

The role of therapeutic music in alleviating comorbid depression: An extended literature review

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Digironimo N. The role of therapeutic music in alleviating comorbid depression: An extended literature review. *Clin Psychol Cog Sci* 2019;3(1):5-8.

Different authors have reflected the beneficial effects of music in alleviating the psychopathic states in humans. Music exhibits its therapeutic effects by alleviating the neuropsychological and psychopathic disorders. Music could also convey a certain mood or ambiance that allows composers to evoke certain emotions based on their cultural backgrounds or ethnic profile. The emotional state itself played a significant role in interpreting the music. Although different studies have endorsed the role of music in alleviating depressive symptoms, very few studies have suggested the domain and extent of music-based interventions for managing MDD alone or comorbid MDD. The methodology in this present study was based on a keyword search strategy. The keywords related to appropriate

Boolean connectors to retrieve the relevant articles from various clinical websites such as Pubmed Central, Cochrane database, PsycINFO, CINAHL, MEDLINE, and OVID Online. The present study utilized an extended literature review that explored the role of music as a therapeutic aid against depression. The review illustrated those different types of music genres appeal in a differential manner to the clients. The review demonstrated that jazz music or percussion music was more effective than the classical music genre in reducing the symptoms of depression. The study also showed that exposure to music for short duration was more effective in alleviating the symptoms of depression. However, the review did not elucidate the mechanisms by which music therapy reduced the symptoms of depression. Likewise, the review also did not highlight the role of music therapy in reducing the prevalence of relapse with depression.

Key Words: *Extended literature review; MDD; Music therapy; Depression improvement; Relapse prevention*

INTRODUCTION

The role of music as a therapeutic aid for depression surfaced from the works of Verrusio et al., Chen et al., Koelsch et al., Fancourt et al. (1,4). However, most of the authors either used a specific type of experimental setup with a particular music genre (such as classical, modern, instrumental, or vocal) (2) while others explored the effects of music on a specific age group (adolescents or elders) (3). Likewise, Hole et al. (5) conducted a meta-analysis that reflected that music significantly reduced the postoperative symptoms of anxiety and pain in patients who underwent surgical interventions. Sarkamo et al. (6) highlighted significant improvements in cognitive and emotional functions in dementia patients who sang or listened to familiar songs. Gold et al. (7) showed the therapeutic benefits of music in alleviating depression across patients suffering from chronic non-malignant pain (CNP). Trappe et al. (8) reported the beneficial effects of music in cardiology patients. Leubner and Hinterberger (9) highlighted the benefits of music in aiding relaxation in patients during heart surgery and angiography. Yinger and Gooding (10) reported music as a therapeutic aid against anxiety and insomnia. Studies also suggest that music could significantly improve verbal and long-term memories in children and adolescents, respectively.

Droit-Volet et al. and Schafer et al. (11,12) elaborated the possible mechanisms by which music exhibited its therapeutic effects in alleviating the neuropsychological and psychopathic disorders. The authors' highlighted music could convey a certain mood or ambiance that allowed composers to evoke certain emotions based on their cultural backgrounds or ethnic profile. On the contrary, the emotional state itself played a role in interpreting the music to which one was exposed. Grewe et al. (13) further highlighted subjective impressions that are embedded in a musical composition elicited physiological reactions. However, there is inconclusive evidence regarding the ways music elicited or integrated psychological and physiological reactions while an individual confronts depression or stressful events. Moreover, there is also inconclusive evidence whether music therapy is effective in alleviating depression across individuals who are affected with schizoaffective disorders (SADs) and substance abuse disorders (SUDs). Although various studies have explored the role of music in alleviating symptoms of depression, a very few of them have explored the role of music in preventing relapse of depression and the severity of depression at relapse across the at-risk individuals.

