be either in a group or individual setting. Group settings are ideal for targeting communication and social skills in younger clients (Bakan et al., 2008; Davis et al., 2008, p. 128 & 172; Wigram et al., 2009, p. 20). On the other hand, individual settings are more personalized and allow for a better relationship to form between the client and the therapist. The client-therapist relationship has a massive impact on the effects of MT; the client must build trust in the therapist and his or her methods if they are to be effective (Choi & Lee, 2014). This is the case in both active and passive music therapy. From this point, the methods begin to differ.

Active Music Therapy (aMT)

As previously mentioned, active music therapy (aMT) involves the client's participation in music. This is manifested in the creation of music with other clients and the therapist(s) and typically involves improvisation – the spontaneous making of music to foster creativity and play. Improvisation is an effective tool of music therapists as it affects human psychology and neurochemistry in beneficial and profound ways (Paul, 1994; Davis et al., 2008, p. 167, 172 & 252; Bakan et al., 2008; Tomaino, 2013; Zarate, 2016). By encouraging active involvement in music, attention is devoted to a complex activity, resulting in strong global neural activation. (Guétin et al., 2008). Much like humans' capacity to learn language, nearly all humans are innately susceptible to music and can learn how to play; however, this takes time and can be challenging (Aigen, 2014a). This is why teaching "musical coherence", the ability to express oneself musically, is the first step in aMT.

Essentially, the therapist becomes the client's music teacher, aiding them in learning a difficult, yet rewarding skill, all while discussing their music-making and the potential underlying

psychological aspects isolated by music. By learning a skill, the client receives a positive experience of accomplishment and grows in "expressive freedom, creativity, self-confidence, and other human qualities associated with self-actualization" (Davis et al., 2008, p. 466; Aigen, 2014a). At this point, the therapist has established improvisation as a powerful tool for treatment and diagnosis. On a behavioral level, improvisation with others can be used to expedite communication and social skill learning in a group setting (Bakan et al., 2008). Musical cues can be easier to teach than social cues, especially in clients who have trouble with eye contact and verbalization. In addition, the therapist can use improvisation as a diagnostic tool, revealing both to themselves and their clients the aspects of their personalities and pathologies and what can be done to mitigate their dysfunction (Wigram & Gold, 2005; Bakan et al., 2008; Zarate, 2016). The active involvement in creating music requires the cognitive processes of attention and memory. In some cases of brain damage, these processes remain intact for music, and thus, bring about positive feelings and emotional regularity (Guétin et al., 2008; McDermott et al., 2013).

Passive Music Therapy (pMT)

Active participation through creating is not the only way for clients to benefit from music. In passive music therapy (pMT) the client is induced into a meditative or relaxed state. This state is similar to that induced by counseling therapies, such as meditation, animal-assisted, and hallucinogenic drug-assisted (Davis et al., 2008, p. 467; Wigram et al., 2009, p. 21). As such, pMT can result in transcendent and spiritual experiences leading to a deep state of self-referential thinking, making one's thoughts feel especially profound (Davis et al., 2008, p. 467; Choi & Lee, 2014). After entering this meditative state, the therapist instructs the client to think about the music, leading to the perception of imagery in the music. The client is encouraged to introspectively explore this imagery which leads to increased self-awareness from an objective viewpoint of the client's issues (Guétin et al., 2008). After emerging from the meditative state, the

therapist discusses the client's experiences with them, hoping to foster further self-actualization and motivation to make positive life changes (Lin et al., 2010).

Similar to aMT, the client must trust the therapist and their methods for therapeutic effects to take place (Choi & Lee, 2014). Indeed, most examples of pMT are conducted in an individual setting as to further foster the trust between therapist and client. The therapist develops an ability to cater music selection based on traits and symptoms of the client to most effectively induce imagery (Davis et al., 2008, p. 466; Lin et al., 2010).

Paper Objectives

In this paper, the author will explore studies in which communication issues, mood and anxiety issues, and neurological issues were addressed using aMT, pMT, or a combined approach. The specific issues to be discussed include autism spectrum disorder (ASD), major depressive disorder (MDD), generalized anxiety disorder (GAD), traumatic brain injury (TBI), and dementia. Through these discussions, the mechanisms behind aMT and pMT will be defined and compared. By doing this, the author explores the potential of MT as a promising addition to the arsenal of treatment for psychological disorders. Although music therapy is not yet convincingly supported, it uses neither invasive nor potentially dangerous practices and yet has immense potential for easing significant distress.

