HTA Austria
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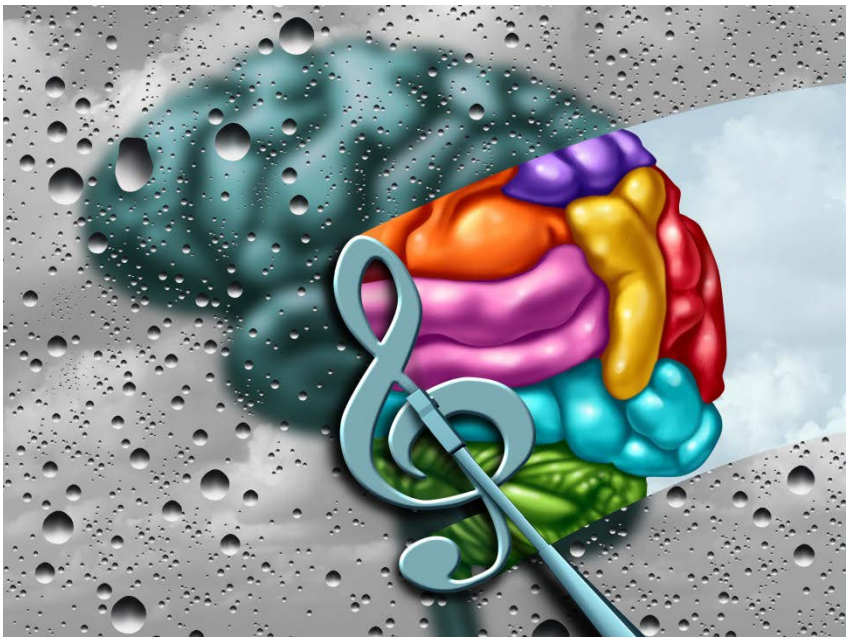
Effectiveness of Music Therapy for Autism Spectrum Disorder, Dementia, Depression, Insomnia and Schizophrenia



Update of Systematic Reviews

Final report

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Update of Systematic Reviews

Vienna, November 2020

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Content

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List of abbreviations

RQ .....research question
MT.....music therapy
n.r. .....not reported
n.a. .....not available
RCT.....randomised controlled trial
CCT.....controlled clinical trial
RoB.....Risk of Bias
SoC .....Standard of Care
QoL .....Quality of Life
FU .....follow up
soc./soz. .....social/sozial
SR.....systematic review

Zusammenfassung

Einführung

Bereits 1958 wurde in Wien – erstmals in Europa – die Österreichische Gesellschaft zur Förderung der Musikheilkunde gegründet. Nur ein Jahr später folgte das erste Ausbildungscurriculum für Musiktherapie in Europa. Musiktherapie ist eine ausdrucksfördernde, wissenschaftlich-künstlerisch-kreative und eigenständige Therapieform mit dem Ziel, körperliche, emotionale und mentale Gesundheit zu erhalten, wiederherzustellen und zu fördern. Dabei kommen sowohl aktive als auch rezeptive Methoden zum Einsatz. Die zwei Hauptarbeitsfelder stellen Kinder und Jugendliche mit Entwicklungs- und Verhaltensauffälligkeiten und Erwachsene mit psychischen Erkrankungen dar.

Ziel der MT: Förderung von körperlicher, emotionaler & mentaler Gesundheit

Hauptarbeitsfelder: KiJu & psychische Indikationen

In Österreich ist Musiktherapie als Gesundheitsberuf durch ein Bundesgesetz über die berufsmäßige Ausübung der Musiktherapie geregelt, welches seit 2009 in Kraft ist. 2019 wurde zudem die Ausbildung in einer Verordnung festgelegt: diese Verordnung regelt die Mindestanforderungen an die Ausbildungen für die – mitverantwortliche und eigenverantwortliche – Ausübung der Musiktherapie und die Kompetenzen, die im Rahmen der Ausbildung erworben werden müssen. Zudem ist jede*r Musiktherapeut*in verpflichtet, sich in der Liste der Musiktherapeut*innen (Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz) registrieren zu lassen.

MT durch Bundesgesetz zur berufsmäßigen Ausübung der MT geregelt

Ausbildungsverordnung & MT-Therapeut*innen Registrierung

Ähnliche gesetzliche Regelungen gibt es derzeit nur in Großbritannien, Estland und Lettland.

In Österreich bieten drei Institutionen die Ausbildung zur Musiktherapie an. Die Entwicklungen der letzten Jahre zeigen eine starke Zunahme an Musiktherapeut*innen. Aufgrund dieses Zuwachses der Musiktherapie-Angebote ist die gesundheitspolitische Fragestellung, in welchen Indikationen Evidenz zur Wirksamkeit von Musiktherapie vorliegt. Die vorliegende systematische Übersichtsarbeit hat zum Inhalt, die Wirksamkeit von Musiktherapie in fünf großen Indikationsgebieten (Autismus-Spektrum-Störungen, Demenz, Depression, Schlafstörung und Schizophrenie) zu untersuchen. Zudem wurde analysiert, welche musiktherapeutischen Methoden bei diesen fünf Indikationen zur Anwendung kommen.

Ö: 3 Ausbildungsstätten = starker Zuwachs an Musiktherapeut*innen

gesundheitspolitische Frage zur Evidenz der MT

Methoden

In einem iterativen Prozess wurden zunächst systematische Reviews und HTAs in sechs Datenbanken gesucht und 139 Treffer für 15 psychiatrische und weitere 23 nicht-psychiatrische Indikationen identifiziert. In einem zweiten Arbeitsschritt wurden fünf häufige Indikationen von der Österreichischen Gesundheitskasse (ÖGK) bestimmt für welche bereits Cochrane Reviews vorlagen. Für das Update der Cochrane Reviews wurde eine weitere systematische Literaturrecherche in vier Datenbanken (Medline via Ovid, Embase, The Cochrane Library, und PsycINFO) durchgeführt, limitiert auf Publikationen von 2013 bis 2020. Zwei Autorinnen nahmen unabhängig voneinander die Studienauswahl und die Datenextraktion vor und bewerteten die methodische Qualität der eingeschlossenen Studien mittels dem Risk Of Bias In Non-randomized Studies of Interventions (ROBINS-I) und dem Cochrane Collaboration's tool. Für das Update wurden letztendlich nur Studien mit moderatem und niedrigem risk of bias ausgewählt.

iterativer Prozess: Suche nach SRs & HTAs für alle MT-Indikationen

dann Auswahl von 5 häufigen Indikationen mit Cochrane Reviews

Update der Reviews mit CCT/RCTs mit niedrigem oder moderatem RoB

Ergebnisse

10 RCTs in 4 Indikationen, 1.248 Pts
Komparator: SoC oder keine Therapie

Zehn randomisierte, kontrollierte Studien (mit insgesamt 1.248 Patient*innen) erfüllten die Einschlusskriterien. Die Studien untersuchten die Effektivität von Musiktherapie in der Therapie von Autismus-Spektrum-Störungen, Demenz, Depression und Schlafstörung im Vergleich zu Standardtherapie oder keiner Therapie (z. B. Warteliste).

Schizophrenie: hohes Verzerrungsrisiko → keine Studie inkludiert

Für **Schizophrenie** wurde eine Studie mit hohem Verzerrungspotenzial gefunden, welche ausgeschlossen wurde. Folglich konnte diese Indikation nicht upgedatet werden. Die Cochrane Autor*innen berichteten gesteigerte Lebensqualität, verbesserte soziale Funktionsfähigkeit und verbesserter mentaler (Gesamt)zustand bei Patient*innen mit Schizophrenie, wohingegen sich die allgemeine Funktionsfähigkeit durch Musiktherapie nicht steigerte.

Ergebnisse der Cochrane Reviews:

Verbesserungen bei
- **Schizophrenie: QoL, soz. Funktionsfähigkeit & mentaler (Gesamt)zustand**
- **Schlafstörung: Schlafqualität**
- **Depression: Stimmung**
- **Autismus: Verhalten, soz. Kommunikation & Eltern-Kind-Beziehung**
- **Demenz: Stimmung & Verhalten**

Des weiteren fanden die Cochrane Reviews eine Verbesserung der Schlafqualität bei Patient*innen mit **Schlafstörungen** sowie Verbesserungen der depressiven Symptome und Angst bei Patient*innen mit **Depression**; die Lebensqualität wurde hingegen nicht gesteigert. Bei Kindern mit **Autismus**-Spektrum-Störungen konnten Verbesserungen hinsichtlich des initiierenden Verhaltens, der sozial-emotionalen Gegenseitigkeit, bei verbaler Kommunikation, und bei sozialer Interaktion und Adaption festgestellt werden sowie die Eltern-Kind-Beziehung gestärkt wurde. Die nonverbale Kommunikation konnte jedoch nicht durch Musiktherapie verbessert werden. Bei Patient*innen mit **Demenz** wurden allgemeine Verhaltensprobleme, emotionales Wohlbefinden, Stimmung, negativer Affekt und soziales Verhalten gesteigert; Kognition, Agitation und Aggression konnten durch Musiktherapie nicht verbessert werden. Positive Langzeiteffekte wurden nicht berichtet.

Update Ergebnisse:

Bestätigung der Cochrane Reviews

keine Langzeiteffekte

Die Update-Suche ergab, dass bei Kindern mit Autismus-Spektrum-Störung Musiktherapie zu einer Verbesserung der Verhaltensweisen und der sozialen Kommunikationsfähigkeit führte, sowie zu einer erhöhten Qualität der Eltern-Kind-Beziehung. Bei Patient*innen mit Depression konnte die Stimmung gesteigert werden, und bei Patient*innen mit Schlafstörung wurde eine Verbesserung der Schlafqualität erreicht. Musiktherapie hat einen positiven Effekt auf die Stimmung von Patient*innen mit Demenz. Die Symptomatik auf Verhaltensebene verbesserte sich, jedoch nur in Alzheimer-Patient*innen in schwerwiegendem Krankheitsstadium. Langzeiteffekte in Bezug auf Stimmung und Verhaltenssymptome konnten nicht gefunden werden. Kognition steigerte sich nur in einer von vier Studien. Das Kurz- und Langzeitgedächtnis verbesserte sich bei Alzheimer-Patient*innen mit mildem Krankheitsverlauf, jedoch nicht bei jenen mit moderatem oder schwerwiegendem Verlauf.

MT-Methoden aktiv oder rezeptiv

für aktive Methoden qualifizierte Musiktherapeut*innen

Gemischte musiktherapeutische Methoden (aktiv und rezeptiv) wurden bei Demenzpatient*innen angewandt, während die Studienautor*innen bei Patient*innen mit Autismus-Spektrum-Störungen und Depression aktive Methoden einsetzten. Bei Patient*innen mit Schlafstörung wurden nur rezeptive musiktherapeutische Methoden verwendet. Es zeigte sich, dass für das Leiten von aktiven Methoden qualifizierte Musiktherapeut*innen essentiell sind. Auch kurze Studien mit niedrigen musiktherapeutischen Frequenzen führten zu patient*innenbezogenen Verbesserungen.

Fazit

Zusammenfassend erwies sich Musiktherapie als niederschwellige Methode, physische, psychische und soziale Einschränkungen bei Patient*innen mit Autismus-Spektrum-Störungen, Demenz, Depression, Schlafstörung und Schizophrenie zu verbessern oder zu stabilisieren. Sie kann als Alternative oder Ergänzung zu krankheitsspezifischen Therapien gesehen werden.

MT verbessert körperliche, psychische und soziale Aspekte

Executive Summary

Introduction

aim of MT: promoting physical, emotional & mental health

effectiveness of MT
MT methods

Music therapy is an expression promoting, scientific-artistic-creative and independent form of treatment and aims at maintaining, restoring, and furthering physical, emotional, and mental health. This systematic review aims at assessing the effectiveness of music therapy for the treatment of autism spectrum disorder, dementia, depression, insomnia, and schizophrenia. In addition, music therapeutic methods used for these indications are analysed.

Methods

iterative process: searching SRs & HTAs for all MT indications; then selection of 5 high-volume indications with Cochrane reviews

update of reviews with CCT/RCTs with low or moderate RoB

In an iterative process, first, systematic reviews and HTAs were searched in six databases and yielded 139 hits for 15 psychiatric and further 23 non-psychiatric indications. Second, the Austrian Health Insurance Company (ÖGK, Österreichische Gesundheitskasse) decided to focus on five frequent indications with available Cochrane reviews.

For the update of Cochrane reviews, a second systematic literature search in four databases (Medline via Ovid, Embase, The Cochrane Library, and PsycINFO) was conducted, limited to publications from 2013 to 2020. Two review authors independently performed the study selection and data extraction. For assessing the methodological quality of the included trials, the Risk Of Bias In Non-randomised Studies of Interventions“ (ROBINS-I) and The Cochrane Collaboration’s tool were used. For the update, only trials with moderate and low risk of bias were selected.

Results

10 RCTs, 1,248 Pts
comparator: SoC or no therapy

Ten randomised controlled trials, involving 1,248 patients, investigating the effectiveness of music therapy in autism spectrum disorder, dementia, depression and insomnia, compared to standard treatment or no treatment (e.g., waiting list), met the inclusion criteria.

schizophrenia: high RoB → no studies incl; QoL, soc. functioning & global/mental state ☺; global functioning ☹

For the indication schizophrenia, one study with a high risk of bias was found and could not be included. Therefore, an update was not possible. The Cochrane authors stated that quality of life, social functioning, the global and mental state improved in patients with schizophrenia due to MT interventions, while global functioning did not ameliorate.

■ autism: behaviour, soc. communication & parent-child relationship ☺
■ depression: mood ☺
■ insomnia: sleep quality ☺

In children with an autism spectrum disorder, music therapy improved behaviour, social communication skills and the quality of the parent-child relationship. Patients with depression enhanced mood, and sleep quality improved in patients diagnosed with insomnia due to music therapy.

■ dementia: mood & behaviour ☺
cognition ☺☹
memory ☺
no long term effects

Music therapy positively affected on mood in patients with dementia. Behavioural symptoms enhanced only in the severe Alzheimer’s stage. No long-term effects on mood and behavioural symptoms could be found. Cognition eased due to music therapy in only one study out of four studies. Short and long-term memory improved in the mild Alzheimer’s disease stage, but not in the moderate or severe stage.

Mixed forms of music therapeutic methods were used in patients with dementia, while the authors of the studies on autism spectrum disorder and depression applied active methods. In patients diagnosed with insomnia, only receptive methods were used.

MT methods

Conclusion

The findings of this update of reviews provide evidence that music therapy may help patients diagnosed with an autism spectrum disorder, dementia, depression, and insomnia. Music therapy improves physical, psychological and social aspects. More research investigating the long-term effects is needed. It is crucial to specify how long the effects of music therapy last.

MT improves physical, psychological and social aspects

1 Introduction

MT zielt auf die Aufrechterhaltung oder Wiederherstellung physischer, emotionaler & psychischer Gesundheit ab & arbeitet dabei mit den Ressourcen der Patient*innen

Music therapy (MT) is a reflexive process wherein the clients optimize their health with the support of the therapists using their relationship formed through them and music experiences. It is the professional practice component of the discipline, which is informed and informs by research and theory [1]. MT aims at maintaining, restoring, and furthering physical, emotional, and mental health within a therapeutic relationship [2]. Furthermore, MT is a conscious and planned treatment for many multiple indications, using the individual patient's resources. It is an independent, scientific-artistic-creative therapy, which promotes patients' expression [3].

Music therapists treat individuals with psychosocial or physiological diseases by tones and rhythms [4], including singing, creating, listening and/or moving to music [5].

Definition des Weltverbandes der Musiktherapeut*innen

The World Federation of Music Therapy (WFMT) describes MT as

> *„the professional use of music and its elements as an intervention in medical, educational, and everyday environments with individuals, groups, families, or communities who seek to optimise their quality of life and improve their physical, social, communicative, emotional, intellectual, and spiritual health and wellbeing [5]."*

berufliche Standards im sozio-kulturellen Kontext; eigenständige Therapieform; Anwendung in Geriatrie, Psychiatrie, Onkologie, Palliativmedizin

Practice, research, clinical training and education in MT are based on professional standards according to social, cultural and political contexts [5]. Existing music therapeutic concepts can be characterised as psychotherapeutic concepts [6]. MT is offered in healthcare settings such as geriatrics, psychiatry, oncology, and palliative care [7]. Due to MT, individuals can develop perceptive faculties and interpersonal abilities. Furthermore, resources can be activated, and experiences can be concretised. MT initiates intrapsychic and interpersonal processes and serves as diagnostic and therapeutic function [6].

MT-Methoden: aktive und rezeptive Methoden

Music therapeutic methods equally use behavioural-learning-theoretical, psychodynamic, systemic, anthroposophical and holistic-humanistic approaches [6]. Active and receptive forms of MT can be distinguished as possible methodological approaches [7]. In receptive MT, patients are guided in listening to recorded or live music, while in active MT, they produce music by, e.g., playing an instrument or singing [7]. Patients are actively involved in the music-making and may be encouraged to participate with voice or musical instruments, with movement or dance activities or singing in musical improvisation [5]. Four main methods can be distinguished: improvising, re-creating (or performing), composing and listening [8].

MT vs. Musik-Medizin

MT is conducted as a systematic process by music therapists, where clients actively participate in improving health status, which belongs to the active form of MT. In literature, another term, music medicine, can be found. Music medicine, a receptive method, can be defined as pre-recorded music via devices with speakers or headphones offered by healthcare workers to individuals [9].

MT vs. Musik-Medizin vs. andere musik-basierende Interventionen

To differentiate, music therapy is the systematic use of several methods of tailored music experiences within a therapeutic relationship to promote health – provided by credentialed music therapists. Music medicine can be defined as listening to pre-recorded music for health-promoting goals – offered by health care professionals. Other music-based interventions can be defined as other uses of music activities for recreational or health-promoting goals – provided by health care musicians, professionals etc. [10].

1.1 Music therapy as a health profession in Austria

1958: MT wird in Ö als erstem Land in Europa institutionalisiert & Curriculum entwickelt

Wiener Schule für Musiktherapie

In Vienna, in 1958, for the very first time in Europe, the institutionalisation process started with founding the Austrian Society for the Promotion of Music Medical Science (Österreichische Gesellschaft zur Förderung der Musikheilkunde). One year later, the first training course in Europe, including practical clinical training, was established. The Viennese School of Music Therapy is the oldest MT education in the German-speaking region and has an interdisciplinary concept since its inception [11].

seit 1959: Ansiedelung an Akademie für Musik & darstellende Kunst Wien seit 1980 (Psychiatriereform): MT als Standardtherapie

Since 1959, MT education is established at the Academy of Music and Performing Arts Vienna with clinical training in psychosomatics, psychiatry, and child and adolescent psychiatry. The therapeutic relationship between therapists and patients, with its curative effects, was seen as the basis. Since 1980, MT has been implemented in the Psychiatry Reform as standard therapy and has been part of the overall treatment plan [11].

berufsrechtlich geregelt im MuthG BGBl. Nr. 93/2008

In Austria, MT as a health profession is legally regulated through the Federal Act on the Professional Practice of Music Therapy (Bundesgesetz über die berufsmäßige Ausübung der Musiktherapie, MuthG BGBl. Nr. 93/2008), which is in force since 2009 [11]. Educational needs for dependent (institutional) and independent (private) practice, professional permissions, and obligations are legally defined [11]. Similar legal regulations only exist in Great Britain, Estonia and Latvia[1].

verpflichtende Registrierung in der Liste der Musiktherapeut*innen (BMSGPK)

Every music therapist must be registered in the List of Music Therapists, maintained by the Federal Ministry of Social Affairs, Health, Care, and Consumer Protection (Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz/BMSGPK). Music therapists are a professional group clearly defined by Austrian law. Two types of vocational qualifications exist:

Ausbildungsregelungen

- First, music therapists who work independently, requiring a master's degree or equivalent, and
- second, those who work with shared responsibility, holding a bachelors' degree or equivalent.