According to the Diagnostic and Statistical Manual of Mental Disorder, fourth edition (DSM-IV), stated that a "Major Depressive Disorder is characterized by one or more Major Depressive Episodes (at least 2 weeks of depressed mood or loss of interest accompanied by at least four additional symptoms of depression)" (DSM-IV, 1994, p. 317). Leubner and Hinterberger (9) acknowledged the burden of depression as a function of reduced social functioning, impaired quality of life (QOL) parameters, high prevalence of psychological and medical comorbidities, more number of DALYs, and a higher risk of mortality in the concerned stakeholders. As per the WHO, almost 322 million individuals across the globe were affected with clinical symptoms of depression. To recall, depression or Major depressive disorder is a neuropsychological disorder that is featured by low mood and a lack of interest in daily activities almost every day. Additionally, patients with MDD often present with the risk of self-harm, including suicidal thoughts. Hence, management of depression imposes significant challenges across healthcare professionals and family members of those affected. The symptoms of MDD stem from the increased turnover of serotonin in the neuronal synapses of the reward-punishment pathway in the brain. Since serotonin is recognized as a mood elevator neurotransmitter, the increased uptake of serotonin in the pre-synaptic neurons of the reward-punishment pathway leads to the episodes of depression. The pharmacological interventions (which are mostly the selective serotonin reuptake inhibitors) prevent the episodes of depression by reducing the reuptake of serotonin in the pre-synaptic neurons.

Leubner and Hinterberger (9) reported that music is used in clinical settings under two perspectives; music therapy and music medicine. Bradt et al. (14) stated that music therapy refers to the "clinical and evidence-based use of musical interventions to accomplish individualized goals within a therapeutic relationship by an accredited professional who has completed formal certification in music therapy." In music therapy, the therapist, in consultation with the clients, selects an individual-specific music that is nurtured and practiced in one or more sessions. The therapy is not only restricted to passive exposure to the music but also active engagement from the part of the client in playing, composing, or interacting with it. Hence, music therapy refers to the act of extending the therapeutic benefits of music in a person-centric and tailored manner.

On the contrary, music medicine or functional music therapy is extended by professionals who do not have formal certification in music therapy. Music

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Received: August 05, 2019, Accepted: September 04, 2019, Published: September 11, 2019



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medicine is defined as the medical, physiological, and physical implications of music in ensuring positive outcomes in patients. When someone listens to his or her favorite tracks to kindle a sense of well-being, it is also referred to as music medicine. Although the domain of music therapy and music medicine differs as per definition, they are often used interchangeably in clinical settings. Nevertheless, both MT and MM focuses on the scientific, artistic, aesthetic, and clinical aspects of medicine in ensuring physical and mental well-being across the concerned stakeholders. For this reason, Leubner and Hinterberger (9) stated that there are seamless transitions between MT and MM across clinical settings. The purpose of the research utilizing an extended literature review is to investigate the role of music in alleviating the symptoms of depression.

LITERATURE REVIEW

The extended literature review was based on a keyword search strategy. The keywords related to appropriate Boolean connectors to retrieve the relevant articles from various clinical websites such as Pubmed Central, Cochran database, PsycINFO, CINAHL, MEDLINE, and OVID Online. The keywords and Boolean connectors used for the scoping search include depression OR major depressive disorder AND music therapy OR music medicine AND recovery OR relapse AND pharmacological interventions OR Psychotherapy OR Psychoanalysis. The articles that were published during the last twenty years and in English were only selected for the final review. Moreover, the articles that did not achieve a CASP score of at least seven were also not included for the review. The articles that were finally selected were thematically sorted and critiqued based on the domain of the review.

THEMATIC ANALYSIS

Age and Gender

Effect of music in young individuals belonging to the age group below 30 years

There was a significant reduction in mean depression scores when the participants attended group therapy compared to individualized sessions. It was speculated that the beneficial effects of music were modulated by social interactions within the groups.

Effect of music in middle-aged individuals belonging to the age group between 30 years and 59 years

There was a significant improvement in depression symptoms when they attended group intervention sessions compared to the individualized sessions (48.37% versus 24.79%, $p < 0.05$).

Effect of music in elderly individuals belonging to the age group beyond 60 years

The participants exhibited significant improvements in their depression scores (48.36%) when they attended music therapy in individualized settings. The respective individuals predominantly belonged to Asian origin and were more exposed to classical music than other music genres. These individuals were also influenced by the music of Asian compositions that were more traditional and culture-related. However, the authors (15) speculated that combining Western classical with Asian traditional music is more suitable to produce better results.

