Music therapy for people with schizophrenia and schizophrenia-like disorders (Review)

Mössler K, Chen X, Heldal TO, Gold C

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[Intervention Review]

Music therapy for people with schizophrenia and schizophrenia-like disorders

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ABSTRACT

Background

Music therapy is a therapeutic method that uses musical interaction as a means of communication and expression. The aim of the therapy is to help people with serious mental disorders to develop relationships and to address issues they may not be able to using words alone.

Objectives

To review the effects of music therapy, or music therapy added to standard care, compared with 'placebo' therapy, standard care or no treatment for people with serious mental disorders such as schizophrenia.

Search methods

We searched the Cochrane Schizophrenia Group Trials Register (December 2010) and supplemented this by contacting relevant study authors, handsearching of music therapy journals and manual searches of reference lists.

Selection criteria

All randomised controlled trials (RCTs) that compared music therapy with standard care, placebo therapy, or no treatment.

Data collection and analysis

Studies were reliably selected, quality assessed and data extracted. We excluded data where more than 30% of participants in any group were lost to follow-up. We synthesised non-skewed continuous endpoint data from valid scales using a standardised mean difference (SMD). If statistical heterogeneity was found, we examined treatment 'dosage' and treatment approach as possible sources of heterogeneity.

Main results

We included eight studies (total 483 participants). These examined effects of music therapy over the short- to medium-term (one to four months), with treatment 'dosage' varying from seven to 78 sessions. Music therapy added to standard care was superior to standard care for global state (medium-term, 1 RCT, n = 72, RR 0.10 95% CI 0.03 to 0.31, NNT 2 95% CI 1.2 to 2.2). Continuous data

identified good effects on negative symptoms (4 RCTs, n = 240, SMD average endpoint Scale for the Assessment of Negative Symptoms (SANS) -0.74 95% CI -1.00 to -0.47); general mental state (1 RCT, n = 69, SMD average endpoint Positive and Negative Symptoms Scale (PANSS) -0.36 95% CI -0.85 to 0.12; 2 RCTs, n=100, SMD average endpoint Brief Psychiatric Rating Scale (BPRS) -0.73 95% CI -1.16 to -0.31); depression (2 RCTs, n = 90, SMD average endpoint Self-Rating Depression Scale (SDS) -0.63 95% CI -1.06 to -0.21; 1 RCT, n = 30, SMD average endpoint Hamilton Depression Scale (Ham-D) -0.52 95% CI -1.25 to -0.21); and anxiety (1 RCT, n = 60, SMD average endpoint SAS -0.61 95% CI -1.13 to -0.09). Positive effects were also found for social functioning (1 RCT, n = 70, SMD average endpoint Social Disability Schedule for Inpatients (SDSI) score -0.78 95% CI -1.27 to -0.28). Furthermore, some aspects of cognitive functioning and behaviour seem to develop positively through music therapy. Effects, however, were inconsistent across studies and depended on the number of music therapy sessions as well as the quality of the music therapy provided.

Authors' conclusions

Music therapy as an addition to standard care helps people with schizophrenia to improve their global state, mental state (including negative symptoms) and social functioning if a sufficient number of music therapy sessions are provided by qualified music therapists. Further research should especially address the long-term effects of music therapy, dose-response relationships, as well as the relevance of outcomes measures in relation to music therapy.

PLAIN LANGUAGE SUMMARY

Music therapy for schizophrenia or schizophrenia-like disorders

Music therapy is a therapeutic method that uses music experiences to help people with serious mental disorders to develop relationships and to address issues they may not be able to using words alone. Studies to date have examined the effects of music therapy as an add-on treatment to standard care. The results of these studies suggest that music therapy improves global state and may also improve mental state and functioning if a sufficient number of music therapy sessions are provided.

SUMMARY OF FINDINGS FOR THE MAIN COMPARISON *[Explanation]*

MUSIC THERAPY versus STANDARD CARE for people with schizophrenia and schizophrenia-like disorders

Patient or population: people with schizophrenia and schizophrenia-like disorders
Settings:
Intervention: MUSIC THERAPY versus STANDARD CARE

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Control	MUSIC THERAPY versus STANDARD CARE				
Mental state: Negative symptoms SANS Follow-up: 1-3 months		The mean Mental state: Negative symptoms in the intervention groups was **0.74 standard deviations lower** (1 to 0.47 lower)		240 (4 studies)	⊕⊕⊕⊕ **high**[1,2]	SMD -0.74 (-1 to -0.47)
Social functioning SDSI Follow-up: 3 months		The mean Social functioning in the intervention groups was **0.78 standard deviations lower** (1.27 to 0.28 lower)		70 (1 study)	⊕⊕⊕⊕ **high**[2,3]	SMD -0.78 (-1.27 to -0.28)
Global state: No clinically important overall improvement as rated by trialists Follow-up: 3 months	**Study population**		**RR 0.1** (0.03 to 0.31)	72 (1 study)	⊕⊕⊕⊕ **high**[3,4]	
	710 per 1000	**71 per 1000** (21 to 220)				
	Medium risk population					

	710 per 1000	**71 per 1000** (21 to 220)			
General mental state PANSS Follow-up: 3 months		The mean General mental state in the intervention groups was **0.36 standard deviations lower** (0.84 lower to 0.12 higher)	69 (1 study)	⊕⊕⊕⊕ **high**	SMD -0.36 (-0.84 to 0.12)
General mental state BPRS Follow-up: 1.5-3 months		The mean General mental state in the intervention groups was **0.73 standard deviations lower** (1.16 to 0.31 lower)	100 (2 studies)	⊕⊕⊕◯ **moderate**[1,2,5]	SMD -0.73 (-1.16 to -0.31)
General functioning GAF Follow-up: 3 months		The mean General functioning in the intervention groups was **0.05 standard deviations lower** (0.53 lower to 0.43 higher)	69 (1 study)	⊕⊕⊕◯ **moderate**[3]	SMD -0.05 (-0.53 to 0.43)
Quality of life SPG Follow-up: 1 months		The mean Quality of life in the intervention groups was **0.05 standard deviations higher** (0.66 lower to 0.75 higher)	31 (1 study)	⊕⊕⊕◯ **moderate**[3]	SMD 0.05 (-0.66 to 0.75)

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **RR:** Risk ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Limitations in the designs such as poorly reported randomisation and blinding, as well as less-well defined music therapy.
[2] The effect was in the large range according to Cohen 1988.
[3] Imprecision - only one study reported results on this outcome.
[4] Very large effect based on direct evidence with no major threats to validity.
[5] Inconsistency - Heterogeneity between studies was high and significant.

BACKGROUND

Description of the condition

Schizophrenia is a serious mental disorder with considerable impact on individuals and their families. It may take a life-long course, although full recovery is also observed in a proportion of cases. Symptoms of schizophrenia are usually classified as 'positive' (where something is added, such as hallucinations or paranoid ideation; also classified as schizophrenia type I) and 'negative' (where something is missing, such as the ability to express oneself emotionally or to form satisfying relationships with others; also classified as schizophrenia type II). The aspects of schizophrenia that are linked to losing and regaining creativity, emotional expressiveness, social relationships, and motivation may be important in relation to music therapy (Gold 2009).

Description of the intervention

Music therapy is generally defined as "a systematic process of intervention wherein the therapist helps the client to promote health, using music experiences and the relationships that develop through them as dynamic forces of change" (Bruscia 1998). It is often perceived as a psychotherapeutic method in the sense that it addresses intra- and interpsychic, as well as social processes by using musical interaction as a means of communication, expression, and transformation. The aim of the therapy is to help people with serious mental disorders to develop relationships and to address issues they may not be able to using words alone.

Recognition of music therapy as a profession (with its own academic and clinical training courses) was first introduced in North and South America in the 1940s. The first European countries (Austria and England) followed in 1958, and soon after that many other countries followed (Maranto 1993). It is now a state-registered profession in some countries (Austria, UK). A survey based in Germany showed that music therapy was used in 37% of all psychiatric and psychosomatic clinics (Andritzky 1996).

Music therapy models practised today are most commonly based on psychoanalytic, humanistic, cognitive behavioural or developmental theory (Gold 2009; Wigram 2002). Generally, behavioural models are more prevalent in the USA, whereas psychodynamic and humanistic models dominate in Europe. However, the competing theoretical models in music therapy and their applications do not necessarily form distinct categories, but rather prototypical positions in a varied but coherent field.

Other than by their theoretical orientation, approaches in music therapy may also be described by their modality ('active' versus 'receptive'), their level of structure, and the focus on the music itself versus on verbal processing of the music experiences. The active modality includes all activities where clients are invited to play or sing. This includes a variety of activities ranging from free improvisation to reproducing songs. Receptive techniques, on the other hand, refer to clients listening to music; this may be played by the therapist for the client, or recorded music may be selected by either therapist or client. Although some models of music therapy rely exclusively on one mode of musical interaction, most models use a mixture of both.

Secondly, the level of predefined structuring may vary. Some therapists may impose a greater degree of structure than others, either by using more structured forms of music-making or by selecting activities before the sessions, as opposed to developing these in dialogue with the client. The level of structuring may depend on the client's needs but may also vary between music therapy models. For example, it has been observed that there are considerable differences between American and European approaches in the level of structuring (Wigram 2002). A recent review concluded that extreme positions were rarely observed and most studies used some structure as well as some flexibility (Gold 2009). A third relevant distinction concerns the focus of attention. Some music therapists and music therapy models may focus more on the processes occurring within the music itself, whereas others have a greater focus on the verbal reflection of the client's issues brought forth by these musical processes (Gold 2009).

In summary, music therapy for people with serious mental disorders often relies on a mixture of active and receptive techniques, even though musical improvisation and verbalisation of the musical interaction are often central. Music therapists working in clinical practice with this population usually have extensive training, and many show a strong psychotherapeutic orientation in their work. Music therapy with patients in mental health care is usually provided either in an individual or a small group setting and is often continued over an extended period of time (Wigram 1999).

How the intervention might work

Music therapy is often justified by a proposed need for a medium for communication and expression other than verbal language. Some people with serious mental disorders may be too disturbed to use verbal language alone efficiently as a therapeutic medium. Research on parent-infant communication is often cited as a rationale for using music therapy; this body of research has shown that the earliest communication that humans develop has many "musical" qualities (Ansdell 2010a; Stern 2010; Trevarthen 2000). More pragmatically, clinical reports have suggested that music therapy can have unique motivating, relationship-building, and emotionally expressive qualities that may help even those who do not benefit from verbal therapy (Rolvsjord 2001; Solli 2008). The musical interaction in music therapy might also support a re-establishment of musical resources and competencies affecting the patient's every day life. This has been described from a patient perspective as an important factor in music therapy increasing quality of life (Ansdell 2010b).

Why it is important to do this review

In its early years, music therapy was established in selected hospitals, by enthusiastic individuals (Mössler 2011), on the basis of successful case histories. The degree to which music therapy is available still varies greatly across and even within countries. As music therapy is becoming more established as a profession and as a service in mental health care, the need for documented evidence of its effects increases.

OBJECTIVES

To review the effects of music therapy, or music therapy added to standard care, compared with placebo therapy, standard care or no treatment for people with serious mental disorders such as schizophrenia.

METHODS

Criteria for considering studies for this review

Types of studies

All relevant randomised controlled trials (RCTs). If a trial was described in a way that implied that the study was randomised, we included such trials in a sensitivity analysis. If there was no substantive difference within primary outcomes (see types of outcome measures) when these 'implied randomisation' studies were added, then we included them in the final analysis. If there was a substantive difference, we only used randomised trials and we described the results of the sensitivity analysis in the text. We excluded quasi-randomised studies, such as those allocating by using alternate days of the week.

Types of participants

People with schizophrenia or any other non-affective serious mental disorders, diagnosed by any criteria, irrespective of gender, age or nationality.

Types of interventions

1. Music therapy or music therapy added to standard care

Music therapy is defined as "a systematic process of intervention wherein the therapist helps the client to promote health, using music experiences and the relationships that develop through them as dynamic forces of change" (Bruscia 1998). This definition of music therapy is rather broad and inclusive of different models, but distinguishes clearly from music listening alone: for it to be music therapy, there has to be a therapist, and the client-therapist relationship as well as the music experience are relevant factors.

2. Placebo

Defined as an alternative therapy designed to control for effects of the therapist's attention.

3. Standard care or no treatment

Types of outcome measures

All outcomes were reported for the short-term (up to 12 weeks), medium-term (13 to 26 weeks), and long-term (more than 26 weeks).

Primary outcomes

There is currently no consensus as to what should be the primary outcomes of music therapy for people with schizophrenia. Goals described by music therapists tend to describe 'soft' outcomes such as well-being, self-esteem, the ability to express oneself and to relate to others, or a sense of identity; outcomes such as overall symptom reduction or improved general functioning seem to be only indirectly related to those goals. However, symptom-related outcomes are most commonly measured in research studies. Notably, measures of negative symptoms include impairments in the ability to express oneself and to relate to others, but also include other domains. Because of the importance to people with schizophrenia, **global state**, **general symptoms**, **negative symptoms** and **functioning** (including social functioning) will be regarded as primary outcomes.

Secondary outcomes

A more comprehensive and general list of relevant outcomes has been defined by the Cochrane Schizophrenia Group as follows. Most of these outcomes and their particular sub-cateogries are defined as secondary outcomes for this review. However, those outcomes marked with a star have been selected from that list as primary outcomes and are therefore also listed above.