In Austria, three locations provide academic training in MT:

3 Ausbildungsstätten

- the University of Music and Performing Arts Vienna,
- the IMC University of Applied Sciences in Krems, and
- the University of Music and Performing Arts in Graz [12].

Zunahme der ausgebildeten MT 2012: 261 2020: 433

The development of the last decades shows the numerical growth of the occupational group from 261 music therapists in July 2012 to 433 in June 2020 (http://musiktherapie.ehealth.gv.at/) [12, 13]. Since the number of training institutions has increased to three in recent years, an even more significant boost in the number of professional music therapists can be expected in the future [12].

79 % weiblich, Ø 44J 86 % freiberuflich tätig Ø 20 Wstd

About one fifth (20.7%) of music therapists in Austria are male, and the average age of all therapists is 43.7 years (age range: 22-72). Most of the therapists can work independently (self-employments or freelancers; 86%), according to the Austrian Music Therapy Act (MuthG: Bundesgesetz über die berufsmäßige Ausübung der Musikterhapie, BGBl. I Nr. 93/2008) [12].

[1] Dr. Melanie Voigt (Vice President of the European Music Therapy Confederation), personal communication, 05.11.2020

This act aims to distinguish the two forms of professional practice: full and shared responsibility. The average weekly working hours per therapist are 20.5 hours, and most therapists work in private organisations (33.7%) or facilities run by provincial governments (23.9%). Private practices (25.8%) and hospitals (23.2%) are the most common settings for MT [12].

Settings:
öffentliche Spitäler & Institutionen (49 %), private Organisationen & Praxis (51 %)

In Austria, MT services are offered most frequently for adolescents and children with behavioural or developmental problems (22.5%), and adults with mental health problems (21.5%). MT with individuals in hospices and elderly patients is becoming less common. Thirty per cent of workplaces work with people 65+ years, 44.6% with adolescents and children, and most of them work with adults (59.4%). Individual (80.1%) and group settings (48.3%) are most frequent next to family settings, couples and parent-child groups. A little more than a quarter (27%) of therapists are involved in diagnostic procedures as well as in behaviour observations, issues of differential diagnostics, and autism spectrum disorder diagnosis [12]. The AQR tool (Assessment of the Quality of Relationship) [14] is used most frequently (25.2%) in practice, followed by the MAKS tool (Measurement of Expressive and Communicative Musical Behaviour) [12, 15].

Indikationen:
KiJu mit Verhaltens- und Entwicklungsstörungen (22,5 %), Erwachsene mit psychischen Erkrankungen (21,5 %)
Einzel-, Gruppen-, Familien- und Paartherapien

Diagnostik

To summarise, from 2011 to 2018, an increase of therapists engaged in only one workplace can be seen. Currently, more therapists work as self-employed or salaried employees compared to 2011, and 85% of those are on permanent contracts [12].

Angebot & Nachfrage:
freiberuflich wie unbefristete Anstellungen

1.2 Educational regulations in Austria

The Educational Regulations for MT by the Federal Ministry of Social Affairs, Health Care and Consumer Protection (BMSGK), with their description of minimum standards of music therapeutic competences, came into force in July 2019. They describe competencies and minimum requirements of MT education for independent and shared-responsible professional practice (Music Therapy Educational Regulations 2019 – Muth-AV 2019). These regulations include

BMSGK 2019 Ausbildungsverordnung

Standards und Anforderungen für MT Kompetenzen

- professional-methodical,
- social-communicative,
- scientific expertise and
- self-competence of music therapists.

Also, competences in the areas of 'framework of professionalism of music therapists' and 'ethical issues' are required, as well as minimum requirements for practical training. A predominant part of the practical training has to take place in hospitals and clinical settings. Therapists must emphasise on diversity within different pathologies, impairments, and age groups. The practical training has to take place in at least three of the following areas: disability and developmental delay, geriatrics, child and adolescent psychiatry, neonatology, neurology, rehabilitation, palliative medicine, psychiatry and psychosomatics [16].

breite Ausbildungsanforderungen mit Praxismodulen in mind. 3 (von vielen) Indikationsbereichen: Geriatrie, KiJu Psychiatrie, Neonatologie, Neurologie etc.

einheitliche Ausbildung als Qulitätsscherung: einmalig im Vergleich zu anderen Ländern

These regulations are essential for healthcare providers and payers to ensure that all music therapists have the required extent of expertise and qualification, which is necessary for the respective area of professional practice, regardless of the educational institution. Such a uniform regulation, or rather agreement, from all training providers with the legislator and responsible ministries, so far, has not been possible in other countries [16].

1.3 Project aims and research questions

Politikfrage im Kontext der steigenden Zahlen ausgebildeter MTs: Nutzenbelege zu 5 (hoch-volumigen) Indikationen

In the context of the numerical growth of music therapists in Austria educated and trained by the three universities, it is the health policy question, in which indications there is evidence of a benefit of an increased offer of MT. Since the spectrum of indications is broad, the review aims to provide decision support for the reimbursement of different music therapeutic approaches for five high-volume indications.

Forschungsfragen:

FF1: Evidenz zur Wirksamkeit in 5 ausgewählten Indikationen

FF2: MT-Methodenwahl

The following research questions (RQ) will be answered:

- RQ1: What evidence regarding the effectiveness of music therapy is available for the following indications: autism spectrum disorder, dementia, depression, insomnia, and schizophrenia?
- RQ2: Which music therapeutic method (active and/or receptive) is used for autism spectrum disorder, dementia, depression, insomnia, and schizophrenia?

2 Methods

2.1 Initial research questions and literature search

initiale Zielsetzung: Overview of Reviews zu „allen" Indikationen

This report initially aimed to investigate the effectiveness of MT compared to standard treatment or no treatment (e.g., waiting list) in general, conducting an overview of reviews. The questions were:

- What evidence in terms of the effectiveness of music therapy is available?
- Which music therapeutic method is used for which indication?

Handsuche zu „allen" Indikationen & Experteninterviews

To identify all potential indications and specify the PICO, we

1. screened the literature (hand search) for potential indications, and
2. conducted two expert interviews with music therapists (see Appendix, Interview guide).

Psychiatric/psychological (e.g., dementia, depression, schizophrenia) and non-psychiatric/-psychological indications (e.g., neonatology, intensive care, pain patients) were included in the initial search strategy.

Table 2-1: Indications for music therapy based on hand searches (June 2020)

Psychiatric/Psychological indications	Non-psychiatric/psychological indications
Anxiety disorder	Surgery/Needle insertion procedure (pre-OP)
Depression, Mood disorder	Physical rehabilitation, Physical disease/disability
Cognitive disease, Intellectual disability	Brain/Spinal cord & Neurological disorder
Developmental and learning disability	Cancer, Chemotherapy
Special needs	*Autism spectrum disorder*
Suicidal ideation	Heart, lung and kidney
Post-traumatic stress disorder	Intensive care/hospitalization
Bipolar disorder	Pregnancy/Labor and delivery
Personality disorder	Palliative care patients, Long-term care
Psychosis mental illness	Hospice
Schizophrenia	Terminally ill patients (incurable illness)
Borderline personality disorder	Burn patients
Tinnitus	Ventilated patients
Psychosomatic disorder	Dental treatment (anxiety)
Insomnia	Allergy testing
	Disorders of consciousness
	Decreased mobility
	Parkinson's disease
	Dementia, Alzheimer
	Individuals with hypertension
	Cardiac catheterisation
	Stroke
	Pain patients

systematische Suche in 6 Datenbanken: nur SR & HTA-Berichte 2010-2020

786 Hits, 139 davon eingeschlossen

A first systematic literature search was conducted on the 29th of June 2020 in six databases (Medline via Ovid, Embase, The Cochrane Library, PsycINFO, CRD [DARE, NHS-EED, HTA], and INAHTA). The systematic search was limited to systematic reviews and HTA reports in English, Spanish or German, published in 2010 to July 2020. Ongoing and unpublished studies were not searched for, and no hand-search was conducted. After deduplication, we yielded 786 citations, whereof 139 were included. The search strategy can be found in the Appendix (Search strategy I: Systematic literature search).

wegen großer Anzahl an SR Entscheidung den Fokus auf hoch-volumige Indikationen zu verlegen:

ÖGK bestimmt die Auswahl

Given the large amount of identified systematic reviews, we decided to concentrate on high-volume indications only. The Austrian Health Insurance Company (ÖGK, Österreichische Gesundheitskasse) decided (on the 10th of July 2020) that the review should focus only on the following five indications:

- autism spectrum disorder,
- dementia,
- depression,
- insomnia, and
- schizophrenia.

als Konsequenz: Update von 5 Cochrane Reviews

As a consequence, we decided to conduct – instead of an overview of reviews, an update of Cochrane reviews, answering the research questions described in chapter 1.3. From the initial literature search, we identified five systematic Cochrane reviews [5, 17-20] covering the five indications.

2.2 Systematic literature update search

zweite systematische Suche nur zu RCTs und CCTs zu den 5 Indikationen:
Autismus
Demenz
Depression
Schlafstörungen
Schizophrenie

Based on the Cochrane reviews, a second literature search was conducted to identify randomised controlled trials (RCTs) and controlled clinical trials (CCTs) for the five indications selected. As the oldest included Cochrane review was from 2014, and its literature search was conducted on the 29th of July 2013, we limited the second literature search to publications from 2013 to July 2020.

The systematic update search was conducted on the 21st of July 2020 in the following four databases:

in 4 Datenbanken

- Medline via Ovid
- Embase
- The Cochrane Library
- PsycINFO

The detailed search strategy of the update search, including search terms, can be found in the Appendix (Search strategy II: Update search). Additional hand-search was not conducted.

2.2.1 Inclusion criteria

Einschlusskriterien PIKO

The inclusion criteria for relevant studies are summarised in the following Table:

Table 2-2: Inclusion criteria

Population	Children, adolescents, and adults with medical indications (exclusion: prisoners/inmates/offenders) Indications: Autism spectrum disorder, dementia, depression, insomnia, and schizophrenia
Intervention	Active and receptive music therapeutic interventions
Control	Standard treatment and no treatment (e.g., waiting list)
Outcomes	Effectiveness outcomes of the individual indications ■ Autism spectrum disorder: behaviour, parent-child relationship, communication, social interaction, symptom severity ■ Dementia: cognition, behaviour, mood, apathy, memory, physical function ■ Depression: depressive symptoms, quality of life, happiness, anxiety ■ Insomnia: sleep quality, objective and subjective sleep parameters, quality of life ■ Schizophrenia: quality of life, global and mental state Safety outcomes (adverse events and side effects)
Study design	Randomised controlled trials (RCT), Controlled clinical trials (CCT)
Setting	Inpatient and outpatient care
Publication period	2013 – June 2020
Languages	English, German, Spanish

2.3 Selection of studies

Literaturauswahl aus 693 Zitaten

39 im Volltext ausgewählt

23 letztendlich eingeschlossen

The update search yielded 832 hits. After deduplicating and collating the update search (RCTs and CCTs) with the previous search (systematic reviews), 693 references remained. The references were screened by two independent researchers (LG, JM), using Rayyan QCRI. We contacted corresponding authors of references of Trial Records, i.e. references of study protocols, to enquire preliminary results. Three of 12 authors came back to us with no completed results for our review. After screening the abstracts, 39 studies were read in full to check for suitability, in accordance with the Preferred Reporting Items for Systematic and Meta-Analyses (PRISMA) [21]. Sixteen full-text articles were excluded, resulting in 23 included studies. Disagreements were solved through discussion, consensus, or involvement of a third researcher (CW). The selection process is displayed in Figure 2-1 [21].

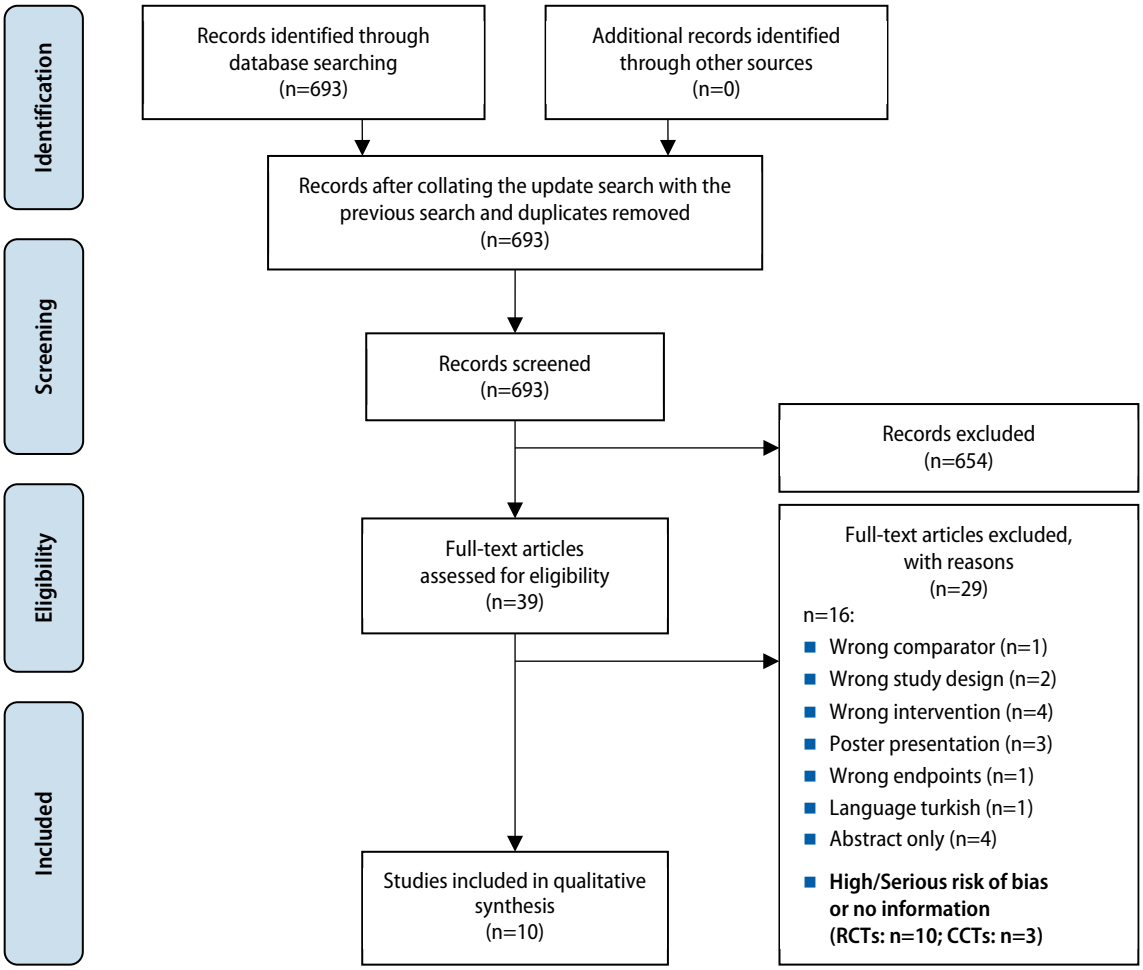

Figure 2-2: Study selection (PRISMA Flow Diagram)

2.4 Analysis, data extraction, and presentation of findings

Risk of Bias (RoB) Bewertung

Studien mit hohem und schwerwiegendem RoB (n=13) wurden ausgeschlossen

keine GRADE Bewertung wegen hoher Heterogenität

Twenty-three full texts were systematically assessed for quality and risk of bias (RoB) by two independent researchers (LG, JM). The 'Cochrane Collaboration's tool' [22] and the 'Risk Of Bias Non-randomized Studies of Interventions (ROBINS-I)' [23] tool were used for assessing the RoB for RCTs and CCTs as presented in the Appendix (Table A-1, Table A-2). Trials with high or serious RoB or insufficient information given to assess the RoB (n=13; RCTs: n=10, CCTs: n=3) were excluded. The interpretation of overall bias judgements can be found in the Appendix (Table A-1, Table A-2). As the study outcomes were heterogeneous, we did not apply a GRADE assessment. Disagreements were solved through discussion, consensus, or involvement of a third researcher (CW).

We extracted all data in terms of study characteristics and effectiveness outcomes:

- *Study characteristics:* author, year, indication, study design, number of included patients, intervention, comparison, setting, duration of treatment intervention, and length of trial; only in the Cochrane Table: included study designs and number of included studies; only in the update search tables: follow-up
- *Effectiveness outcomes:* author, year, indication, comparison, number of included patients, music therapeutic methods, effectiveness outcomes, outcome measurements, adverse events, side effects, and conclusion; only in the Cochrane Table: number of included studies

Data retrieved from the finally selected trials (n=10, unclear RoB) were systematically extracted into data extraction tables. Study characteristics and effectiveness outcomes are presented in the Appendix (from Table A-3 to Table A-12). Data extraction was executed by one researcher (LG). A second person (JM) examined the completeness and correctness of extracted data.

2.5 Quality assurance

interner Review: AIHTA

externer Review: Expert*innen der Dt. musiktherapeutischen Gesellschaft

An internal and external review process was performed to assure the quality of the present review. CW from the AIHTA executed the internal review, focusing on the methodological rigour. Four experts of the scientific advisory board of the German Music Therapeutic Association (DMtG, Deutsche musiktherapeutische Gesellschaft e.V.) conducted the external review to guarantee the methodological and scientific quality as well as the objectivity and independence of the report, considering the latest findings in the research area.

3 Results

This chapter

1. gives an overview of the results of five included Cochrane reviews, which served as a basis for the following update search,
2. describes the results of the update search, and
3. describes the applied music therapeutic methods.

Überblick über Ergebnisse der Cochrane Reviews, deren Updates &, musiktherapeutische Methoden

3.1 Overview of five Cochrane reviews

Giving an overview of the indications of autism spectrum disorder, dementia, depression, insomnia, and schizophrenia, we exclusively considered five Cochrane reviews [5, 17-20]. Detailed study characteristics and effectiveness outcomes can be found in the Appendix (Table A-3, Table A-4).