Effect of music as a function of gender

Although there are no direct and head-on comparisons, instrumental music without vocals significantly improved depression scores in males and females when played through CD or MP3 in group settings (2). The average duration of the sessions was approximately 80 minutes, and on average, the participants were exposed to 17 sessions.

Effectiveness of music when administered as music therapy

Various authors have explored the effects of MT in improving symptoms of depression (16-18). The average improvement noted by the authors was around 40.87%+7.7% ($p < 0.05$). However, compared to the control groups, there was no significant improvement in the depression scores in the experimental group. These findings implicated that MT was comparable to control groups (who did not receive musical intervention but other recommended interventions) ($p > 0.05$). One of the reasons why there were no significant improvements in the depression scores as compared to the control groups reported by Leubner and Hinterberger (9) was because the metrics of diagnosing depression differed for different studies. Moreover, the difference in the depression improvement scores was also modulated by the type of music to which the participants were exposed. For example,

Choi et al. showed that exposure to drumming, relaxing music, and singing significantly improved the mean depression scores (48.28%) on the BDI scale, while the improvement on the MADRS scale was estimated to be 42.68%. Likewise, exposure to the same type of music assessed on the RMPCD scale was estimated to be 42.9% (16).

On the contrary, Silverman did not find any significant improvement in the mean depression scores when the participants were engaged in song-writing. Erkilla et al. suggested that participants with depression expressed their liking for percussion instruments (such as the African Djembe drum and mixed composition of different instruments synthesized by digital instrument synthesizers). Han et al. further elucidated that percussion instruments, when played rhythmically (rhythmic drumming) coupled with vocals, significantly improved the mean depression scores. Nevertheless, none of these authors did explore the effects of classical music or jazz music exclusively (17,18).

Effectiveness of music when administered as music medicine

Leubner and Hinterberger (9) reported 22 articles that explored some variant of music medicine in improving depression symptom score. The studies by Lu et al. (19), Chen et al. (2), and Fancourt et al. (4) reflected that on an average music medicine improved depression symptom scores by almost 53.71%. Compared to music therapy, the participants who participated in music medicine studies were exposed to a wide range of music genres. These findings implicated that participants who were exposed to music medicine experienced comparatively greater improvements in depression symptom scores than their counterparts who received music therapy (53.71% versus 42.6%-48.4%). The findings are highly interesting because exposure to unstructured music (MM) sessions compared to structured music sessions (MT) translated into greater improvements in depression symptom score in the study participants. Such findings reflected that patients have their own choice for the music they want to listen or chant, and it should not be prefixed or suffixed by the therapist. To recall, the domain of MM permits an individual to remain exposed to any form or genre of music that ensured his or her well-being irrespective of the formal certification of the therapist on music therapy. Although Leubner and Hinterberger (9) stated that there are seamless transitions between MM and MT, therapists often expose patients with depression to prototype music or specific music genres in their respective clinical settings. The analysis reflected that patients should be preferably provided the choice to select or discard a music genre based on their liking because it is the mind of the patient that could only say which music or songs seemed more appropriate to overcome his or her episodes of depression. In this regard, it is important to explore the role of jazz music or other music genres which are beyond the normal music prototypes for music therapy.

Effect of different types of music genres on depression score improvement

Effect of classical music: Leubner and Hinterberger (9) reported nine articles that explored the effects of classical music (composed by well-known composers such as Beethoven and Mozart) on depression improvement scores (DIS). Surprisingly, only four studies reflected a significant effect size for depression improvement with an average improvement in the scores to the tune of 39.98%+12%. The wide fluctuations in the DIS in the four studies itself signified that patients with depression respond differently to the same music genre. These findings further reflected that patients reserve the ultimate right in accepting a music genre as per their state of mind. Hence, it could be speculated that patients with depression interpret and respond to the same music genre differentially. These speculations are substantiated from the observations of Koelsch et al. (3), who highlighted that the classical music genre was preferably extended to the patients in an individualized manner rather than a group setting. Since the classical music genre was imposed on the patients, some of the patients had to accept it as a part of the therapy.