1. Death

Suicide and natural causes

2. Global state

2.1 Relapse
2.2 Time to relapse
2.3 No clinically important change in global state*
2.4 Not any change in global state

2.5 Average endpoint global state score
2.6 Average change in global state scores
2.7 No decrease in medication
2.8 Increase in medication

3. Service outcomes

3.1 Hospitalisation
3.2 Time to hospitalisation

4. Mental state

4.1 No clinically important change in general mental state
4.2 Not any change in general mental state
4.3 Average endpoint general mental state score
4.4 Average change in general mental state scores
4.5 No clinically important change in specific symptoms
4.6 Not any change in specific symptoms
4.7 Average endpoint specific symptom score*
4.8 Average change in specific symptom scores

5. Leaving the study early

5.1 For specific reasons
5.2 For general reasons

6. General functioning

6.1 No clinically important change in general functioning
6.2 Not any change in general functioning
6.3 Average endpoint general functioning score*
6.4 Average change in general functioning scores
6.5 No clinically important change in specific aspects of functioning, such as social or life skills
6.6 Not any change in specific aspects of functioning, such as social or life skills
6.7 Average endpoint specific aspects of functioning, such as social or life skills*
6.8 Average change in specific aspects of functioning, such as social or life skills

7. Behaviour

7.1 No clinically important change in general behaviour
7.2 Not any change in general behaviour
7.3 Average endpoint general behaviour score
7.4 Average change in general behaviour scores
7.5 No clinically important change in specific aspects of behaviour
7.6 Not any change in specific aspects of behaviour
7.7 Average endpoint specific aspects of behaviour
7.8 Average change in specific aspects of behaviour

8. Adverse effects

8.1 No clinically important general adverse effects
8.2 Not any general adverse effects
8.3 Average endpoint general adverse effect score
8.4 Average change in general adverse effect scores
8.5 No clinically important change in specific adverse effects
8.6 Not any change in specific adverse effects
8.7 Average endpoint specific adverse effects
8.8 Average change in specific adverse effects

9. Engagement with services

9.1 No clinically important engagement
9.2 Not any engagement
9.3 Average endpoint engagement score
9.4 Average change in engagement scores

10. Satisfaction with treatment

10.1 Recipient of care not satisfied with treatment
10.2 Recipient of care average satisfaction score
10.3 Recipient of care average change in satisfaction scores
10.4 Carer not satisfied with treatment
10.5 Carer average satisfaction score
10.6 Carer average change in satisfaction scores

11. Quality of life

11.1 No clinically important change in quality of life
11.2 Not any change in quality of life
11.3 Average endpoint quality of life score
11.4 Average change in quality of life scores
11.5 No clinically important change in specific aspects of quality of life
11.6 Not any change in specific aspects of quality of life
11.7 Average endpoint specific aspects of quality of life
11.8 Average change in specific aspects of quality of life

12. Economic outcomes

12.1 Direct costs
12.2 Indirect costs

Search methods for identification of studies

1. Cochrane Schizophrenia Group Trials Register (December 2010)

We searched the register using the phrase:
[(*musi* or *improvis* in title, abstract, index terms of REFERENCE)] or [(music* in interventions of STUDY)]

This register is compiled by systematic searches of major databases, handsearches and conference proceedings (see Group Module).
The previous version of the review (Gold 2005a) used a slightly different search strategy:
{[* musi* or musi* or * sound* or sound* or * acou* or acou* or gim in title, abstract, index terms of REFERENCE] or [music* in interventions of STUDY]}
However, the search terms sound* and acou* were dropped in this 2011 update as they only appeared to increase the number of false positives and did not help to identify any music therapy trials.

2. Handsearching

We searched the three American music therapy journals (*Journal of Music Therapy*, *Music Therapy* and *Music Therapy Perspectives*) as reissued on CD Rom by the American Music Therapy Association using the search term random* and then manually browsing through the results. The search covered the *Journal of Music Therapy* (1964-1998), *Music Therapy* (1981-1996) and *Music Therapy Perspectives* (1982-1984, 1986-1998).

3. Reference searching

We also inspected the references of all identified studies, included or excluded, for more studies.

4. Personal contact

We contacted the contact authors of relevant reviews or studies to enquire about other sources of relevant information.

5. Review articles

We inspected existing review articles pertinent to the topic of this review (Oerter 2001; Silverman 2003b) for references to any additional studies.

6. Cited reference search (forward search)

We searched ISI Web of Sciencefor articles citing any of the included studies, in order to identify any more recent studies that might have been missed.

Data collection and analysis

We have updated our methods in line with current Cochrane policy. For previous data collection and analysis methods please see Appendix 1. We have now for the most part adhered to the current template as provided by the Cochrane Schizophrenia Group (CSG), but have tried to improve the wording of some sections. Substantial deviations from the template, in line with our protocol and previous review version, are:

- Definite exclusion of therapist-rated scales, rather than vague statement about possible exclusion (Data extraction and management, 2.2);
- Exclusion of skewed data that cannot be transformed, rather than presenting skewed data from studies of less than 200 participants in additional tables (Data extraction and management, 2.4);
- Use of standardised mean differences (SMDs) rather than mean differences (Measures of treatment effect, 2.);
- Subgroups to be analysed (Subgroup analysis and investigation of heterogeneity).

Selection of studies

Review authors XJC, TOH, and KM independently inspected citations from the searches and identified relevant abstracts. Review author XJC first inspected study reports written in Chinese and then translated relevant sections which were re-inspected by CG, TOH and KM to ensure reliability. Where disputes arose, we acquired the full report for more detailed scrutiny. If citations met the inclusion criteria, we obtained full reports of the papers for more detailed inspection. Where it was not possible to resolve disagreement by discussion, we attempted to contact authors of the study for clarification.

Data extraction and management

1. Extraction

Review authors XJC and KM extracted data from all included studies. Any disagreement was discussed and review author CG helped to clarify upcoming problems. We extracted data presented only in graphs and figures whenever possible, but we only included the data if two review authors independently had the same result. We reported all decisions and, if necessary, we contacted the authors of studies through an open-ended request in order to obtain missing information or for clarification. If multi-centre studies had been included, we would have extracted data relevant to each component centre separately where possible.

2.Management

2.1 Forms

We extracted data onto standard, simple forms.

2.2 Scale-derived data

We included continuous data from rating scales only if:
a. the psychometric properties of the measuring instrument have been described in a peer-reviewed journal (Marshall 2000); and
b. the measuring instrument has not been written or modified by one of the trialists for that particular trial.

To be considered in this review, the measuring instrument should either be i. a self-report or ii. completed by an independent rater or relative (not the therapist). We realise that this is not often reported clearly. Therefore, detailed information on this was provided in the Characteristics of included studies section.

2.3 Endpoint versus change data

There are advantages of both endpoint and change data. Change data can remove a component of between-person variability from the analysis. On the other hand, calculation of change needs two assessments (baseline and endpoint) which can be difficult to measure in unstable conditions such as schizophrenia. We decided to primarily use endpoint data, and would have used change data if the former had not been available.

2.4 Skewed data

Continuous data on clinical and social outcomes are often not normally distributed. To avoid the pitfall of applying parametric tests to non-parametric data, we aimed to apply the following standards to all data before inclusion: a) standard deviations (SDs) and means were reported in the paper or were obtainable from the authors; b) when a scale starts from a finite number (such as zero), the SD, when multiplied by two, was less than the mean (as otherwise the mean was unlikely to be an appropriate measure of the centre of the distribution, (Altman 1996); c) if a scale started from a positive value (such as Positive and Negative Symptoms Scale (PANSS) which can have values from 30 to 210), the calculation described above was modified to take the scale starting point into account. In these cases skew was present if 2SD > (S-S min), where S is the mean score and S min is the minimum score. Endpoint scores on scales often have a finite start and endpoint and these rules can be applied. When continuous data are presented on a scale that includes a possibility of negative values (such as change data), it is difficult to tell whether data are skewed or not. When individual patient data were available, we attempted to remove skewness through log-transformation. Where this was not possible, we did not consider skewed data in this review.

2.5 Common measure

To facilitate comparison between trials, we would have converted variables that can be reported in different metrics, such as days in hospital (mean days per year, per week or per month) to a common metric (e.g. mean days per month).

2.6 Conversion of continuous to binary

Where possible, we made efforts to convert outcome measures to dichotomous data. This can be done by identifying cut-off points on rating scales and dividing participants accordingly into 'clinically improved' or 'not clinically improved'. It is generally assumed that if there is a 50% reduction in a scale-derived score such as the Brief Psychiatric Rating Scale (BPRS, Overall 1962) or the PANSS (Kay 1986), this could be considered as a clinically significant response (Leucht 2005; Leucht 2005a). If data based on these thresholds were not available, we used the primary cut-off presented by the original authors.

2.7 Direction of graphs

We entered data in such a way that the area to the left of the line of no effect indicated a favourable outcome for music therapy when the outcome was negative (where 'high' means 'poor'), and reversed for positive outcomes (where 'high' means 'good').

2.8 Summary of findings table

We used the GRADE approach to interpret findings (Schünemann 2008). A 'Summary of findings' table was created by using the GRADE profiler (www.ims.cochrane.org/revman/gradepro) into which data were imported from RevMan 5 (www.ims.cochrane.org/revman). This table provides outcome-specific information concerning the overall quality of evidence from each included study and the magnitude of effect of the interventions examined. Available data on those outcomes that we rated as most important regarding patient-care and decision making are presented in this table. We selected the following main outcomes for inclusion in the Summary of findings for the main comparison.

1. Mental state: negative symptoms and general (PANSS/BPRS).
2. Functioning: social and general Global Assessment of Functioning (GAF).
3. Global state: no clinically important overall improvement.
4. Quality of Life

Assessment of risk of bias in included studies

Again, XJC and KM independently assessed the risk of bias for evaluating trial quality by using criteria described in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011). This set of criteria is based on evidence of associations between overestimate of effect and high risk of bias of the article such as sequence generation, allocation concealment, blinding, incomplete outcome data, and selective reporting. If the raters disagreed, we made the final rating by consensus with the involvement of CG. Where inadequate details of randomisation and other characteristics of trials were provided, we contacted the authors of the studies in order to obtain further information. We reported non-concurrence in quality assessment, but if disputes arose as to which category a trial was to be allocated, again, we resolved this by discussion. We noted the level of risk of bias in both the text of the review and in the Summary of findings for the main comparison.

Measures of treatment effect

1. Binary data

For binary outcomes, we calculated a standard estimation of the fixed-effect risk ratio (RR) and its 95% confidence interval (CI). We also calculated the number needed to treat (NNT) statistic. It has been shown that RR is more intuitive (Boissel 1999) than odds ratios and that odds ratios tend to be interpreted as RR by clinicians (Deeks 2000). For statistically significant results, we calculated the NNT to provide benefit/to induce harm statistic (NNTB/H), and its 95% CI taking account of the event rate in the control group.

2. Continuous data

For continuous outcomes, we estimated SMD between groups. As standardised measures of effect size these are often more readily interpretable than mean differences on the original scale, particularly when the scale is not universally well-known (Cohen 1988; Gold 2004). However, we also transformed the effect size back to the units of one or more of the specific instruments to further aid interpretation and to ensure comparability across schizophrenia reviews.

Unit of analysis issues

1. Cluster trials

Studies may employ 'cluster randomisation' (such as randomisation by clinician or practice) but analysis and pooling of clustered data poses problems: Authors often fail to account for intra-class correlation in clustered studies, leading to a 'unit of analysis' error (Divine 1992) where P values are spuriously low, CIs unduly narrow and statistical significance overestimated causing type I errors (Bland 1997; Gulliford 1999).

Although no cluster trials were identified for this review, the planned procedure for analysis would have been as follows. Where clustering was not accounted for in primary studies, we would have presented the data in a table, with an (*) symbol to indicate the presence of a probable unit of analysis error. We would have attempted to contact the first authors of studies to seek intra-class correlation coefficients (ICC) of their clustered data and to adjust for this using accepted methods (Gulliford 1999). If the intra-class correlation was not available, we would have used an external estimate from similar studies (Higgins 2008). Where clustering had been incorporated into the analysis of primary studies, we presented these data as if from a non-cluster randomised study, but adjusted for the clustering effect.

We have sought statistical advice and have been advised that the binary data as presented in a report should be divided by a 'design effect'. This was calculated using the mean number of participants per cluster (m) and the (ICC) [Design effect=1+(m-1)*ICC] (Donner 2002). If the ICC was not reported it was assumed to be 0.1 (Ukoumunne 1999).

If cluster studies had been appropriately analysed taking into account ICCs and relevant data documented in the report, synthesis with other studies would have been possible using the generic inverse variance technique.

2. Cross-over trials

A major concern of cross-over trials is the carry-over effect. It occurs if an effect (e.g. pharmacological, physiological or psychological) of the treatment in the first phase is carried over to the second phase. As a consequence, on entry to the second phase the participants can differ systematically from their initial state despite a wash-out phase. For the same reason cross-over trials are not appropriate if the condition of interest is unstable (Elbourne 2002). As both effects are very likely in severe mental illness, we only used data from the first phase of cross-over studies.

3. Studies with multiple treatment groups

Where a study involved more than two treatment arms, if relevant, we presented the additional treatment arms in comparisons. If data were binary, we simply added and combined the data within the two-by-two table. If data were continuous, we combined data following the formula in section 7.7.3.8 (Combining groups) of the *Cochrane Handbook for Systematic Reviews of Interventions*. Where the additional treatment arms were not relevant, we did not reproduce these data.

Dealing with missing data

1. Overall loss of credibility

At some degree of loss of follow-up, data must lose credibility (Xia 2009). We excluded data from studies where more than 30% of participants in any group were lost to follow-up (this did not include the outcome of 'leaving the study early'). If, however, more than 30% of those in one arm of a study were lost, but the total loss was less than 30%, we marked such data with (*) to indicate that such a result may well be prone to bias.

2. Binary

In the case where attrition for a binary outcome was between 0% and 30% and where these data were not clearly described, we presented data on a 'once-randomised-always-analyse' basis (an intention-to-treat analysis). In studies with less than 30% dropout rate, people leaving early were considered to have had the negative outcome for dichotomous outcomes, except for the event of death and adverse effects. For these outcomes, the rate of those who stayed in the study - in that particular arm of the trial - would

have been used for those who did not. We analysed the impact of including studies with high attrition rates (20% to 30%) in a sensitivity analysis. If inclusion of data from this latter group did result in a substantive change in the estimate of effect, we did not add these data to trials with less attrition but presented them separately.

3. Continuous

3.1 Attrition

In the case where attrition for a continuous outcome was between 0% and 30% and completer-only data were reported, we reproduced these.

3.2 Standard deviations

If SDs were not reported in the original studies, we would have tried to obtain the missing values from the authors. In cases where measures of variance for continuous data were missing, but an exact standard error (SE) and CIs were available for group means and either P or t values were available for differences in mean, we would have made calculations according to the rules described in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011): When only the SE is reported, SDs are calculated by the formula SD = SE * square root (n).Chapters 7.7.3 and 16.1.3 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011) present detailed formulas for estimating SDs from P values, t or F values, CIs, ranges or other statistics. If these formulas did not apply, we calculated the SDs according to a validated imputation method which is based on the SDs of the other included studies (Furukawa 2006). Although some of these imputation strategies can introduce error, the alternative would be to exclude a given study's outcome and thus to lose information. We nevertheless would have examined the validity of the imputations in a sensitivity analysis excluding imputed values.