After a cursory description of aMT and pMT methods, brief explanations of the pathology groups will be presented. Within each of these pathology sections, the uses of aMT and pMT from scientific case studies, observational studies, quasi-experiments, and systematic reviews will be described. The theoretical mechanisms behind the potential efficacy of these approaches will also be presented.

Methods

Sources were searched for and acquired through the Union College Schaffer Library and its databases

between September 5th, 2018 and November 14th, 2018. Research began by establishing a broad picture of the field of MT with expansive overview sources, chiefly among which was Davis, Gfeller, & Thaut, 2008. These overview sources include massive reviews of the applications of music therapy in nearly every type of psychological disorder and include numerous case study examples. From these overviews, the author established three categories of commonly addressed disorder issues (social, emotional, and neurological) and two methods of MT used to address them (aMT and pMT).

With a general understanding of music therapy established, research was directed towards more specific observational studies, case studies, quasi-experiments, and systematic reviews. The author searched for papers addressing communication issues, mood and anxiety issues, and neurological issues and gave preference towards those that specifically mentioned aMT, pMT, or both. By covering three distinct disorders and two distinct treatment methods of MT, a general overview of research within the field was established, allowing the author to pinpoint common shortcomings between the studies. The author then explicitly searched for MT research articles that addressed these shortcomings and discussed the overall findings of this paper.

Communication Issues

One of the most popular examples of potential applications of MT is among children with autism spectrum disorder (ASD) or those with other disorders that affect social interaction. Specifically, MT has been used to mitigate issues regarding communication, social skills, and adaptability. Individuals with delays in these cognitive processes have a difficult time interpreting the intentions of others and in communicating their own intentions. In cases of ASD, issues with attunement to others, even during infancy with one's mother, contribute to these communication issues (Wigram & Gold, 2005). Because of this, social situations can become threatening and anxiety provoking, leading to significant distress and interruption of normal everyday functioning (Montello & Coons, 1998;

Wigram & Gold, 2005; Bakan et al., 2008). In addition, new situations in which established schemas and scripts do not apply will cause anxiety (Montello & Coons, 1998; Wigram & Gold, 2005).

MT can address these difficulties with social interaction and adaptability. This is due to the non-verbal expressive and structural qualities of music. Indeed, there are many parallels between musical structure and language structures; however, music differs from typical language in that it is often far more engaging and attention grabbing, especially when one is actively involved in the music (Montello & Coons, 1998; Wigram & Gold, 2005; David et al., 2008, p. 44). For this reason, PMT is less common than aMT when addressing communication and attunement issues (James et al., 2014). Within this attention grabbing and predictably structured modality, clients are more comfortable, and thus, can ascribe social interactions with pleasurable qualities (Bakan et al., 2008). In addition, the way a client actively improvises music can assist a trained therapist in diagnosis. Case studies will now be presented to better explain these concepts.

Active Improvisation Therapy in ASD

The Bakan et al. (2008) study is an example of group improvisation therapy for autistic children. Bakan et al. (2008) describes how the Music-Play Project was organized to provide children with ASD a safe environment in which they can learn self-expression and associate it with positive emotions. In this program, clients and their parents participated in free improvisation on Balinese gamelan, an Indonesian brass gong and xylophone ensemble. By following a set of priorities that can be simplified down to valuing the expressions of the children, both musical and behavioral, their parents and therapists learned more about their children's individual difficulties and preferences.

In this setting, the children are able to experience communication that does not require eye contact and verbalization, two things that those with ASD find particularly distressing. Due to formulating a positive association with musical communication, the children can generalize these positive

associations to all forms of communication with bolstered confidence (Bakan et al., 2008). Bakan writes specifically about Jimmy, a six-year-old who at his first session anxiously remained with his mother. After accidentally causing a sound that he liked on one of the instruments and expressing happiness, Jimmy let the researcher approach and repeat the sound himself. Jimmy, the research, and his mother then engaged in a musical dialogue repeating this sound. At this point, Jimmy opened up socially, attenuating to others and even engaging in conversation with another boy in his group. This example demonstrates how the non-threatening nature of free musical play can lead to musical communication with others in those with difficulties communicating. This creates positive associations that can then be generalized to other forms of communication.