3.1.1 Characteristics of reviews

All five Cochrane reviews included RCTs [5, 17-20], and two reviews additionally involved CCTs [17, 19]. The number of included patients ranged from 165 patients [17] to 1,215 patients [20]; the age range stretched between two years [17] and 103 years [5], and the number of included studies varied between six [18] and 22 studies [5].

alle 5 Cochrane Reviews basieren auf RCTs, 2 auch CCTs
165-1.215 Pts
6-22 Studien inkludiert

Searches of the review authors investigating autism spectrum disorder from 2014 were limited to 2004 onwards [17]. The Cochrane review on dementia from 2018 included studies between 2010 and 2017 [5]. The authors of the review about depression (2017) searched from the inception of the databases to 2017 [19]. The review on insomnia from 2015 [18] and on schizophrenia from 2017 [20] included studies from the inception of the databases until 2015.

Suchzeitraum
Autismus: 2004-2014
Demenz: 2010-2017
Depression: – 2017
Schlafstörung: – 2015
Schizophrenie: – 2015

The study authors applied MT as monotherapy and as combination therapy added to standard care [17, 19, 20], listening to music with or without relaxation instructions and MT added to treatment-as-usual [18], and music-based therapeutic interventions [5]. The authors compared MT to placebo therapy, no treatment and standard care [17, 20], no treatment and treatment-as-usual [18], treatment as usual and psychological therapy [19], and usual care and other activities with or without music [5]. The settings of interventions were outpatient therapy centre, hospital, school and home [17], home, sleep lab, and rehabilitation centre [18], any setting such as mental health services, nursing home, geriatric facility, and high school [19], in- and outpatients [20], and institutional settings [5].

MT als Monotherapie oder Kombinations-therapie (+ SoC) eingesetzt
Komparator: SoC

Setting: Spital, im niedergelassenen Bereich, Schule, zu Hause, Rehab-Einrichtung etc.

The duration of treatment intervention was very heterogeneous; one MT session lasted between 20 [19] and 120 minutes [5, 19, 20]. The most extended investigation of MT was for four weeks to 27 months [5], whereas the shortest was for three days to five weeks [18].

Dauer:
sehr heterogen

aktive wie rezeptive MT-Methoden

Considering the music therapeutic *methods*, one review [18], investigating MT in patients suffering from insomnia, included only studies using receptive methods; the remaining four reviews included studies applying a mix of active and receptive music therapeutic methods [5, 17, 19, 20].

3.1.2 Effectiveness: Outcomes in reviews

Endpunkte in 2 Kategorien gemessen

A summary of the outcomes measured in the respective five Cochrane reviews and categorised into two main categories are presented in Table 3-1 (and in Appendix, Table A-4).

Psychological effectiveness outcomes

Endpunkte psychischer Effekte

gemessen mit zahllosen unterschiedlichen Instrumenten

Psychological effectiveness was measured in all five indications, but with very different instruments:

- *Autism spectrum disorder:* Mother Play Intervention Profile (MPIP) and Parent-Child Relationship Inventory (PCRI)
- *Dementia:* Cohen-Mansfield Agitation Inventory (CMAI), Mini-Mental State Examination (MMSE), and Neuropsychiatric Inventory (NPI)
- *Depression:* Hamilton Rating Scale for Depression (HAM-D), Montgomery-Åsberg Depression Rating Scale (MADRS), Beck Depression Inventory (BDI), Thai Depression Inventory (TDI), Geriatric Depression Scale (GDS), Global Assessment of Functioning scale (GAF), Thai version of Short-Form Health Survey (Thai SF-36), Health-related quality of life survey (RAND-36), Hamilton Anxiety Scale (HAM-A), and Hospital Anxiety and Depression Scale – Anxiety (HADS-A)
- *Insomnia:* Pittsburgh Sleep Quality Index (PSQI)
- *Schizophrenia and schizophrenia-like disorders:* Positive and Negative Symptoms Scale (PANSS), Brief Psychiatric Rating Scale (BPRS), Scale for the Assessment of Negative Symptoms (SANS), Scale for the Assessment of Positive Symptoms (SAPS), Global Assessment of Functioning (GAF), Self-Rating Depression Scale (SDS), Hamilton Depression Scale (HAM-D), Calgary Depression Scale for Schizophrenia (CDSS), Self-Rating Anxiety Scale (SAS), Lawton Instrumental Activities of Daily Living Scale (IADL), Paced Auditory Serial Addition Task (PASAT), Conners Continuous Performance Task (CCPT), Wechsler Memory Scale (WMS), Clinical Memory Test (CMT), Berg's Card Sorting Test (BCST), Wisconsin Card Sorting Test (WCST), Nurses' Observation Scale for Inpatient Evaluation (NOSIE), Client Satisfaction Questionnaire (CSQ), General Well-Being Schedule (GWB), Skalen zur psychischen Gesundheit (SPG), and Social Support Questionnaire (SSQ)

Social effectiveness outcomes

Endpunkte sozialer Effekte gemessen mit zahllosen unterschiedlichen Instrumenten

Social effectiveness was measured in three Cochrane reviews [5, 17, 20], using the following instruments:

- Autism spectrum disorder: Childhood Autism Rating Scale (CARS), Pervasive Developmental Disorder Behavior Inventory (PDDBI), Vineland Social-Emotional Early Childhood Scales (Vineland SEEC), and Social Responsiveness Scale (SRS), Early Social Communication Scales

(ESCS), and MacArthur-Bates Communicative Development Inventories – Words and Gestures (MBCDI-W&G)

- Dementia: Neuropsychiatric Inventory (NPI)
- Schizophrenia: Social Disability Screening Schedule (SDSS)

3.1.3 Safety: Outcomes in reviews

spezifische Endpunkte in nur einem Review definiert

No specific safety outcomes (adverse events or serious adverse events) were reported in the Cochrane reviews, except in one. Geretsegger et al. [20] specified the outcome adverse effects/events on clinically important general adverse effects, any general adverse effects, average endpoint general adverse effect score, average change in general adverse effect scores, clinically important change in specific adverse effects, any change in specific adverse effects, average endpoint specific adverse effects, average change in specific adverse effects, and adverse event such as death (suicide or natural causes).

3.1.4 Results of reviews: Summary of effectiveness

Ergebnisse: nur signifikante Effekte hier berichtet

Only outcomes with p-values reported by the Cochrane authors are included in Table 3-1. The colours highlight the type of indication and can be compared with the results of the update search, where the same colours are applied. The complete extraction tables can be found in the Appendix (Table A-4).

Results of psychological effectiveness outcomes

Schlafstörungen: Schlafqualität ☺ Schizophrenie, Autismus, Demenz: QoL ☺

Patients diagnosed with *insomnia* enhanced sleep quality due to receptive MT [18]. Quality of life improved in *schizophrenic* [20], but not in *depressed* patients [19]. Positive effects on the quality of the parent-child relationship were reported in children with *autism spectrum disorder* [17]. MT improved the end-of-treatment effects on emotional well-being, including quality of life, in patients with *dementia*, but no long-term impacts could be found [5]. Furthermore, MT positively affected anxiety in patients with *depression* [19] and mood and negative affect (anxiety) in patients with *dementia* without long-term effects [5].

kurzfristige, nicht langfristige Effekte in verschiedenen Endpunkten

Depression vs. SoC: Symptome ☺ Depression vs. PsyTherapie ☹

Demenz: Agitation & Aggression ☹

Global and mental states enhanced in patients with *schizophrenia* due to MT interventions, while global functioning did not ameliorate [20]. Patient-reported and clinician-rated depressive symptoms significantly improved in patients with *depression*, comparing MT to standard treatment; comparing patient-reported depressive symptoms to psychological therapies, no significant effects could be found [19]. MT enhanced mood and negative affect (depression), but no long-term impact in patients with *dementia* was reported [5]. Neither end-of-treatment effects nor long-term effects on cognition could be found in persons with *dementia* [5]. Van der Steen et al. [5] reported improved overall behavioural problems in patients with *dementia* without long-term effects. Behavioural issues such as agitation or aggression did not enhance due to MT [5]. Furthermore, initiating behaviour improved in children with *autism spectrum disorder* due to MT [17].

Results of social effectiveness outcomes

Autismus, Demenz: soziale Interaktion ☺
Schizophrenie: soziale Funktionsfähigkeit ☺

MT interventions positively impacted social interaction, adaptation, and social-emotional reciprocity in children with *autism spectrum disorder* [17]. Furthermore, verbal communicative skills improved, but not non-verbal skills [17]. MT enhanced social behaviour in patients with *dementia*, but no long-term effects were reported [5]. Geretsegger et al. [20] reported significant effects on social functioning in patients with *schizophrenia*, applying active and receptive music therapeutic methods.

Table 3-1: Overview of effectiveness as presented in the Cochrane reviews

Effectiveness outcome ☺ = significant effect/☹ = non-significant effect	Indication	Number of included patients (age range)	Length of trial	MT methods
Psychological effectiveness outcomes				
☺ Quality of parent-child relationship [17] ☺ Initiating behaviour [17]	Autism spectrum disorder	165 (2-9 years)	1 week to 8 months	Active, receptive
☺ Emotional well-being incl. quality of life (end-of-treatment effects) [5] ☹ Emotional well-being incl. quality of life (long-term effects) [5] ☺ Mood disturbance or negative affect: anxiety (end-of-treatment effects) [5] ☹ Mood disturbance or negative affect: anxiety (long-term effects) [5] ☺ Mood disturbance or negative affect: depression (end-of-treatment effects) [5] ☹ Mood disturbance or negative affect: depression (long-term effects) [5] ☹ Cognition (end-of-treatment effects; long-term effects) [5] ☺ Behavioural problems: overall (end-of-treatment effects) [5] ☹ Behavioural problems: overall (long-term effects) [5] ☹ Behavioural problems: agitation or aggression (end-of-treatment effects; long-term effects) [5]	Dementia	1,097 (55-103 years)	4 weeks to 27 months	Active, receptive
☺ Depressive symptoms (clinician-rated) [19] ☺ Depressive symptoms (patient-reported; MT vs treatment as usual) [19] ☹ Depressive symptoms (patient-reported; MT vs psychological treatment) [19] ☹ Quality of life [19] ☺ Anxiety [19]	Depression	421 (14-86 years)	n.a.	Active, receptive
☺ Sleep quality [18]	Insomnia	314 (19-83 years)	3 days to 5 weeks	Receptive
☺ Quality of life [20] ☺ Global state [20] ☺ Mental state [20] ☹ Global functioning [20]	Schizophrenia, schizophrenia-like disorders	1,215 (mean 24-38)	1 to 6 months	Active, receptive
Social effectiveness outcomes				
☺ Social interaction [17] ☹ Non-verbal communicative skills [17] ☺ Verbal communicative skills [17] ☺ Social-emotional reciprocity [17] ☺ Social adaptation [17]	Autism spectrum disorder	165 (2-9 years)	1 week to 8 months	Active, receptive
☺ Social behaviour (end-of-treatment effects) [5] ☹ Social behaviour (long-term effects) [5]	Dementia	1,097 (55-103 years)	4 weeks to 27 months	Active, receptive
☺ Social functioning [20]	Schizophrenia, schizophrenia-like disorders	1,215 (mean 24-38)	1 to 6 months	Active, receptive

3.1.5 Results: Summary of safety

Four Cochrane reviews reported that there were no safety events [5, 17, 18, 20]. Geretsegger et al. additionally stated that there were no data available for adverse effects [20]. Aalbers et al. reported that in one study on depression, a worsening of depressive symptoms due to MT occurred in one patient [19].

3.2 Update of Cochrane reviews

3.2.1 Study characteristics, outcomes, and results by indication

To evaluate the effectiveness of MT in the five selected indications, we exclusively considered trials with low/unclear/moderate risk of bias; serious/high risk of bias studies or trials with insufficient information to draw a conclusion were excluded (see Appendix, Table A-1, Table A-2). Ten RCTs [24-33] assessing the effectiveness of MT in autism spectrum disorder, dementia, depression, and insomnia compared to standard treatment and no treatment, with a total of 1,248 patients, met the inclusion criteria. Unfortunately, no study met the inclusion criteria for schizophrenia and therefore, results for this indication was not updated.

nur niedrig/unklar/moderat RoB RCTs eingeschlossen: 10 Studien: 1.248 Pts

nur Studien zu 4 Indikationen identifiziert, NICHT: Schizophrenie

In the following section, autism spectrum disorder, dementia, depression, and insomnia are described in terms of study characteristics, outcomes measured and results (for details see Appendix, from Table A-5 to Table A-12).

3.2.2 Autism spectrum disorder

Study characteristics

Two RCTs were identified [24, 31] evaluating MT in children with an autism spectrum disorder. Bieleninik et al. [24] examined one-to-one 30-minutes sessions of improvisational MT plus enhanced standard care compared to enhanced standard care, i.e., routine care plus parent counselling, including 364 children with autism spectrum disorder between four and seven years. This five-month multicentre study, involving ten centres in nine different countries, examined MT in a high and low-intensity group, an outpatient setting, and a 12 months follow-up.

2 RCTs:
RCT: 364 Kinder 4-7J
Multicentre im niedergelassenen Bereich,
12 Monate FU
aktive MT: 30 Min
vs. SoC

Sharda et al. [31] involved 51 children between six and 12 years in 45-minute weekly MT individual sessions, conducted over eight to 12 weeks. The sessions had improvisational approaches through songs and rhythms, using musical instruments, vocals, and rhythmic cues. MT was compared to an 'active comparison', i.e., a play-based and behavioural intervention implemented in a non-musical context.

RCT: 51 Kinder, 6-12J
aktive MT: 45 Min, wöchentlich vs. aktive nicht musische Interventionen

Outcomes

The effectiveness was measured with the

Endpunkte mit vielen unterschiedlichen Instrumenten gemessen

- Autism Diagnostic Observation Schedule (ADOS), Social Responsiveness Scale (SRS) [24],
- Children's Communication Checklist (CCC-2), Social Responsiveness Scale (SRS-II), Peabody Picture Vocabulary Test (PPVT-4), Beach Family Quality of Life Scale (FQoL), Vineland Adaptive Behaviour Scales (VABS-MB), and the Resting-state functional magnetic resonance imaging (rsfMRI) [31].

For exploring adverse events, no statistical analysis was conducted [24]. Sharda et al. did not report safety outcomes [31].

Results

Schweregrad der Symptome ☹

In children with an autism spectrum disorder, active music therapeutic methods were used [24, 31]. Symptom severity was measured in both studies and did not improve in any of the two trials after the MT intervention [24, 31]; thereby, Sharda et al. focused on interpersonal behaviour, communication, and repetitive behaviour [31].

zerebrale Konnektivität, maladaptives Verhalten, Eltern-Kind-Beziehung & soz. Kommunikation ☺; rezeptiver Wortschatz & sozialer Affekt ☹

Brain connectivity, maladaptive behaviour, quality of the parent-child relationship, and social communication skills significantly improved after eight to 12 weeks, while there was a lack of receptive vocabulary [31]. Furthermore, MT did not have significant effects on social affect after five months [24].

3.2.3 Dementia

Study characteristics

4 RCTs:
RCT: 60 Pts, Ø 69,8J
RCT: 77 Pts, Ø 75,9J
RCT: 119 Pts, Ø 80,5J
RCT: 298 Pts, Ø 69,4J

aktive & rezeptive MT vs. SoC in Einrichtungen (Alten-/Pflegheimen) 30-60 min, mehrmals tgl, wöchtentlich

For dementia, we identified four RCTs [29, 30, 32, 33] meeting the inclusion criteria. Sixty (mean age 69.8) [33], 77 (mean age 75.9) [32], 119 (mean age 80.5) [30], and 298 (mean age 69.4) [29] patients with dementia were analysed. The authors used MT plus routine drug therapy [33], musical sensory stimulation, playing instruments and singing nostalgic songs [32], active music-based interventions using preferred music plus standard occupational therapy [30], and singing and listening to songs [29] as intervention compared to routine drug therapy [33] and standard care [29, 30, 32]. Effectiveness of MT was examined in a (geriatric) hospital [29, 33] or nursing home/residential nursing facility [30, 32] with a trial length of three months [29, 33], eight [30] and 12 weeks [32]. The treatment duration was 30-50 minutes three times daily [33], 50 minutes three times weekly [32], 60 minutes five days a week [30], and 30-40 minutes twice daily [29]. Two studies [29, 33] conducted a follow-up three months after the intervention completion.

Outcomes

The effectiveness was measured using the

Endpunkte mit vielen unterschiedlichen Instrumenten gemessen

- Mini Mental State Examination (MMSE), Montreal cognitive assessment (MoCA), Neuropsychiatric inventory (NPI) [33],
- Apathy Evaluation Scale-Clinician (AES-C), Mini Mental State Exam (MMSE), Holden's communication scale [32],

- Barthel Index (BI), Tinetti Scale, Mini Mental State Exam (MMSE), Yesavage Geriatric Depression Scale (GDS), Cornell Scales [30],
- Mini Mental State Exam (MMSE), World Health Organization University of California-Los Angeles, Auditory Verbal Learning Test (WHO-UCLA AVLT), semantic verbal fluency test, Neuropsychiatric Inventory (NPI), and Barthel Index (BI) [29].

None of the four authors reported how safety was assessed [29, 30, 32, 33].

Results

The authors used active and receptive music therapeutic methods [29, 30, 32], or active methods only [33]. Cognition improved after three months of active music therapeutic intervention [33], while MT did not significantly affect cognition after eight weeks [30], 12 weeks [32] and three months [29] active and receptive MT. Two studies investigated improvements in behaviour due to three months of MT. They found that neuropsychiatric behaviour [33] and behavioural and psychological symptoms (participants with severe Alzheimer's disease) [29] enhanced in patients with dementia. Apathy and communication significantly improved after 12 weeks of MT [32].

Kognition:
☺ nach aktiver MT,
☹ nach gemischten MT-Formen

Verhalten ☺
Apathie ☺

After eight weeks, physical function and mood (Cornell Scale) significantly enhanced in patients with dementia, while mood did not ease measuring with the Yesavage Geriatric Depression Scale [30]. Verbal fluency, short- and long term memory improved in patients with mild Alzheimers's disease, and caregiver distress (moderate or severe disease stage) due to three months of MT [29]. MT intervention did not significantly affect activities of daily living and mobility in patients with dementia [29].

körperl. Funktion & Stimmung (Cornell Scale) ☺
Stimmung (YGDS) ☹
Sprachkompetenz, Gedächtnis & Belastung der Pflegekräfte ☺
alltägliche Aktivitäten & Mobilität ☹

3.2.4 Depression

Study characteristics

One study [25] investigating the effectiveness in patients with depression met the inclusion criteria. In this RCT, 30 patients (age not reported) were involved, comparing 12 MT sessions to no intervention. A two months follow-up was conducted.

1 RCT: 30 Pts
12 MT Sitzungen (aktiv),
1 Monat FU

Outcomes

The effectiveness was measured with the following two scales:

- Beck's Depression Inventory (BDI) and the Oxford Happiness Questionnaire [25].

Endpunkte mit BDI und Oxford Happiness Questionnaire gemessen

No information regarding the safety outcome measurement is given [25].

Results

The authors reported on enhanced depression and happiness due to active MT interventions. MT significantly reduced depression compared to pretest and controls in women with depression: increased happiness and decreased depression were found. Furthermore, MT caused the maintenance of the effect of the intervention on the MT group compared to the control group [25].