3.3 Last observation carried forward

We anticipated that in some studies the method of last observation carried forward (LOCF) would be employed within the study report. As with all methods of imputation to deal with missing data, LOCF introduces uncertainty about the reliability of the results (Leucht 2007). Therefore, where LOCF data had been used in the trial, if less than 30% of the data had been assumed, we would have reproduced these data and indicated that they were the product of LOCF assumptions.

Assessment of heterogeneity

1. Clinical heterogeneity

We considered all included studies initially, without seeing comparison data, to judge clinical heterogeneity. We simply inspected all studies for outlying people or situations which we had not predicted would arise. When such situations or participant groups arose, we discussed them fully.

2. Methodological heterogeneity

We considered all included studies initially, without seeing comparison data, to judge methodological heterogeneity. We simply inspected all studies for clearly outlying methods which we had not predicted would arise. When such methodological outliers arose, we discussed them fully.

3. Statistical heterogeneity

3.1. Visual inspection

We visually inspected graphs to investigate the possibility of statistical heterogeneity.

3.2 Employing the I^2 statistic

We supplemented the visual inspection primarily by employing the I^2 statistic alongside the Chi^2 P value. This provides an estimate of the percentage of inconsistency thought to be due to chance (Higgins 2003). The importance of the observed value of I^2 depends on i. magnitude and direction of effects and ii. strength of evidence for heterogeneity (e.g. a P value from Chi^2 test, or a CI for I^2). We interpreted an I^2 estimate greater than or equal to around 50% accompanied by a statistically significant Chi^2 statistic as evidence of substantial levels of heterogeneity (Higgins 2011). When substantial levels of heterogeneity were found in the primary outcome, we explored reasons for heterogeneity (Subgroup analysis and investigation of heterogeneity).

Assessment of reporting biases

We entered data from all included studies into a funnel graph (trial effect against trial size) in an attempt to investigate the likelihood of overt publication bias (Davey 1997). Reporting biases arise when the dissemination of research findings is influenced by the nature and direction of results (Egger 1997). These are described in Section 10 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011). We are aware that funnel plots may be useful in investigating reporting biases but are of limited power to detect small study effects. We did not use funnel plots for outcomes where there were 10 or fewer studies, or where all studies were of similar sizes. In other cases, where funnel plots were possible, we would have sought statistical advice in their interpretation.

Data synthesis

We understand that there is no closed argument for preference for use of fixed-effect or random-effects models. The random-effects method incorporates an assumption that the different studies are estimating different, yet related, intervention effects. This often seems to be true to us and the random-effects model takes into account differences between studies even if there is no statistically significant heterogeneity. There is, however, a disadvantage to the random-effects model. It puts added weight onto small studies which often are the most biased ones. Depending on the direction of effect, these studies can either inflate or deflate the effect size. We chose fixed-effect model for all analyses. The reader is, however, able to choose to inspect the data using the random-effects model.

Subgroup analysis and investigation of heterogeneity

1. Subgroups

We anticipated no subgroup analyses.

2. Investigation of heterogeneity

If we found heterogeneity (see under Assessment of heterogeneity), we examined the following possible sources of heterogeneity:

- treatment 'dosage' (20 sessions or more versus less than 20 sessions); and
- treatment approach (quality of music therapy method and training).

Sensitivity analysis

We planned to investigate the effect of including studies with high attrition rates on the primary outcomes, but no such studies were identified in this review. We did however, compare the results when we included our assumptions regarding those lost to follow-up (see Dealing with missing data) with 'completer only' analyses.

RESULTS

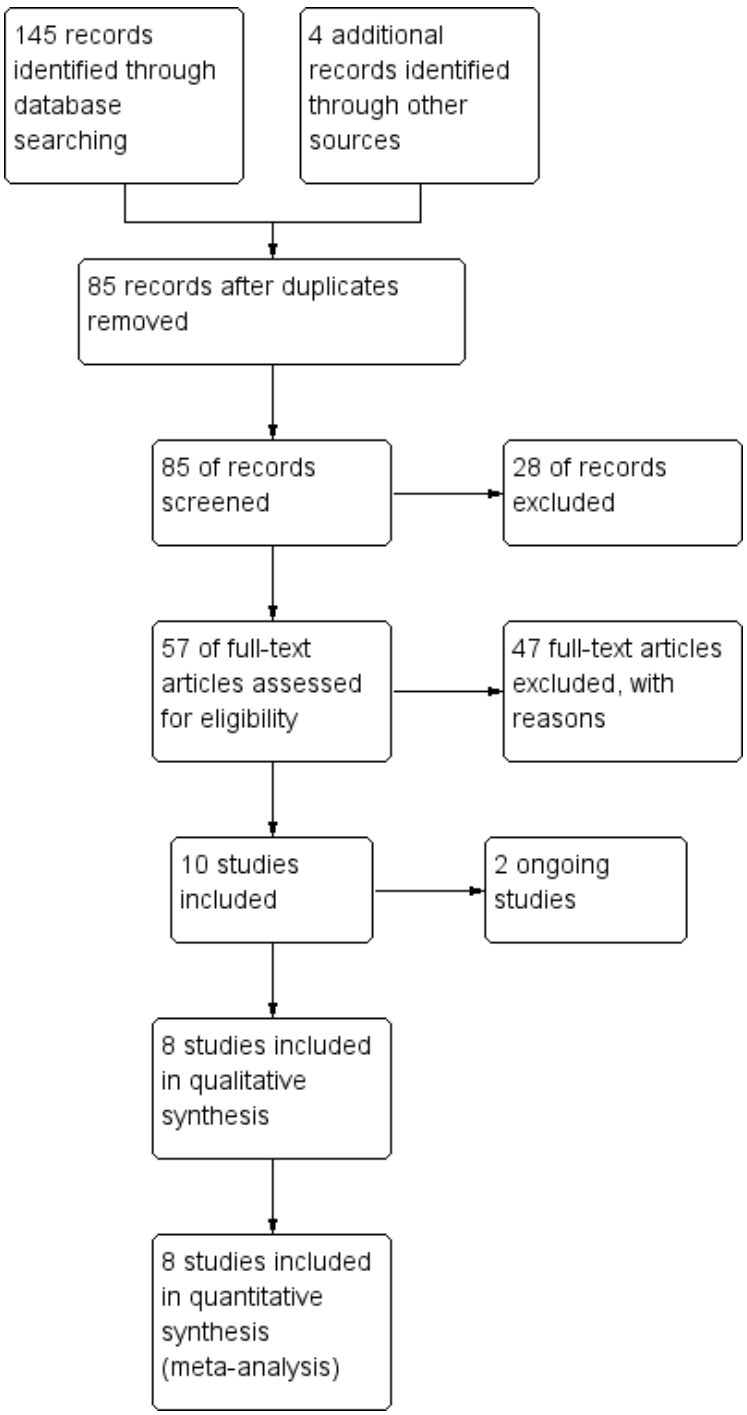
Description of studies

See: Characteristics of included studies; Characteristics of excluded studies; Characteristics of ongoing studies.

Results of the search

The original search identified 34 potentially relevant studies (Gold 2005a). Updated searches in 2008 and 2010 yielded 97 references (from 81 studies), and 18 references (from 18 studies), respectively. After excluding duplicates and clearly irrelevant references, we inspected 85 studies closely for possible inclusion. We included eight studies and excluded 75 studies. Two studies were classified as ongoing studies (Figure 1).

Figure 1. Study flow diagram (all searches)



Included studies

We included eight studies that compared music therapy added to standard care with standard care alone (Ceccato 2009; He 2005; Li 2007; Talwar 2006; Tang 1994; Ulrich 2007; Wen 2005; Yang 1998). The characteristics of these studies are described below (see also Additional tables 'Music therapeutic approach' and Characteristics of included studies).

1. Length of trials

The duration of studies varied from one to four months. Five studies examined the short-term effects of music therapy over about one to one-and-a-half months (He 2005; Li 2007; Tang 1994; Ulrich 2007; Wen 2005). The three other trials investigated medium-term effects over three to four months (Ceccato 2009; Talwar 2006; Yang 1998). No later follow-up assessments over a longer term were included in any of the studies.

2. Participants

All studies included adults with schizophrenia or related psychoses. The included studies differed somewhat with respect to diagnostic heterogeneity. Two studies included people with schizophrenia as well as people with related psychoses (Talwar 2006; Ulrich 2007). The other six trials were more restrictive, allowing only schizophrenia (Ceccato 2009; Li 2007; Wen 2005) or only a certain subtype of schizophrenia (chronic, Yang 1998); residual, Tang 1994; type II, He 2005). People with acute positive symptoms were also excluded by Ulrich 2007. Diagnosis was based on three different psychiatric classification systems primarily used in the Western world (International Classification of Diseases (ICD), Diagnostic and Statistical Manual of Mental Disorders (DSM)) and China (Chinese Classification of Mental Disorders (CCMD)). The CCMD is similar in categorisation and structure to the ICD and DSM in terms of most diagnostic items, though acknowledging cultural-related differences (Lee 2001). ICD-10 was used in Ceccato 2009 and Talwar 2006, and Ulrich 2007 and Tang 1994 referred to the DSM-III-R. The CCMD-2 was used in Yang 1998 and the current third version of the CCMD was used as classification system in He 2005, Li 2007, and Wen 2005.

History of disorder was reported in only two studies (He 2005: around nine years; Yang 1998: range two to 26 years).

3. Setting

Most studies concerned inpatients (He 2005; Li 2007; Talwar 2006; Tang 1994; Ulrich 2007; Wen 2005). Ceccato 2009, however, included both in- and outpatients.

4. Study size

There were six studies with a sample size between 60 and 81 (Ceccato 2009; He 2005; Li 2007; Talwar 2006; Tang 1994; Yang 1998) and two smaller trials (Ulrich 2007, n = 37; Wen 2005, n = 30).

5. Interventions

5.1 Setting

All studies compared music therapy added to standard care with standard care alone. The setting of music therapy varied from individual (Talwar 2006) to large group therapy (Ceccato 2009; He 2005; Li 2007; Tang 1994; Ulrich 2007; Wen 2005). Yang 1998 used a combination of group and individual settings.

Music therapy varied according to the use of active and receptive methods, level of structure, focus of discussions and verbal reflection. In four studies the content of music therapy included receptive working modalities (listening to music) (Ceccato 2009; He 2005; Li 2007; Wen 2005). Two trials included exclusively active music making (improvisation, singing) (Talwar 2006; Ulrich 2007), and the last two made use of both active and receptive ingredients (Tang 1994; Yang 1998). For all trials, except for Ceccato 2009, the musical experiences were accompanied by a discussion or verbal reflection of therapy contents. Musical improvisation seemed most central in Talwar 2006 and somewhat less so in Ulrich 2007 and Yang 1998 (Table 1). Listening to music seemed to be most predominant in He 2005, Li 2007, Tang 1994, Wen 2005, and Ceccato 2009, and of somewhat less of importance in Yang 1998. All studies used active music-making, and musical improvisation was explicitly mentioned in all but Tang 1994. Receptive techniques seemed most predominant in Tang 1994, somewhat less so in Yang 1998, and of marginal importance in the two other studies. The focus of discussions and level of structure varied between patients, depending on their ability level (explicitly mentioned in Ulrich 2007). Those two studies using exclusively active music making referred to a process-oriented approach, whereas Ceccato 2009 offered a relatively fixed session structure. For the five remaining studies (He 2005; Li 2007; Tang 1994; Wen 2005; Yang 1998) the level of structure was not explained explicitly, but according to the described working modalities a more structured session process can be assumed. In summary, there was variation in music therapy methods but overall, all were within the accepted range. There was more worrisome variation in music therapy training (Table 1; see also below: Other potential sources of bias).

The number of sessions per week varied greatly from one (Talwar 2006) to six (Yang 1998). There was less variation in the total duration of therapy (from one to four months). The total number

of sessions received was reported explicitly in only two studies (Ulrich 2007, 7.5 sessions, Tang 1994, 19 sessions). Sixteen sessions were offered in Ceccato 2009 and 12 in Talwar 2006. For the other studies, we calculated the maximum possible number of sessions from session frequency and duration: He 2005, Li 2007, and Wen 2005: 30 sessions (five weekly over six weeks), Yang 1998: 78 sessions (six weekly over three months). The actual number of sessions received, however, could have been less: Talwar 2006 reported that only 58% of all participants received more than eight sessions. According to the a priori criteria for this review, four of these studies can be classified as low 'dosage' (less than 20 sessions) of music therapy and four studies as high 'dosage' (20 or more sessions). Additionally, five of these studies can be classified as short-term music therapy (up to 12 weeks) (He 2005; Li 2007; Ulrich 2007; Tang 1994; Wen 2005) and three studies as medium-term music therapy (13 to 26 weeks) (Ceccato 2009; Talwar 2006; Yang 1998).

6. Outcomes

This section describes the outcomes used in the included studies, categorised according to the list of relevant outcomes in the Methods section.

6.1 Global state

Global overall improvement, as judged by independent assessors, was rated as 'remission', 'marked improvement', 'some improvement', or 'no change' (Yang 1998).

6.2 Mental state

6.2.1 General mental state

a. Positive and Negative Symptoms Scale - PANSS (Kay 1987)
The PANSS scale was designed to address severity of psychopathology in patients with psychotic disorders. It consists of 30 items which belong to three subscales: positive symptoms, negative symptoms, and general psychopathology. Ratings are based on a clinical interview and additional information from caregivers or family members and clinical material. Each item is scored on a seven-point Likert scale.
b. Brief Psychiatric Rating Scale - BPRS (Overall 1988)
The BPRS scale is a clinician-rated tool designed to address severity of psychopathology in patients with psychotic disorders as well as those with severe mood disorders. The 18 items of the scale include common psychotic symptoms as well as mood disturbances. The scale is administered by an experienced clinician based on a clinical interview and observation of the patient. The items are scored on a seven-point Likert scale.

6.2.2 Negative symptoms

a. Scale for the Assessment of Negative Symptoms - SANS (Andreasen 1982)
The SANS is a clinician-rated instrument used to rate the presence and severity of negative symptoms, including affective flattening and blunting, alogia, avolition-apathy, anhedonia-associality, and attentional impairment. It consists of 20 items which are rated by trained raters using a clinical interview and additional collateral information from clinical material and family or caregivers. The items are scored using a six-point Likert scale.