Using Active Improvisation to Diagnose ASD and Cognitive Delays

Wigram and Gold (2005) created a systematic review that supported the findings of Bakan et al. (2008) and also discusses the use of improvisation aMT as a diagnostic tool for assessing levels of social engagement and non-verbal communication. The capacity to promote and assess creativity is also attributed to improvisation aMT. Wigram and Gold (2005) mention an assessment from Bruscia (1987) called the Improvisation Assessment Profiles (IAP). The IAP instructs a trained musical therapist in how to use a client's improvisation as "raw data" with which his or her personality, pathology, and presentation of the former can be analyzed. This assessment includes six measures, two of which are specifically important to ASD and cognitive delays: autonomy and variability. Autonomy refers to the social role the client takes during improvisation and variability refers to how much the client's improvised music changes. Those with the above discussed disorder tend to lead without listening, as they have trouble attenuating to others, and improvise very rigidly, without much change (Wigram & Gold, 2005). Through careful trained observation, these markers of ASD and cognitive delays can be readily diagnosed as such.

Comparing Active and Passive Music Therapy for Cognitive Delays

Montello and Coons (1998) created an interesting quasi-experimental design to test the efficacy of aMT against pMT in children with emotional disturbances, learning disabilities, and attention deficit disorder. The researchers hypothesized that aMT would better reduce issues with attention, motivation, and hostility than pMT. This was supported using the argument that the organized and attention-requiring qualities of active improvised music would help these individuals achieve internal structure and stability (Montello & Coons, 1998). This refers to heart rate, breathing, and blood pressure. The researchers attempted random assignment of three classes into the following conditions: C (received aMT for 24 weeks), A (received aMT for 12 weeks followed by pMT for 12 weeks), and B (received pMT for 12 weeks followed by aMT for 12 weeks). This research design not only allowed Montello and Coons (1998) to compare aMT to pMT, it also allowed them to compare the order in which these therapy strategies were implemented. Interestingly, after 12 weeks, the condition A experienced increased hostility while condition B had reduced motivation issues and condition C had reduced hostility and motivation issues. After the full 24 weeks, condition A experienced reduced hostility beyond baseline measures and condition B experienced reduction in attention, motivation, and hostility.

This surprising increase in hostility could probably be attributed to the miniscule sample size of only 16. Indeed, condition A was later identified as containing the greatest cases of “the most ‘fragile’” in terms of their ego development compared to the other clients and, even more confounding to the study, condition C contained more musicians than the other conditions (Montello & Coons, 1998). Despite this, the researchers offer a more interesting interpretation that reveals valuable insight into the optimal order of aMT and pMT. In condition A, the clients were immediately asked to spontaneously create and express themselves in front of an unfamiliar audience. This environment offered little structure and security, and thus, was probably too

frightening, causing the clients to act out aggressively. Meanwhile, in condition B, the clients listened to music and communicated their common interests, facilitating group cohesion. This created a much less stressful environment when it became their time to receive aMT. While this study certainly reveals the issues of statistical power that commonly plague MT experiments, the discrepancy between receiving aMT or pMT first is clear. The necessity to use MT carefully and appropriately is evidenced by this study.

Mood and Anxiety Issues

While some may use music in a casual setting to ease feelings of sadness or unease, music has been employed therapeutically to alleviate issues of mood and anxiety in those with significant disorders. These include general mood disorders, MDD and GAD, examples of which exhibit emotional dysregulation. While both aMT and pMT have been used to treat these disorders, the literature is far more extensive on pMT and combined approaches. Despite this, examples of aMT, pMT, and a combined approach will be discussed as they have been demonstrated to have potential merit. In all examples, the MT intervention was used to alleviate dysphoric feelings either directly resulting in better mood or fostering a strong client-therapist relationship in which the client more readily divulged relevant information. In giving more information, the client and therapist are better able to form effective emotional regulation strategies, leaving the client feeling better prepared and motivated to handle negative moods (Lin et al., 2010; Guitérrez & Camarena, 2015). Despite various different approaches, in both cases, the potential of music to treat mood disorders has been demonstrated.