However, the corollary was that they also remained refractory to the classical music genre, as substantiated by five out of the nine studies reported by Leubner and Hinterberger (9). Leubner and Hinterberger (9) further reflected that the classical music genres that were effective had an average duration of 11 sessions while those that were not so effective were of 30 sessions. These findings further implied that patients who accepted the classical music genre to overcome their symptoms of depression responded early compared to their counterparts who remained refractory to the classical music genre. Hence, if all patients accepted the classical music genre, they would have responded similarly (either in individualized sessions or with lesser sessions). Although Leubner and Hinterberger (9) concluded that classical music improves depression symptom score with lesser number of sessions, such conclusions are either inappropriate or inconclusive because if that would have been the case then all the patients of depression represented in all the nine studies should have responded to classical music and that too with session sizes of 11 to 14. Leubner and Hinterberger (9) reported

that patients with depression remained refractory to classical music therapy even after 30 sessions. To negate such inferences, Leubner and Hinterberger (9) stated that the “saturation effect” with different types of intervention co-administered with classical music could have been responsible for the refractory cases of depression.

Effect of percussion-based music: Leubner and Hinterberger (9) reported nine studies that used percussion-based rhythmic music to improve depression symptom score in the participants. The authors reflected that on an average, the improvements were 47.8%. These findings implicated that percussion-based music was more effective compared to the classical music genre in improving depression symptoms (47.8% versus 39%). The authors further reflected that the average duration to which the participants were exposed to such music varied between 63 minutes to 93 minutes, the duration of exposure did not translate into increased improvements in the mean depression scores. These findings further reciprocated that fast-paced music (rhythmic drumming or jazz music) might be more effective compared to the classical music genre in improving depression scores in a certain population of patients. The point that duration of exposure to fast-paced music (percussion-based music) did not significantly influence the mean depression score, it could be inferred that the quality of a musical genre is more important than its duration in improving depression symptom score across the concerned stakeholders.

Effect of Jazz-Music in alleviating depression: Various authors explored the effectiveness of jazz-music in improving depression symptom score irrespective of the gender or age of the patients. However, the number of studies in this segment is not only less (n=5) but also inconclusive. Nevertheless, all the five studies reflected that jazz music significantly improved mean depression scores in the participants, and the results were significant at the 0.001 level and also below it. The average improvement in depression scores was estimated to be 43.41% + 6%. Two studies reflected improvements to the tune of 48.78% (15) and 46.5% (3). Therefore, jazz-based music improved the depression symptom score that was almost comparable to percussion-based music and music medicine in improving depression scores. The beneficial effects of jazz music were substantiated from the findings of Koelsch et al. (3). The authors used a combination of jazz and classical music genres in treating depression.

On the contrary, Chan et al. (15) exclusively used the jazz music genre for managing depression across the concerned stakeholders. From the previous findings, it could be speculated that the classical music genre could have acted in an antagonistic manner to the jazz music genre or vice-versa. In fact, Leubner and Hinterberger (9) highlighted that the classical music genre and the jazz music genre might have blurred the outcome scores by interacting with each other or by preventing the accuracy of the results.

Impact of additional music genres

Regional music genres or specific instrumental music: Various authors reported their independent findings with diverse music genre (Indian Classical music to Irish folk) and compositions (with the flute, meditation, and nature-sound compositions, and lullabies) (15). Since the sample sizes for these studies were too small, and the methodologies were not standardized, conclusive evidence could not be drawn from the effect of these musical interventions in improving depression symptom score. Leubner and Hinterberger (9) voiced for designing well-designed and case-controlled studies with larger sample sizes to draw conclusive inferences regarding the role of such musical genres as a music therapy aid in the future. Nevertheless, Leubner and Hinterberger (9) suggested that such studies could be interpreted in the light of three broad music genres (percussion, classical, and jazz) if at all the music genres that were considered are eligible for such classifications. Under such circumstances, cross-sectional or randomized studies with such music genres would add to the literature on the effectiveness of music therapy in alleviating depression and allied disorders.

