

Music Therapy for Depression in Adolescents: A Systematic Review of Randomized Controlled Trials

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ABSTRACT

Objective: The purpose of this systematic review is to examine the evidence of music therapy for depression in adolescents in order to answer the following questions: (1) What types of music therapy are being employed to target symptoms of depression in adolescents? (2) What is the effect of music therapy on depressive symptoms of depression in adolescents?

Methods: PRISMA guidelines were followed in performing this systematic review. Studies published in the last 25 years from January 1996 to December 2020 were identified through the use of the PubMed database, using the keywords: 'music' AND 'depres*' OR 'anx*'. Two authors independently conducted a focused analysis and reached a final consensus on 8 studies that met the specific selection criteria and passed the study quality checks.

Results: Eight randomized controlled trials were selected in this review including 8 music therapy interventions for depression: musical negative mood induction procedures (NMIP), Health RHYTHMS drumming protocol, group music therapy (GMT), musical improvisation, Chinese 5-element music therapy, percussion exercises, and cognitive behavioral therapy combined with music therapy. Overall, music therapy interventions appear to significantly reduce depressive symptoms in adolescents.

Conclusion: The findings of this systematic review indicate that music therapy may be an effective tool for reducing symptoms of depression in adolescents. There is a need for large sample studies examining this area, along with those that address symptoms of anxiety. Future research incorporating music therapy into clinical practice is necessary.

Keywords

Music therapy, Depression, Adolescents.

Introduction

Depression is among the most common psychiatric disorders in adolescents. Research has shown that 20% of adolescents face chronic depression before adulthood [1], and recent data has shown that 60% of diagnosable depression in this age group remains untreated [1]. Access to treatment and engagement in treatment impact outcomes for adolescent depression [1]. Studies show that nearly half of adolescents discontinue antidepressant medications,

and adherence to a prescribed medication regimen continues to be a challenge even in primary care settings [2].

Music therapy has been gaining traction as a treatment for a variety of physical ailments and behavioral health symptoms, especially in the last five years [3]. This treatment combines interventions meditation with patient-selected and/or therapist-selected music and has been shown to be effective in physical rehabilitation, impact motivation for involvement in medical treatment, and create of an emotional outlet for patients [3]. Adolescents commonly listen to music on a day-to-day basis, whether to facilitate relaxation,

provide emotional support, or create an enjoyable experience. In fact, recent data has demonstrated that approximately 66% of adolescents listen to music everyday [4]. Given many adolescents' inherent engagement with music, the behavioral health profession may consider whether music therapy could be employed as a behavioral health treatment and, if so, what impact this treatment modality would have on adolescent depression outcomes.

The purpose of this systematic review is to examine the evidence for the effect of music on depression in adolescents in order to answer the following questions:

- (1) What types of music therapy are being employed to target symptoms of depression in adolescents?
- (2) What is the effect of music therapy on symptoms of depression in adolescents?

Methods

Search Strategy

This systematic review was performed in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [5]. A systematic literature search was conducted on articles in the PubMed database published within the past 25 years, from January 1996 to December 2020 using the following keywords: 'music' AND 'depres*' OR 'anx*' and following the inclusion and exclusion criteria detailed below. More studies were added from the reference lists for identified research studies and reviews.

Study Selection Criteria and Methodology

The following inclusion criteria were used: (a) articles published in English or had a published English translation; (b) articles published in a peer reviewed journal; (c) original randomized controlled trials in human adolescents ages 12-18 (no reviews, no animal studies). Exclusion criteria involved studies with patients who had medical or substance use comorbidity, reviews, editorials, opinion pieces, and case reports. Two authors independently conducted a focused analysis then together reached a consensus on studies that meet the specific selection criteria. The quality of each study was examined by identifying its strengths and limitations using the criteria adapted from Lohr and Carey by the Agency for Healthcare Research and Quality [6]. Quality aspects assessed include sample size, patient selection methods, potential for bias, study group comparison, blinding, intervention details, outcome measures, and statistical analysis plans. The search method is displayed in a flow diagram in Figure 1.

Search Results

Our search strategy identified 252 articles. After elimination of the duplicates and irrelevant abstracts, 40 studies were identified to meet the pre-defined selection criteria. Two authors independently conducted a focused analysis of the gathered 40 full-text articles. The two authors then reached a consensus on what studies to include in this review, which yielded 23 studies. The findings from the study quality check method eventually led to the exclusion of 15 studies due to inadequate sample size and statistical reporting resulting in a final selection of 8 studies.