Depression & Freude ☺

3.2.5 Insomnia

Study characteristics

3 RCTs: 249 Pts
mind. 30 min rezeptive MT
Studienlänge zwischen 6 Tage bis 3 Wochen
4 Wochen FU

For insomnia, three RCTs [26-28] were included. One trial enrolled 121 pregnant women (>18 yrs) [28], and the other two included 71 (mean age 41.1) [26] and 57 (mean age 50.2) adults respectively. Bedtime music listening [26-28] was compared to general prenatal care [28], music video watching and no intervention [26], or audiobook listening and no intervention [27]. In all three studies, patients listened to music at home for a minimum of 30 min per day at bedtime [26-28]. The length of trials was six days [26], two weeks [28], and three weeks [27]; Jesperson et al. conducted a four weeks follow-up [27].

Outcomes

The effectiveness was measured using

Endpunkte mit vielen unterschiedlichen Instrumenten gemessen

- Pittsburgh Sleep Quality Index (PSQI), Perceived Stress Scale (PSS), State Anxiety Inventory (S-STAI) [28],
- Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI), Psychological domain of the WHO quality of life questionnaire – abbreviated version (pQoL), Polysomnography (PSG) [27],
- Electroencephalography (EEG), sleep measurements for total sleep time (TST; stage 1-4), and an investigator-developed sleep diary [26].

No safety outcomes were reported [26-28].

Results

Schlafqualität & psychologische QoL ☺

objektive Schlaf(parameter) ☹
subjektiver Schlaf ☺

Stress, Angst & Schweregrad ☺

- In insomnia therapy, receptive music therapeutic methods were used in all three studies [26-28]. Sleep quality improved in two studies [27, 28]. After two [28] and three weeks [27] sleep quality and also the psychological quality of life [27] enhanced. Objective sleep (parameters) did not ease in two studies [26, 27], while MT significantly affected subjective total sleep time after six days [26].
- After two weeks, stress and anxiety significantly improved due to bedtime music listening [28]. Furthermore, disease severity enhanced after three weeks of MT intervention [27]. Sleep onset latency and daytime fatigue of sleep disturbance did not improve after six days in patients diagnosed with insomnia [26].

3.2.6 Schizophrenia

Aufgrund des hohen Verzerrungsrisikos Studie ausgeschlossen

In our systematic update search, we found one study on the effectiveness of MT in patients with schizophrenia, meeting the inclusion criteria [34]. But due to the high risk of bias, we excluded it. Therefore, no additional results on the effectiveness of MT in persons with schizophrenia are given in the updated review.

3.2.7 Update results: Summary of effectiveness

An overview of the results on effectiveness is given in Table 3-2. Only outcomes with p-values reported by study authors are included. The colours highlight the type of indication and can be compared with the findings of the Cochrane reviews, where the same colours are applied. The complete extraction tables can be found in the Appendix (from Table A-9 to Table A-12).

Ergebnisse: signifikante ☺ und nicht signifikante ☹ Effekte hier berichtet

Table 3-2: Update search: Overview Table of effectiveness outcomes of the five indications

Effectiveness outcome ☺ = significant effect/☹ = non-significant effect	Number of included patients (age range/mean)	Length of trial	MT methods
Autism spectrum disorder			
☹ Symptom severity [24] ☹ Social affect [24]	364 (4-7 yrs)	5 months	Active
☺ Social communication skills [31] ☺ Family quality of life [31] ☺ Maladaptive behaviour [31] ☺ Brain connectivity [31] ☹ Symptom severity: Interpersonal behaviour, communication and repetitive behaviour [31] ☹ Receptive vocabulary [31]	51 (6-12 yrs)	8-12 weeks	Active
Dementia			
☺ Cognition (MMSE + MoCA) [33] ☺ Neuropsychiatric behaviour [33]	60 (overall mean age: 69.8±7.9 yrs.)	3 months	Active
☺ Apathy [32] ☺ Communication [32] ☹ Cognition [32]	77 (mean age: 75.88 years (SD = 5.09); range: 65-90)	12 weeks	Active, receptive
☺ Physical function (activities of daily living, balance, gait; BI + Tinetti Scale) [30] ☺ Mood (Cornell Scale) [30] ☹ Mood (GDS) [30] ☹ Cognition [30]	119 (mean = 80.52 yrs [SD = 7.44])	8 weeks	Active, receptive
☺ Verbal fluency (all participants; participants with mild Alzheimer's disease) [29] ☺ Behavioural and psychological symptoms (all participants; participants with severe Alzheimer's disease) [29] ☺ Short and long-term memory (participants with mild Alzheimer's disease) [29] ☺ Caregiver distress (participants with moderate or severe Alzheimer's disease) [29] ☹ Cognition (all participants; participants with mild, moderate or severe Alzheimer's disease) [29] ☹ Short and long-term memory (all participants; participants with moderate or severe Alzheimer's disease) [29] ☹ Behavioural and psychological symptoms (participants with mild or moderate Alzheimer's disease) [29] ☹ Verbal fluency (participants with moderate or severe Alzheimer's disease) [29] ☹ Activities of daily living and mobility (all participants; participants with mild, moderate or severe Alzheimer's disease) [29]	298 (*MT*: mean = 68.9 yrs [SD= 7.1]; *controls*: mean = 69.9 yrs [SD= 7.9]	3 months	Active, receptive
Depression			
☺ Depression [25] ☺ Happiness [25]	30 (n.r.)	n.r.	Active

Effectiveness outcome ☺ = significant effect/☹ = non-significant effect	Number of included patients (age range/mean)	Length of trial	MT methods
Insomnia			
☺ Sleep quality [28] ☺ Stress [28] ☺ Anxiety [28]	121 (>18 yrs)	2 weeks	receptive
☺ Subjective total sleep time [26] ☹ Sleep onset latency [26] ☹ Daytime fatigue of sleep disturbance [26] ☹ Objective sleep parameters [26]	71 (mean = 41.06 yrs [SD = 16.66])	6 days (4 test days)	receptive
☺ Disease severity (Baseline – posttest score changes MT group; Baseline to follow-up) [27] ☺ Sleep quality (Baseline – posttest score changes MT group) [27] ☺ Psychological quality of life (Baseline – posttest score changes MT group; Baseline to follow-up) [27] ☹ Objective sleep (Baseline – posttest score changes MT group; Baseline to follow-up) [27]	57 (mean = 50.2 yrs [SD = 11.6])	3 weeks	receptive

3.2.8 Update results: Summary of safety

in 9 von 10 Studien keine Angaben zu Sicherheitsend-punkten

Nine of ten studies did not report any safety events [24, 25, 27-33]. Huang et al. reported a minor adverse event: one patient felt worried about losing the EEG machine while sleeping [26].

3.3 Music therapeutic methods

Schlafstörungen: rezeptive MT Autismus, Depression: aktive MT Demenz: gemischt

In *insomnia* [26-28], bedtime music listening was used as a receptive music therapeutic method. The authors of the studies regarding *autism* spectrum disorder [24, 31] and *depressed* patients [25] used active methods. Active methods were also used in one study [33] with patients with *dementia*, while the three others [29, 30, 32] used a mix of active and receptive forms.

Autismus: gemeinsames Musizieren mit Instrumenten, Singen; Depression: Chor- oder individuelles Singen, rythmisches Bewegen, fröhliche Lieder; Demenz: Singen von bekannten Liedern

Active music therapeutic methods for *autism* spectrum disorder comprised joint musical activities, i.e. singing or instrumental playing, and improvisation techniques such as synchronising, mirroring, or grounding, individually with each child [24]. Furthermore, musical instruments, songs and rhythmic cues were used [31]. In patients with *depression* the MT program included choirs and individual singing, playing instruments, individual and collective rhythmic movements accompanied by music, collective reciting of poems, and listening preferably happy music at their free time [25]. For *dementia*, a researcher selected older familiar songs according to patients' pathogenic condition, personal preferences and education level with a sound volume at 40 decibels, and patients sang along with the therapist [33].

rezeptive MT bei Schlafstörungen: beruhigende Musik, entsp. Herzrythmus; Dauer: mind. 1 ganze CD

Receptive methods were used for *insomnia*. Patients were instructed to listen to at least one disc of the five pre-recorded compact discs (symphonic/classical music, nature sounds, lullabies and Chinese children's rhymes) with a tempo similar of the human heart rate of 60–80 beats/minute or their preferred music at bedtime [28]. Other patients received an audio player for listening to instrumental music (classical, jazz, new-age and ambient) characterised by a slow tempo (50–80 beats/minute), simple structure and stable dynamics

at bedtime [27]. Three peaceful Buddhist songs were pre-installed onto the mobile phones of the participants and were instructed to listen with or without earphones before bedtime [26].

gemischte MT-Angebote bei Demenz

Only for *dementia*, mixed forms of music therapeutic methods were applied. Sensory stimulation with music was used, and after music listening patients were asked to the heard sounds of musical instruments, nature and animals. Furthermore, patients sang nostalgic songs together while clapping their hands and played musical instruments using a xylophone [32]. In another trial, playlists of the preferred music were compiled with patients' favourite songs of their life. Out of all favourite songs, two playlists were created, and active music-based intervention was applied. All patients were in the same room, interacting, singing, dancing and clapping to the music played through loudspeakers [30]. Other patients with dementia sang their favourite and familiar classic and soothing songs from their twenties and thirties or just listened to it [29].

sensorische Stimulanz mit Kommunikation danach

nostalgische Lieder, rhythmisches klatschen, singen & tanzen

Unterschied der MT-Angebote: ausgebildete Therapeut*innen: aktive MT

Authors reported that qualified *music therapists* [24] and *accredited therapists* [31] conducted the active MT sessions. In two other studies, *therapists* practised active [33] and active and receptive [29] MT with patients. Furthermore, a *researcher* pre-recorded music for a receptive use [28], *nurses* [30] and *trained therapists* with responsibility for implementation of music intervention [32] performed active and receptive MT. Three studies did not report who conducted MT with the patients [25-27]. In Austria, only music therapists are allowed to offer MT. Therefore, the differentiation between MT, music medicine and other uses of music activities is crucial [10].

Pflege: eher gemischte & rezeptive MT

4 Discussion

Bericht: Evidenz zu Musiktherapie bei 5 Indikationen; MT wird aber in breitem Spektrum an Indikationen eingesetzt

This report aims to update the findings of five Cochrane reviews regarding the effectiveness and methods applied to music therapeutic interventions in five indications: autism spectrum disorder, dementia, depression, insomnia, and schizophrenia. Given a large amount of identified indications, other essential indications were not considered in this report. The focus on some high-volume indications should not exclude others, such as MT in oncology and palliative care. The results of these five indications might be considered as representative also for further indications, even if not analysed in this report: the support of patients to express themselves.

rezente Metaanalyse: Effektivität von MT bei Schizophrenie

We could not identify any further trials (RCTs, CCTs) evaluating music therapy (MT) in patients with schizophrenia for the update of the Cochrane review. Nevertheless, a recent meta-analysis from 2020 analysed the effectiveness of MT for patients with schizophrenia [35]. The authors concluded that MT significantly improved total symptoms, reduced negative symptoms and depression and increased quality of life in people with schizophrenia compared with the control group.

Aussagen zur Evidenz zu MT von guten Studien, aber auch von Vergleichinterventionen abhängig

Gründe für den Ausschluss von Studien: hoher RoB

Considering the international evidence of MT, numerous systematic reviews (n = 139) could be identified for a broad spectrum of indications. Many trials with different study designs exist, but – nevertheless – the available evidence is limited due to a lack of good-quality studies, and furthermore, the effects are dependent on the quality and type of comparison groups [36]. Therefore, in this report, we excluded studies with high or serious risk of bias: Reasons for rating studies with serious risk of bias were a lack of blinding of the treating physicians or outcome assessors, incomplete outcome data (e.g., high drop out rate or missing data), selective outcome reporting, or baseline group differences. We also considered aspects such as the potential bias of self-report, unbalanced medication intake in the groups or discrepancies in the number of participants. We did not include studies with insufficient or no information on relevant baseline characteristics or bias due to missing data, e.g., neither reporting drop-outs nor how many patients were included in the analyses.

Cochrane Reviews: RoB assessment, aber kein konsistenter Umgang mit Studien mit hohem RoB

Cochrane: auch Metaanalysen

All Cochrane authors [5, 17-20] of the five respective reviews assessed the methodological quality using the Cochrane risk of bias tool and performed meta-analyses. We used the Risk Of Bias In Non-randomised Studies of Interventions (ROBINS-I) tool in addition to the Cochrane Collaboration's tool. Two reviews [5, 18] excluded one study, respectively, for the meta-analyses. Four reviews [5, 17-19] included high risk of bias studies, while we excluded them. If data were insufficient, authors of the relevant studies were contacted in one Cochrane review [20], while we did not contact any study authors. We did not assess heterogeneity for this update and, therefore, did not calculate meta-analyses.

4.1 Summary of findings of the Cochrane reviews

Psychological effectiveness

Schlafstörung: Schlafqualität ☺ Schizophrenie: QoL, soz. Funktions-fähigkeit ☺ Depression: depressive Symptome, Angst ☺ Autismus: Eltern-Kind-Beziehung, soz. Interaktion, verbale Kommunikation ☺

Demenz: emotionales Wohlbefinden, Stimmung, negativer Affekt, Verhalten ☺

Summarizing the findings of the Cochrane reviews, patients diagnosed with insomnia enhanced sleep quality, and quality of life improved in schizophrenic, but not in depressed patients. Global and mental state enhanced in patients with schizophrenia due to MT interventions, while global functioning did not ameliorate. Patients with depression improved their depressive symptoms. Enhanced quality of the parent-child relationship and initiating behaviour due to MT was reported in children with an autism spectrum disorder.

MT enhanced anxiety in patients with depression and mood, overall behavioural problems, emotional well-being and negative affect in patients with dementia. No long-term impacts could be found. Neither end-of-treatment effects nor long-term effects on cognition could be observed in persons with dementia, and behavioural issues focusing on agitation and aggression did not enhance.

Social effectiveness

keine Langzeiteffekte

MT positively impacted social interaction, adaptation, and social-emotional reciprocity in children with an autism spectrum disorder. Furthermore, verbal communicative skills improved, but not non-verbal skills. MT enhanced social behaviour in patients with dementia, but no long-term effects were reported. For schizophrenia, significant impacts on social functioning were observed.

4.2 Syntheses of the Cochrane reviews and the update

Synthese & Vergleich von Ergebnissen

Comparing the findings on *common* endpoints and music therapeutic methods reported in the Cochrane reviews with the update results, we are focusing on differences and similarities.

Psychological effectiveness

Wirksamkeit in psychologischen Endpunkten

Geretsegger et al. reported that the quality of the **parent-child relationship** significantly improved with MT in children with *autism spectrum disorder* [17]. Our update search verifies this finding, confirming a significantly better family quality of life after MT interventions [31]. Furthermore, Geretsegger et al. [17] stated that MT ameliorated initiating **behaviour**, while Sharda et al. [31] additionally found improvements in maladaptive behaviour in children with an *autism spectrum disorder*. These consistent positive findings indicate that MT may indeed be effective regarding psychological effectiveness in children with an autism spectrum disorder.

Autismus: Bestätigung zu positiven Effekten bei QoL in der Familie & positives Verhalten

Demenz: Bestätigung zu positiven Effekten bei Stimmungsaufhellung & negative Gefühlen (Angst, Depression)

In the Cochrane review investigating MT in patients with *dementia*, the authors reported **mood** enhancements and less negative affect, focusing on anxiety and depression, comparing the end-of-treatment effects of the groups; no significant long-term effects were found [5]. Updating this review, Perez-Ros et al. found significant mood enhancements measuring with the Cornell Scale, but not using the Geriatric Depression Scale [30]. This difference may

be due to the validity of the different scales and instrument applied. The Cornell Scale is described as a scale with higher sensitivity and specificity than the Geriatric Depression Scale [37]. To conclude, many different scales are used, which is a barrier to direct comparison.

Demenz: gewisse Bestätigung von KEINEN kurz- oder langfristigen Effekten bei Kognition, aber auch kontroversielle Ergebnisse ggf durch MT-Methode (aktiv) bedingt

Neither in the Cochrane review [5] nor in the update search [29, 33], end-of-treatment effects or long-term effects could be found in *demented* patients' **cognition**. However, Wang et al. updated this finding with improved cognition after three months of active MT intervention, using two different tests (Mini-Mental State Examination, Montreal Cognitive Assessment) [33]. Comparing the music therapeutic methods of the Cochrane authors [5] and the update literature of Wang et al. [33] and Lyu et al. [29], active methods may be better for patients with dementia to improve cognition than mixed forms of active and receptive methods. Furthermore, short and long-term **memory** enhanced in patients with mild Alzheimer's disease, but not in participants with moderate or severe disease stage [29]. A trial investigating musical and verbal memory in Alzheimer's disease indicated that short and long-term memory is impaired in Alzheimer's patients [38]. But why only mild Alzheimer's disease improved from MT is subject for further research.

Kurz- und Langzeitgedächtnis: Verbesserung bei mildem, nicht aber moderatem schwerem Alzheimer

im Gegensatz: kontroversielle Ergebnisse bei Verhaltensproblematiken (Agitation, Aggression)

The Cochrane authors found improvements in **behavioural** problems, comparing the end-of-treatment effects in patients with *dementia* patients; no long-term effects were reported [5]. Focusing on agitative or aggressive behaviour, MT did not positively affect patients with dementia [5]. The update search found enhanced behavioural and psychological symptoms in patients with severe Alzheimer's disease, but not with mild or moderate disease severity [29], and improved neuropsychiatric behaviour [33] after three months of MT.

dazu Forschungsbedarf

In Alzheimer's disease, neuropsychiatric symptoms, such as behavioural and psychological symptoms, are predictive of more rapid deterioration of cognition in the early stages [39]. Neuropsychiatric symptoms are recognized as core features; greater symptom severity predicts a faster cognitive decline [39]. These findings connect cognitive and neuropsychiatric symptoms in Alzheimer's disease. Further research is needed correlating these symptoms and investigating effects of MT.

Depression: Bestätigung zu positiven Effekten bei depressiven Symptomen bei aktiver MT, aber nur im Vergleich zu SoC, nicht Psychotherapie

Aalbers et al. (Cochrane review on MT or depression) reported positive effects on clinical-rated **depressive** symptoms in patients with *depression* after MT [19]. Comparing MT to treatment as usual, MT improved patient-reported depressive symptoms; while when comparing MT to psychological therapies, no significant effect could be found [19]. Updating these findings, we additionally found improvements in depression and happiness due to active MT [25]. These outcomes show that MT therapy compared to treatment as usual [19] and no intervention [25] yielded better effects than compared to psychological therapies [19].