6.2.3 Other specific aspects of mental state

a. Self-Rating Depression Scale - SDS (Zhang 2003)
The SDS scale is a self-report instrument designed to measure levels of depression. It consists of 20 items each of which is scored on a four-point Likert scale.
b. Hamilton Depression Scale - Ham-D (Hamilton 1960; Hamilton 2000)
The Ham-D scale is a questionnaire for clinicians designed to assess the severity of a patient's major depression.
c. Self-Rating Anxiety Scale - SAS (Zhang 2003)The SAS scale is a self-report instrument designed to measure anxiety-associated symptoms. It consists of 20 items each of which is scored on a four-point Likert scale.

6.3 Leaving the study early

This outcome was available in all studies, but events occurred only in two of the longer studies (Talwar 2006; Yang 1998).

6.4 Functioning

6.4.1 General functioning

a. Global Assessment of Functioning - GAF (Spitzer 2000)
The GAF scale is a clinician-rated scale to rate global functioning on a continuum of mental health to mental disorder. It consists of a single item ranging from one to 100 with anchor points. It is usually rated on the basis of a clinical interview.

6.4.2 Social functioning

a. Social Disability Schedule for Inpatients -SDSI
The SDSI is a psychiatrist-rated scale used to rate levels of social functioning on the basis of a semi-structured clinical interview.

6.4.3 Cognitive functioning

a. Paced Auditory Serial Addition Task - PASAT (Gronwall 1977; Tombaugh 2006)
The PASAT scale is a computerised serial-addition task used to assess rate of information, processing, sustained attention, and working memory. Responses are recorded by a blinded assessor.
b. Conners Continuous Performance Task - CCPT (Rosvold 1956)
The CCPT is a computerised neurophysiological test assessing attention disorders and neurological functioning. Response patterns indicate, for example, inattentiveness or impulsivity, activation and arousal problems, or difficulties in maintaining vigilance.
c. Wechsler Memory Scale - WMS (Saggino 1983)
The WMS is a neurophysiological test assessing various memory functions including five index scores: auditory memory, visual memory, visual working memory, immediate memory, and delayed memory.
d. Berg's Card Sorting Test - BCST (Berg 1948; Nelson 1976)
The BCST is a neurophysiological test assessing executive functions of the brain responsible for, among others, planning, cognitive flexibility, abstract thinking, or initiating appropriate actions and inhibiting inappropriate actions.

6.5 Quality of life

a. Skalen zur psychischen Gesundheit - SPG (Tönnies 1996)
The SPG scale is a self-report instrument designed to address quality of life. It consists of 76 items each of which is scored on a four-point Likert scale.

6.6 Other outcomes

6.6.1 Behaviour

a. Nurses' Observation Scale for Inpatient Evaluation - NOSIE (Honigfeld 1965)
The NOSIE scale is an assessment instrument for nurses designed to assess behaviour of patients on an inpatient unit. It consists of 30 items measuring various aspects of positive behaviour (social competence, personal neatness) and negative behaviour (e.g. irritability, manifest psychosis, depression, retardation). Items are scored on a five-point Likert scale.

6.6.2 Patient satisfaction with care

a. Client Satisfaction Questionnaire - CSQ (Atkinson 1994)
The CSQ is a self-report instrument designed to measure patients' satisfaction with care. It consists of eight items which are scored on four-point Likert scale.

6.7 Missing outcomes

In addition to symptom and functioning scales, mainly represented here, it will be important to include more "positive" outcomes such as quality of life or music-related outcomes in future studies. Such outcomes might play an important role from a client perspective. Furthermore, studies focusing on cost-effectiveness will be a next step when investigating music therapy.

Excluded studies

We excluded 33 studies because they were not randomised (14 CCTs, 15 case series, four single case studies). We excluded a further 35 studies because the intervention was not music therapy. Twenty studies investigated another type of therapy, e.g. art therapy, movement therapy, psychotherapy, a treatment package, or medication. Fifteen studies investigated the effects of music interventions that did not meet the definition of music therapy (e.g. music listening alone or Karaoke singing). We excluded three studies because information needed could not be retrieved from the authors. Two studies compared music therapy with another type of therapy and we therefore, excluded them. No adequate outcome data were reported for two studies which led to exclusion (see Characteristics of excluded studies).

Awaiting assessment

There are no studies awaiting assessment.

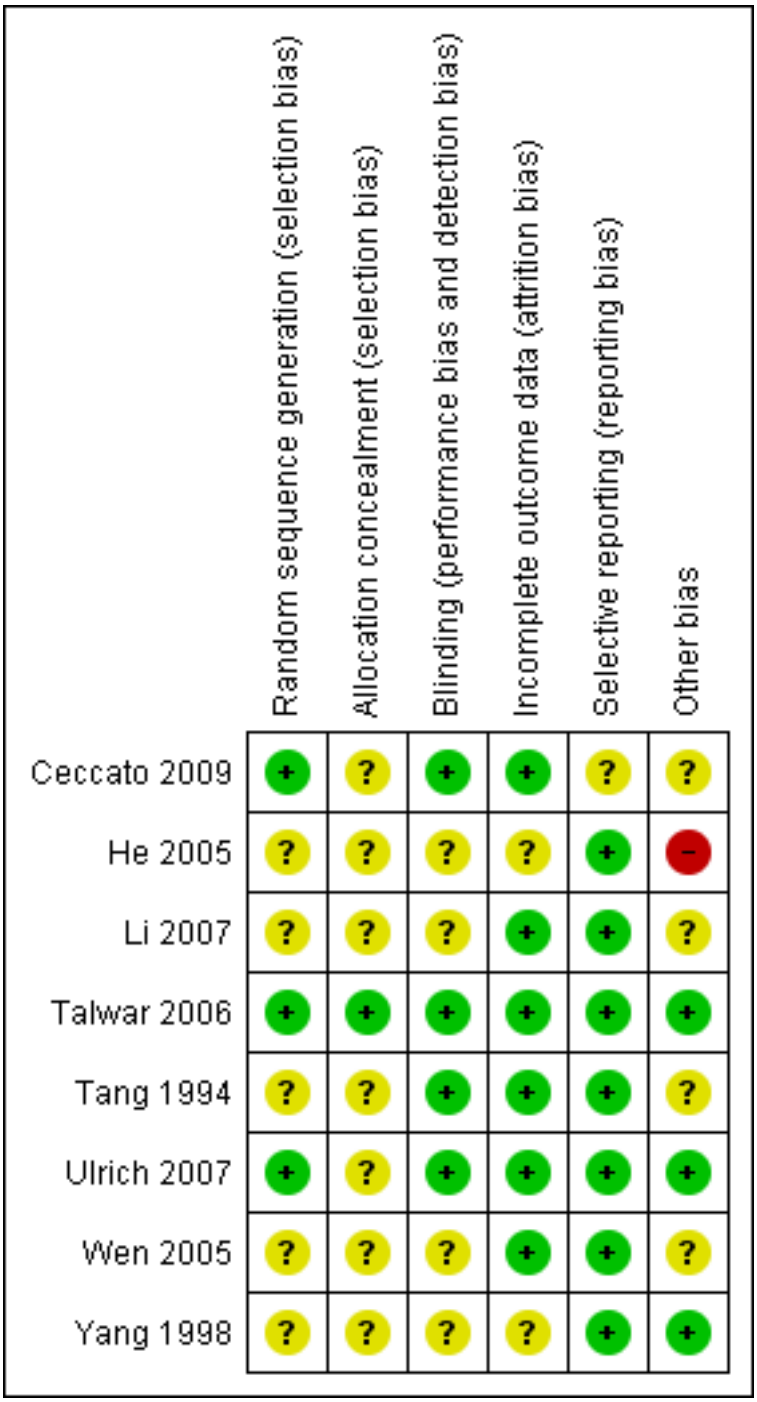
Ongoing

We identified two ongoing studies. These compared music therapy with standard care, will involve 300 people and should report by 2012 (see Characteristics of ongoing studies).

Risk of bias in included studies

For graphic overview please see Figure 2.

Figure 2. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.



Allocation

While all studies stated that participants were randomly assigned, only Talwar 2006 described that randomisation was concealed (remote randomisation using a central telephone). In the other studies it was unclear whether randomisation was really concealed.

Blinding

Four studies were explicitly single-blind, using blinded assessment (Ceccato 2009; Talwar 2006; Tang 1994; Ulrich 2007). For the other four it was unclear whether the persons conducting the assessments were blinded to treatment provision (He 2005; Li 2007; Wen 2005; Yang 1998). Two studies tested the success of blinding. Ulrich 2007 tested whether assessors were aware of the study aim and found that they were not aware that the aim of the study had to do with music therapy. Talwar 2006 asked assessors to guess which group the participants were assigned to and identified that they guessed correctly in more than 50% of the cases. However, as this would always be the case when an experimental treatment is effective, this cannot be taken as an indication of unsuccessful blinding (Higgins 2008).

Incomplete outcome data

Seven studies had low or even no drop-out rates (Ceccato 2009, 0%; Li 2007, 0%; Talwar 2006, 15%; Tang 1994, 0%; Ulrich 2007, 0%; Wen 2005, 0%; Yang 1998, 3%). In Ulrich 2007, rates of missing data (i.e. participants who were followed up but where outcome data were incomplete) varied from 8% to 19% for the different outcome variables. The other studies had complete data for all cases that were followed up. For He 2005, the drop-out rate was not reported. According to the setting (only inpatients) and apparent reporting standards in the Chinese trials (drop-out rates were usually reported if there were any), we assumed that all participants had completed the trial. All analyses were conducted on an intention-to-treat basis.

Selective reporting

All studies reported means and SDs of both groups before and after treatment. We performed log transformation to remove skewness when this was present (as was the case with one outcome - negative symptoms - in Ulrich 2007). We considered all outcomes for all studies in the analyses.

Other potential sources of bias

1. Co-intervention (treatment contamination)

For all studies, medication was reported as standard care. Tang 1994 reported a higher drop of medication level in the music therapy group than in the control group, but no significant difference at follow-up. The other studies reported no significant differences in medication level. Standard care available to all participants included other therapies and activities (e.g. supportive counselling, occupational, social activities) (Ceccato 2009; Li 2007; Talwar 2006; Ulrich 2007).

2. Adequate music therapy method and training

The quality of the music therapy methods applied was satisfactory in all studies, and level of music therapy training in four (Table 1). According to the given definition of music therapy, both musical experiences and relationships developing through them could be identified as working mechanisms within these studies, although the level of intensity of the client-therapist relationship might have varied between them. For example, Ceccato 2009 used a highly structured approach but therapists were nevertheless also instructed to "pay attention to relational atmosphere".

Adequately trained music therapists were used in Ceccato 2009, Talwar 2006, Ulrich 2007, and Yang 1998. In the first three studies, it was stated that music therapy was conducted by "qualified music therapists". This statement was underlined by referring to quality standards in music therapy (Ulrich 2007) or approved training courses (Talwar 2006). In Ceccato 2009, personal communication with the authors clarified the level of training. Yang 1998 was conducted by a well-known Chinese music therapist, which implies that the music therapists collaborating on this study were trained adequately. In the remaining four studies, the level of training was unclear. For example, music therapy was conducted by nurses and psychiatrists who had attended a minimal music therapy training course (Tang 1994) "musicians who were employed full-time as music therapists" (He 2005), or nurses and psychiatrists whose level of training was unclear (Li 2007; Wen 2005).

Effects of interventions

See: **Summary of findings for the main comparison** MUSIC THERAPY versus STANDARD CARE for people with schizophrenia and schizophrenia-like disorders

The eight included studies were al included in a meta-analysis. Outcomes are presented in the order specified in the methods section as well as in terms of their relevance to music therapy and music therapy patients. All outcomes were short- to medium-term (one to four months), and all comparisons concerned music therapy in addition to standard care versus standard care. When heterogeneity was present, we first attempted to explain this via the 'dosage' (less than 20 versus 20 or more sessions). Secondly,

we also considered the adequacy of the music therapy, excluding studies where untrained therapists applied only receptive methods (He 2005; Li 2007; Wen 2005), see Table 1.

COMPARISON 1: MUSIC THERAPY versus STANDARD CARE

1. Global state

Global state (no clinically important overall improvement) was addressed as a dichotomous outcome in only Yang 1998. The results showed a significant effect favouring music therapy, suggesting that clinically important overall improvement was more likely to occur than with standard care alone (1 RCT, n = 72, RR 0.10 95% CI 0.03 to 0.31, NNT 2 95% CI 1 to 2). This effect was not changed in a sensitivity analysis where only completer data were used.

2. Mental state

Mental state was measured using six continuous scales. These included endpoint scores of general mental state (PANSS and BRPS) as well as a specific endpoint score for negative symptoms of schizophrenia (SANS), depression (SDS, Ham-D) and anxiety (SAS).

2.1 General mental state

Average endpoint general mental state scores using PANSS (high score = poor) were used in one study with 'low-dose' music therapy (12 sessions, Talwar 2006). These showed no significant effect (1 RCT, n = 69, SMD -0.36 95% CI -0.85 to 0.12). BPRS scores (high score = poor) were used in two studies with 'high-dose' music therapy (78 sessions, Yang 1998; 30 sessions, Wen 2005). The overall effect was significant in favour of music therapy (2 RCTs, n = 100, SMD -0.73 95% CI -1.16 to -0.31), but with significant heterogeneity between studies (P = 0.0008, I^2 = 91%; Analysis 1.3). The one study showing no effect (Wen 2005) involved untrained therapists applying only receptive methods, whereas the study that showed an effect used appropriate music therapy methods and training.

2.2 Negative symptoms

Average endpoint scores of negative symptoms (SANS, high score = poor) were available from two 'low-dose' (Tang 1994; Ulrich 2007) and two 'high-dose' studies (He 2005; Yang 1998). As described above, the data from Ulrich 2007 were log-transformed to remove skew. The overall effect was significant in favour of music therapy (4 RCTs, n = 240, SMD -0.74 95% CI -1.00 to -0.47), and heterogeneity between studies was not significant (P = 0.09, I^2 = 53%; Analysis 1.4). 'High-dose' music therapy tended to have a larger effect than 'low-dose' music therapy (SMD -0.97 versus -0.60). Within the 'high-dose' category, less well-defined music therapy (untrained music therapists applying only receptive methods; He 2005) tended to have a smaller effect than well-defined music therapy (Yang 1998).

