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Music therapy for anxiety disorders in adolescents and young adults: A systematic review

Michael Ishak [1, 2, *], Aasim Naqvi [2, 3], Aida Azatian [2] and Jessica Jeffrey [4]

[1] *Princeton University, Princeton, NJ, United States.*
[2] *Cedars-Sinai Medical Center, Los Angeles, California, United States.*
[3] *California Northstate University College of Medicine, California, United States.*
[4] *David Geffen School of Medicine at University of California Los Angeles (UCLA), Los Angeles, CA, United States.*

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Abstract

Purpose: The purpose of this systematic review is to examine the effectiveness of music therapy for adolescents and young adults with anxiety disorders.

Methods: PRISMA guidelines were followed in performing this systematic review. Studies published in the last 25 years from September 1997 to September 2022 were identified through the use of the Medline, PsycInfo, PubMed, and Google Scholar databases, using the keywords: music* AND anxi*. Two authors independently conducted a focused analysis and reached a final consensus on six studies that met the specific selection criteria and passed the study quality checks.

Results: All six studies included showed significant improvement as measured by anxiety symptom severity measures for adolescents and young adults receiving music therapy.

Conclusion: While music therapy has shown to be promising as a stand-alone or adjunctive treatment for anxiety disorders in adolescents and young adults, more research is needed to establish music therapy as an effective treatment.

Keywords: Music therapy; Anxiety disorders; Adolescents; Young adults

1. Introduction

Anxiety disorders are encountered in nearly one-third of adolescents worldwide, with a prevalence of 31.9% [1]. The two main treatments for anxiety disorders are medication and psychotherapy. Cognitive behavioral therapy (CBT) used in conjunction with medication currently possesses the most evidence in its effectiveness for anxiety disorders [2]. A large portion of anxiety disorders go undiagnosed and in turn are insufficiently treated [3]. Untreated anxiety may cause major impairment to physical, social and emotional functioning, as well as an increased risk of developing comorbid psychiatric disorders such as depression [3].

Music can produce anxiolytic effects, including a reduction in heart rate and blood pressure, two biomarkers associated with stress and anxiety [4]. It was shown that over 80% of adolescents listen to music everyday [5]. Music has also been proven to be a necessary tool for adolescents in identity formation and healing [6]. Furthermore, adolescents use listening to preferred music as a tool for stress reduction and emotional regulation [6].

* Corresponding author: Michael Ishak; Email: mi1933@princeton.edu
Princeton University, Princeton, NJ, United States.

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Music therapy is defined as the "clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program" [7]. Music therapy encompasses interventions ranging from receptive music-listening to participatory singing and instrument-playing to improvisation and composition [8].

Neuroscientific evidence has demonstrated music therapy's effectiveness at both attention-modulation, shifting attention away from negative stimuli that trigger anxiety symptoms, and emotion-modulation, regulating neural activity in the major brain regions involved with emotion and linked with mood and anxiety disorders [9]. Music therapy has been used to treat anxiety disorders and has been studied primarily in adults, with a recent meta-analysis showing that music therapy significantly improved anxiety symptoms [10]. However, with the exception of one trial, none of the 32 studies reviewed included adolescents or young adults [10]. Given evidence for music therapy as both a stand-alone and adjunctive treatment for anxiety, supported by neurological and psychosocial research on music's anxiolytic effects, it is important to examine the evidence for this intervention, specifically for adolescents and young adults with anxiety disorders, especially given music's wide acceptance and accessibility by this age group.

The purpose of this systematic review is to examine the effectiveness of music therapy on symptoms of anxiety in adolescents and young adults.

2. Methodology

2.1. Information Sources and Search Strategy

This systematic review was performed in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [11]. A systematic literature search was conducted on articles in the Medline, PsycInfo, EBM Reviews, PubMed, and Google Scholar databases published in the past 25 years, from September 1997 to September 2022 using the following keywords: music* AND anxi*. More studies were added from the reference lists for identified research articles.