Examples of Active and Passive Music Therapy in Mood and Depression Disorders

Plastow et al. (2018) conducted a pretest-posttest study in which thirteen clients with mood disorders characterized by high instances of depression and anxiety participated in a therapist-led aMT session using African drums. Following the intervention, improved anxiety and depression scores were

recorded. Furthermore, those with the highest self-reported anxiety and depression experienced the strongest positive reactions to the intervention (Plastow et al., 2018). Plastow et al. (2018) argues that the anxiolytic and antidepressant effect of drumming is due to the activity essentially being a form of moderate-intensity exercise. Many studies contribute evidence for the mood raising and depression lowering effects of exercise (Plastow et al., 2018). This study demonstrates the potential efficacy of aMT for mood disorders; however, there are many more examples of pMT being used to address mood and anxiety disorders.

In an observational study conducted by Lin et al. (2010), the transcripts of five Taiwanese clients with depression were coded to identify the subjective experience of pMT. The intervention included relaxation through music listening followed by induced imagery by the therapist. Afterwards, the experience was discussed with the therapist. Coding revealed “pivotal moments” –breakthroughs that result in clients moving towards recovery (Lin et al., 2010). Indeed, after experiencing and discussing their pivotal moments, clients were able to develop healthy coping strategies and plan for the future (Lin et al., 2010).

At the beginning of their sessions, the clients described how the music selected by their therapists directed them towards “comfort and calmness”, into a relaxed state (Lin et al., 2010). This relaxation and the trust between the client and therapist gave the clients feelings of security and support, and thus, further motivated the clients to trust the therapist and their methods.

Even while experiencing comfort and security, clients were “unable to forget their suffering and painful emotions” (Lin et al., 2010). At this point, the therapist facilitated the perception of imagery in the clients to explore their negative experiences. The imagery helped clients focus on their painful and negative thoughts, feelings, memories, and sensations and connect them to their origins and meanings (Lin et al., 2010). The clients were able to consciously acknowledge that their depressive symptoms – lingering feelings of dysphoria – are a normal part of their condition rather than a sign of

failure and were not due to their own actions (Lin et al., 2010). This represents a step in the right direction towards a more positive view of self. In addition, the relaxed state brought on by the music gave the clients energy and motivation to rethink and attempt to solve their problems. The clients expressed the need to stop avoiding conflicts, and instead, deal with them in constructive ways. These feelings gave the clients motivation to work towards recovery (Lin et al., 2010).

After returning to normal waking states, the clients remarked on their desires to seek a normal, healthy life. This was reflected in their thoughts. Clients reported a distinct change in the valence of their thoughts from negative to positive (Lin et al., 2010). For example, multiple clients who were harboring negative feelings towards their ex-husbands stated that they no longer felt this way. The clients considered the articulation of their issues during pMT to be necessary to begin addressing the cause of their problems rather than avoiding them (Lin et al., 2010). This led to clients beginning to set achievable personal goals for themselves, putting them on the path to normalized functioning.

While no follow-up to this study was conducted, the setting of personal goals and statement of motivation reveals the promise of this form of MT. By using music to relax the clients, the therapist bolstered their clients’ social interaction. When relaxed, people in general are more open and receptive to others and more willing to share information about themselves (Lin et al., 2010). In standard counseling therapies, several sessions are devoted to establishing a client-therapist relationship; however, in MT, the client-therapist relationship process is sped up due to the relaxing qualities of music which aid social interaction.

Direct Comparison of Active and Passive MT in MDD

As can be seen by the sheer difference in the discussion of methods, pMT is much more involved than aMT in treating mood and anxiety disorders. This is not to say that one type of therapy is more effective than another in all cases. An experiment by Atiwannapat et al. (2016) compared aMT, pMT,

and a control for clients with major depressive disorder (MDD). In the aMT condition, clients sang in groups, played percussion instruments, and did both simultaneously, whereas in the pMT condition, clients listened to songs, analyzed the lyrics, wrote their own songs, drew while listening, and relaxed to music. In all groups, traditional problem solving and coping skills were discussed. While not producing statistically significant results, depression scores reduced in the MT conditions as compared to the control; however, the two MT groups also differed statistically insignificantly: the pMT group experienced depression score reduction sooner whereas the aMT group experienced more of a reduction. There were significant limitations, including a low sample size of 14 participants who were mostly women, dropouts, and intake of various medications during the experiment (Atiwannapat et al., 2016). Indeed, this is another example of MT experiments suffering from low statistical power; however, not only does the experiment reveal a need for more research, it also provides cursory support for the difference in approach between aMT and pMT, yet not a difference in efficacy. Both MT and pMT have some demonstrated merit in treating mood disorders. The two types of therapies have also been combined together for a doubled approach to relaxing the client and promoting therapeutic conversation with the therapist.