2.3 Other specific aspects of mental state

Depression and anxiety were assessed in studies of less well-defined music therapy. Average endpoint scores of depression (SDS, high score = poor) were measured in two studies (Li 2007; Wen 2005). These 'high-dose' studies showed an overall significant effect in favour of music therapy (2 RCTs, n = 90, SMD -0.63 95% CI -1.06 to -0.21). Heterogeneity between studies was not significant (P = 0.73, I^2 = 0%). One of the same studies (Wen 2005) also used average endpoint depression scores using another scale (Ham-D, high score = poor). The effect size from this scale was comparable but did not become statistically significant from this small study alone (1 RCT, n = 30, SMD -0.52 95% CI -1.25 to -0.21). Average endpoint scores of anxiety (SAS, high score = poor) were available from one study (Li 2007), yielding a significant effect in favour of music therapy (1 RCT, n = 60, SMD -0.61 95% CI -1.13 to -0.09).

3. Leaving the study early

Data on leaving the study early were available for all eight studies but events occurred only in two (Talwar 2006; Yang 1998). There were no significant differences on this outcome (8 RCTs, n = 493, RR 1.03 95% CI 0.38 to 2.78).

4. Functioning

4.1 General functioning

General functioning was measured in one study of well-defined music therapy (12 sessions, Talwar 2006) using GAF scores (high score=good). This 'low-dose' study did not show a significant effect (1 RCT, n = 69, SMD -0.05 95% CI -0.53 to 0.43).

4.2 Social functioning

Average endpoint scores of social functioning (SDSI, high score = poor) was used in a 'high-dose' study of well-defined music therapy (78 sessions, Yang 1998) and showed a significant effect favouring music therapy (1 RCT, n = 70, SMD -0.78 95% CI -1.27 to -0.28).

4.3 Cognitive functioning

Various aspects of cognitive functioning were addressed in one 'low-dose' study (16 sessions, Ceccato 2009) of well-defined music therapy. Scales were used measuring neurophysiological endpoints of attention, vigilance, memory, and abstract thinking. Average endpoint scores of attention (PASAT, high score = good) showed an overall significant effect favouring music therapy (1 RCT, n = 67, SMD 0.72, 95% CI 0.22 to 1.21, P = 0.005). CCPT scores measuring vigilance and attention (high score = good) did not show a significant effect (SMD 0.25, 95% CI -0.23 to 0.74). Similarly, no significant effects could be found for the average endpoint scores of memory (WMS, high score = good) (SMD 0.43, 95% CI -0.06 to 0.92) and the average endpoint scores of abstract thinking (BCST, high score = good) (SMD 0.09, 95% CI -0.39 to 0.58).

5. Quality of life

Average endpoint scores of quality of life (SPG, high score = good) were available from one study of well-defined music therapy (7.5 sessions, Ulrich 2007). This 'low-dose' study did not show a significant effect (1 RCT, n = 31, SMD 0.05 95% CI -0.66 to 0.75).

6. Other Outcomes

6.1 Behaviour

Average endpoint scores of positive and negative behaviour (NOSIE, high score = poor) were used in one 'high-dose' study of less well-defined music therapy (30 sessions, Li 2007). A significant effect favouring music therapy was found both for positive behaviour (1 RCT, n = 60, SMD -1.24 95% CI -1.79 to -0.68) and negative behaviour (SMD -2.22 95% CI -2.87 to -1.57).

6.2 Patient satisfaction with care

Patient satisfaction with care was assessed using CSQ scores (high score = good) in one 'low-dose' study (12 sessions, Talwar 2006) of well-defined music therapy. No significant effect was found (1 RCT, n = 69, SMD 0.32 95% CI -0.16 to 0.80).

DISCUSSION

Summary of main results

COMPARISON 1: MUSIC THERAPY versus STANDARD CARE

1. Global state

Although there are data from only one study, these results suggest that music therapy has a strong effect on global state. The number to treat is small (total n = 72, NNT 2, 95% CI 1 to 2). These results come from one small 'high-dose' study where many sessions were provided, and so it is unclear whether a smaller number of sessions would also have such an effect. This is an important result that should be replicated.

2. Mental state

Mental state was measured considering symptom scores of general mental state (PANSS, BPRS), negative symptoms (SANS), depression (SDS and Ham-D) and anxiety (SAS). Significant results were found on four of the six scales. According to Cohen's guidelines (Cohen 1988), music therapy showed moderate to large effects on general mental state, negative symptoms, depression, and anxiety. Differences between the results mainly seemed to reflect differences in the number of sessions but might also indicate differences in the quality of the music therapy applied (music therapy method and training). 'High-dose' music therapy providing more than 20 sessions showed significant effects on all mental state scores but two. In these cases tendencies could be found that 'high-dose' studies offering less-well defined music therapy (untrained music therapist applying only receptive techniques) seemed to have considerably smaller or even no effects. However, the comparatively small sample size in Wen 2005 might have also contributed to the non-significant effects in this 'high-dose' study.

The overall effects of 'low-dose' music therapy with less than 20 sessions remained somewhat unclear. For these 'low-dose' interventions, effects on general mental state were non-significant, whereas negative symptoms of schizophrenia showed a significant response. This is in line with another review that suggests that at a medium effect on negative symptoms can only be expected after at least 16 sessions (Gold 2009). Negative symptoms are related to affective flattening and bluntness, poor social interaction and a general lack of interest. Music as a medium of therapy may address specifically issues related to emotion and interaction, and therefore it appears plausible that music therapy may be particularly well-suited to the treatment of negative symptoms.

When expressed in standardised mean differences (Cohen's d), the effect of the 'high-dose' music therapy on the BPRS was 1.25, which corresponds to a difference of 10 points on the raw scale. The combined effect of music therapy on the SANS scale was 0.74 in Cohen's d. This corresponds to about 15 points on the raw scale. These effects are large compared to, for example, those of cognitive behaviour therapy (Jones 2004) and would also be considered large using general guidelines for the interpretation of intervention effects in the social sciences (Cohen 1988; Gold 2004).

3. Leaving the study early

There were no differences concerning the outcome of leaving the study early. Both treatment conditions seemed to be well tolerated - only about 5% of people left either group.

4. Functioning

Functioning was measured in terms of three different aspects: general, social and cognitive functioning.
Effects on general functioning, including aspects of psychological, occupational and social functioning, were not significant for 'low-dose' music therapy, whereas a significant effect could be found for 'high-dose' music therapy when exclusively examining social functioning.The magnitude of the effect on social functioning was in the large range (SMD = 0.78) using Cohen's guidelines (Cohen 1988). Again, differences seemed to reflect the number of therapy sessions. However, the significant finding for social functioning may be more specific to the aspects of social interaction especially addressed in music therapy.
No significant effects could be found on cognitive functions for 'low-dose' music therapy, except for the average endpoint of attention measured by PASAT scores. Data were too sparse to make any further conclusions.

5. Quality of life

Quality of life was addressed in one 'low-dose' study without showing a significant effect. Data were too sparse to make any conclusions.

6. Other Outcomes

This category summarizes various aspects of mental health related to the patient's behaviour and well-being inside an institutional setting. As for previous outcomes, significant effects favouring music therapy could only be found for 'high-dose' music therapy. According to Cohen's guidelines (Cohen 1988) a large effect on positive behaviour (SMD = 1.24) and negative behaviour (SMD = 2.22) could be identified. Positive and negative behaviour covers among others, aspects of symptoms and functioning. In this case, this outcome might emphasize previous results on mental state and functioning outcomes.
No effects on patient satisfaction with care could be identified. Data were to sparse to make any conclusions.

Overall completeness and applicability of evidence

1. Music therapy techniques

All studies used a combination of typical music therapeutic techniques: active music-making (often improvisation, but also songs) and music listening. Verbal discussion and reflection emerging from, and connected to, the musical processes was described for all studies. The techniques of clinical music therapy were, therefore, relatively well represented.

2. Setting

All studies, however, concerned short- to medium-term music therapy in a hospital setting including both acute and long-term inpatients in mental health care. Therefore, most direct applicability of results is restricted to similar settings. Clinical music therapy is provided in such settings, but longer-term individual and group music therapy, often with outpatients, is also common. Outpatients were only considered in one study. In one of the included studies, up to 78 sessions were provided over a relatively condensed three-month period. Whether the results of this study could be generalised to the same number of sessions applied over a longer time period remains unclear.

3. Outcomes

The outcomes of included studies mainly reflect symptom- and functioning scales assessing the patient's deficits. The inclusion of more "positive" outcomes (e.g. quality of life, music-related outcomes) might be of special importance when investigating effects of music therapy. Some of these outcomes have already been addressed in ongoing studies, especially quality of life (QlesQ) and musical engagement (IiM) (see Characteristics of ongoing studies).

Quality of the evidence

The included trials were of moderate quality, so at moderate risk of bias. All studies stated explicitly that randomisation was used, but concealment of allocation was unclear in all but one study. There was no indication of unintended co-intervention. In Talwar 2006, however, it was reported that some participants received less sessions than planned, which may have lowered the observed effects. Attrition rates were relatively low. All analyses were intention-to-treat. Blinding of assessment was reported in four studies. The adequacy of the music therapeutic approach is reflected satisfactorily by the applied music therapeutic techniques for all studies but one. Music therapists were trained adequately in only four of the included studies.

Potential biases in the review process

The extensive search strategy that was undertaken for this review might make it seem likely that all relevant studies were identified. No restrictions concerning nationality or language have been made

within the search process. Non-English articles were included in the review and relevant articles were translated into English. Furthermore, dealing with data was done thoroughly and we contacted authors of relevant studies when data were insufficient.
There is, however, the possibility that our interest in this area (see Declarations of interest) or past knowledge of the literature (Gold 2005a) could have resulted in a biased view of the data. We think it would be hard to avoid some degree of similar risks of bias in the reviewing process.

Agreements and disagreements with other studies or reviews

The findings of this review are in agreement with a review of randomised and observational studies on music therapy for serious mental disorders (Gold 2009). That review confirmed and quantified the relationship between the number of sessions and the size of the effect of music therapy. Using meta-regression, the review found that a large proportion of the variance in effects (73% to 78%) was explained by the number of sessions or its square root. A clear dose-effect relationship strengthens the knowledge about the effects of music therapy (Higgins 2011) and might contribute to a better use of mental health resources. In contrast to that other review which drew on a broader basis and larger number of studies, meta-regression was not considered appropriate for the present review due to the small number of studies included (Higgins 2011).

AUTHORS' CONCLUSIONS

Implications for practice

1. For people with schizophrenia

There is evidence that music therapy, as an addition to standard care, can help people with schizophrenia improve their global state, negative symptoms, depression, anxiety, and social functioning over the short- to medium-term. Music therapy seems to address especially motivational, emotional and relational aspects, and helps patients reconnect to both intrapersonal and social resources. However, the effects of music therapy seem to depend heavily on the number of music therapy sessions, as well as the quality of the music therapy provided (trained music therapists who are skilled in using adequate music therapy methods). To benefit from music therapy, it is important to participate in regular sessions over some time. The minimum number of sessions is difficult to determine and will probably vary from patient to patient. Active participation is crucial for the success of music therapy. Participants do not need musical skills, but a motivation to work actively within a music therapy process is important.

2. For clinicians

Music therapy, as an addition to standard care, does seem to help across a wide range of measures - at least over the short- to medium-term. Those positive effects might help support the motivation as well as emotional and relational competencies of people with schizophrenia. However, these effects seem to depend highly on the number of music therapy sessions provided, as well as to the quality of the therapy. The results of this review suggest that at least 20 sessions may be needed to reach clinically significant effects. This is consistent with significant dose-effect relationships found in Gold 2009. This review demonstrates that medium effects of music therapy on general and negative symptoms, as well as functioning occur between 16 and 24 sessions. The specific techniques of music therapy, including, among others, musical improvisation and the discussion of personal issues related to the musical processes, require specialised music therapy training. Both training courses and qualified music therapists are available in many countries, but in some countries there may be a need to develop better quality training. Music therapy may be especially important for improving negative symptoms such as affective flattening and blunting, poor social relationships, and a general loss of interest and motivation. These symptoms seem to be specifically related to music therapy's strengths, but do not typically respond well to other treatment.

3. For managers/policy makers

There does seem to be more evidence for music therapy than for some other approaches given in addition to standard care. We think that music therapy should be more widely available and that there is an evidence-base to underpin this.

Implications for research

1. General

Generally, there is room for improvement concerning the quality of reporting of trials in this area, and future research reports should make use of guidelines such as the CONSORT statement (Moher 2001).

2. Specific

2.1 Additional reviews

Out of necessity the search strategy for this review was broad. It revealed other music-based interventions such as music listening that could be relevant to review. This type of music-based intervention does not qualify as music therapy but might play an important role in particular settings or cultures. Further reviews

might address music therapy compared with other psychosocial interventions.

2.2 Trials

Two specific areas where research is particularly needed are long-term effects and the dose-effect relationship.

2.2.1 'Dosage'

Even though significant dose-response relationships could be demonstrated in another review (Gold 2009), studies randomising high versus low 'dosage' of music therapy would be required to quantify and confirm the knowledge that has been gained so far. Such studies would require considerably larger sample sizes than those represented in this study because the expected effect sizes between two active treatments will be smaller than between music therapy as an add-on treatment and standard care alone.

2.2.2 Duration

Long-term effects extending over six months or more have not been addressed in previous trials, and research on long-term effects are especially necessary as schizophrenia is often a chronic condition. This may include trials of long-term music therapy as well as long-term follow-up assessments of short- or medium-term music therapy. There is also a need for trials examining the effects of music therapy in outpatient care for people with schizophrenia.

2.2.3 COMET

One last specific area of future qualitative research might address the examination of primary outcomes in music therapy. There is a real place for agreement of core outcome measures in this area such as are being generated by the COMET initiative. For this review, symptom reduction and an improvement of functioning could be identified as frequently used outcomes. These are of general clinical importance in mental health care but there might be other health-related aspects (e.g. quality of life, interest in music) supported by music therapy that are even more relevant to the patient as well as the music therapeutic approach. To gain further knowledge about outcomes which are connected more directly to music therapy seems to be indicated for being able to investigate the effects of music therapy more adequately.