2.2. 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 study of any kind in human adolescents and/or young adults, of ages 10-29. Exclusion criteria involved reviews, editorials, opinion pieces, and case reports. Two authors independently conducted a focused analysis and then reached a consensus on studies that met 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 [12, 13]. Quality aspects assessed included 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.

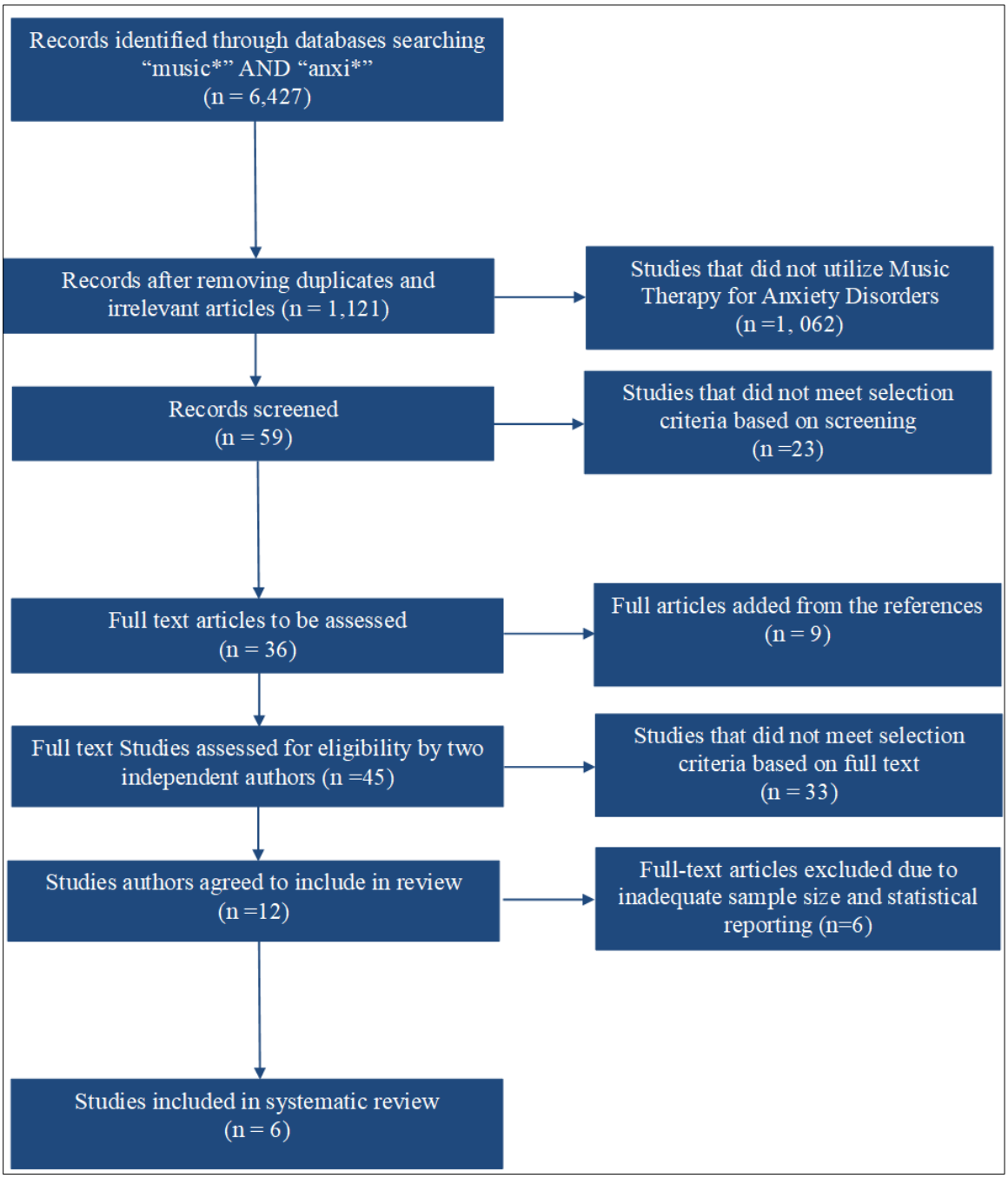

Figure 1 PRISMA Diagram

2.3. Search Results

Our search strategy identified 6,427 articles. After elimination of the duplicates, irrelevant articles, and studies and did not focus on music therapy in anxiety disorders, 59 studies were identified to meet the pre-defined selection criteria which were screened further. This process resulted in the selection of 36 studies for a focused analysis by two authors independently, and 9 nine studies that met selection criteria were added from the references, bringing the total to 45 full-text studies. The two authors then reached a consensus on which studies to include in this review, which yielded 12 studies. The findings from the study quality check method eventually led to the exclusion of six studies due to inadequate sample size and statistical reporting, resulting in a final selection of six studies.

2.4. Data Extraction and Yield

Key findings were derived from the full-text and tables of the selected studies.

Table 1 Findings from the studies of Music Therapy for Anxiety Disorders in Adolescents

Author, Year, Location	Population and Setting	Sample size	Type of study	Music Intervention	Adjunctive or Stand-Alone	Comparator	Duration of treatment	Anxiety instruments used	Outcome	Outcome (Others)	QUALITY CHECK
Kwok 2019 Hong Kong	Students from grade 8 to grade 9 from three secondary schools in Hong Kong	106	Two-arm RCT	Resource-oriented Music Therapy with Positive Psychology	Stand-Alone	Control condition	8 weeks	Chinese version of CHS, HADS, & SHS WLEIS	Anxiety levels were significantly reduced in the experimental group (p = 0.002)	Experimental groups had significantly higher hope, emotional competence, and higher happiness when compared to those in the control groups.	Strong: Strong sample size; strong to adequate methodology including study group, therapeutic regimen, study protocol and outcomes