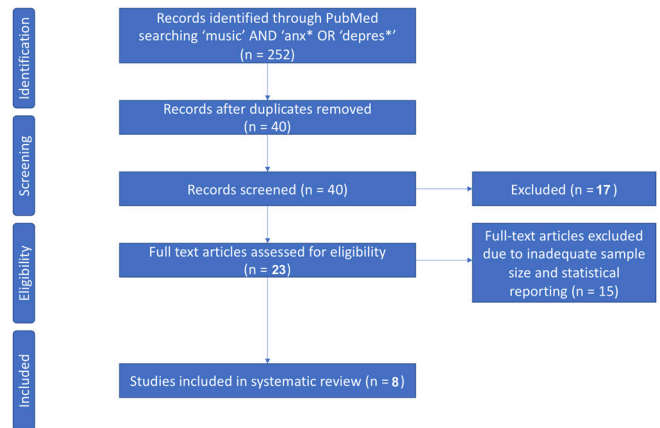


Figure 1: Identification of records and reasons for exclusion for systematic review.

Data Extraction and Yield

Key findings were derived from the full-text and table of the selected studies. The study designs and findings were analyzed for quality and are detailed in Table 1.

Results

Overview

All eight selected studies are randomized controlled trials (RCTs). Study samples sizes ranged from 31 to 100 subjects with intervention duration ranging spanning from 30 to 90 minutes duration with a follow-up ranging from 0 to 12 weeks. All eight studies focused on depression outcomes, with no anxiety studies meeting selection criteria and/or quality checks.

1. What types of music therapy are being employed to target symptoms of depression in adolescents?

The studies reviewed employed different forms of musical interventions. Musical negative mood induction procedures (NMIP), employed by Woolgar et al. [7], exposes participants to sad images that align with participants' experiences, accompanied by suggestive music. The fairly new intervention of Health RHYTHMS drumming protocol, invited participants to complete rhythmic exercises in a freeform manner to improve focus and group confidence [8]. Group music therapy (GMT) was used by Gold et al. [9] and consisted of the following activities: group improvisation, song analysis, songwriting, and playlist-creation. Another study that utilized musical improvisation was Porter et al. [10]. Patients were encouraged to create music freely through voice, instrument or movement, while receiving support from a therapist [10]. Chinese five-element music therapy was utilized in depressed nursing students [11]. Played on Chinese musical instruments, this music was based on the 'Five Element' Theory, explaining that "the acoustic effects of these five types of music in their five different tones moderate the movement of Chi in the body" [11]. Percussion group therapy as part of a program called Doing Anger Differently (DAD) was used for adolescents with depression and history of in-school misbehavior [12]. The program contained a series of structured Latin American percussion exercises, guided psychoeducation, and journaling. Both studies by Hendricks et al.

Table 1: Summary of the findings of the selected studies of Music Therapy for Depression in Adolescents.