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The Cochrane Schizophrenia group now provide a template for the methods section and other parts of the protocol. For this 2011 update (2010 search), we have used this template and adapted it accordingly.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Ceccato 2009

Methods	Allocation: randomised. Blindness: assessors were masked to treatment. Duration: 4 months. Design: parallel group.
Participants	Diagnosis: people with schizophrenia (ICD-10). History: not reported. N = 67. Age: range 20 to 60 years. Sex: 41 M, 26 F. Setting: in- and outpatients (private clients).
Interventions	1. Group music therapy: STAM (one weekly session; total 16 sessions). N = 37. 2. Standard care (medication and other therapeutic treatment indicated for schizophrenia). N = 30
Outcomes	Cognitive functioning: BCST, CCPT, PASAT, WMS.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomised - no further details.
Allocation concealment (selection bias)	Unclear risk	No details given.
Blinding (performance bias and detection bias) All outcomes	Low risk	Assessors were masked to treatment.
Incomplete outcome data (attrition bias) All outcomes	Low risk	No drop outs.
Selective reporting (reporting bias)	Unclear risk	All outcomes were considered in the analysis.
Other bias	Unclear risk	Adequate music therapy method: unclear (highly structured approach, relational aspects unclear). Adequate music therapy training: yes (based on a general statement in the pa-

		per: 'qualified music therapists' and personal communication with the authors). No personal, financial, or any other interests producing bias could be found

He 2005

Methods	Allocation: randomised - no further details. Blindness: unknown. Duration: 6 weeks. Design: parallel group.
Participants	Diagnosis: schizophrenia type II (CCMD-3). History: approx. 9 years of disorder. N = 60. Age: mean 35 years, SD 8. Sex: 51 M, 9 F. Setting: inpatients.
Interventions	1. Receptive and 'participative' group music therapy (music listening, or music listening in combination with reading poems or dancing, music was chosen by the participants after an "induction" given by the therapist), five one-hour sessions per week (total 30 sessions). N = 30. 2. Standard care (medication only). N = 30.
Outcomes	Mental state: SANS. Not used: Prolactin levels (biomarker for mood: high = good)
Notes	Music therapy was conducted by musicians.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No details given.
Allocation concealment (selection bias)	Unclear risk	No details given.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	No details given.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No information about how many participants have completed the study can be found in the results or discussion part of the article. According to the study design (only inpatients) and Chinese reporting

He 2005 (*Continued*)

		standards (drop outs are usually reported if there are any) we assume that all participants have completed the study
Selective reporting (reporting bias)	Low risk	All outcome measures were considered in the analysis.
Other bias	High risk	Adequate music therapy method: yes. Adequate music therapy training: unclear (music therapy was conducted by musicians who worked full time as music therapists at the hospital). No personal, financial, or any other interests producing bias could be found

Li 2007

Methods	Allocation: randomised - no further details. Blindness: unknown. Duration: 6 weeks. Design: parallel group.
Participants	Diagnosis: schizophrenia (CCMD-3). History: not reported. N = 60. Age: mean 32, SD 12. Sex: 60 M, 0 F. Setting: inpatients.
Interventions	1. Receptive group music therapy (music listening, music listening in combination with verbal inductions given by the therapist, 'positive hypnosis'/positive imagery,), 5 weekly 40-min sessions per week (total 30 sessions). N = 30. 2. Standard care (supportive counselling). N=30.
Outcomes	Mental state: depression (SDS). Mental state: anxiety (SAS). Social functioning: NOSIE subscale. Not used: 7 other subscales of NOSIE.
Notes	Music therapy was conducted by nurses, unclear how much they were trained in music therapy

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No details given.

Li 2007 (*Continued*)

Allocation concealment (selection bias)	Unclear risk	No details given.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	No details given.
Incomplete outcome data (attrition bias) All outcomes	Low risk	All 60 participants completed the trial.
Selective reporting (reporting bias)	Low risk	All outcome measures were considered in the analysis.
Other bias	Unclear risk	Adequate music therapy method: yes. Adequate music therapy training: unclear (music therapy was conducted by nurses with 'music therapy ability'). No personal, financial, or any other interests producing bias could be found

Talwar 2006

Methods	Allocation: randomised - block randomisation with ratio of experimental treatment to control treatment 1:2. Blindness: single - assessor blinded; success of blinding verified by letting assessors guess the allocated condition; more than 50% guessed correctly, but this may be confounded with treatment effect. Duration: 3 months. Design: multicenter, 4 sites.
Participants	Diagnosis: schizophrenia or related psychoses (ICD-10: F2). History: not reported. N = 81. Age: mean 37 years, range 18 to 64. Sex: 60 M, 21 F. Setting: inpatients.
Interventions	1. Active individual music therapy (improvisation, songs, dialogue), weekly sessions of 50 min (total 12 sessions). N = 33. 2. Standard care (medication, nursing care, access to occupational, social and other activities). N = 48
Outcomes	Mental state: PANSS. General functioning: GAF. Satisfaction with care: CSQ. Unable to use -Quality of life: SFQ (unknown reliability and validity). Service outcomes: HAS, Use of Hospital Services, ePEX (unknown reliability and validity)

Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-generated list of random numbers.
Allocation concealment (selection bias)	Low risk	Randomisation was conducted by a person independent of the researcher, and extensive steps were taken to mask the researcher to the participants' allocation status
Blinding (performance bias and detection bias) All outcomes	Low risk	Interviews were conducted by a researcher masked to treatment condition; a test of the success of masking was provided: Interviewer attempted to guess the allocation status of each of the participants after three month follow-up data had been collected (kappa = .31, P <. 01)
Incomplete outcome data (attrition bias) All outcomes	Low risk	Analysis was carried out on an intention-to-treat basis. Multiple imputation was used to account for the missing data in outcome measures at follow-up. This method imputes m > 1 plausible values for each missing value, under the assumption of missing at random In this review, only the actually observed data were used, not the imputed data. Multiple imputation is not recommended when only dependent variables are missing (Allison 2002, p. 54, p. 70).
Selective reporting (reporting bias)	Low risk	All outcome measures were considered in the analysis.
Other bias	Low risk	Adequate music therapy method: yes. Adequate music therapy training: yes (all music therapists attended an approved music therapy course and received fortnightly supervision). No personal, financial, or any other interests producing bias could be found

Tang 1994

Methods	Allocation: randomised - no further details. Blindness: single - assessor blinded. Duration: 1 month. Design: parallel group.
Participants	Diagnosis: residual schizophrenia (DSM-III-R). History: not reported. N = 76. Age: not reported. Sex: not reported. Setting: inpatients.
Interventions	1. Active and receptive large-group music therapy (music listening, singing and playing on instruments, discussion), five one-hour sessions per week (on average 19 sessions). N = 38. 2. Standard care (medication only). N = 38.
Outcomes	Mental state: SANS. Unable to use - Disability: Disability Assessment Schedule (DAS) (insufficient data)
Notes	Author unable to provide additional data. Music therapy was conducted by clinicians (doctor, nurses) with limited training

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No details given.
Allocation concealment (selection bias)	Unclear risk	No details given.
Blinding (performance bias and detection bias) All outcomes	Low risk	Nurses who did the SANS and DAS assessment for participants were blind to treatment status
Incomplete outcome data (attrition bias) All outcomes	Low risk	All 76 participants completed the trial.
Selective reporting (reporting bias)	Low risk	All outcome measures were considered in the analysis.
Other bias	Unclear risk	Adequate music therapy method: yes. Adequate music therapy training: unclear (one doctor and two nurses conducted the music therapy. Two of them attended a two-week music therapy course). No financial, personal or other interests

		producing bias detected

Ulrich 2007

Methods	Allocation: randomised - no further details. Blindness: single - assessor blinded; assessors unaware of study aim; success of blinding verified by letting assessors guess what the study aim was; none were aware that the study aim involved music therapy. Duration: 4.8 weeks. Design: parallel group.
Participants	Diagnosis: schizophrenia or related psychoses (27 of 37 had F20 in ICD-10). History: not reported. N = 37. Age: mean 38 years, range 22 to 58. Sex: 20 M, 17 F. Setting: inpatients.
Interventions	1. Active group music therapy (focusing on musical processes and discussion of patients' problems), on average 7.5 sessions of 60 to 105 minutes. N = 21. 2. Standard care (medication, "other" activities - no detailed description given). N = 16
Outcomes	Mental state: SANS. Quality of life: SPG. Unable to use - Social functioning (unvalidated subscale of published scale). Satisfaction with care (unpublished scale).
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	A die was thrown.
Allocation concealment (selection bias)	Unclear risk	No details given.
Blinding (performance bias and detection bias) All outcomes	Low risk	Researchers and patients were blinded to the fact that research of music therapy was the study aim
Incomplete outcome data (attrition bias) All outcomes	Low risk	Drop outs were reported. Intention-to-treat analysis was used: Participants whose diagnosis was changed after inclusion in the study were not excluded

Ulrich 2007 (*Continued*)

Selective reporting (reporting bias)	Low risk	All outcome measures were considered in the analysis.
Other bias	Low risk	Adequate music therapy method: yes. Adequate music therapy training: yes (based on a general statement: 'qualified music therapists' and a reference in the article). No financial, personal or other interests producing bias detected

Wen 2005

Methods	Allocation: randomised; no further details given. Blindness: unknown. Duration:6 weeks. Design: parallel group.
Participants	Diagnosis: schizophrenia (CCMD-3). History: not reported. N = 30. Age:15 to 50. Sex: 21 M, 9 F. Setting: inpatients
Interventions	1. Receptive group music therapy (music listening, other music activities: dancing, discussion emphasising the emotional aspects of the music while listening to it), five one-hour sessions per week (total 30 sessions). N = 16. 2. Standard care (medication only, no anxiolytic or antidepressant). N = 14
Outcomes	Mental state: BPRS; depression (SDS, Ham-D). Unable to use - Inpatient Recovery Effect Scale (unpublished scale)
Notes	Music therapy was conducted by the authors (probably psychiatrists) and nurses. No information given if these clinicians were trained in music therapy

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No details given.
Allocation concealment (selection bias)	Unclear risk	No details given.
Blinding (performance bias and detection bias)	Unclear risk	No details given.

Wen 2005 (*Continued*)

All outcomes		
Incomplete outcome data (attrition bias) All outcomes	Low risk	All participants completed the trial.
Selective reporting (reporting bias)	Low risk	All outcome measures were considered in the analysis.
Other bias	Unclear risk	Adequate music therapy method: yes. Adequate music therapy training: unclear (no information was given, if the persons conducting music therapy, nurses and probably psychiatrists, were trained in music therapy). No financial, personal or other interests producing bias detected

Yang 1998

Methods	Allocation: randomised - no further details. Blindness: not reported; assessments by two psychiatrists. Duration: 3 months. Design: parallel group.	
Participants	Diagnosis: schizophrenia (CCMD-2). History: chronic, duration of disorder 2 to 26 years. N = 72. Age: range 21-55 years. Sex: 41 M, 29 F (reported for 70 valid cases). Setting: inpatients.	
Interventions	1. Active and receptive individual and group music therapy (music listening, improvisation, discussion), six two-hour sessions per week (total 78 sessions). N = 41. 2. Standard care (medication only). N = 31.	
Outcomes	Global state: No clinically important improvement (as rated by trialists). Mental state: BPRS, SANS. Social functioning: SDSI. Unable to use - Mental state: PSE (insufficient data).	
Notes	Author unable to provide additional data.	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

Yang 1998 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	No details given.
Allocation concealment (selection bias)	Unclear risk	No details given.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	No details given.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Two drop outs were reported and the reported data are based on a total number excluding the drop outs. No participants with complete data were excluded
Selective reporting (reporting bias)	Low risk	All outcome measures were considered in the analysis.
Other bias	Low risk	Adequate music therapy method: yes. Adequate music therapy training: yes (well-known Chinese music therapist was involved in the project). No financial, personal or other interests producing bias detected

BCST - Bergs' Card Sorting Test
BPRS - Brief Psychiatric Rating Scale
CCMD-2/3 - Chinese Classification of Mental Disorders 2/3
CCPT - Conners Continuous Performance Task 10
CSQ - Client Satisfaction Questionnaire
DAS - Disability Assessment Schedule
DSM-III-R - Diagnostic and Statistical Manual of Mental Disorders-III-R
ePEX - Protechnic Exeter
F - Female
GAF - General Assessment of Function
Ham-D - Hamilton Depression Scale
HAS - Hamilton Anxiety Scale
ICD-10 - ICD-10: F2 - International Classification of Diseases (version 10); 'F' refers to large disease sub-categories within ICD
M - Male
NOSIE - Nurses' Observation Scale for Inpatient Evaluation
PANSS - The Positive and Negative Syndrome Scale
PASAT - Auditory Serial Addition Paced Test
PSE - Present State Examination Change Rating Scale
SANS - Scale for the Assessment of Negative Symptoms
SAS - Self-Rating Anxiety Scale
SD - Standard deviation
SDS - Self-Rating Depression Scale
SDSI - Social Disability Schedule for Inpatients
SFQ - The Social Functioning Questionnaire

SPG - Skalen zur psychischen Gesundheit
STAM - Sound Training Attention and Memory
WMS - Wechsler Memory Scale

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Adler 2005	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (medication versus placebo)
Apter 1978	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (movement therapy, dance therapy)
Arango 2003	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (medication).
Barrowclough 2001	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (treatment package versus standard care)
Bean 1964	Allocation: not randomised (all received the same intervention)
Bechdolf 2005	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (CBT versus supportive counselling)
Brotons 1987	Allocation: unclear (unable to retrieve full report).
Cassity 1976	Allocation: randomised. Participants: people with schizophrenia and other psychiatric disorders. Intervention: music therapy versus standard care. Outcomes: no usable and relevant data.
Castilla-Puentes 2002	Allocation: randomised. Participants: people with schizophrenia and other psychiatric disorders. Intervention: music therapy versus supportive talking/counselling. Outcomes: no usable data (unable to retrieve full report).
Ceccato 2006	Allocation: not randomised (CCT, matched groups).
Chambliss 1996	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (music listening).

(*Continued)*

Cook 1973	Allocation: not randomised (single case study).
de l'Etoile 2002	Allocation: not randomised (single group study).
Drury 1996	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (cognitive therapy versus structured activities and informal support)
Gaszner 2009	Allocation: unclear (CCT; author was contacted but we did not get the requested information). Participants: people with schizophrenia. Interventions: not music therapy (one medication versus two or more medications versus medication and complex therapy including psychotherapy, sociotherapy, psychiatric rehabilitation)
Glicksohn 2000	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (only music listening).
Green 1987	Allocation: randomised. Participants: people with schizophrenia and other psychiatric disorders. Interventions: not music therapy (art therapy versus standard care)
Grocke 2009a	Allocation: not randomised (pre-post test).
Hannes 1974	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (recreational therapy/socialising)
Hayashi 2002	Allocation: not randomised (CCT/comparison of 2 cohorts).
Hodgson 1996	not able to retrieve information needed.
Hogarty 1988	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (family therapy versus standard care)
Hu 2004	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (music-sport therapy: music listening, karaoke, sport activities)
Hustig 1990	Allocation: not randomised (single group study).
Johnston 2002	Allocation: not randomised (n-of-1-CCT).
Kallert 2004	Allocation: randomised. Participants: people with schizophrenia and other mental disorders. Interventions: not music therapy (treatment package).