Neal-Barnett et al., 2019 US	12-15 y middle school students enrolled in the Sisters United Now program in the Midwest	72	Mixed Methods	BYOTS: Build Your Own Theme Song	Stand-Alone	N/A	1 week	MASC-2	Anxiety from pre-use to post-use of the app was reduced (t = 2.82, p = .004)	Negative thinking was significantly lower at day 7 than day 1 (t = 1.69, p = .05)	Negative thinking was significantly lower at day 7 than day 1 (t = 1.69, p = .05)
Travis et al., 2019 US	11-15 y middle school students participating in a non-residential summer program in Austin, Texas	35	Convenience sample	Hip Hop Empowerment (HHE) + Therapeutic Beat Making (TBM)	Stand-Alone	Control condition	6 weeks	EMPYD, abbreviated BSI	At Time 2, the intervention group depression and anxiety measure was 5.00, substantially lower than the 9.88 of the non-	Experimental group had improvement in all youth development indicators (connection, confidence, competence, caring, character,	Adequate: Adequate to poor sample size; adequate methodology including study group, therapeutic regimen,

									intervention group (reported as statistically significant with no p value)	sense of community, and active and engaged citizenship)	study protocol, outcomes and statistical analyses
Scheufler et al., 2021 US	10-18 y participants in a hospital-based intensive interdisciplinary pain treatment program in the Midwest	48	qRCT	Live Patient-Selected Music (LPSM), Active Music Engagement (AME), and Music-Assisted Relaxation (MAR)	Adjunctive TAU (IIPT program)	N/A	3-5 weeks	STICSA-C	The effects of each music therapy intervention was powerful, leading to statistically significant changes in each outcome (all $p < .001$) with very large effect sizes (per Cohen's *d* interpretation guidelines)	MAR intervention led to a greater reduction in somatic anxiety levels for patients compared to AME ($p < .001$). MAR also led to greater reduction in self-reported anxiety compared to AME	Adequate: Adequate sample size; adequate methodology including study group, therapeutic regimen, study protocol, outcomes and statistical analyses
Hernandez-Ruiz, 2022 US	Performing arts college students from the Schools of Music, Dance and Theater	36	Quasi-Experiment	Receptive Musical Experience based on Therapeutic Function of Music (TFM)	Stand-Alone	N/A	20 minutes	S-STAI & T-STAI	A brief (5-min) online music experience was sufficient to significantly decrease anxiety levels ($p =< 0.001$)	Trait anxiety, stress overload, and gender were not significant predictors of S-STAI after MT intervention	Adequate: Adequate sample size, poor to adequate methodology including study group, therapeutic regimen, study protocol,