Evaluation of experimental interventions (those include music as one of the interventions) versus control interventions (that did not involve any musical interventions). Two studies out of 28 studies that were reported by Leubner and Hinterberger (9) did not reflect the beneficial effects of music therapy over the control interventions. Although the sample size in the Deshmukh et al. (20) study is small, the same cannot be concluded for the Silverman et al. (17) study. Such findings further raised the question, “why does some form of music are beneficial while others are not?” Likewise, questions are triggered on the issue of why one music genre is beneficial in one group of individuals while they are ineffective in others. Although Leubner and Hinterberger (9) concluded that the Deshmukh et al. (20) and the Silverman et al. (17) studies are exceptions, such conclusions are an oversimplification of a deep-rooted phenomenon. The authors attributed their observations to the diagnostic tools used by the respective authors of the two studies. In

reality, these authors used the HADS scale, which is also a standardized questionnaire for screening depression.

Temporal and spatial attributes of the sessions: Leubner and Hinterberger (9) reported that on an average, 13 to 17 sessions with music therapy was effective in improving DSS. However, various authors have expressed that the effective number of sessions could range from as low as one to as high as 56 (15,21). Such findings are not surprising because the collective unconscious of an individual is intrinsic to him or her. Therefore, it is hard to predict the number of sessions that would take to trigger one’s collective unconscious to overcome the episodes of depression or the thoughts that prompted such episodes. Likewise, the average session frequency with MT that was found to be most effective in alleviating the symptoms of depression across the concerned stakeholders was 2.69 per week. However, some authors reported that one session per week also contributed to favorable outcomes in the concerned stakeholders. These findings suggest that the duration or the frequency of music therapy sessions is not sacrosanct in ensuring positive outcomes across the respective stakeholders.

Role of music in comorbid depression: Degli and Biasutti (22) conducted a study across 27 participants who presented with schizophrenia, SAD, bipolar affective disorder, depression, and personality disorders to explore the role of music and standard therapy in reducing the dependence on neuroleptic medications. The study reflected that administration of music therapy as group therapy (48 sessions per week) combined with standard care provisions reduced the dependence of the participants on neuroleptic medications. These findings once again endorsed the speculation that standard care provisions or TAU should not be neglected even if music therapy shows promising results. Nevertheless, the Degli and Biasutti (22) study confirmed that music therapy could be extended to psychopathic conditions beyond depression and schizoaffective disorder. However, the authors did not clarify whether such regimes would also be useful in managing comorbid psychopathic conditions.

Nevertheless, it could be extrapolated that if music therapy is effective in managing these disorders independently, then there is every possibility that music therapy would be beneficial across those individuals who present with comorbid psychopathic disorders. In another study, Geretsegger et al. (23) conducted a systematic review to evaluate the effects of music therapy in improving outcomes in patients with schizophrenia and SAD. The study showed that medium-term follow-up exhibited significant improvement in the symptoms of the psychopathic disorder and social functioning. However, the study did not reflect the effect of music therapy in improving general functioning in the concerned participants. These findings raise the doubt whether music therapy is more effective over the long term in improving symptom scores of depression or SAD or other psychopathic disorder.

DISCUSSION

Leubner and Hinterberger (9) reported the findings of control groups who received alternative interventions (non-music therapies) compared to their control counterparts who received treatment as usual. Significant improvements were noted regarding depression symptom scores (DSS) in all such groups that received alternative interventions compared to the TAU. These findings were further substantiated by Hendricks et al. (24), who showed that administration of CBT to the treatment-as-usual (TAU) interventions significantly improved DSS in depressed patients ($p < 0.05$). In another study, Chan et al. (15) showed that the addition of music therapy to CBT interventions deteriorated the DSS (GDS-15) in the concerned stakeholders if the two therapies were not spaced. On the contrary, the spacing out of the two types of therapies in the same individual did not influence the DSS ($p > 0.05$). These findings implicated two postulates; the mechanism through which music therapy alleviates depression might be comparable to the mechanisms by which CBT does the same and patients might be sensitized or focused only to a specific type of non-pharmacological intervention at one time. These findings suggest that music therapy could be used as an alternative to CBT and vice-versa for managing depression. However, neither of the authors did highlight the baseline parameters on the severity and type of depression in which the two therapies could be administered interchangeably.