(*Continued*)

Kong 2007	Allocation: randomised. Participants: people with chronic schizophrenia. Interventions: not music therapy (music listening only).
Krajewski 1993	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (CBT versus art therapy versus CBT and art therapy)
Leung 1998	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (Karaoke therapy versus simple singing)
Li 2005	Allocation: randomised. Participants: people with chronic schizophrenia. Interventions: not music therapy (music education, sport activities, gardening)
Lin 2003	Allocation: randomised. Participants: people with schizophrenia on recovery stage. Interventions: not music therapy (music listening only).
Margo 1981	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (music listening only).
Martinez 2005	Allocation: not randomised (CCT, quasi-randomised).
McInnis 1990	Allocation: not randomised (single case study).
Meschede 1983	Allocation: not randomised (single group study).
Metzner 2010	Allocation: not randomised (single case study).
Moe 2000	Allocation: not randomised (single group study).
Murow 1997	Allocation: not randomised (CCT, allocation by order of intake)
Na 2009	Allocation: not randomised (CCT, cross-over design)
Nelson 1991	Allocation: not randomised (CCT).
Ni 2002	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (music listening only).
Olbrich 1990	Allocation: not randomised (CCT, allocation by order of intake)
Pavlicevic 1994	Allocation: not randomised (CCT, matched groups).

(*Continued*)

Pfeiffer 1987	Allocation: randomised. Participants: people with schizophrenia. Interventions: music therapy versus standard care. Outcomes: no usable data.
Reker 1991	Allocation: not randomised (single group study).
Schmuttermayer 1983	Allocation: not randomised (single group study).
Silverman 2003a	Allocation: not randomised (single case study).
Silverman 2009	Allocation: randomised. Participants: people with schizophrenia and other mental disorders. Interventions: music therapy. Outcomes: we contacted the author but did not receive the data of the subset of participants with schizophrenia
Skelly 1952	Allocation: not randomised (single group study).
Song 1994	Allocation: not randomised (groups were matched by age, sex, education, and diagnosis)
Steinberg 1991	Allocation: not randomised (single group study).
Su 1999	Allocation: randomised. Participants: people with chronic schizophrenia. Interventions: not music therapy (dance therapy).
Su 2005	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (group psychotherapy, behaviour therapy, recreational therapy, music listening, other activities)
Tan 2009	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (computerised cognitive remediation therapy), active control group (treatment package including occupational therapy, recreational therapy and music therapy)
Tang 2002	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (brainwave generator combined with electronic music instruments)
Thaut 1989	Allocation: not randomised (single group study).
Troice 2003	Allocation: not randomised (single group study).
Valencia 2006	Allocation: not randomised to music therapy versus placebo or standard care (random allocation of participants to three active treatment conditions including music therapy; a control group (medication only) was not randomised but obtained from a waiting list)

(*Continued*)

Wahass 1997	Allocation: randomised. Participants: people with schizophrenia. Intervention: not music therapy (treatment package).
Wang 2002a	Allocation: randomised. Participants: people with chronic schizophrenia. Interventions: not music therapy (music listening only).
Wang 2002b	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (music listening only).
Wang 2005	Allocation: not randomised (CCT, quasi-randomised according to the date of entry)
Wang 2006	Allocation: not randomised (CCT, quasi-randomised according to the date of entry)
Wang 2007	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (music listening, Karaoke singing by the patients, without music therapist)
Warren 1980	Allocation: not randomised (all received the same stimuli within the same session); not an intervention study
Wu 2000	Allocation: not randomised (pre-post test design).
Wu 2003	Allocation: not randomised (uncontrolled pre-post design).
Xiao 2005	Allocation: randomised. Participants: people with chronic schizophrenia. Interventions: unclear if music therapy (insufficient details), and not music therapy alone (treatment package: psychotherapy, recreational therapy, music therapy versus medical treatment)
Yang 2005	Allocation: randomised. Participants: people with chronic schizophrenia. Interventions: not music therapy (psychotherapy) versus active control group (recreational therapy: dance, music, reading, writing, drawing)
Zhang 2003a	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (music listening, music appreciation, dancing)
Zhang 2003b	Allocation: possibly randomised, unclear. Participants: people with schizophrenia. Interventions: music therapy versus behaviour correcting therapy
Zhang 2005	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (different music activities, e.g. singing, music education, dancing, watching

(*Continued*)

	MTV, are taking place in the patient's leisure time together with nurses who are not trained as music therapists)
Zhou 2003	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (music listening).
Zhou 2006	Allocation: randomised. Participants: people with schizophrenia. Interventions: music therapy versus active control group (music listening only)
Zhu 2002	Allocation: randomised. Participants: people with schizophrenia. Interventions: not music therapy (music listening only).

CBT - Cognitive Behavioural Therapy
CCT - Controlled Clinical Trial
MTV - Music Television

Characteristics of ongoing studies *[ordered by study ID]*

Gold 2005b

Trial name or title	Resource-oriented music therapy for psychiatric patients with low therapy motivation (RCT-MTPSY, registration no. NCT00137189)
Methods	Allocation: randomised, stratified by treatment centre and type of disorder (psychotic versus non-psychotic). Blindness: single - assessor blinded. Duration: treatment duration 3 months, latest follow-up 9 months. Design: parallel groups.
Participants	Diagnosis: people with a non-organic mental disorder (F1 to F6 according to ICD-10), presenting with a low therapy motivation and showing a willingness to work with music. History: duration of disorder not specified. N = 144. Age: adults; minimum and maximum age not specified. Sex: both males and females. Setting: inpatients, day patients and outpatients.
Interventions	1. Individual resource-oriented music therapy, 2 times a week over a period of 3 months, lasting 45 minutes; in addition to standard care. 2. Standard care. (Music therapy may be offered after 3 months.)
Outcomes	Mental state: Negative Symptoms (SANS), SANS Subscale Affective Flattening or Blunting. Mental state: Brief Symptom Inventory-18 (BSI-18). Mental state: Clinical Global Impressions Scale (CGI).

Gold 2005b (*Continued*)

	Mental state: Vitality (SF-36 Health Survey). General Functioning: Global Assessment of Functioning Scale (GAF) Interpersonal and social functioning: Inventory of Interpersonal Problems (IIP-32) Intrapersonal functioning: Motivation for change, URICA. Intrapersonal functioning: Self-efficacy, General Perceived Sef-Efficacy Scale Intrapersonal functioning: Rosenberg Self Esteem Scale (RSES) Quality of life: Quality of Life Enjoyment and Satisfaction Questionnare-18 (Q-LES-Q-18) Musical engagement: Interest in Music Scale (IiM).
Starting date	2004.
Contact information	Christian Gold. E-mail: christian.gold@uni.no
Notes	

Grocke 2009b

Trial name or title	Evaluation of a group music therapy program on quality of life in people living with severe and enduring mental illness (SEMI) in the community
Methods	Allocation: randomised. Blindness: only self-report measures used. Duration: 13 weeks. Design: parallel groups.
Participants	Diagnosis: severe and enduring mental disorder (e.g. schizophrenia, bipolar disorders, major depression). History: at least 2 years of disorder. N = 160. Age: minimum 18, no maximum limit. Sex: both males and females. Setting: outpatients.
Interventions	1. Group music therapy (including singing, percussive improvisation, writing and recording an original song) . 2. Waiting list control.
Outcomes	Mental state: BSI. Quality of life: Q-LES-Q-18. Social functioning: ESSI. Intrapersonal functioning: Self-esteem (RSES).
Starting date	2009.
Contact information	Denise Grocke. E-mail: d.grocke@unimelb.edu.au.

Grocke 2009b (*Continued*)

Notes	

BSI / BSI-18 - Brief Symptom Inventroy-18
CGI - Clinical Global Impressions Scale
SF-36 - Short Form-36 Health Survey
ESSI - ENRICHED Social Support Instrument
GAF - Global Assessment of Functioning Scale
IiM - Interest i Music
IIP-32 - Inventory of Interpersonal Problems
Q-LES-Q-18 - Quality of Life Enjoyment and Satisfaction Questionnare-18
RCT randomised controlled trial
RSES - Rosenberg Self Esteem Scale
SANS - Scale for the Assessment of Negative Symptoms
URICA - The University of Rhode Island Change Assessment Scale

DATA AND ANALYSES

Comparison 1. Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Global state: No clinically important overall improvement (as rated by trialists)	1	72	Risk Ratio (M-H, Fixed, 95% CI)	0.10 [0.03, 0.31]
1.1 20 or more sessions	1	72	Risk Ratio (M-H, Fixed, 95% CI)	0.10 [0.03, 0.31]
2 Mental state: General - 1a. Average endpoint score (PANSS, high score = poor)	1	69	Std. Mean Difference (IV, Fixed, 95% CI)	-0.36 [-0.84, 0.12]
2.1 less than 20 sessions	1	69	Std. Mean Difference (IV, Fixed, 95% CI)	-0.36 [-0.84, 0.12]
3 Mental state: General - 1b. Average endpoint score (BPRS, high score = poor)	2		Std. Mean Difference (IV, Fixed, 95% CI)	Subtotals only
3.1 20 or more sessions	2	100	Std. Mean Difference (IV, Fixed, 95% CI)	-0.73 [-1.16, -0.31]
4 Mental state: Specific - 2. Negative symptoms - average endpoint score (SANS, high score = poor)	4	240	Std. Mean Difference (IV, Fixed, 95% CI)	-0.74 [-1.00, -0.47]
4.1 less than 20 sessions	2	110	Std. Mean Difference (IV, Fixed, 95% CI)	-0.79 [-1.19, -0.40]
4.2 20 or more sessions	2	130	Std. Mean Difference (IV, Fixed, 95% CI)	-0.69 [-1.05, -0.33]
5 Mental state: Specific - 3a. Depression - average endpoint score (SDS, high score = poor)	2	90	Std. Mean Difference (IV, Fixed, 95% CI)	-0.63 [-1.06, -0.21]
5.1 20 or more sessions	2	90	Std. Mean Difference (IV, Fixed, 95% CI)	-0.63 [-1.06, -0.21]
6 Mental state: Specific - 3b. Depression - average endpoint score (Ham-D, high score = poor)	1	30	Std. Mean Difference (IV, Fixed, 95% CI)	-0.52 [-1.25, 0.21]
6.1 20 or more sessions	1	30	Std. Mean Difference (IV, Fixed, 95% CI)	-0.52 [-1.25, 0.21]
7 Mental state: Specific - 4. Anxiety - average endpoint score (SAS, high score = poor)	1	60	Std. Mean Difference (IV, Fixed, 95% CI)	-0.61 [-1.13, -0.09]
7.1 20 or more sessions	1	60	Std. Mean Difference (IV, Fixed, 95% CI)	-0.61 [-1.13, -0.09]
8 Leaving the study early	8	493	Risk Ratio (M-H, Fixed, 95% CI)	1.03 [0.38, 2.78]
8.1 less than 20 sessions	4	261	Risk Ratio (M-H, Fixed, 95% CI)	1.04 [0.36, 2.99]
8.2 20 or more sessions	4	232	Risk Ratio (M-H, Fixed, 95% CI)	1.0 [0.06, 15.45]
9 General functioning: Average endpoint score (GAF, high score = good)	1	69	Std. Mean Difference (IV, Fixed, 95% CI)	-0.05 [-0.53, 0.43]
9.1 less than 20 sessions	1	69	Std. Mean Difference (IV, Fixed, 95% CI)	-0.05 [-0.53, 0.43]
10 Social functioning: Average endpoint score (SDSI, high score = poor)	1	70	Std. Mean Difference (IV, Fixed, 95% CI)	-0.78 [-1.27, -0.28]
10.1 20 or more sessions	1	70	Std. Mean Difference (IV, Fixed, 95% CI)	-0.78 [-1.27, -0.28]

11 Behaviour: 1. Positive behaviour - average endpoint score (NOSIE, high score = poor)	1	60	Std. Mean Difference (IV, Fixed, 95% CI)	-1.24 [-1.79, -0.68]
11.1 20 or more sessions	1	60	Std. Mean Difference (IV, Fixed, 95% CI)	-1.24 [-1.79, -0.68]
12 Behaviour: 2. Negative behaviour - average endpoint score (NOSIE, high score = poor)	1	60	Std. Mean Difference (IV, Fixed, 95% CI)	-2.22 [-2.87, -1.57]
12.1 20 or more sessions	1	60	Std. Mean Difference (IV, Fixed, 95% CI)	-2.22 [-2.87, -1.57]
13 Cognitive functioning: 1. Attention - average endpoint score (PASAT, high score = good)	1	67	Std. Mean Difference (IV, Fixed, 95% CI)	0.72 [0.22, 1.21]
13.1 less than 20 sessions	1	67	Std. Mean Difference (IV, Fixed, 95% CI)	0.72 [0.22, 1.21]
14 Cognitive functioning: 2. Vigilance and attention - average endpoint score (CCPT, high score = good)	1	67	Std. Mean Difference (IV, Fixed, 95% CI)	0.25 [-0.23, 0.74]
14.1 less than 20 sessions	1	67	Std. Mean Difference (IV, Fixed, 95% CI)	0.25 [-0.23, 0.74]
15 Cognitive functioning: 3. Memory - average endpoint score (WMS, high score = good)	1	67	Std. Mean Difference (IV, Fixed, 95% CI)	0.43 [-0.06, 0.92]
15.1 less than 20 sessions	1	67	Std. Mean Difference (IV, Fixed, 95% CI)	0.43 [-0.06, 0.92]
16 Cognitive functioning: 4. Abstract thinking - average endpoint score (BCST, high score = good))	1	67	Std. Mean Difference (IV, Fixed, 95% CI)	0.09 [-0.39, 0.58]
16.1 less than 20 sessions	1	67	Std. Mean Difference (IV, Fixed, 95% CI)	0.09 [-0.39, 0.58]
17 Patient satisfaction: Average endpoint score (CSQ, high score = good)	1	69	Std. Mean Difference (IV, Fixed, 95% CI)	0.32 [-0.16, 0.80]
17.1 less than 20 sessions	1	69	Std. Mean Difference (IV, Fixed, 95% CI)	0.32 [-0.16, 0.80]
18 Quality of life: Average endpoint score (SPG, high score = good)	1	31	Std. Mean Difference (IV, Fixed, 95% CI)	0.05 [-0.66, 0.75]
18.1 less than 20 sessions	1	31	Std. Mean Difference (IV, Fixed, 95% CI)	0.05 [-0.66, 0.75]