Author, year, location	Population and Setting	Sample size	Type of study	Intervention	Comparator	Duration of treatment	Depression instruments used	Outcome (Others)	Outcome	QUALITY CHECK
Gold et al., 2017 Australia	13- 15 y participants from government-funded secondary schools in socio-economically disadvantaged areas in Victoria, Australia.	100	Cluster-RCT	GMT	SDML	8 weeks	K10	No significant differences in K10 scores were found between GMT condition and SDML condition (p>0.05)	N/A	Adequate: Adequate sample size; strong to adequate methodology including study group, therapeutic regimen, study protocol and outcomes.
Woolgar & Tranah 2010 UK	12-17 y participants detained in center within the UK.	38	Crossover trial	Music NEG	Neutral mood induction	30-40mins	CDI, Current mood check	The influence of the mood induction condition was restricted to the participants who reported suicidal ideation (p < .01)	N/A	Adequate: Adequate to poor sample size; adequate methodology including study group, therapeutic regimen, study protocol, outcomes and statistical analyses
Bittman et al., 2009 US	12-18 y living at Bethesda Children's Home, a staff-secure residential treatment facility in Meadville, Pennsylvania	52	Crossover trial	Health RHYTHMS drumming protocol	Control condition	6 weeks	RADS 2	Significant changes in experimental pretest/posttest RADS2 scores	N/A	Adequate: Adequate sample size; adequate methodology including study group, therapeutic regimen, study protocol, outcomes and statistical analyses
Porter et al. 2016 UK	Reporting on subgroup (13-16) with social, emotional, behavioral and developmental difficulties at six Child and Adolescent Mental Health Service community care facilities in Northern Ireland	110	RCT	MT + TAU	TAU	12 weeks	CES-DC	For participants 13 and over in the intervention group, depression scores were significantly lower at week 13 (p = .004 for overall sample).	Social functioning was significantly improved in the intervention group (p = .04). Self-esteem significantly improved in intervention group (p = .002)	Strong: Strong sample size; strong to adequate methodology including study group, therapeutic regimen, study protocol and outcomes.
Chen et al. 2015 Taiwan	Nursing students from Taiwan with depressed mood to the music and control groups at medical center in Taiwan	71	RCT	Chinese five-element MT	Routine lifestyle control	10 weeks	DMSRIA	Depression levels were significantly reduced (P = 0.038) compared with the control group (P < 0.001)	Salivary cortisol levels	Strong: Strong sample size; strong to adequate methodology including study group, therapeutic regimen, study protocol and outcomes.
Currie & Startup 2012 Australia	Group treatment for reactively aggressive 12-15 year old males	54	qRCT	DAD percussion exercises	Waitlist control	10 weeks	BDI	Treatment resulted in lowered depression (p < .05).	Decreased trait anger aggression and increased self-esteem	Strong: Strong sample size; strong to adequate methodology including study group, therapeutic regimen, study protocol and outcomes.
Hendricks et al. 1999 US	Students (14-15) enrolled in a public junior high school in a middle-sized southwestern town	19	RCT	GMT	CBT	8 weeks	BDI	Experimental group showed larger decrease in depression index than control group (p = .0195)	N/A	Adequate: Adequate sample size; strong to adequate methodology including study group, therapeutic regimen, study protocol and outcomes.
Hendricks et al. 2001 US	Junior and senior high school students (13-18) from two schools in a mid-size city in the Southwestern United States	63	RCT	CBT w/ MT	CBT	12 weeks	BDI	Results indicated that the use of music therapy techniques was positively correlated with reduced posttest depression scores (p < .0001).	Increased posttest self-concept scores for both junior high and senior high participants.	Strong: Strong sample size; strong to adequate methodology including study group, therapeutic regimen, study protocol and outcomes.

BDI: Beck Depression Inventory, CBT: Cognitive behavioral Therapy, CDI: Children Depression Inventory, CES-DC: Centre for Epidemiological Studies Depression Scale for Children, CHUGS: mother-infant therapeutic playgroup—Community, Corah, DAD: Doing Anger Differently, DASS: Depression Anxiety and Stress Scale, DMSRIA: Depression Mood Self-Report Inventory for Adolescence, GMT: Group music therapy, K10: Kessler 10 depression scale, MT: Music Therapy, NEG: Negative Mood Induction, qRCT: quasi-Randomized Controlled Trial, RADS 2: Reynolds Adolescent Depression Scale, 2nd edition, RCT: Randomized Controlled Trial, SDML: Self-directed music listening, TAU: Treatment as Usual.

[13,14], consisting of students in the southwestern US, received group music therapy divided into seven crucial elements: exercise, relaxation, positive mood induction, sleep, productivity, group drawing, and positive experience association.

2. What is the effect of music therapy on symptoms of depression in adolescents?

Except for one study [9], significant improvements in post-treatment ratings were detected following music therapy. Eight studies showed significant improvements in post-treatment ratings of depression. A study by Bittman et al. [8] showed significant changes in experimental pre-test to post-test RADS2 scores ($p < .05$). One study by Woolgar et al. [7] found significant improvements only for participants who reported suicidal ideation ($p < .01$). In the study by Chen et al. [11], Chinese 5-element music therapy significantly reduced depression in nursing students ($p < 0.001$). Currie et al. [12] found that percussion therapy significantly reduced depression in adolescents with aggressive behavior ($p < 0.05$). Within the musical improvisation intervention group, Porter et al. found that depression scores were significantly lower at week 13 ($p = .004$). Hendricks et al. demonstrated that public junior high school ($p = .0195$) [13] and junior/senior high school students ($p < .0001$) [14] showed a reduction in depression when music therapy was combined with group therapy and CBT respectively.