Active and Passive Music Therapies Combined in Generalized Anxiety Disorder

Additionally, the incorporation of both aMT and pMT in studies on mood and anxiety disorders can be discussed. As mentioned by Johnson and Olson (2015, p. 304), the varying arsenal of therapies for addressing emotional disorders focus on different avenues of the emotional response. While a behavioral therapy addresses motor reactions, a cognitive therapy targets learned emotional responses. The authors suggest this means a combined therapy approach could affect multiple aspects of the emotional response, and thus, be more effective together. This may apply to an approach that includes meditation-based cognitive therapies, such as MT. In a pretest-posttest study by

Guitérrez and Camarena (2015), seven individuals with generalized anxiety disorder (GAD) were given both CBT and MT based on a multi-step, individualized humanist approach. The intervention involved both active and passive involvement of music as well as “exercises for handling irrational thoughts and patterns of erroneous behavior” from CBT (Guitérrez & Camarena, 2015). Following 12 weekly therapy sessions, the client’s depression and anxiety scores on the Beck Depression Index and Beck Anxiety Index had decreased significantly.

Despite combining multiple modalities of treatment to create this effect, Guitérrez and Camarena (2015) postulate on the effect of the active and passive components distinctly. Similar to the Plastow et al. (2018) study, the physical activity of aMT was attributed to creating its therapeutic effect; however, Guitérrez and Camarena (2015) refer specifically to tension. During the intense body movements of aMT, tension is released. Tension contributes to feelings of stress, and thus, cortisol, the stress hormone, is reduced during tension release. This helps to facilitate the therapeutic effect of the pMT component. Guitérrez and Camarena (2015) state that self-reflective meditative state of pMT, helped brought on by the release of tension, aids clients in processing their emotions and memories of anxiety. This helps lead to changes in irrational thinking and beliefs. In conjunction with strategies taught with CBT, clients learn effective stress management behaviors and get rid of erroneous ones. Simply the knowledge that one can better handle stress can lead to reduced anxiety (Lin et al., 2010; Guitérrez & Camarena, 2015).

Despite the study suffering from low statistical power due to its small sample size, the significant effect of the MT intervention is promising. The study demonstrates how MT can both aid clients in becoming comfortable in a therapeutic setting and then help clients and therapists create emotional regulation strategies that leave the client feeling more confident, and thus, less anxious. By using both aMT and pMT, the therapist can more flexibly use music in a variety of cases. For example, even if the aMT component does not work, the pMT component may still be successful. Having a more

involved approach gives the intervention more chances to work.

Neurological Issues

Issues in day-to-day functioning arise when neurological impairment occurs in the brain. The two specific examples of this to be mentioned are TBI and dementia. In both cases, clients experience problems with neurological and emotional regulation that cause profound dysfunction in their lives (Guétin et al., 2008; McDermott et al., 2013). Although cases like these can seem hopeless for full recovery, certain activities that draw upon clients' memories seem to restore normal functioning for at least sometime. Both playing and listening to music draws attention and maintains concentration of clients with neurological damage due to their intact memories of familiar music (Davis et al., 2008; p. 266; McDermott et al., 2013). Indeed, the response to music includes increasing heart rate, less variable gait, and neural activation of both the left and right brain hemispheres (Guétin et al., 2008; Owens, 2014; Zhang, 2016; Plastow et al., 2018). During these periods in which regulation has seemingly returned, clients are able to interact better socially, control their emotions, and experience positive emotions. At the very least, MT interventions can alleviate the distress felt by clients with physiological issues and their families.

Traumatic Brain Injury

In a Guétin et al. (2008) pretest-posttest study, 13 TBI clients were treated with an individual combined MT approach for 20 weeks. The therapy intervention consisted of 30 minutes of passive listening, followed by 30 minutes of active playing. Guétin et al. (2008) employed a "u-based" pMT method in which relaxation was achieved by steadily and seamlessly slowing the speed and reducing the amount of instruments playing and volume of the music towards a trough of maximum relaxation. After sometime at this level, the music increased in speed to return the client to normal awareness. The clients then directly engaged in music, playing, writing, and dancing with the

therapist. These activities required memorization, concentration, and attenuation (Guétin et al., 2008).