The other types of non-music interventions that were extended to the experimental groups include the presentation of monomorphic tones, verbal therapy sessions, conductive-behavioral psychotherapy, and antidepressant medications. Different authors have substantiated and provided conclusive evidence regarding the effectiveness of such interventions in alleviating depression with or without the presence of comorbid disorders (17,25). In one study, the authors reported that psychoanalytic psychotherapy produced

larger effect sizes compared to CBT while managing individuals presenting with comorbid depression and alcohol use disorder (AUD) (73 versus 63.5, $p < 0.001$). These findings implicate that non-pharmacological interventions (whether music or non-music based) are effective in mitigating symptoms of depression; however, their effectiveness varies across different target populations. Hence, studies should explore which non-pharmacological interventions are most appropriate for the specific subset of depressed patients.

In their study, Leubner and Hinterberger (9) reported the effectiveness of the experimental interventions such as music therapy, cognitive behavioral interventions, and pharmacological interventions as separate groups while comparing the effectiveness of music in improving depression symptom scores. Such comparisons are also unjustified from the perspective of ethical considerations. Different regulatory guidelines suggest that pharmacological interventions with anti-depressants are mandatory for managing MDD patients irrespective of their severity of depression. However, the take home point from the Leubner and Hinterberger (9) study suggests that music therapy and anti-depressant therapy could be used interchangeably. Such speculations should be discouraged because depressed patients are always predisposed to the risk of self-harm. There are no studies that have substantiated that music therapy could eliminate the risk of self-harm in MDD patients.

Nevertheless, studies should explore the role of music therapy in combination with pharmacological interventions for managing the episodes or the symptoms of depression across the concerned stakeholders. Future studies should explore the role of music in preventing the relapse of depression. Therefore, music therapy should be explored in combination with pharmacological interventions for managing acute episodes of depression. They should also be used as an independent therapeutic modality for managing chronic episodes of depression once the acute episodes of it have subsided.

From the Leubner and Hinterberger (9) it could be extrapolated that music therapy and CBT produced comparable efficacies, it might be possible that music therapy helps an individual with MDD to recognize and overcome such behaviors that impair their personal and professional well-being. These speculations suggest that music therapy might work by increasing the resilience and coping skills of the respective individual with which he or she could overcome the thoughts that prompt the episodes of depression. These findings are aligned to the substantiations provided by Leubner and Hinterberger (9). To recall, these authors reported that music could alter the physical, physiological, and psychological state of humans. In this regard, the concept of collective unconscious might come into play. It might be speculated that music triggers the collective unconscious of the mind that are associated with self-belief, resilience, self-exploration, and determination. Motivating such attributes could help an individual not only to overcome the episodes of depression or the thoughts that triggered them but could also encourage them to perform beyond their professional and personal visions.

CONCLUSION

These speculations suggest that two non-pharmacological interventions (psychotherapy and music therapy) should not be used in combination for managing depression because a combination therapy deteriorates depression outcomes in the respective individuals. Hence, it could be speculated that both the referred therapies might act through the same neurological pathways and the presence of one non-pharmacological intervention could jeopardize the benefits of the other non-pharmacological intervention. However, there are no well-controlled studies that have provided conclusive evidence that music therapy is antagonistic to psychotherapy (especially psychoanalytic psychotherapy) in managing depressed individuals presenting with or without comorbid psychopathic disorders.