Discussion

In this review of randomized controlled trials that met pre-defined selection criteria and quality check, we identified 8 musical interventions for depression: musical negative mood induction procedures (NMIP), Health RHYTHMS drumming protocol, group music therapy (GMT), musical improvisation, Chinese 5-element music therapy, percussion exercises, and cognitive behavioral therapy combined with music therapy. Except for the study by Gold et al. which utilized a music-based intervention as a control, the reviewed studies showed music significantly improved symptoms of depression in adolescents. Musical interventions were also shown to improve conditions of depressed participants at risk for suicide [8]. Research suggests musical therapies might be appropriate as a supplemental behavioral health treatment, as opposed to a stand-alone treatment for depression in adolescents [15], a conclusion that was also reached by the Cochrane review on music therapy for depression [16]. Our review supports the findings of a recent meta-analysis of five studies ($n = 100$) in which internalizing symptoms of depression were shown to be reduced in adolescents as result of music-based interventions [17]. The overwhelming majority of articles reviewed for this paper provide evidence that music therapy is an effective means of reducing depression in adolescents. Based on our review, music therapy is effective as a stand-alone intervention or adjunctive treatment for symptoms of depression.

This systematic review exclusively focuses on music therapy RCTs in the context of adolescents with depression. Among other reviews examining the impact of music therapy on adolescents with

depression, this is one of the few that exclusively evaluates RCTs. RCTs are well established as the gold standard of study designs, bolstering the credibility of the reported results. Stegemann et al. reviewed the application of music-based interventions for multiple pediatric health conditions but did not exclusively focus on depression [18]. Cochrane's review on music therapy for depression, while thorough, did not focus exclusively on the experiences of adolescents [16].

Strengths and Limitations

Strengths of this review include a diverse array of musical interventions, both in terms of application and geography. Examples include musical tone therapy rooted in ancient Chinese medicine, Latin American percussion, and elements of hip hop in a variety of settings. The strict quality check criteria also ensured that only adequate to strong studies were reviewed, due to a combination of adequate to strong sample size and methodology. This review also focuses on RCTs, which are well established as the most reliable of study designs. The literature reviewed reflects the most rigorous of the current research available as a result.

Limitations of this review include the use of a single database. In addition, multiple tools were used to screen for and monitor depression. Depression tends to exist alongside multiple comorbidities, which may have impacted the presented results. Further disaggregation of the adolescents would also be useful, as some of the reviewed articles used study samples that were overwhelmingly homogenous in terms of race and gender. Ultimately, there exists a lack of high-quality studies regarding music therapy for adolescents with depression. While this certainly limits the generalizability of the evidence, the fact that music therapy led to favorable outcomes around the world with various subsets of adolescents is promising.

Conclusion and Future Directions

The findings of this systematic review indicate that music therapy has a positive impact on depression with adolescents. This trend appears to apply across multiple adolescent populations and musical interventions.

Discovering the optimal application of music therapy remains a compelling challenge for future research. Some of the reviewed articles relied heavily on trained facilitators and group participation, while others were individualized or incorporated passive exposure to particular music. While it is unclear as to which particular types of music are most effective at alleviating depressive symptoms in adolescents, a good amount of studies in this review focused on improvisational techniques, mostly with percussion. To build on current findings, in addition to establishing adequate sample sizes and study designs, future trials capable of expanding improvisational therapy beyond percussive music to incorporate improvised music production, where a session could revolve around the patient spontaneously creating a personalized tune would be of value to the field [19,20]. The effect of improvisation creates therapy that is catered to each individual, allowing patients

to forage their own paths to recovery. Studies showed that music is associated with changes in biomarkers of stress such as a decreasing trend in cortisol, salivary alpha-amylase, heart rate, and blood pressure, an increasing trend in Immunoglobulin A (IgA), oxytocin, and EEG theta wave, and sex-related differences in testosterone [21]. Future studies should evaluate the impact of different types of music therapy on these biomarkers and examined their correlation with reduction of psychiatric symptoms. Future studies should also evaluate music therapy's impact on anxiety in adolescent populations, given its high prevalence and frequent role as comorbidity to depression.

Lastly, it is necessary for future research to focus on optimal incorporation of music therapy into clinical practice.

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