Schlafstörungen: Bestätigung zu positiven Effekten bei Schlafqualität rezeptive MT

Bestätigung der Verbesserung subjektiver Parameter, nicht jedoch ojektiver (= Mismatch)

Regarding the indication *insomnia*, Jespersen et al. reported improved **sleep quality** in the Cochrane review [18], and our update search yielded the same findings [27, 28]. Additionally, in the update, the psychological **quality of life** [27] and subjective total sleep time [26] ameliorated due to MT. Other **sleep** parameters like sleep onset latency and objective sleep parameters [26] did not improve after six days of MT, and objective sleep did not improve after three weeks [18]. These findings show enhanced sleep quality due to receptive MT. Subjective total sleep time [26] improved, but not objective sleep parameters [26] and objective sleep [18], neither after six days nor after three weeks of MT. Our findings are consistent with literature documenting subjective-objective mismatch in patients with insomnia; subjective, patient-re-

ported sleep-wake times may not agree with objective measurements [40]. An extreme case of insomnia, paradoxical insomnia, is characterized by a discrepancy between subjective and objective assessments of sleep [41]. Contradictory to our findings, the authors stated that typically, objective findings show significantly longer total sleep time than patients' subjective report of sleep [41].

Social effectiveness

Autismus: Bestätigung zu positiven Effekten bei Kommunikationsfähigkeiten

In children with *autism spectrum disorder*, verbal **communication** skills and social **interaction** and adaptation improved due to MT, based on the Cochrane review [17]. The update search supports this finding, reporting enhanced social communication skills after MT interventions [31].

Demenz: Bestätigung zu positiven Effekten bei Sozialverhalten und Kommunikation

vornehmlich bei milder Demenz

Based on a Cochrane review, MT positively affected social **behaviour** comparing end-of-treatment effects in patients with *dementia*, but no long-term effects could be found [5]. Additionally, our update search revealed positive effects on communication and apathy after 12 weeks [32] and verbal fluency in patients with mild Alzheimer's disease after three months of MT [29]; participants with moderate or severe Alzheimer's did not significantly enhance verbal fluency [29]. In dementia research, verbal fluency patterns exist in mild cognitive impairment and Alzheimer's disease [42]. Albeit the intervention group, consisting of mild cognitive impaired patients, was more impaired than the control group, verbal fluency patterns of mild cognitive impaired patients were more similar to healthy participants [42]. Comparing this finding with ours, we can conclude that verbal fluency may be enhanced in mild, but not moderate or severe Alzheimer's disease due to verbal fluency patterns in mild cognitive impaired patients.

Adverse events and side effects

nur in einer Studie (Depression) wurde negative Nebenwirkung bei 1 Pt berichtet

Aalbers et al. reported that in one study of the Cochrane review on depression, a worsening of depressive symptoms due to MT occurred [19]. No explanation for these effects was given neither in the Cochrane review nor the primary study. However, only one participant out of 33 of the MT group experienced this significant worsening of depression, leading to quitting the study earlier.

entweder nicht berichtet oder nicht beobachtet

No other adverse events or side effects were reported in the Cochrane reviews or the studies included in the update, using MT methods in children with autism spectrum disorder and patients with depression, or in patients suffering from schizophrenia, insomnia or dementia. Most studies of the update search did not mention adverse events at all.

4.3 Music therapeutic methods

Demenz: Methodenmix bei Cochrane wie Update

Comparing the Cochrane reviews and the update search, we found no differences in the used mixed methods in patients with *dementia*. For *autism* spectrum disorder and *depression*, the authors of the update search used active methods, while the authors of studies included in the Cochrane reviews used mixed forms. For patients with *insomnia*, all study authors applied receptive methods. It is obvious that in patients with insomnia, receptive music therapeutic methods are preferred due to the relaxing effect of listening to music passively.

Schlafstörung: rezeptive MT bei Cochrane wie Update

Autismus, Schizophrenie, Depression: aktive MT zur Aktivierung sozialer Interaktion

Because autism spectrum disorder is characterized by persistent interaction and social communication [24, 31], and children with schizophrenia often remain unengaged in social settings [20, 43], active music therapeutic methods may have the potential of social communication. Patients with depression show symptoms of apathy, social withdrawal and are more likely to have low extraversion, i.e. less talkative and outgoing [44]. Therefore, active methods may be preferred in recent studies.

4.4 Limitations

keine wirklich hoch-qualitative Evidenz, kurze FU = keine Aussagen zu langfristige Effekten möglich

The findings reported in this update of Cochrane reviews need to be interpreted with caution, as no study of real high quality was found, and, therefore, these finding may not be reliable. The included studies have very short or no follow-up, and consequently, it is not possible to evaluate the long term effects of MT. Furthermore, long term effects cannot be seen as equally important and meaningful among the five indications, e.g. dementia vs. autism. The MT interventions are described very heterogeneously in the different studies.

wenig vergleichbare Studien und Transferierbarkeit in andere Settings in Ö fraglich

In some cases, the intervention is not described in sufficient detail to be compared with MT methods applied in other studies. The attitude towards music may be culturally influenced; therefore, applied MT methods and, especially, the MT interventions in detail (e.g., the kind of chosen music, the setting for MT) may need some adaptation to allow transferring the results of included studies into the Austrian context.

keine Kostenevaluation vorgenommen

Furthermore, we did not assess costs for MT, as this was not the object of this review. For the implementation of MT in practice, it might be valuable to evaluate the costs of different MT methods relating to expectable health improvements.

Verwendung aggregierter Daten: Verlust an Detailinformationen

Last but not least, the use of aggregated data, like in systematic reviews, always implies a loss of more detailed qualitative information that might be explanatory in the interpretation of the findings. Additionally, only outcomes with p-values reported by the authors were included, which yield to a loss of information; trends were not taken into account.

Nevertheless, though those limitations are given, we think that the results provide a valid impression of the effectiveness of MT in the respective patient groups.

5 Conclusion

Ergebnisse zeigen Wirksamkeit in den untersuchten Indikationen, nicht in allen Endpunkten, aber einigen

Recent findings indicate that MT may help patients diagnosed with an autism spectrum disorder, dementia, depression, insomnia, and schizophrenia. Regarding the current evidence, MT is a safe and low-threshold method leading to improvements in terms of physical, psychological and social aspects, though not in all outcomes measured but in some/many. MT can be seen as a non-pharmaceutical alternative and complement to other disease-specific therapies, particularly for depression and schizophrenia.

MT ist komplementäre Methode

aktive MT durch ausgebildete Therapeut*innen

Quality of life, social functioning, global and mental state improved in patients with schizophrenia due to MT interventions, while global functioning did not ameliorate in the Cochrane review. The update search showed that for active music therapeutic methods, qualified music therapists and accredited therapists are essential for leading music therapeutic sessions. For receptive MT, e.g. pre-recorded music, also nurses and health researchers are capable of conducting the MT sessions, leading to patient-related improvements. But in Austria, only music therapists are allowed to perform MT.

rezeptive MT auch durch anderes Personal

No recommendation for active, receptive or mixed forms of MT can be given: depending on the indication, the MT methods used in the included studies are varying, and the music therapeutic interventions are not always described in sufficient detail.

Verbesserungen werden auch nach wenigen kurzen MT-Interventionen beobachtet

The studies show that even short trials, i.e. six days, with low frequencies such as 30 minutes per session, yielded to patient-related enhancements. In the trials identified for the update, long-term effects extending over more than six months have received limited attention. High-quality research on long-term effects or intensity of MT as well as long-term follow-up assessments are needed. Finally, MT has its role in the spectrum of therapeutic opportunities and can be seen as a stabilising form of therapy.

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Appendix

Interview guide

Effectiveness of music therapy

Leitfaden für Fragen – Experteninterview 12.06.2020 (10:30 bis 11:30)

Einleitung (CW): Hintergrund des Projekts

Konkrete Fragen (LG):

Indikationen

1. Identifikation aller potentieller Indikationen
   (z. B. Depression, Autismus, Demenz, Schizophrenie)
   - In welchen Berufsfeldern (stationär, extramural) kommen Musiktherapeut*innen unter, bei welchen Indikationsbereichen?
   - Wird in Lehre auf Indikationen eingegangen?
   - Welche verschiedenen musiktheoretischen Ansätze werden für welche Indikationen angewandt?
2. Nachfrage zum Einschluss hoch-volumiger Indikationen
   - Hochvolumige psychiatrische/psychologische Indikationen
     (Bearbeitung in Tiefe einzelner oder Breite – Überblick)?
   - Hochvolumige nicht nicht-psychiatrische/psychologische Indikationen?

Zielgruppen:

3. Welches sind die primären Zielgruppen:
   - Children, Adolescents, Adults, Older adults?
   - In welchen Settings/Umfeldern werden die Zielgruppen behandelt?

Musiktherapiemethoden:

4. Bitte um Beschreibung der Methoden:
   - Rezeptive und aktive Musiktherapie?
   - Bevorzugte Methodik bei Indikationsbereichen?

Endpunkte/Outcomes:

5. Welche Endpunkte/Outcomes werden bei Evaluationen herangezogen? (was ist zu erwarten)
   - Wirksamkeitsendpunkte?
   - Sicherheitsendpunkte (Nebenwirkungen, negative Effekte)?

Methodik des Review of Reviews (Expert*innen um Rat fragen):

- Einschlusskriterien nach Zeitraum: 2015-2020?
- Einschlusskriterien nach Zielgruppe oder nach Indikationen, Auschlusskriterien: Musiktherapie mit Häftlingen ausschließen?
- Einschlusskriterien nach Therapiemethode?
- Peer-Review im Oktober?

Risk of bias – study level (in- and excluded randomized controlled trials)

Table A-1: Risk of bias – study level (in- and excluded randomized controlled trials)

Trial: Author, year	Adequate generation of randomisation sequence	Adequate allocation concealment	Blinding[2]		Incomplete outcome data	Selective outcome reporting unlikely	No other aspects which increase the risk of bias	Risk of bias – study level
			Patient	Treating Physician/ outcome assessor				
Ahessy 2016 [45]	Unclear[3]	Unclear[4]	Yes[5]	No[6]	No[7]	Unclear[8]	Yes[9]	High
Amiri 2019 [46]	Unclear[10]	Unclear[4]	Yes	Unclear[11]	Yes[12]	No[13]	Yes[14]	High
Bielennik 2017 [24]	Yes[15]	Yes[14]	Yes	Unclear[16]	Yes[17]	Yes[18]	Unclear[19]	Unclear

[2] The nature of the intervention does not allow to blind those who deliver music therapy or those who received it. Since it is not possible to blind a participant to music therapy, we assessed the blinding of the trials with 'yes', i.e. low risk of bias if we judged that the lack of blinding was not affecting the results. Consequently, neither participants nor personnel of the studies under review can be declared to be blinded [5, 17, 18, 20].

[3] No description of the randomization process and therefore, insufficient information about the sequence generation process. It is stated "Participants were randomly assigned to two groups".

[4] Insufficient information about the allocation concealment: no description of the method used.

[5] The study authors state that control group participants may have felt disappointed not being chosen for the singing group, resulting in negative outcomes. Therefore, the control group was informed that they would receive choral sessions after the study.

[6] The treating physician was also the principal researcher; the lack of blinding is described as a limitation in the study.

[7] Data for all outcomes reported; however, 3/20 participants (15%) of the intervention group were excluded due to illness/hospitalization and death. 1/20 participant (5%) in the control group was excluded due to illness. The authors state that given the frailty of the population, attrition was low.

[8] Insufficient information to permit judgement.

[9] Study appears to be free of other source of bias.

[10] No description of the randomisation process and therefore, insufficient information about the sequence generation process. It is stated that "patients were enrolled and randomly assigned to the intervention and control groups".

[11] It is not mentioned whether the treating physician(s) and/or outcome assessor(s) were blinded.

[12] All outcomes reported, no drop-outs.

[13] According to study protocol, all outcomes should be measured 6 weeks after the intervention; in the present study, "patients were evaluated one day after the intervention". "Stress" was not pre-specified as an outcome in the study protocol.

[14] A coordinator with no clinical involvement handed out the randomization via an online system. There was no evidence of broken or subverted allocation concealment.

[15] "Individuals were randomly assigned according to a computer-generated randomization list with a ratio 1:1:2, stratified by site and with randomly varying block sizes of 4 and 8, which was prepared by an investigator with no clinical involvement."

[16] The authors state that the study was assessor-blinded for the primary outcome. "For 20 participants (i.e. 5%), blinding of assessors was broken unintentionally (15 in the music therapy group and 5 in the standard care group), usually due to a parent or other person inadvertently mentioning the intervention."

[17] Similar reasons for missing data across intervention groups (17/ 182 excluded) and control group (33/ 182 excluded); ITT analysis performed, assuming no improvements for missing data. 50 (14%) were lost to the 5-month follow-up.

Trial: Author, year	Adequate generation of randomisation sequence	Adequate allocation concealment	Blinding[2]		Incomplete outcome data	Selective outcome reporting unlikely	No other aspects which increase the risk of bias	Risk of bias – study level
			Patient	Treating Physician/ outcome assessor				
Cho 2018 [47]	Yes[20]	Yes[21]	Yes	No[22]	Unclear[23]	Unclear[8]	No[24]	High
Ertekin Pinar 2019 [34]	Unclear[25]	Unclear[4]	Yes	Unclear[8]	Yes[26]	Yes[27]	No[28]	High
Fancourt 2018 [48]	Yes[29]	Unclear[30]	Yes	No[31]	No[32]	Unclear[33]	Yes[34]	High

[18] Study protocol available. All pre-specified outcomes reported. One outcome, cost-effectiveness, reported separately.
Non-clinician checked eligibility and baseline before handing out randomization via online system. Low risk even if the secondary outcomes were analyzed non-blinded.

[19] "The study team decided to stop recruitment, in a decision that included considerations of limited funding and therefore limited likelihood of successful and timely additional recruitment. This early termination may have affected the study's ability." One percent in both groups received MT outside the study before the 2-month follow-up.

[20] Participants were randomly assigned to one of the three groups using a randomization number table. "For the random assignment, the list of participants was given to another activity staff with specially assigned numbers in place of the participants' names. The participants' names were not revealed to the activity staff who was responsible for the random assignment until the randomization process was completed in order to ensure the allocation concealment."

[21] The list of participants was given to activity staff with specially assigned numbers in place of the participants' names.
The participants' names were not revealed to the activity staff who was responsible for the random assignment until the randomization process was completed.

[22] The authors state that it was „impossible to blind assessors to the participants' group allocation". "Complete blinding for the participant's group assignment to the assessors was not guaranteed."

[23] Only 37 participants (71.2%) completed the assigned interventions and 35 (67.3%) were included in the final analysis, due to missing data.
The authors state that this "may be due to the vulnerable state of the participants with advanced age and may reflect the reality of most long-term care settings".
Similar reasons for missing data across intervention and control groups and balanced in numbers.

[24] Potential bias of self-report. The control groups "were implemented by activity staff who did not have the same level of training as the music therapist, especially in facilitating a group process. As a result, the mutual interaction between the participants/facilitator in the music listening or the TV group may have not been as active as in the music therapy-singing group." "The accuracy and validity of data from the participants at varying degrees may be questioned participants' preferences for the TV programs were not assessed or reflected, whereas music programs for singing and listening group were created based on the participants' preferred music and musicians. The lack of reflecting the participants' preference in the choice of the TV group may have contributed to the decrease of positive affect and the increase of negative affect, as well as the highest drop-out rate of participants in the TV group."

[25] Patients were "divided into experimental and control groups by randomization using simple random sampling method".

[26] No missing outcome data, no drop-outs reported.

[27] Insufficient information to permit judgement. Study appears to be free of other sources of bias.

[28] A percentage of 85.7 of the patients in the control group and 71.4% of the patients in the experimental group took new generation antipsychotics. As the control group took more non-antipsychotic drugs, outcomes may be biased. "That the scores of the control group patients obtained from the auditory hallucination questionnaire and the hallucination subscale of the SAPS at follow-ups were lower in the majority of these patients suggests that new generation antipsychotic drugs were effective."

[29] Randomisation "using SPSS with a 1:1:1 allocation using random block sizes of six, stratified by age of their child and the severity of their EPDS score".

[30] Method of concealment is not described.

[31] Participants and researchers were not masked to the groups they were allocated to.

[32] One participant reported not responding to the questions accurately so was retrospectively excluded, providing a final n of 134 (91% completion rate). Further drop outs:
Withdrew consent (n=3), moved away (n=1), lost to follow-up (n=9). 134/ 148 of participants (91%) completed data collection. There were no differences across any of the baseline variables measured between those who did complete and those who did not complete data collection; missing data across intervention and control groups balanced in numbers.

Trial: Author, year	Adequate generation of randomisation sequence	Adequate allocation concealment	Blinding[2]		Incomplete outcome data	Selective outcome reporting unlikely	No other aspects which increase the risk of bias	Risk of bias – study level
			Patient	Treating Physician/ outcome assessor				
Gök Ugur 2017 [49]	Yes[35]	Unclear[30]	Yes[36]	No[37]	Yes[38]	Unclear[8]	Unclear[39]	High
Hamid 2019 [25]	Unclear[40]	Unclear[30]	Yes	Unclear[8]	Unclear[41]	Unclear[8]	Yes	Unclear
Ho 2019 [50]	Unclear[42]	Unclear[30]	Yes	Unclear[8]	Unclear[41]	Unclear[8]	No[43]	High
Huang 2017 [26]	Yes[44]	Yes[45]	Yes	Yes[46]	Yes[47]	Unclear[8]	Yes	Unclear
Jespersen 2019 [27]	Yes[48]	Unclear[30]	Yes	Yes[49]	Yes[50]	Yes	Yes	Unclear
La Gasse 2014 [51]	Yes[51]	Unclear[30]	Yes	Yes[52]	Yes[53]	Unclear[8]	No[54]	High

[33] Primary outcome reported in a pre-specified way; however, pre-specified secondary outcomes (mental wellbeing, self-esteem, social functioning, inflammatory immune response) are not reported without explanation. Patients were not informed about the study hypothesis. This suggests that the results were not entirely driven by placebo.

[34] There were no differences across any of the baseline variables measured between those who did complete and those who did not complete data collection.

[35] Computerized random numbers: The first 32 elderly people were recruited as the control group; the subsequent 32 elderly people formed the music group.

[36] The authors state that participants were „blinded to intervention allocation".

[37] There was no blinding of assessors.

[38] All outcome data reported; no drop-outs reported.

[39] No sample size calculation was carried out.

[40] Insufficient information about the sequence generation process.

[41] No information about drop-outs or missing outcome data reported.

[42] Sequence generation not described; the authors state that "A cluster-randomization design was used; the care facilities served as the unit for allocation and were allocated under a randomized blocked design. Participants from five elderly homes were randomly assigned to the intervention group and those from another five elderly homes were assigned to the control group." "They were assigned depending on their elderly home unit, which may have introduced a bias."

[43] Baseline group differences.

[44] The random allocation sequence was consecutively numbered for the participants and sealed, opaque envelopes determining groups were generated using a random numbers generator (Microsoft Excel) by a statistician.

[45] Sealed, opaque envelopes determining groups were generated using a random numbers generator (Microsoft Excel) by a statistician who was not involved in the rest of the study.

[46] The researchers and research assistant were blinded to the randomization.

[47] No missing outcome data; no participants withdrew during the study period. ITT analysis performed.