											outcomes and statistical analyses
Ceccato & Roveran 2022 Italy	Adolescents suffering from Anorexia Nervosa attending the daily therapy program at the Eating Disorder Unit if the San Bortolo Hospital in Vicenza	24	Experimental design	Group-based Music Therapy	Adjunctive to TAU (Occupational and rehabilitation activities)	N/A	19 sessions	AT	Significantly lower level of pre-meal anxiety after the MT group session compared to the prior 2 days (p=0.006 and p=0.001)	Reports indicated that some girls would subsequently make spontaneous use of music they had heard or texts they had read during the sessions in order to relax or relive emotions they had experienced during the group therapy	Adequate: Adequate to poor sample size; adequate methodology including study group, therapeutic regimen, study protocol, outcomes and statistical analyses

ABBREVIATIONS: AME: Active Music Engagement, AT: Anxiety Thermometer, BSI: Brief Symptom Inventory, BYOTS: Build Your Own Theme Song, CHS: Children's Hope Scale, EMPYD: Empowerment-based Positive Youth Development, FACE: Fast Assessment of Children's Emotions, HADS: Hospital Anxiety and Depression Scale, HHE: Hip Hop Empowerment, IIPT: intensive interdisciplinary pain treatment, LPSM: Live Patient-Selected Music, MAP: Personalized Receptive Music Therapy Intervention, MAR: Music-Assisted Relaxation, MASC-2: Multidimensional Anxiety Scale for Children 2, MT: Music Therapy, PROMIS: Patient-Reported Outcomes Measurement Information System, qRCT: quasi-Randomized Controlled Trial, RCT: Randomized Controlled Trial, SHS: Subjective Happiness Scale, SMS: State Mindfulness Scale, SSIS: Social Skills Improvement Rating Scales, STAI: State-Trait Anxiety Inventory, STAI-Y: State-Trait Anxiety Inventory-Y, S- STAI: State version of the State Trait Anxiety Inventory, STICSA-C: State-Trait Inventory for Cognitive and Somatic Anxiety for Children, TAU: Treatment as usual, TBM: Therapeutic Beat Making, TFM: Therapeutic Function of Music, TSST: The Trier Social Stress Test, T-STAI: Trait version of the State Trait Anxiety Inventory, WLEIS: Wong and Law Emotional Intelligence Scale

3. Results

All six studies showed significant improvements in anxiety for adolescents and young adults receiving music therapy [14, 15, 16, 17, 18, 19].

In the RCT by Kwok, eight weeks of group music therapy significantly reduced anxiety in Hong Kong secondary school students ($p = .002$) [14]. An uncontrolled open trial of middle school students by Neal-Barnett et al. found significant anxiety improvements after 1 week of using a "Build Your Own Theme Song" mobile app designed to provide cognitive restructuring ($p = .004$) [15]. In the quasi-RCT examining middle school students in a summer program by Travis et al., the researchers found significantly lower post-treatment anxiety in Hip Hop-Empowerment and Therapeutic Beat Making group compared to the non-intervention group [16]. In the quasi-experimental crossover study of 10 to 18-year-olds in a pain treatment program, Scheufler et al. tested three music therapy interventions (active music engagement, live patient-selected music, and music-assisted relaxation); all three interventions led to significant anxiety improvements ($p < 0.001$) with very large effect sizes [17]. The quasi-experimental study of performing arts college students by Hernandez-Ruiz showed significantly improved anxiety scores after a five-minute online music experience [18]. In a quasi-experimental study examining 14 to 25-year-old females with anorexia nervosa, Ceccato and Roveran found significantly lower levels of pre-meal anxiety after group music therapy [19].