REFERENCES

- Verrusio W, Andreozzi P, Marigliano B, et al. Exercise training and music therapy in elderly with depressive syndrome: A pilot study. *Complement. Ther Med* 2014;22:614-20.
- Chen XJ, Hannibal N, Gold C. Randomized trial of group music therapy with Chinese prisoners: impact on anxiety, depression, and self-esteem. *Int J Offend Ther Comp Criminol* 2016;60:1064-81.
- Koelsch S, Offermanns K, Franzke P. Music in the treatment of affective disorders: an exploratory investigation of a new method for music-therapeutic research. *Music Percept Interdisc J* 2010;27:307-16.
- Fancourt D, Perkins R, Ascenso S, et al. Effects of group drumming interventions on anxiety, depression, social resilience, and inflammatory immune response among mental health service users. *PLoS ONE* 2016;11:e0151136.
- Hole J, Hirsch M, Ball E, et al. Music as an aid for postoperative recovery in adults: a systematic review and meta-analysis. *The Lancet* 2015;386:1659-71.
- Särkämö T, Tervaniemi M, Laitinen S, et al. Music listening enhances cognitive recovery and mood after middle cerebral artery stroke. *Brain* 2008;131:866-76.
- Gold C, Voracek M, Wigram T. Effects of music therapy for children and adolescents with psychopathology: A meta-analysis. *J Child Psychol Psychiatry* 2004;45:1054-63.
- Trappe HJ. The effects of music on the cardiovascular system and cardiovascular health. *Heart* 2010;96:1868-71.
- Leubner D, Hinterberger T. Reviewing the effectiveness of music interventions in treating depression. *Frontiers in Psychology* 2017;8:1109.
- Yinger OS, Gooding LF. A systematic review of music-based interventions for procedural support. *J Music Ther* 2015;52:1-77.
- Droit-Volet S, Ramos D, Bueno JL, et al. Music, emotion, and time perception: the influence of subjective emotional valence and arousal? *Front Psychol* 2013;4:417.
- Schäfer T, Fachner J, Smukalla M. Changes in the representation of space and time while listening to music. *Front Psychol* 2013;4:508
- Grewe O, Nagel F, Kopiez R, et al. Listening to music as a re-creative process: physiological, psychological, and psychoacoustical correlates of chills and strong emotions. *Music Percept* 2007;24:297-314
- Bradt J, Potvin N, Kesslick A, et al. The impact of music therapy versus music medicine on psychological outcomes and pain in cancer patients: a mixed methods study. *Support. Care, Cancer* 2015;23:1261-71.
- Chan MF, Chan EA, Mok E. Effects of music on depression and sleep quality in elderly people: A randomized controlled trial. *Complement. Ther Med* 2010;8:150-9.
- Han P, Kwan M, Chen D, et al. A controlled naturalistic study on weekly music therapy and activity program on disruptive and depressive behaviors in dementia. *Dement Geriatr Cogn Disord* 2011;30:540-6.
- Silverman MJ. Effects of music therapy on change and depression on clients in detoxification. *J Addict Nurs* 2011;22:185-92.
- Choi AN, Lee MS, Lim HJ. Effects of group music intervention on depression, anxiety, and relationships in psychiatric patients: a pilot study. *J Alternat Complement Med* 2008;14:567-70
- Lu SF, Lo CHK, Sung HC, et al. Effects of group music intervention on psychiatric symptoms and depression in a patient with schizophrenia. *Complement. Ther Med* 2013;21:682-8.
- Deshmukh AD, Sarvaiya AA, Seethalakshmi R, et al. Effect of Indian classical music on quality of sleep in depressed patients: a randomized controlled trial. *Nordic J Music Ther* 2009;18:70-8.
- Castillo-Pérez S, Gómez-Pérez V, Velasco MC, et al. Effects of music therapy on depression compared with psychotherapy. *The Arts in Psychotherapy* 2010;37:387-90.
- Degli Stefani M, Biasutti M. Effects of music therapy on drug therapy of adult psychiatric outpatients: A pilot randomized controlled study. *Frontiers in Psychology* 2016;7:1518.
- Geretsegger M, Mössler KA, Bieleninik I, et al. Music therapy for people with schizophrenia and schizophrenia-like disorders. *Cochrane Database Syst Rev* 2017;5:CD004025
- Hendricks CB, Robinson B, Bradley LJ, et al. Using music techniques to treat adolescent depression. *The Journal of Humanistic Counseling* 1999;38:39.
- Albornoz Y. The effects of group improvisational music therapy on depression in adolescents and adults with substance abuse: a randomized controlled trial. *Nordic Journal of Music Therapy* 2011;20:208-224.