[48] "Persons were randomly allocated to one of the three groups by the drawing of lots. The bowl was prepared by administrative staff with no knowledge of the study."

[49] Assessors were blinded.

[50] Seven drop-outs during the intervention period; balanced in numbers and reasons across groups. Eight participants did not complete the follow-up measure with no reasons provided. Among those who completed the study, there were missing data at different time-points due to a few participants not filling in all questionnaire and technical problems with the actigraphs and PSG equipment. As used analyses allow for the inclusion of participants with missing data at one or more time-points, authors included all participants in the analyses and did not impute missing data.

[51] Computerized random numbers table used.

Trial: Author, year	Adequate generation of randomisation sequence	Adequate allocation concealment	Blinding[2]		Incomplete outcome data	Selective outcome reporting unlikely	No other aspects which increase the risk of bias	Risk of bias – study level
			Patient	Treating Physician/ outcome assessor				
Liu 2016 [28]	Unclear[8]	Unclear[8]	Yes[55]	Unclear[8]	Yes[56]	Unclear[8]	Unclear[57]	Unclear
Lyu 2018 [29]	Yes[58]	Yes[59]	Yes	Yes[60]	Yes[61]	Unclear[8]	Yes	Unclear
Perez-Ros 2019 [30]	Yes[62]	Unclear[63]	Yes	Yes[64]	Yes[65]	Unclear[8]	Yes	Unclear
Sharda 2018 [31]	Yes[66]	Unclear[30]	Yes[67]	Yes[68]	Yes[69]	Unclear[8]	Yes[70]	Unclear

[52] Assessor was masked to the participant's group.

[53] Attrition rate was 22% of recruited participants (withdrawing or taken off the study). Attrition was higher in the control group (33% attrition, due to dissatisfaction with randomization status) than in the intervention group (10% attrition, one child taken off the study due to illness that led to excessive absences). Analysis for the ATEC sores was computed using SAS statistical package, in order to allow for data imputation for missing data points. Since there were a total of eight missing data points, a SAS program unit imputation was completed to avoid listwise deletions.

[54] "One child in the MTG had inconsistent SRS scores due to a different parent completing the pretest and posttest tool with a large discrepancy between all items. Three guardians did not complete the ATEC at every time point, with one parent failing to complete measures after Session 2 (MTG), 4 (SSG), and 8 (MTG). Four guardians failed to turn in the 3-week posttest measure (two in the MTG & two in the SSG. Since there were a total of eight missing data points, a SAS program unit imputation was completed to avoid listwise deletions.
One disadvantage to this study design with the small sample size is potential low power for statistical analysis."

[55] Participants who self-assessed their outcomes were not masked as to study group assignment, which could have biased their reporting of outcomes.

[56] 3/63 participants in the control group and 4/65 participants in the intervention group withdrew from the follow-up assessment; balanced in numbers and reasons across groups.

[57] "Participants in the control group did not maintain a diary of their activities prior to bedtime excluded the possibility to yield any conclusions about potential influences on their sleep quality after the 2-week study. Participants of the experimental group read about the purpose of the study and about music, which may have had heightened expectations relative to the control group, and this could have had psychosomatic effects."

[58] Random number sequence using SAS software.

[59] "The research assistant produced sealed envelopes with the serial number outside and group number inside, kept in a locked drawer. The envelopes were opened sequentially by the RA after baseline assessments. The RA then assigned participants with different severity levels of dementia to the three groups equally according to the group number printed inside the envelopes."

[60] Outcome evaluators and data analysts were blinded to the group assignment.

[61] Ten out of the 298 participants withdrew from the study (three left the study due to changing residence; seven left due to the occurrence of new medical problems).
But the sample sizes for comparison maintained relatively balanced. Drop-outs balanced in numbers and reasons across groups.

[62] Individuals were randomly selected for inclusion in the intervention group using an MS Excel 2010 spreadsheet.

[63] Concealed sequence procedure by external researchers not involved in the study.

[64] The initial and final assessments were made by nurses and physiotherapists unrelated to the study and blinded to its objectives.

[65] No loss to follow-up reported; no missing outcome data.

[66] Covariate-adaptive method where the first 20 participants were randomized using simple coin toss and remaining 31 by the MinimPy software (stochastic covariate-adaptive minimization algorithm) by the first author, who was not involved in assessing behavioral outcomes.

[67] Attempt to blind parents (who assessed parent-rated outcomes) was only partially successful, with 31 out of the 51 parents reporting awareness of group allocation.

[68] Assessors and authors were blind to group allocation information; nurses and physio therapists were blinded to the assessments. "All other assessors and authors were blind to group allocation information. Our attempt to blind parents (who assessed parent-rated outcomes) was only partially successful, with 31 out of the 51 parents reporting awareness of group allocation."

Trial: Author, year	Adequate generation of randomisation sequence	Adequate allocation concealment	Blinding[2]		Incomplete outcome data	Selective outcome reporting unlikely	No other aspects which increase the risk of bias	Risk of bias – study level
			Patient	Treating Physician/ outcome assessor				
Tang 2018 [32]	Yes[71]	Unclear[30]	Yes	Yes[72]	Yes[73]	Unclear[8]	Yes[74]	Unclear
Thompson 2014 [52]	Yes[75]	Yes[75]	Yes	No[76]	Yes[77]	Yes[78]	No[79]	High
Wang 2018 [33]	Yes[80]	Unclear[30]	Yes	Unclear	Yes[81]	Unclear[8]	Yes[82]	Unclear
Weise 2020 [53]	Yes[83]	Unclear[30]	Yes	No[84]	Yes[81]	Unclear[8]	Unclear[85]	High

Interpretation of overall bias judgement:

Unclear risk of bias: Plausible bias that raises some doubt about the results. Unclear risk of bias for one or more key domains.

High risk of bias: Plausible bias that seriously weakens confidence in the results. High risk of bias for one or more key domains.

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[69] One drop-out in intervention group whose baseline data was used for analysis. An intention-to-treat analysis was carried out, whereby missing data from any drop-out participants was replaced with data at baseline. Brain imaging outcomes missing for 6 participants due to motion or incomplete data.

[70] "All sessions were video-recorded to assess treatment fidelity."

[71] A computer-based random number allocation method was used.

[72] Raters in the study who were blinded to the delivery of the music intervention performed scoring.

[73] 1/38 participants in the intervention group was lost to analysis due to hospital admission. One evaluation result was omitted from comparison (fracture and hospital admission). Of the 37 subjects, 35 had full attendance at all the music intervention sessions, but two participants were absent for one time because of physical illness.

[74] The therapist, recorder and research assistant was excluded from any participation in the evaluation work. Raters also were data collectors.

[75] Concealed allocation was carried out using a computer generated sequence.

[76] Parent-report assessments: The standard care control meant that parents could not be blinded, and may therefore be biased.

[77] Missing data balanced in numbers across groups. Two participants were lost to the study; one in the treatment group due to severe illness, and one in the control group whose family was not contactable after recruitment. ITT analysis performed.

[78] Al pre-defined outcomes reported; planned 24-week follow-up for 2 outcomes not reported.

[79] "The use of only one therapist may limit the generalizability of the findings."

[80] Groups were divided into two groups using a random number table.

[81] No drop-outs or missing data.

[82] No other risks found.

[83] The random number generator random.org was used for randomization.

[84] The project staff and nursing home staff knew which participants received the music intervention and which did not. Blinding was not possible.

[85] Small sample size and low statistical power.

Risk of bias – study level (in- and excluded controlled clinical trials)

Table A-2: Risk of bias – study level (in- and excluded controlled clinical trials)

Study reference/ID	Bias due to confounding	Bias selection of participants into the Study	Bias in measurement of intervention	Bias due to departures from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported results	Overall bias	Comments
Chen 2020 [54]	Low[86]	Low[87]	Low[88]	Low[89]	NI[90]	Moderate[91]	Moderate[92]	NI	-
Ghasemtabar 2015 [55]	NI[93]	Low[94]	Low[95]	Low	LoGaw[96]	Moderate[97]	Moderate[92]	NI	-
Wang 2017 [56]	Moderate[98]	Low[99]	Low[100]	Low	Serious[101]	Moderate[102]	Moderate[92]	Serious	-

[86] Participants in intervention and control group lived in different areas but baseline characteristics were similar.

[87] A "non-equivalent control group was used" in this study with a quasi-experimental design. Participants were recruited from a long-term care facility. "From 63 potentially eligible residents, 44 residents were willing to consent to participate in this study." The two groups "lived in different areas and were independent of each other to avoid sample contamination."

[88] The intervention groups were defined before the pretesting and "sensitive assessment tools" were used. The classification of intervention status could not have been affected by knowledge of the outcome or risk of the outcome.

[89] No deviations from intended interventions reported.

[90] High attendance rate but neither reporting of drop outs nor how many patients were included in the analysis.

[91] Demographic data were collected by nursing staff and specially trained research assistants completed the measures. No description of blinding of outcome assessors; blinding of participants not possible.

[92] No study protocol available.

[93] Relevant baseline characteristics not comprehensively provided or controlled for. Reported baseline characteristics are similar between groups; however, missing information of other important baseline characteristics.

[94] However, not all eligible participants were included due to circumstances of parents.

[95] The intervention group were defined before the pretesting. The classification of intervention status could not have been affected by knowledge of the outcome or risk of the outcome.

[96] No drop-outs; no missing data.

[97] No blinding of outcome assessors; blinding of participants not possible. Trial personnel was aware of intervention received. Outcome measurement was compared to and used in other studies.

[98] Demographic baseline data at baseline testing were significant. The unbalanced groups could have affected the outcomes. Baseline characteristics available and compareable. Participants in intervention and control group lived in different care facility units; statistically significant baseline differences in MMSE and CAPE-BRS, substantially more participants in the intervention group.

[99] Patients were assigned to the group "based on the care facility unit in which they lived."

[100] The intervention groups were defined before the pretesting. The classification of intervention status could not have been affected by knowledge of the outcome or risk of the outcome.

[101] Discrepancies were found in the number of participants: In the abstract the authors state that "subjects were not randomly assigned to experimental group (n=90) or comparison group (n=56)." But in the results section is written that "they were assigned to either an experimental group (n=104) or comparison group (n=68), depending on which unit they lived in. However, during the intervention period, seven subjects were hospitalized, seven returned home, and nine died. At the end of the study, only 149 subjects remained (90 subjects in the experimental group, 59 subjects in the comparison group)." Furthermore, more drop-outs in intervention group (14 vs 9), no information about distribution of reasons; drop-outs seem to be independent from intervention.

[102] It is not stated if outcome assessors were aware of the intervention received by study participants. Thus, the outcome measure could have been influenced by knowledge of the intervention received. Blinding of participants not possible.

Interpretation of overall bias judgement:

NI: No information on which to base a judgement about risk of bias. There is no clear indication that the Study is at serious or critical risk of bias and there is a lack of information in one or more key domains of bias (a judgement is required for this).

Serious risk of bias: The Study has some important problems.
The Study is judged to be at serious risk of bias in at least one domain, but not at critical risk of bias in any domain.

Tables of the Cochrane reviews as the basis for the update search

Table A-3: Overview of study characteristics of five systematic Cochrane reviews

Author, year	Indication	Included study designs	Number of included patients (age range)	Number of included studies	Intervention	Comparison	Setting	Duration of treatment intervention	Length of trials
Geretsegger, 2014 [17]	Autism spectrum disorder	RCTs, CCTs	165 (2-9 years)	10	MT, MT added to standard care	'placebo' therapy, no treatment, standard care	Outpatient therapy centre, hospital, school, home	Daily for 1-2 weeks or weekly for 5 weeks to 7 months	1 week to 8 months
Jespersen, 2015 [18]	Insomnia	RCTs, quasi-RCTs	314 (19-83 years)	6	Listening to music with or without relaxation instructions, MT added to treatment-as-usual	No treatment, treatment as usual	Home, sleep lab, rehabilitation centre	Daily (25-60 min) for 3 to 35 days	3 days to 5 weeks
Aalbers, 2017 [19]	Depression	RCTs, CCTs	421 (14-86 years)	9	MT, MT plus treatment as usual	Treatment as usual, psychological therapies	Any setting (mental health services, nursing home, geriatric facility, high school)	Weekly to 6 sessions/ week, 8-48 sessions (20-120 min) for 6 to 12 weeks	n.a.
Geretsegger, 2017 [20]	Schizophrenia, schizophrenia-like disorders	RCTs	1,215 (mean 24-38)	18	MT, MT added to standard care	Placebo therapy, standard care, no treatment	In- and outpatients	Weekly to 6 sessions/ week (40-120 min) for 1 to 6 months	1 to 6 months
Van der Steen, 2018 [5]	Dementia	RCTs	1,097 (55-103 years)	22	Music-based therapeutic intervention	Usual care, other activities with or without music	Institutional settings	Weekly to daily, 6-156 sessions (30 to 120 min) for 4 weeks to 6 months	4 weeks to 27 months[103]

RCT: Randomized controlled trial, *CCT: Controlled clinical trial*

[103] Nine studies did not report the length of trial.

Table A-4: Summary of effectiveness of five systematic Cochrane reviews

						Effectiveness outcomes			Safety outcomes		
Author, year	**Indication**	**Comparison**	**Number of included patients (age range)**	**Number of included studies**	**MT methods**	**Absolute effects (95% CI; p-value of overall effect)**	**Relative effects (95% CI; p-value of overall effect)**	**Outcome measure-ments**	**Adverse events: Relative effects (95% CI)**	**Side effects**	**Conclusion**
Geretsegger, 2014 [17]	Autism spectrum disorder	'placebo' therapy, standard care	165 (2-9 years)	10	Active, receptive	n.a.	■ Social interaction: SMD 0.71 (0.18, 1.25; **P=0.01**) ■ Non-verbal communica-tive skills: SMD 0.48 (-0.02, 0.98; P=0.06) ■ Verbal communicative skills: SMD 0.33 (0.16, 0.49; **P<0.0001**) ■ Initiating behaviour: SMD 0.73 (0.36, 1.11; **P=0**) ■ Social-emotional reciprocity: SMD 2.28 (0.73, 3.83; **P=0**) ■ Social adaptation: SMD 1.15 (0.69, 1.61; **P<0.0001**) ■ Quality of parent-child relationship: SMD 0.82 (0.13, 1.52; **P=0.02**)	CARS, PDDBI, Vineland SEEC, SRS, ESCS, MBCDI-W&G, MPIP, PCRI	None	None	MT improves social interaction, verbal communication, initiating behaviour, and social-emotional reciprocity, and increases social adaptation skills and promotes quality of the parent-child relationship. Non-verbal communication did not improve due to MT.
Jespersen, 2015 [18]	Insomnia	No treatment, treatment-as-usual	314 (19-83 years)	6	Receptive	*Illustrative comparative risks (95% CI):* ■ Sleep quality: MD -2.8 (-3.42, -2.17; **P<0.00001**)	n.a.	PSQI	None	None	MT improves subjective sleep quality and decreases symptoms of insomnia.
Aalbers, 2017 [19]	Depression	Treatment as usual, psychological therapies	421 (14-86 years)	9	Active, receptive	*Anticipated absolute effects (95% CI):* *MT vs treatment as usual:* ■ Depressive symptoms (clinician-rated): SMD -0.98 (-1.69, -0.27; **P=0.01**) ■ Depressive symptoms (patient-report-ed): SMD -0.85 (-1.37, -0.34; **P=0**) ■ Global functioning: SMD 0.51 (0.02, 1; P= n.a.) ■ Quality of life: SMD 0.32 (-0.17, 0.80; P=0.2) ■ Anxiety: SMD -0.74 (-1.40, -0.08; **P=0.03**)	n.a.	HAM-D, MADRS, BDI, TDI, GDS, GAF, Thai SF-36, RAND-36, HAM-A, HADS-A	*MT vs treatment as usual:* OR 0.45 (0.02-11.46) *MT vs psychological treatment:* n.r.	n.a.	MT provides short-term beneficial effects. It enhances depressive symptoms, improves the quality of life and shows effi-cacy in improving functioning and decreasing anxiety levels.

						Effectiveness outcomes			Safety outcomes		
Author, year	**Indication**	**Comparison**	**Number of included patients (age range)**	**Number of included studies**	**MT methods**	**Absolute effects (95% CI; p-value of overall effect)**	**Relative effects (95% CI; p-value of overall effect)**	**Outcome measure-ments**	**Adverse events: Relative effects (95% CI)**	**Side effects**	**Conclusion**
Aalbers, 2017 [19] *(continuation)*						*MT vs psychological treatment:* ■ Depressive symptoms (clinician-rated): SMD -0.78 (-2.36, 0.81; P= n.a.) ■ Depressive symptoms (patient-reported): SMD -1.28 (-3.57, 1.02; P=0.28) ■ Quality of life: SMD 1.31 (-0.36, 2.99; P=n.a.)					Worsening of depression and lower back pain was reported 0in one study. None of the other studies stated whether any adverse events occurred.
Geretsegger, 2017 [20]	Schizophrenia, schizophrenia-like disorders	Placebo therapy, standard care, no treatment	1215 (mean 24-38)	18	Active, receptive	*Illustrative comparative risks (95% CI):* ■ Mental state (medium term; SANS): SMD -0.55 (-0.87, -0.24; **P=0**) ■ Mental state (medium term; PANSS): SMD -0.97 (-1.31, -0.63; **P<0.0001**) ■ Mental state (medium term; BPRS): SMD -1.25 (-1.77, -0.73; **P<0.0001**) ■ Global functioning (medium term; GAF): SMD -0.19 (-0.56, 0.18; P=0.31) ■ Social functioning (medium term; SDSS): SMD -0.72 (-1.04, -0.40; **P<0.0001**) ■ Quality of life (short term; GWB): SMD 1.82 (1.27, 2.38; **P<0.0001**)	Global state (medium term): RR 0.38 (0.24, 0.59; **P<0.0001**)	PANSS, BPRS, SANS, SAPS, SDS, HAM-D, CDSS, SAS, GAF, IADL, SDSS, PASAT, CCPT, WMS, CMT, BCST, WCST, NOSIE, CSQ, GWB, SPG, SSQ	No data available for adverse effects	None	MT improves global and mental state, global and social functioning and quality of life.
Van der Steen, 2018 [5]	Dementia	Usual care, other activities with or without music	1097 (55-103 years)	22	Active, receptive	*Anticipated absolute effects, SMD (95% CI):* *End-of-treatment effects:* ■ Emotional well-being incl. quality of life: SMD 0.32 (0.02, 0.62; **P=0.04**) ■ Mood disturbance or negative affect: depression: SMD -0.27 (-0.45, -0.09; **P=0.003**) ■ Mood disturbance or negative affect: anxiety: SMD -0.43 (-0.72, -0.14; **P=0.004**) ■ Behavioural problems: agitation or aggression: SMD -0.07 (-0.24, 0.10; P=0.42)	n.a.	CMAI, MMSE, NPI	None	None	MT reduces depressive symptoms and anxiety and improves social behaviour and overall behavioural problems, emotional wellbeing and quality of life.