4. Discussion

This review of six recent studies that met pre-defined selection criteria and quality check shows that music therapy has a positive impact on anxiety in adolescents and young adults. We identified seven distinct musical interventions used to treat anxiety in adolescents and young adults. Three studies employed active interventions: active music engagement (AME) [17]; a Build Your Own Theme Song app (BYOTS) [15]; and Hip Hop, Empowerment, and Therapeutic Beat Making (HHE-TBM) [16]. Three passive interventions were employed among two studies: receptive musical experience based on the therapeutic function of music (TFM) [18], receptive music-assisted relaxation (MAR) and live patient-selected music (LPSM) [17]. Two studies integrated active and passive methods with individual and group music therapy [14], [19]. Out of the six studies, four utilized music therapy as a stand-alone treatment [14], [15], [16], [18] and two utilized music therapy as an adjunctive treatment [17], [19].

The trial by Kwok et al., the only RCT included in this review, found a significant reduction in anxiety in the group music therapy condition. Notably, the intervention in this trial lasted 8 weeks and found significantly higher hope and emotional competence for the music therapy condition [14]. Group settings for patients who have similar diagnoses could possibly have a significant impact on this population compared to one-on-one interventions. This could be due to the positive impact of support drawn from the group compared to working with a music therapist individually [20].

The remaining studies included in this review found that music therapy significantly improved anxiety in adolescents and young adults. The uncontrolled trial by Hernandez-Ruiz found significant improvements in anxiety after a single five-minute intervention [18]. This intervention was administered online, distinguishing it from other studies included in this review. Neal-Barnett et al. utilized a novel "Build Your Own Theme Song" app where black female adolescents designed self-written and self-recorded theme songs based on their individual favorite song [15]. The study found improvements in not only anxiety after this weeklong intervention, but also in negative thinking [15]. Ceccato and Roveran studied a sample of adolescent females with anorexia nervosa and found improvements in pre-meal anxiety after group music therapy [19]. Additional reports from the study indicated that participants were spontaneously utilizing the music from the sessions on their own time, in order to relax or relive emotions from the group sessions [19]. These trials, while methodologically incomparable to RCTs, demonstrated significant findings that can guide further research in various adolescent populations. Interestingly, the study by Scheufler et al., the only trial that compared active and passive methods side by side, found positive effects across all three interventions (two passive and one active), with no significant differences [17].

All studies in our review which utilized both active and passive methods of music therapy demonstrated improvements in the anxiety of adolescents and young adults both on its own and as an adjunctive to existing treatment programs. Overall, this review adds to the growing evidence suggesting improvement of anxiety with this treatment in adolescents and young adults.

This systematic review focuses on music therapy trials in the context of adolescents and young adults with anxiety. Among other reviews examining the impact of music therapy on anxiety, this review distinguishes itself by evaluating studies which exclusively included adolescents and young adults, a population in which the rate of anxiety disorders

has been dramatically increasing, especially after the events of the COVID-19 pandemic [21], [22]. In the past decade, studies have shown that young adults are receptive to music therapy when it is presented; for example, a 2015 study showed that adolescents felt that music therapy was helpful for elevating their mood, reducing anxiety, and in facilitating social interaction with others [23]. The authors of this study recommended further exploration of different types of musical interventions for anxiety. This review separates itself from other recent reviews by clearly outlining the unique music interventions used in each included study.

The findings of our study are consistent with those of recent reviews examining music therapy for anxiety, though many of these reviews had important limitations. For example, a 2018 meta-analysis by Geipel el al. found that music-based interventions reduced internalizing symptoms in children and adolescents; however, only one of five included trials investigated children with anxiety disorders, and no trial examined adolescents with anxiety symptoms [24]. Lu et al. showed in a recent meta-analysis that music therapy significantly improved anxiety symptoms during treatment, however, out of 32 studies, none included adolescents and only one included young adults [10]. Additionally, a 2019 systematic review of RCTs by Umbrello et al. assessed 11 studies and found that music therapy was consistently associated with reduction in anxiety, but this review only examined critically ill patients and did not primarily focus on adolescents or young adults [25]. A recent review of music therapy for anxiety and depression in children and adolescents by Belski et al. found some evidence to support music therapy for anxiety for adolescents and young adults; however, there was significant clinical heterogeneity and risk of bias [26].