Mood, anxiety and depression scores were assessed before the intervention started and every 5 weeks. Guétin et al. (2008) found that clients experienced improved mood following each session. Starting week 10, there was a significant reduction in anxiety-depression scores that lasted at least one week after the last therapy session, the last time the researchers collected data. Guétin et al. (2008) attributed this effect to global and inter-hemisphere activation of music stimuli processing. Separating their MT intervention, the researchers stated that aMT served to activate cognitive and psychomotor functions and that pMT relieved dysphoric feelings and encourage verbal emotional expression.

During the combined process, clients were relieved of unpleasant feelings due to becoming fully engrossed in the music. This diverted their attention away from painful thoughts and feelings and resulted in relief of tension (Guétin et al., 2008). Next, the clients' active involvement in the music required complex cognitive processes that are typically impeded by their condition. Being able to focus on the rewarding task of music seemed to stabilize the clients' emotions for a time and perhaps bolstered their confidence in their abilities to stabilize their emotions outside of sessions. This could be why the positive effects of the MT intervention lasted a week after the therapy sessions had concluded. As demonstrated in Guitérrez and Camarena (2015), simply the knowledge that one's emotional dysregulation can be combated by certain methods, bolsters confidence and reduces background anxiety about one's condition.

Significant limitations do exist in the study. A small sample size, lack of a control group, and an over representation of women affect the external validity of this study. In addition, the client's subjective experience of the intervention was not recorded. In future experiments, these limitations should be addressed; however, the study does support music's ability to facilitate normal cognitive functioning in individuals with neurological damage.

Dementia

Cases of dementia have also been addressed with MT. Eighteen of these studies are covered in a review by McDermott et al. (2013). The authors present both quantitative and qualitative studies revealing a variety of results. For instance, three studies by Raglio et al. (2008) demonstrate consistent evidence for the efficacy of small group improvisation aMT in reducing neuropsychiatric symptoms in dementia patients that lasted in a follow-up study (McDermott et al., 2013). In addition, a series of studies discuss the physiological effects of relaxation pMT. These effects include improved heart rate variability, lowered heart rate overall, calmer mood, and reduction of salivary chromogranin A, a stress hormone (McDermott et al., 2013). Social improvements were also recorded in these studies, as with reduced symptoms, dementia clients experienced normal social functioning with their therapists and friends and families.

The authors again mention the attention-drawing and arousing quality of music. Even in clients with dementia, processing of music, especially familiar music, remains intact. This is why music represents a valuable tool for addressing dementia cases (McDermott et al., 2013). Music a pleasing stimulus that can boost clients' moods and successfully performing it results in a positive "experience of empowerment" (McDermott et al., 2013). Music also facilitates client-therapist attunement as clients are put in a better mood by music, and thus, more readily divulge personal information and bond with others. In addition, music offers an avenue of social interaction in which spoken language is not necessary, making it very useful in cases where conventional language is difficult or impossible (McDermott et al., 2013).

This review differs from the other studies discussed in that most of the studies it references have relatively high sample sizes; however, it is not without issue. Only six of the eighteen studies were "randomised control trials" in which random assignment reduced the possibility of confounds (McDermott et al., 2013). The biggest flaw the review documents is that the authors made no

distinction between studies analyzing MT – the presence of a trained music therapist during interventions – and studies analyzing music activity – no trained music therapist. Despite these limitations, the review shows multiple cases of music being applied therapeutically to sufferers of dementia in efficacious ways. The studies discussed give examples of how music was used to alleviate dysphoria, promote social interaction, and leave clients feeling accomplished.

Discussion

Addressing Low Statistical Power and Disputing Findings

Despite the promising findings presented in this paper, it is important to recognize that most of these studies have low statistical power. A large portion of MT research is either observational or correlational in nature, meaning scientists can only interpret associations, rather than causations, from these findings. Confounding factors are often present in the quasi-experiments that do exist, due to small sample sizes. In addition, there is very little experimental control implemented due to ethical concerns. The therapists would rather give individual attention to their clients than maintain controls as rehabilitation is more important to therapists than generating scientific conclusions.

On the other hand, there are some studies with far greater statistical power that refute claims for the efficacy of MT. For example, Bieleninik et al. (2017) conducted an experiment assessing if improvisation MT reduced ASD symptomatic behaviors in autistic individuals. Taking place over the course of five months, the study included nine countries and an impressive 364 participants, enough for a control condition and two improvisation MT conditions: high and low intensity. The study yielded no significant effect of either MT intervention on ASD symptomatic behaviors and only some significant effects on secondary measures. On a more concise note, another study by Choppin et al. (2016) found that patients with bipolar disorder in a euthymic state experienced more intense negative emotions than

the healthy control group when listening to classical music.