						Effectiveness outcomes			Safety outcomes		
Author, year	**Indication**	**Comparison**	**Number of included patients (age range)**	**Number of included studies**	**MT methods**	**Absolute effects (95% CI; p-value of overall effect)**	**Relative effects (95% CI; p-value of overall effect)**	**Outcome measure-ments**	**Adverse events: Relative effects (95% CI)**	**Side effects**	**Conclusion**
Van der Steen, 2018 [5] *(continuation)*						■ Behavioural problems: overall SMD -0.23 (-0.46, -0.01; **P=0.04**) ■ Social behaviour: SMD 0.54 (0.06, 1.02; **P=0.03**) ■ Cognition: 0.15 (-0.06, 0.36; P=0.17) *Long-term effects:* ■ Emotional well-being incl. quality of life: SMD 0.34 (-0.12, 0.80; P=0.14) ■ Mood disturbance or negative affect: depression SMD -0.03 (-0.24, 0.19; P=0.82) ■ Mood disturbance or negative affect: anxiety: SMD -0.28 (-0.71, 0.15; P=0.21) ■ Behavioural problems: agitation or aggression: SMD -0.10 (-0.33, 0.13; P=0.38) ■ Behavioural problems: overall SMD -0.19 (-0.51, 0.14; P=0.26) ■ Social behaviour: SMD 0.53 (-0.53, 1.6; P=0.33) ■ Cognition: 0.07 (-0.21, 0.36; P=0.61)					Cognition did not enhance due to MT, and no long-term effects could be found.

n.a.: not available, MT: Music therapy, CI: Confidence interval, PSQI: Pittsburgh Sleep Quality Index, CARS: Childhood Autism Rating Scale, PDDBI: Pervasive Developmental Disorder Behavior Inventory, Vineland SEEC: Vineland Social-Emotional Early Childhood Scales, SRS: Social Responsiveness Scale, ESCS: Early Social Communication Scales, MBCDI-W&G: MacArthur-Bates Communicative Development Inventories – Words and Gestures, MPIP: Mother Play Intervention Profile, PCRI: Parent-Child Relationship Inventory, CMAI: Cohen-Mansfield Agitation Inventory, MMSE: Mini-Mental State Examination, NPI: Neuropsychiatric Inventory, OR: Odds ratio, HAM-D: Hamilton Rating Scale for Depression, MADRS: Montgomery-Åsberg Depression Rating Scale, BDI: Beck Depression Inventory, TDI: Thai Depression Inventory, GDS: Geriatric Depression Scale, GAF: Global Assessment of Functioning scale, Thai SF-36: Thai version of Short-Form Health Survey, RAND-36: Health-related quality of life survey, HAM-A: Hamilton Anxiety Scale, HADS-A: Hospital Anxiety and Depression Scale – Anxiety, PANSS: Positive and Negative Symptoms Scale,, BPRS: Brief Psychiatric Rating Scale, SANS: Scale for the Assessment of Negative Symptoms, SAPS: Scale for the Assessment of Positive Symptoms, SDS: Self-Rating Depression Scale, CDSS: Calgary Depression Scale for Schizophrenia, SAS: Self-Rating Anxiety Scale, IADL: Lawton Instrumental Activities of Daily Living Scale, SDSS: Social Disability Screening Schedule, PASAT: Paced Auditory Serial Addition Task, CCPT: Conners Continuous Performance Task, WMS: Wechsler Memory Scale, CMT: Clinical Memory Test, BCST: Berg's Card Sorting Test, WCST: Wisconsin Card Sorting Test, NOSIE: Nurses' Observation Scale for Inpatient Evaluation, CSQ: Client Satisfaction Questionnaire, GWB: General Well-Being Schedule, SPG: Skalen zur psychischen Gesundheit, SSQ: Social Support Questionnaire

Tables of the update search: Study characteristics

Table A-5: Study characteristics of autism spectrum disorder

Author, year	Indication	Study designs	Number of included patients (age range)	Intervention	Comparison	Setting	Duration of treatment intervention	Length of trial	Follow-up
Bieleninik 2017 [24]	Autism spectrum disorder	RCT	364 (4-7 yrs)	One-to-one sessions of improvisational MT (low and high-intensity group) + enhanced standard care	Enhanced standard care (routine care + parent counselling)	Outpatient (clinics, kindergartens, family homes) Multicenter (10 centres, 9 countries)	30-minutes sessions (overall, a median of 19 sessions received) *High-intensity group:* 3 times per week (median of 34 sessions received), *Low-intensity group:* weekly (median of 15 sessions received)	5 months	12 months after randomization
Sharda 2018 [31]	Autism spectrum disorder	RCT	51 (6-12 yrs)	Improvisational approaches through song and rhythm (musical instruments, songs and rhythmic cues), individual sessions	„Active comparison": play-based intervention/behavioural intervention implemented in a non-musical context	n.r.	45-minute weekly sessions (average of 10.3 sessions completed)	8-12 weeks	No

Table A-6: Study characteristics of insomnia

Author, year	Indication	Study designs	Number of included patients (age range)	Intervention	Comparison	Setting	Duration of treatment intervention	Length of trial	Follow-up
Liu 2016 [28]	Insomnia	RCT	121 (>18 yrs)	Bedtime music listening	General prenatal care	At home	Min. 30 min per day at bedtime	2 weeks	No
Jespersen 2019[27]	Insomnia	RCT	57 (mean = 50.2 yrs [SD = 11.6])	Bedtime music listening	Audiobooklistening (30 min per day at bedtime), waitlist (no intervention)	At home	Min. 30 min per day at bedtime	3 weeks	4 weeks
Huang 2017 [26]	Insomnia	RCT	71 (mean = 41.06 yrs [SD = 16.66])	Bedtime music listening	Music video watching (30 min per day, 2h before bedtime), no intervention	At home	30 min per day at bedtime	6 days (4 test days)	No

Table A-7: Study characteristics of dementia

Author, year	Indication	Study designs	Number of included patients (mean age)	Intervention	Comparison	Setting	Duration of treatment intervention	Length of trial	Follow-up
Wang 2018 [33]	Dementia	RCT	60 (overall age 69.8±7.9 yrs.)	MT + routine drug therapy	Routine drug therapy	Hospital	30-50 min, 3 times daily	3 months	3 months after intervention completion
Tang 2018 [32]	Dementia	RCT	77 (mean age: 75.88 years (SD = 5.09); range: 65-90)	Sensory stimulation with music, playing musical instruments and singing nostalgic songs	Standard care	Residential nursing facility	50 min, 3 times weekly (36 sessions in total)	12 weeks	No
Perez-Ros 2019 [30]	Dementia	RCT	119 (mean = 80.52 yrs [SD = 7.44])	Active music-based intervention using preferred music + usual occupational therapy	Standard care (usual occupational therapy)	Nursing home	60 min, 5 days a week	8 weeks	No
Lyu 2018 [29]	Dementia	RCT	298 (*MT*: mean = 68.9 yrs [SD = 7.1]; *controls*: mean = 69.9 yrs [SD = 7.9]	Singing, listening to songs	Standard care, lyric reading[104]	Geriatric hospital	30-40 min, twice daily	3 months	3 months after intervention completion

Table A-8: Study characteristics of depression

Author, year	Indication	Study designs	Number of included patients (age range)	Intervention	Comparison	Setting	Duration of treatment intervention	Length of trial	Follow-up
Hamid 2019 [25]	Depression	RCT	30 (n.r.)	MT	No intervention	n.r.	12 sessions (duration of sessions n.r., time n.r.)	n.r.	2 months

[104] We did not compare MT and lyric reading, as this is not a standard treatment [57, 58].

Tables of the update search: Summary of findings

Table A-9: Summary of effectiveness of autism spectrum disorder

Author, year	Indication	Comparison	Number of included patients (age range)	MT methods	Absolute effects (95% CI; p-value of overall effect)[105]	Outcome measurements	Adverse events: Relative effects (95% CI)	Side effects	Conclusion
Bieleninik 2017 [24]	Autism spectrum disorder	Enhanced standard care (routine care + parent counceling)	364 (4-7 yrs)	Active	*Symptom severity:* ■ ADOS score, change from baseline, MT vs. standard care at 5 months: MD = 0.06 (-0.70, 0.81; p = 0.88) ■ ADOS score, change from baseline, MT vs. standard care: At 2 months: -0.21 (-0.69, 0.26) vs. -0.44 (-0.99, 0.11), MD = 0.23; At 12 months: -1.51 (-2.05, -0.96) vs. -1.60 (-2.27, -0.93), MD = -0.09 *QoL (post hoc):* ■ mean changes in QoL at 5 months significantly more positive in the MT group than in the standard care group *SRS subscales:* ■ either adjusted or unadjusted for site: Small, significant outcomes were unlikely to be clinically important [24]. *Follow-up* (baseline to 12 month after randomization (mean (95% CIs)): ■ Symptom severity (ADOS): *MT*: -1.51 (-2.05, -0.96), *comparison*: -1.60 (-2.27, -0.93) ■ Social responsiveness (SRS): *MT*: -7.37 (−10.95, -3.78), *comparison*: -5.06 (-8.94, -1.19) *Relative effects (95% CI; p-value of overall effect):* ■ Improvement in ADOS social affect MT vs. standard care at 5 months (post hoc): RR = 1.25 (1.00, 1.56, p = 0.047); RD = 0.1 (0.00, 0.21, p = 0.047)	ADOS[106], SRS[107]	No adverse events reported	n.r.	MT does not significantly improve symptom severity based on the ADOS social affect domain over five months. The use of improvisational MT for children with ASD may not be warranted for improving autistic symptoms. The few significant outcomes were small and unlikely to be clinically important. No dose-effect was found in the prespecified analyses. Mean changes in participants' quality of life at five months were significantly more positive in the high-intensity MT group than in the standard care group.

[105] Absolute effects (95% CI; p-value of overall effect) if available. Otherwise effect sizes as presented by the authors.

[106] Autism Diagnostic Observation Schedule

[107] Social Responsiveness Scale

Author, year	Indication	Comparison	Number of included patients (age range)	MT methods	Absolute effects (95% CI; p-value of overall effect)[105]	Outcome measurements	Adverse events: Relative effects (95% CI)	Side effects	Conclusion
Sharda 2018 [31]	Autism spectrum disorder	„Active comparison": play-based intervention/ behavioural intervention implemented in a non-musical context	51 (6-12 yrs)	Active	*Behavioural outcomes (MT vs. comparison):* ■ Social communication skills (Pragmatic communication, CCC-2): MD= 4.84 (0.76, 8.92; **p = 0.01** ■ Symptom severity: Interpersonal behaviour, communication and repetitive behaviour (SRS-II): MD= 0.65 (−3.25, 4.1; p = 0.92) ■ Receptive vocabulary (PPVT-4): MD= 0.03 (-4.32, 4-38; p = 0.78) ■ Family quality of life (FQoL): MD= 7.06 (0.79, 13.33; **p = 0.01**) ■ Maladaptive behaviour (VABS): MD= 0.08 (n.r.; **p = 0.01**) *Brain connectivity outcomes:* ■ Between auditory seeds and striatal and motor regions: right: z = 3.94, **p = 0.000019**; left: z = 3.79, **p = 0.00009** ■ Between auditory seeds and visual regions: left: z = 3.39, **p < 0.00001**, right: z = 4.01, **p < 0.00001**	CCC-2[108], SRS-II[107], PPVT-4[109], FQoL[110], VABS-MB[111], rsfMRI[112]	n.r.	n.r.	MT (relative to non-music behavioural intervention) can improve parent-reported social communication, intrinsic brain connectivity, maladaptive behaviour and family quality of life in children with ASD. Symptom severity and receptive vocabulary did not improve significantly.

MD: mean difference, SD: standard deviation, RR: risk ratio, RD: risk difference

[108] Children's Communication Checklist

[109] Peabody Picture Vocabulary Test

[110] Beach Family Quality of Life Scale

[111] Vineland Adaptive Behaviour Scales

[112] Resting-state functional magnetic resonance imaging

Table A-10: Summary of effectiveness of insomnia

Author, year	Indication	Comparison	Number of included patients (age range)	MT methods	Absolute effects (95% CI; p-value of overall effect)[113]	Outcome measurements	Adverse events: Relative effects (95% CI)	Side effects	Conclusion
Liu 2016 [28]	Insomnia	General prenatal care	121 (>18 yrs)	Receptive	*Pretest – posttest score differences (ANCOVA with pretest scores as covariate):* ■ Sleep quality: t = −2.75 (−2.50, −0.41; p = 0.007) ■ Stress: t = −2.37 (−2.66, −0.24; p = 0.02) ■ Anxiety: t = −3.13 (−7.21, −1.62; p = 0.002)	PSQI[114], PSS[115], S-STAI[116]	n.r.	n. r.	Women in the experimental group reported statistically significantly lower posttest PSQI, PSS and S-STAI scores than women in the control group: MT significantly reduced stress and anxiety and yielded better sleep quality in pregnant women.
Jespersen 2019 [27]	Insomnia	Audiobook listening (30 min per day at bedtime), waitlist (no intervention)	57 (mean= 50.2 yrs [SD= 11.6])	Receptive	*Baseline – posttest score changes MT group, Cohen's D (p-value):* ■ Disease severity (ISI): MD -3.1 (-5.4, -0.8), 0.71 (p < 0.05) ■ Sleep quality (PSQI): MD -2.2 (-3.4, -0.9), 0.77 (p < 0.05) ■ Psychological quality of life (pQoL): MD 1.2 (0.3, 2.2; p = 0.01), 0.3 (p < 0.05) *Baseline to follow-up: Cohen's D; p-value:* ■ Disease severity: 0.83; p < 0.05 ■ Sleep quality: 0.69 ■ Psychological quality of life: 0.43; p < 0.05 *Objective sleep measure: no significant differences between groups*	ISI[117], PSQI[114], pQoL[118], PSG[119]	No adverse effects were reported.	n.r.	Significantly more participants in the music group experienced sleep improvement during the intervention period compared with participants in the control groups. A significantly larger improvement in the psychological quality of life, disease severity, and sleep quality in the music group compared with the two control groups was found. No changes in objective measures of sleep between the groups were stated. The follow-up resulted in enhanced disease severity and psychological quality of life, but not in sleep quality. In conclusion, MT shows effects of bedtime music on perceived sleep improvement and quality of life, but no clear effect on insomnia severity.

[113] Absolute effects (95% CI; p-value of overall effect) if available. Otherwise effect sizes as presented by the authors.
[114] Pittsburgh Sleep Quality Index
[115] Perceived Stress Scale
[116] State Anxiety Inventory
[117] Insomnia Severity Index
[118] Psychological domain of the WHO quality of life questionnaire—abbreviated version
[119] Polysomnography

Author, year	Indication	Comparison	Number of included patients (age range)	MT methods	Absolute effects (95% CI; p-value of overall effect)[113]	Outcome measurements	Adverse events: Relative effects (95% CI)	Side effects	Conclusion
Huang 2017 [26]	Insomnia	Music video watching (30 min per day, 2h before bedtime), no intervention	71 (mean = 41.06 yrs [SD = 16.66])	Receptive	*Group effects in post-test scores of subjective sleep parameters:* ■ Subjective total sleep time (TST[120]) between groups: Wald's χ2= 6.23 (380.78, 427.63; p = 0.04) ■ Subjective TST was significantly longer in the music group than in the MV group (p= 0.01) subjective SOL[121] did not significantly differ among groups ■ No significant differences in the daytime fatigue of sleep disturbance among the three groups (Wald's χ2 = 7.64, p = 0.11) ■ No significant differences in objective sleep parameters (TST, SOL, SE[122], WASO[123], stage N1–N3 and REM sleep, and number of awakenings) between intervention and control groups	EEG[124] (SOL, SE, REM[125] sleep, WASO, number of awakenings), sleep measurements for TST (stage 1-4); investigator-developed sleep diary for subjective TST and daytime fatigue of sleep disturbance	Minor adverse event: patient felt worried about losing the EEG machine.	n. r.	The music group had significantly longer subjective total sleep time than the music video group did. MT had no effect on any objective sleep parameters or subjective sleep onset latency and daytime fatigue of sleep disturbance.

[120] Total sleep time

[121] Sleep onset latency

[122] Sleep efficiency

[123] Wake time after sleep onset

[124] Electroencephalography

[125] Rapid eye movement

Table A-11: Summary of effectiveness of dementia

Author, year	Indication	Comparison	Number of included patients (mean age)	MT methods	Absolute effects (95% CI; p-value of overall effect)[126]	Outcome measurements	Adverse events: Relative effects (95% CI)	Side effects	Conclusion
Wang 2018 [33]	Dementia	Routine drug therapy	60 (overall age 69.8±7.9 yrs.)	Active	*mean±SD; F (p-value):* ■ Cognitive function (MMSE): *MT*: t0: 22.85±1.22, t1: 23.62±1.55, t2: 24.15±1.55, *comparison*: t0: 22.92±1.28, t1: 23.29±1.53, t2: 23.80±1.53; **p = 0.003** ■ Cognitive function (MoCA): *MT*: t0: 12.42±2.18, t1: 13.08±2.19, t2: 13.39±1.17, *comparison*: t0: 12.48±2.14, t1: 12.56±2.31, t2: 12.75±2.32; **p = 0.000** ■ Neuropsychiatric behaviour (NPI): *MT*: t0: 16.35±1.95, t1: 15.78±1.95, t2: 15.39±1.98, *comparison*: t0: 16.29±2.05, t1: 15.98±1.89, t2: 15.78±1.91; **p = 0.000**	MMSE[127], MoCA[128], NPI[129]	n.r.	n.r.	MT, combined with pharmacological treatment, improved cognitive function and mental behaviour in patients with Alzheimer's disease, helping to delay disease's progression and improving prognosis. Cognitive function improved in both groups over the course of treatment, but patients in the MT group demonstrated a greater magnitude of improvement compared to the control group. MT may relieve mental impairment and some of the progressive cognitive dysfunction.
Tang 2018 [32]	Dementia	Standard care	77 (mean age: 75.88 years (SD = 5.09); range: 65-90)	Active, receptive	*Within group comparison pretest vs. posttest; mean±SD; p-value:* ■ Apathy (AES-C): *MT*: t0: 55.13±9.27, t1: 52.08±9.56, **p < 0.05**; *comparison*: t0: 54.51±9.31, t1: 55.31±8.49; p > 0.05 ■ Cognitive function (MMSE): *MT*: t0: 16.42±4.88, t1: 16.71±5.03, p > 0.05; *comparison*: t0: 15.77±4.64, t1: 15.01±4.52; **p < 0.05** ■ Communication (Holden's communication scale): *MT*: t0: 21.05±9.40, t1: 19.68±8.97, **p < 0.05; *comparison***: t0: 21.31±9.30, t1: 21.82±8.54; **p < 0.05**	AES-C[130], MMSE[131], Holden's communication scale	n.r.	n.r.	MT was effective for the treatment of apathy in the early stages of dementia. It improved communication abilities and reduced symptoms of apathy. Cognitive function remained stable in the MT group but declined in the control group.

[126] Absolute effects (95% CI; p-value of overall effect) if available. Otherwise effect sizes as presented by the authors.