4.1. Strengths and Limitations

Strengths of this review include that it successfully found six studies that utilized music therapy for anxiety in adolescents and young adults and all showed statistically significant results. This is the only systematic review on music therapy for anxiety that primarily focuses on adolescent and young adult populations. Although music is widely used to improve anxiety associated with a variety of medical conditions and procedures, we focused our review primarily on anxiety disorders. Unfortunately, there are a limited amount of studies included in this review for the following reasons: music therapy practice is under-researched and quite scarce in healthcare settings, most research in this field primarily focuses on adults, a large number of research in this field is qualitative due to the subjective and personalized nature of music therapy, and finally, many studies had to be excluded due to poor quality.

4.2. Future Directions

Much of the research done in music therapy primarily focuses on adult populations, reporting a lot of promising evidence for using music therapy for symptoms of anxiety. However, more research needs to be focused on adolescents and young adults, in which anxiety disorders are very common and widely under-treated. Research that did highlight this population included a number of studies that were either qualitative reports, case studies, or clinical trials of poor quality and did not meet criteria for inclusion in this review. In the included material, only one study was a randomized controlled trial among other uncontrolled or quasi-experimental designs. Thus, an effort must be made in this field of research to prioritize the scientific method to ensure results that are precise, accurate, unbiased, and generalizable to the global population. This can be specifically done with more randomized-controlled trials aiming to examine the effect of music therapy on anxiety in adolescents and young adults. However, there has been a recent trend in the last three years among the studies included in this review towards higher quality research in the field. A similar trend was also witnessed in the research of music therapy's effect on depression, a common comorbidity to anxiety, with an increasing number of studies focusing on adolescents and young adults in the last decade [27]. Thus, maybe in the next five to ten years there will be a larger selection of studies to include in a future systematic review.

Much of the limited findings in this area can also be attributed to the scarcity of music therapy practice around the world. The field of music therapy, although widely growing, is still in its infancy, and has much more room to expand in healthcare settings, especially in adolescent and young adult populations. Music therapy, unlike medication, is not a standardized treatment, and instead involves subjective practices geared towards each treatment-seeking individual. Such a variable poses a challenge for collecting objective data. Given this information, an important future direction for research examining the effect of music therapy on anxiety in adolescents and young adults is testing one specific music therapy intervention for each study administered, instead of combining a number of practices under the umbrella of music therapy. For example, a future study could focus specifically on comparing regular sessions of music-listening to treatment as usual; or alternatively, comparing regular sessions of group choir singing to treatment as usual. This would ensure less extraneous variables and more objective results. It would also be very important to compare music therapy methodologies side by side, such as active interventions compared to passive interventions or individual settings compared to group settings. Using this method is important for determining which music therapy interventions are more impactful for symptoms of anxiety or more relevant to the specific population of adolescents and young adults.

5. Conclusion

Despite the challenge it poses to research, music therapy's personalized nature is an important factor that could influence future interventions that could be specifically designed to target symptoms of anxiety. More recent music therapy interventions promote a larger sense of involvement from participants, some of which involve participants composing their own therapeutic music under the guidance of a therapist. Furthermore, this intervention could invite the therapist to use music technology to assist a participant through the composition of a complete personalized song, facilitating ongoing use and therapeutic involvement beyond sessions. A future direction to explore is the effect of such music compositional interventions on anxiety and how they compare to passive-engagement interventions.

It is clear that while music therapy has shown to be promising as a treatment for anxiety in adolescents and young adults, much more research needs to be done in order to establish music therapy as a viable stand-alone or adjunctive treatment.

Compliance with ethical standards

Disclosure of conflict of interest

The authors have no conflicts of interest relevant to the content of this article.

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