While there is some merit to these examples, just as limitations exist in studies that support MT, so do limitations exist in the studies that refute MT. In Bieleninik et al. (2017), there was very little experimental control as multiple different therapists were using a variety of strategies to treat a diverse sample of patients varying in severity. In addition, despite a large sample size remaining, a considerable dropout of nearly 14% occurred before final data collection. Therapy sessions could also have been discontinued too soon as it is typical for children with ASD to be in MT for years rather than only months. Furthermore, Bieleninik et al. (2017) concede that measuring symptoms does not necessarily reveal rehabilitation. Indeed, some of the study's secondary outcomes, such as social motivation, social awareness, and autistic mannerisms, that could represent "well-being and adaptive functioning" did improve significantly compared to standard therapies. Perhaps Bieleninik et al. (2017) measured the wrong variable. Referring to the Chopin et al. (2016) study, the authors acknowledge that their lack of control on the type of bipolar disorder and individual affinities for classical music resulted in significant limitations.

Suggestions and Predictions for Future Research

Completed studies are already calling for more research into fields of MT. Indeed, this should be conducted if MT is to be used to the fullest potential. Large scale experiments that reveal causality over correlations should be strongly considered as these studies can begin to move scientific thought on MT from conjecture to evidence-based theories. Future experiments must however keep as much experimental control as possible to prevent confounds from causing unfounded results.

Despite this necessity for continued MT research, there are important considerations to make. As mentioned previously in Bieleninik et al. (2017), a large scale experiment can easily contain confounds in the form of different therapists with different

methods and clients with a variety of pathology presentations. This raises concerns for ethics as well. There is a trade off between good statistical power with a large sample size and rigid MT guidelines and if the intervention will be truly effective for those in dire need of treatment (Montello & Coons, 1998). Indeed, individual cases require lots of attention, not only to establish the therapist-client relationship, but also to allow the therapist to effectively cater the therapy to the client's individual needs.

Ensuring that future experiments are both statistically powerful and ethical will be expensive as many therapists should be employed and all trained in the same fashion. This is perhaps too unrealistic for the current state of MT. Another alternative would be to assess the effect of MT on healthy populations as fewer concerns of ethics arise in these circumstances. With large healthy populations, good research designs using random assignment can assess the various beneficial and potentially negative effects of MT. As far as where research should be directed, a combined aMT and pMT approach offers more opportunity for the intervention to work. Areas of interest should certainly be those discussed in this paper to affirm if MT is efficacious for disorders of cognitive development, mood and anxiety, and damaged physiology; however, interest should also be expanded in more directions. In the Davis, Gfeller, and Thaut (2008) overview of MT, the authors identify that music has been used therapeutically in a wide variety of cases beyond what was discussed in this paper. These include motor disorders, such as Parkinson's, hospice care, correctional rehabilitation, and more. Indeed, due to the flexible nature of MT, its methods could be applied in many ways. Future research has many different avenues of promise.

Limitations

While this paper attempted to capture an expansive view of MT research at a glance, a meta-analysis was not conducted. Although many different topics were covered, the author cannot guarantee that the

paper accurately represents the field of MT. Controls on sample populations, severity of disorder, and types of interventions were not kept consistent throughout the paper, nor within each section.

Conclusion

Although the majority of research in MT is in the form of case studies, quasi-experiment, and reviews, rather than empirical evidence, strong psychological, affective, and physiological effects of music are being discovered. MT has been demonstrated to be an easier form of communication in which social interactions can be associated with positive experience and diagnosis can be streamlined in populations with conversational impediments. Music has also been shown to help clients relax during sessions, further facilitating the therapeutic process. In addition, it has been supported that music can temporarily counteract physiological and emotional instability. This helps to regulate moods and social interaction in clients who typically lack these necessary functions. There are many cases in which significant pathologies do not respond favorably to our most effective treatments. MT offers another option for these cases. In addition, MT is not invasive or dangerous and has very little potential for negative side effects. MT may show promise, but studies also exist refuting these claims making claims to MT efficacy inconclusive. Research at a larger scale with more experimental control is required in the near future to make use of this potent and flexible therapeutic tool.

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