[127] Mini Mental State Examination

[128] Montreal cognitive assessment

[129] Neuropsychiatric inventory

[130] Apathy Evaluation Scale-Clinician

[131] Mini Mental State Exam

Author, year	Indication	Comparison	Number of included patients (mean age)	MT methods	Absolute effects (95% CI; p-value of overall effect)[126]	Outcome measurements	Adverse events: Relative effects (95% CI)	Side effects	Conclusion
Perez-Ros 2019 [30]	Dementia	Standard care (usual occupational therapy)	119 (mean = 80.52 yrs [SD = 7.44])	Active, receptive	*Interaction effects of group and time; mean difference (95% CI; p-value):* ■ Physical function (BI): *MT:* 1.48 (–0.01, 2.98; **p = 0.049**); *comparison*: –0.68 (–1.69, 0.33; p > 0.05) ■ Physical function (Tinetti Scale): *MT:* 0.59 (0.04, 1.15; **p < 0.05**; *comparison*: 0.31 (0.07, 0.56; **p < 0.05)** ■ Cognition (MMSE): *MT:* 0.08 (–0.27, 0.44; p > 0.05); *comparison*: –2.33 (–2.89, –1.77; **p < 0.01**) ■ Mood (GDS): *MT:* –0.04 (–0.15, 0.06; p > 0.05); *comparison*: 1.77 (0.99, 2.56; **p < 0.01**) ■ Mood (Cornell Scale): *MT:* 0.29 (0.09, 0.49; n.r.; **p < 0.01**); *comparison*: –0.66 (–2.31, 0.97; p > 0.05)	BI[132], Tinetti Scale, MMSE[131], GDS[133], Cornell Scales	n.r.	n.r.	MT was effective in the management of physical functional and emotional symptoms in patients with cognitive impairments. It improved functional condition and mood state, while cognitive function did not worsen. Cognitive function remained stable in the MT group but was seen to decline in the control group.
Lyu 2018 [29]	Dementia	Standard care, lyric reading[134]	298 (*MT*: mean= 68.9 yrs [SD = 7.1]; *controls*: mean= 69.9 yrs [SD = 7.9]	Active, receptive	*Comparison among groups t1 → t2 (follow-up)):* *All participants:* ■ Verbal fluency: *MT*: t1: 5.85±1.04, t2: 5.78±1.09; **p < 0.05;** *comparison*: t1: 5.48±1.86, t2: 5.41±1.51 ■ Behavioural and psychological symptoms (NPI): *MT*: t1: 20.00±12.63, t2: 19.36± 12.24; **p < 0.05;** *comparison*: t1: 24.99±12.35, t2: 25.22±11.38 ■ The results of MMSE, WHO-UCLA AVLT, Barthel Index show there is no significant difference in all assessments of the groups. *Participants with mild Alzheimer's disease:* ■ Verbal fluency: *MT*: t1: 8.63± 1.94, t2: 8.45±1.69, **p < 0.05**; *comparison*: t1: 7.54±2.03, t2: 7.43±1.52 ■ Short-term memory (WHO-UCLA AVLT, immediate recall): *MT*: t1: 7.38±1.45, t2: 7.24±1.42, **p < 0.05;** *comparison*: t1: 6.63±1.26, t2: 6.61±1.13 ■ Long-term memory (WHO-UCLA AVLT, delayed recall): *MT*: t1: 6.51±1.52, t2: 6.01±1.63, **p < 0.05;** *comparison*: t1: 5.57±1.10, t2: 5.55±1.30 ■ The results of MMSE, NPI, and Barthel Index showed there was no significant difference in all assessments of the groups.	MMSE[131], WHO-UCLA AVLT[135], semantic verbal fluency test, NPI[129], BI[132]	n.r.	n. r.	MT enhanced cognitive function and mental wellbeing, improved verbal fluency and alleviated psychiatric symptoms and caregiver distress. MT was effective for enhancing language ability and memory in patients with mild Alzheimer's disease. It reduced psychiatric symptoms and caregiver distress in patients with moderate/severe Alzheimer's disease. No significant effect was found for activities of daily living.

[132] Barthel Index

[133] Yesavage Geriatric Depression Scale

[134] We did not compare MT and lyric reading, as this is not a standard treatment [57, 58]

[135] World Health Organization University of California-Los Angeles, Auditory Verbal Learning Test

Author, year	Indication	Comparison	Number of included patients (mean age)	MT methods	Absolute effects (95% CI; p-value of overall effect)[126]	Outcome measurements	Adverse events: Relative effects (95% CI)	Side effects	Conclusion
Lyu 2018 [29] *(continuation)*					*Participants with moderate Alzheimer's disease:* ■ Caregiver distress (NPI): *MT*: t1: 20.73±10.16, t2: 21.00±13.63, **p < 0.05**; *comparison*: t1: 30.55±19.13, t2: 31.10±13.14 ■ The results of MMSE, WHO-UCLA AVLT, verbal fluency test, Barthel Index showed there was no significant difference in all assessments of the groups. *Participants with severe Alzheimer's disease:* ■ Behavioural and psychological symptoms (NPI): *MT*: t1: 26.57±10.35, t2: 25.96±14.23, **p < 0.05**; *comparison*: t1: 35.35±16.45, t2: 35.43±14.36 ■ Caregiver distress: *MT*: t1: 25.12±13.30, t2: 25.02±13.47, **p < 0.05**; *comparison*: t1: 39.57±16.34, t2: 40.38±17.31 ■ The results of MMSE, WHO-UCLA AVLT, Verbal Fluency Test, Barthel Index showed there was no significant difference in all assessments of the groups.				

Table A-12: Summary of effectiveness of depression

Author, year	Indication	Comparison	Number of included patients (age range)	MT methods	Absolute effects (95% CI; p-value of overall effect)[136]	Outcome measurements	Adverse events: Relative effects (95% CI)	Side effects	Conclusion
Hamid 2019 [25]	Depression	No intervention	30 (n.r.)	Active	*Mean (SD); p-value:* ■ Depression: *posttest*: MT: 19.65 (2.25), controls: 40.22 (3.08); *follow-up*: MT: 18.72 (4.11), controls: 42.06 (2.66); difference between the two groups: **p < 0.001** ■ Happiness: *posttest*: MT: 54.13 (3.14), controls: 29.31 (2.17); *follow-up*: MT: 55.01 (2.08), controls: 28.62 (3.16); difference between the two groups: **p < 0.001**	BDI[137], Oxford Happiness Questionnaire	n.r.	n.r.	MT significantly reduced depression compared to pretest and controls in depressed women. MT caused an increase in happiness and a decrease in depression. Furthermore, MT caused the maintenance of the effect of the intervention on the MT group compared to the control group.

[136] Absolute effects (95% CI; p-value of overall effect) if available. Otherwise effect sizes as presented by the authors.

[137] Beck's Depression Inventory

Search strategy I: Systematic literature search

Medline via Ovid

Database: Ovid MEDLINE(R) and In-Process & Other Non-Indexed Citations and Daily <1946 to the 26th of June, 2020>, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily <2016 to the 26th of June, 2020>	
Search Strategy:	
1	exp Music Therapy/(4336)
2	music*.mp. (34208)
3	„Therapeutic Use". fs. (2526148)
4	2 and 3 (586)
5	(music* adj5 (therap* or intervention* or treat* or program* or regimen*)).mp. (7208)
6	1 or 4 or 5 (7492)
7	limit 6 to (meta analysis or „systematic review" or systematic reviews as topic) (461)
8	(((comprehensive* or integrative or systematic*) adj3 (bibliographic* or review* or literature)) or (meta-analy* or metaanaly* or „research synthesis" or ((information or data) adj3 synthesis) or (data adj2 extract*))).ti,ab. or (cinahl or (cochrane adj3 trial*) or embase or medline or psyclit or (psycinfo not „psycinfo database") or pubmed or scopus or „sociological abstracts" or „web of science").ab. or („cochrane database of systematic reviews" or evidence report technology assessment or evidence report technology assessment summary).jn. or Evidence Report: Technology Assessment*.jn. or ((review adj5 (rationale or evidence)).ti,ab. and review.pt.) or meta-analysis as topic/or Meta-Analysis.pt. (690098)
9	6 and 8 (882)
10	7 or 9 (884)
11	limit 10 to (english or german or spanish) (865)
12	limit 11 to yr=„2010 - 2020" (750)
13	remove duplicates from 12 (441)
Search date: 29.06.2020	

Embase

Session Results			
No.	Query Results	Results	Date
#8.	(#4 OR #5) AND ([english]/lim OR [german]/lim OR [spanish]/lim) AND [2010-2020]/py	476	29 Jun 2020
#7.	(#4 OR #5) AND ([english]/lim OR [german]/lim OR [spanish]/lim)	581	29 Jun 2020
#6.	#4 OR #5	592	29 Jun 2020
#5.	#3 AND ([cochrane review]/lim OR [systematic review]/lim OR [meta analysis]/lim)	537	29 Jun 2020
#4.	#3 AND ('meta analysis'/de OR 'meta analysis topic'/de OR 'systematic review'/de OR 'systematic review topic'/de)	555	29 Jun 2020
#3.	#1 OR #2	7,858	29 Jun 2020
#2.	(music* NEAR/1 (therap* OR intervention* OR treat* OR program* OR regimen*)):ti,ab,kw,de	7,858	29 Jun 2020
#1.	'music therapy'/exp	6,966	29 Jun 2020

The Cochrane Library

Search Name: Music Therapy	
Last Saved: 29/06/2020 13:52:00	
Comment: LG/JM 290620	
ID	Search
#1	MeSH descriptor: [Music Therapy] explode all trees
#2	(music* NEAR (therap* OR intervention* OR treat* OR program* OR regimen*)):ti,ab,kw (Word variations have been searched)
#3	#1 OR #2 with Cochrane Library publication date Between Jan 2010 and Jun 2020, in Cochrane Reviews, Cochrane Protocols (Word variations have been searched)
41 Hits	

PsycINFO

Database: APA PsycInfo <1806 to June Week 4 2020>	
Search Strategy:	
1	exp Music Therapy/(4802)
2	(music* adj5 (therap* or intervention* or treat* or program* or regimen*)).mp. (7856)
3	1 or 2 (7856)
4	limit 3 to („0830 systematic review“ or 1200 meta analysis) (170)
5	(((comprehensive* or integrative or systematic*) adj3 (bibliographic* or review* or literature)) or (meta-analy* or metaanaly* or „research synthesis“ or ((information or data) adj3 synthesis) or (data adj2 extract*))).ti,ab,id. or ((review adj5 (rationale or evidence)).ti,ab,id. and „Literature Review“.md.) or (cinahl or (cochrane adj3 trial*) or embase or medline or psyclit or pubmed or scopus or „sociological abstracts“ or „web of science“).ab. or („systematic review“ or „meta analysis“).md. (92528)
6	3 and 5 (302)
7	4 or 6 (302)
8	limit 7 to (english or german or spanish) (286)
9	limit 8 to yr=„2010 - 2020“ (221)
Search date: 29.06.2020	

CRD (DARE, NHS-EED, HTA)

#### Music Therapy (LG/JM) 290620	
Search Date: 29.06.20	
1	MeSH DESCRIPTOR Music Therapy EXPLODE ALL TREES
2	(music* NEAR (therap* OR intervention* OR treat* OR program* OR regimen*))
3	#1 OR #2
4	(music* NEAR (therap* OR intervention* OR treat* OR program* OR regimen*)) FROM 2010 TO 2020
Total: 61 Hits	

INAHTA

Date of search: 29.06.2020	
Search limited to English/German/Spanish and 2010-2020	
Query Nr.	Search query,“Hits“,“Searched At“
7	(music* regimen*) OR (music* program*) OR (music* treat*) OR (music* intervention*) OR (music* therap*) OR (Music Therapy“[mhe])“,“14“,“2020-06-29T13:45:45.000000Z“
6	music* regimen*,“0“,“2020-06-29T13:45:33.000000Z“
5	music* program*,“5“,“2020-06-29T13:44:35.000000Z“
4	music* treat*,“5“,“2020-06-29T13:43:50.000000Z“
3	music* intervention*,“6“,“2020-06-29T13:42:59.000000Z“
2	music* therap*,“13“,“2020-06-29T13:42:14.000000Z“
1	Music Therapy“[mhe]“,“8“,“2020-06-29T13:41:05.000000Z“
7 Hits	

Search strategy II: Update search

Medline via Ovid

Database: Ovid MEDLINE(R) and In-Process & Other Non-Indexed Citations <1946 to July 17, 2020>, Ovid MEDLINE(R) Epub Ahead of Print <July 17, 2020>, Ovid MEDLINE(R) Daily Update <July 17, 2020>	
Search Strategy:	
1	exp Music Therapy/(3535)
2	music*.mp. (26279)
3	„Therapeutic Use“.fs. (2220710)
4	2 and 3 (505)
5	(music* adj5 (therap* or intervention* or treat* or program* or regimen*)).mp. (5450)
6	1 or 4 or 5 (5697)
7	exp Dementia/(165278)
8	dement*.mp. (131473)
9	exp Depression/(118811)
10	exp Depressive Disorder/(108969)
11	depress*.mp. (543810)
12	exp Schizophrenia/(104413)
13	schizophreni*.mp. (148610)
14	exp Autism Spectrum Disorder/(29945)
15	exp Autistic Disorder/(20386)
16	autism*.mp. (45361)
17	autist*.mp. (25774)
18	exp „Sleep Initiation and Maintenance Disorders“/(13276)
19	insomni*.mp. (21635)
20	sleepless*.mp. (879)
21	7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 (926616)
22	6 and 21 (1306)
23	limit 22 to clinical trial, all (286)
24	((randomized controlled trial or controlled clinical trial).pt. or randomi#ed.ab. or placebo.ab. or drug therapy.fs. or randomly.ab. or trial.ab. or groups.ab.) not (exp animals/not humans.sh.) (4136205)
25	22 and 24 (601)
26	23 or 25 (625)
27	limit 26 to (english or german or spanish) (594)
28	limit 27 to yr=„2013 - 2020“ (346)
29	remove duplicates from 28 (343)
Search date: 21.07.2020	

Embase

Session Results			
No.	Query Results	Results	Date
#23.	#22 AND [2013-2020]/py	416	21 Jul 2020
#22.	#21 AND ([english]/lim OR [german]/lim OR [spanish]/lim)	713	21 Jul 2020
#21.	#18 OR #20	748	21 Jul 2020
#20.	#17 AND #19	667	21 Jul 2020
#19.	random*:ab,ti OR placebo*:de,ab,ti OR ((double NEXT/1 blind*):ab,ti)	1,807,836	21 Jul 2020
#18.	#3 AND #16 AND ([controlled clinical trial]/lim OR [randomized controlled trial]/lim)	397	21 Jul 2020

#17.	#3 AND #16	2,338	21 Jul 2020
#16.	#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15	1,453,794	21 Jul 2020
#15.	sleepless*:ti,ab,de,kw,lnk	1,330	21 Jul 2020
#14.	insomni*:ti,ab,de,kw,lnk	75,267	21 Jul 2020
#13.	'insomnia'/exp	68,673	21 Jul 2020
#12.	autist*:ti,ab,de,kw,lnk	16,933	21 Jul 2020
#11.	autism*:ti,ab,de,kw,lnk	74,802	21 Jul 2020
#10.	'autism'/exp	73,092	21 Jul 2020
#9.	schizophren*:ti,ab,de,kw,lnk	219,315	21 Jul 2020
#8.	'schizophrenia'/exp	192,031	21 Jul 2020
#7.	depress*:ti,ab,de,kw,lnk	796,158	21 Jul 2020
#6.	'depression'/exp	497,972	21 Jul 2020
#5.	demen*:ti,ab,kw,de,lnk	207,960	21 Jul 2020
#4.	'dementia'/exp	363,306	21 Jul 2020
#3.	#1 OR #2	7,906	21 Jul 2020
#2.	(music* NEAR/1 (therap* OR intervention* OR treat* OR program* OR regimen*)):ti,ab,kw,de,lnk	7,906	21 Jul 2020
#1.	'music therapy'/exp	7,006	21 Jul 2020

The Cochrane Library

Search Name: Music Therapy for dementia, depression, schizophrenia, autism and insomnia	
Last Saved: 21/07/2020 11:57:13	
Comment: LG/JM 210720	
ID	Search
#1	MeSH descriptor: [Music Therapy] explode all trees
#2	(music* NEAR (therap* OR intervention* OR treat* OR program* OR regimen*)):ti,ab,kw (Word variations have been searched)
#3	#1 OR #2 (Word variations have been searched)
#4	MeSH descriptor: [Dementia] explode all trees
#5	(dement*):ti,ab,kw (Word variations have been searched)
#6	MeSH descriptor: [Depression] explode all trees
#7	MeSH descriptor: [Depressive Disorder] explode all trees
#8	(depress*):ti,ab,kw (Word variations have been searched)
#9	MeSH descriptor: [Schizophrenia] explode all trees
#10	(schizophreni*):ti,ab,kw (Word variations have been searched)
#11	MeSH descriptor: [Autism Spectrum Disorder] explode all trees
#12	MeSH descriptor: [Autistic Disorder] explode all trees
#13	(autism*):ti,ab,kw (Word variations have been searched)
#14	(autist*):ti,ab,kw (Word variations have been searched)
#15	MeSH descriptor: [Sleep Initiation and Maintenance Disorders] explode all trees
#16	(insomni*):ti,ab,kw (Word variations have been searched)
#17	(sleepless*):ti,ab,kw (Word variations have been searched)
#18	#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 (Word variations have been searched)
#19	#3 AND #18 with Publication Year from 2013 to 2020, in Trials (Word variations have been searched)
532 Hits	

PsycINFO

Database: APA PsycInfo <1806 to July Week 2 2020>	
Search Strategy:	
1	exp Music Therapy/(4829)
2	(music* adj5 (therap* or intervention* or treat* or program* or regimen*)).mp. (7887)
3	1 or 2 (7887)
4	exp Dementia/(77248)
5	demen*.mp. (76179)
6	exp Major Depression/(131325)
7	exp „Depression (Emotion)"/(25568)
8	depress*.mp. (368682)
9	exp Schizophrenia/(90860)
10	schizophreni*.mp. (138643)
11	exp Autism Spectrum Disorders/(43824)
12	autism*.mp. (53869)
13	autist*.mp. (22174)
14	exp Insomnia/(6333)
15	insomni*.mp. (13345)
16	sleepless*.mp. (562)
17	4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (616040)
18	3 and 17 (1473)
19	limit 18 to „0300 clinical trial" (92)
20	clinical trials/or „treatment outcome clinical trial".md. or ((randomi?ed adj7 trial*) or ((single or doubl* or tripl* or treb*) and (blind* or mask*)) or (controlled adj3 trial*) or (clinical adj2 trial*)).ti,ab,id. (103341)
21	18 and 20 (199)
22	19 or 21 (226)
23	limit 22 to (english or german or spanish) (215)
24	limit 23 to yr=„2013 - 2020" (123)
Search date: 21.07.2020	

Squared/collated EndNote Library with new references only

As the list is too long for this report, if interested in details, please notify the corresponding author.

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