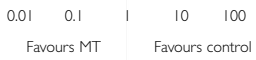
Analysis 1.1. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 1 Global state: No clinically important overall improvement (as rated by trialists).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 1 Global state: No clinically important overall improvement (as rated by trialists)

Study or subgroup	Music therapy n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 20 or more sessions					
Yang 1998	3/41	22/31		100.0 %	0.10 [0.03, 0.31]
Total (95% CI)	**41**	**31**		**100.0 %**	**0.10 [0.03, 0.31]**
Total events: 3 (Music therapy), 22 (Control)					
Heterogeneity: not applicable					
Test for overall effect: Z = 4.00 (P = 0.000063)					
Test for subgroup differences: Not applicable					



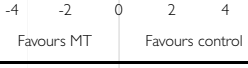
Analysis 1.2. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 2 Mental state: General - 1a. Average endpoint score (PANSS, high score = poor).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 2 Mental state: General - 1a. Average endpoint score (PANSS, high score = poor)

Study or subgroup	Music therapy N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 less than 20 sessions							
Talwar 2006	28	63 (13.57)	41	67.9 (13.35)		100.0 %	-0.36 [-0.84, 0.12]
Total (95% CI)	**28**		**41**			**100.0 %**	**-0.36 [-0.84, 0.12]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.46 (P = 0.14)							
Test for subgroup differences: Not applicable							



Analysis 1.3. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 3 Mental state: General - 1b. Average endpoint score (BPRS, high score = poor).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 3 Mental state: General - 1b. Average endpoint score (BPRS, high score = poor)

Study or subgroup	Music therapy N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 20 or more sessions							
Wen 2005	16	49.01 (7.04)	14	46.92 (8.22)		34.2 %	0.27 [-0.45, 0.99]
Yang 1998	40	29.35 (6.95)	30	39.26 (8.85)		65.8 %	-1.25 [-1.77, -0.73]
Subtotal (95% CI)	**56**		**44**			**100.0 %**	**-0.73 [-1.16, -0.31]**

Heterogeneity: Chi^2 = 11.25, df = 1 (P = 0.00079); I^2 =91%

Test for overall effect: Z = 3.41 (P = 0.00064)

Test for subgroup differences: Not applicable

Analysis 1.4. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 4 Mental state: Specific - 2. Negative symptoms - average endpoint score (SANS, high score = poor).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 4 Mental state: Specific - 2. Negative symptoms - average endpoint score (SANS, high score = poor)

Study or subgroup	Music therapy N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 less than 20 sessions							
Tang 1994	38	27.5 (14.5)	38	46.5 (20.3)		30.3 %	-1.07 [-1.55, -0.58]
Ulrich 2007	21	-0.5 (0.84)	13	-0.29 (1)		14.6 %	-0.23 [-0.92, 0.47]
Subtotal (95% CI)	**59**		**51**			**45.0 %**	**-0.79 [-1.19, -0.40]**
Heterogeneity: Chi² = 3.79, df = 1 (P = 0.05); I² =74%							
Test for overall effect: Z = 3.92 (P = 0.000087)							
2 20 or more sessions							
He 2005	30	49.47 (24.54)	30	60.37 (29.43)		27.0 %	-0.40 [-0.91, 0.11]
Yang 1998	40	37.95 (17)	30	56.76 (21.63)		28.0 %	-0.97 [-1.47, -0.47]
Subtotal (95% CI)	**70**		**60**			**55.0 %**	**-0.69 [-1.05, -0.33]**
Heterogeneity: Chi² = 2.49, df = 1 (P = 0.11); I² =60%							
Test for overall effect: Z = 3.78 (P = 0.00016)							
Total (95% CI)	**129**		**111**			**100.0 %**	**-0.74 [-1.00, -0.47]**
Heterogeneity: Chi² = 6.41, df = 3 (P = 0.09); I² =53%							
Test for overall effect: Z = 5.44 (P < 0.00001)							
Test for subgroup differences: Chi² = 0.14, df = 1 (P = 0.71), I² =0.0%							

Analysis 1.5. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 5 Mental state: Specific - 3a. Depression - average endpoint score (SDS, high score = poor).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

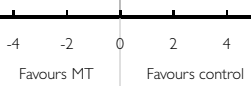
Outcome: 5 Mental state: Specific - 3a. Depression - average endpoint score (SDS, high score = poor)

Study or subgroup	Music therapy N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 20 or more sessions							
Li 2007	30	42.32 (9.21)	30	48.58 (8.84)		66.3 %	-0.68 [-1.21, -0.16]
Wen 2005	16	38.62 (7.44)	14	43.12 (9.27)		33.7 %	-0.53 [-1.26, 0.21]
Total (95% CI)	**46**		**44**			**100.0 %**	**-0.63 [-1.06, -0.21]**

Heterogeneity: $Chi^2 = 0.12$, df = 1 (P = 0.73); $I^2 = 0.0\%$

Test for overall effect: Z = 2.91 (P = 0.0036)

Test for subgroup differences: Not applicable



Analysis 1.6. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 6 Mental state: Specific - 3b. Depression - average endpoint score (Ham-D, high score = poor).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 6 Mental state: Specific - 3b. Depression - average endpoint score (Ham-D, high score = poor)

Study or subgroup	Music therapy N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 20 or more sessions							
Wen 2005	16	14.12 (3.86)	14	16.68 (5.64)		100.0 %	-0.52 [-1.25, 0.21]
Total (95% CI)	**16**		**14**			**100.0 %**	**-0.52 [-1.25, 0.21]**

Heterogeneity: not applicable

Test for overall effect: Z = 1.40 (P = 0.16)

Test for subgroup differences: Not applicable

Analysis 1.7. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 7 Mental state: Specific - 4. Anxiety - average endpoint score (SAS, high score = poor).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 7 Mental state: Specific - 4. Anxiety - average endpoint score (SAS, high score = poor)

Study or subgroup	Music therapy N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 20 or more sessions							
Li 2007	30	41.61 (9.12)	30	47.31 (9.28)		100.0 %	-0.61 [-1.13, -0.09]
Total (95% CI)	**30**		**30**			**100.0 %**	**-0.61 [-1.13, -0.09]**

Heterogeneity: not applicable

Test for overall effect: Z = 2.31 (P = 0.021)

Test for subgroup differences: Not applicable

Analysis 1.8. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 8 Leaving the study early.

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 8 Leaving the study early

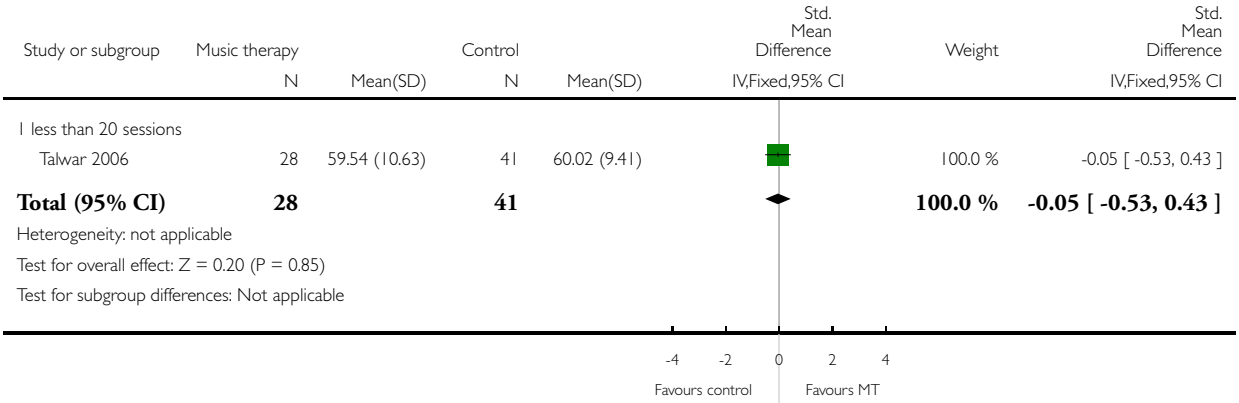
Study or subgroup	Music therapy n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 less than 20 sessions				
Ceccato 2009	0/37	0/30		0.0 [0.0, 0.0]
Talwar 2006	5/33	7/48		1.04 [0.36, 2.99]
Tang 1994	0/38	0/38		0.0 [0.0, 0.0]
Ulrich 2007	0/21	0/16		0.0 [0.0, 0.0]
Subtotal (95% CI)	**129**	**132**		**1.04 [0.36, 2.99]**
Total events: 5 (Music therapy), 7 (Control)				
Heterogeneity: Chi² = 0.0, df = 0 (P = 1.00); I² =0.0%				
Test for overall effect: Z = 0.07 (P = 0.94)				
2 20 or more sessions				
He 2005	0/30	0/30		0.0 [0.0, 0.0]
Li 2007	0/30	0/30		0.0 [0.0, 0.0]
Wen 2005	0/16	0/14		0.0 [0.0, 0.0]
Yang 1998	1/41	1/41		1.00 [0.06, 15.45]
Subtotal (95% CI)	**117**	**115**		**1.00 [0.06, 15.45]**
Total events: 1 (Music therapy), 1 (Control)				
Heterogeneity: Chi² = 0.0, df = 0 (P = 1.00); I² =0.0%				
Test for overall effect: Z = 0.0 (P = 1.0)				
Total (95% CI)	**246**	**247**		**1.03 [0.38, 2.78]**
Total events: 6 (Music therapy), 8 (Control)				
Heterogeneity: Chi² = 0.00, df = 1 (P = 0.98); I² =0.0%				
Test for overall effect: Z = 0.06 (P = 0.95)				
Test for subgroup differences: Chi² = 0.00, df = 1 (P = 0.98), I² =0.0%				

Analysis 1.9. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 9 General functioning: Average endpoint score (GAF, high score = good).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 9 General functioning: Average endpoint score (GAF, high score = good)

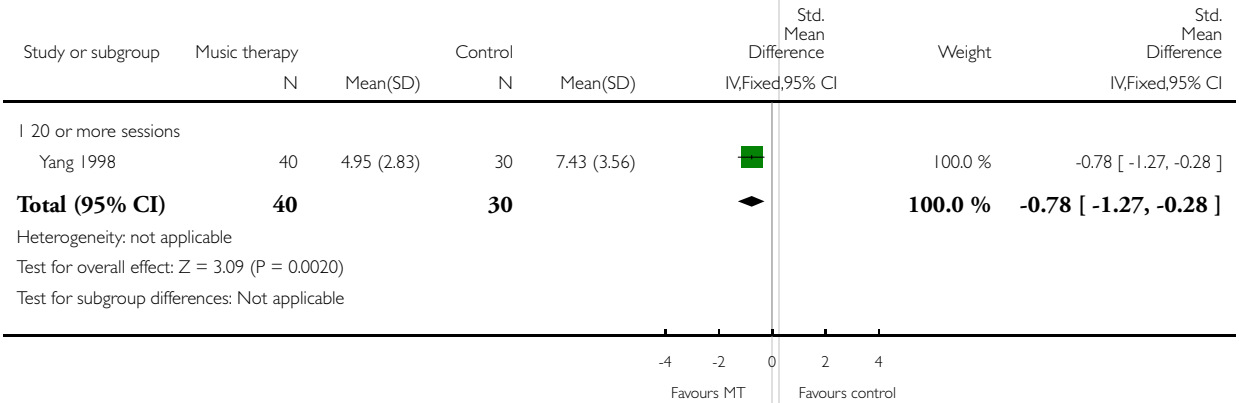


Analysis 1.10. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 10 Social functioning: Average endpoint score (SDSI, high score = poor).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 10 Social functioning: Average endpoint score (SDSI, high score = poor)



Analysis 1.11. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 11 Behaviour: 1. Positive behaviour - average endpoint score (NOSIE, high score = poor).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 11 Behaviour: 1. Positive behaviour - average endpoint score (NOSIE, high score = poor)

Study or subgroup	Music therapy N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 20 or more sessions							
Li 2007	30	4.22 (3.26)	30	8.31 (3.27)		100.0 %	-1.24 [-1.79, -0.68]
Total (95% CI)	**30**		**30**			**100.0 %**	**-1.24 [-1.79, -0.68]**

Heterogeneity: not applicable

Test for overall effect: Z = 4.36 (P = 0.000013)

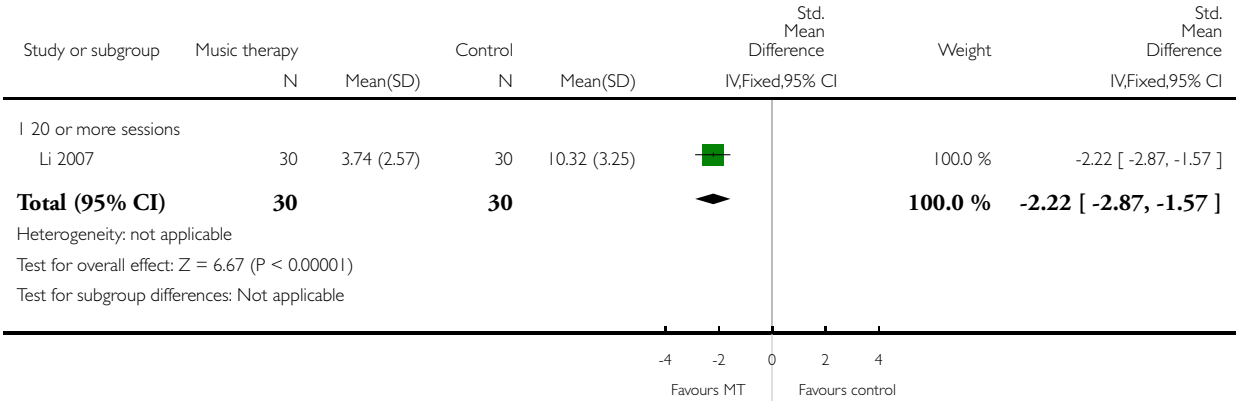
Test for subgroup differences: Not applicable

Analysis 1.12. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 12 Behaviour: 2. Negative behaviour - average endpoint score (NOSIE, high score = poor).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 12 Behaviour: 2. Negative behaviour - average endpoint score (NOSIE, high score = poor)

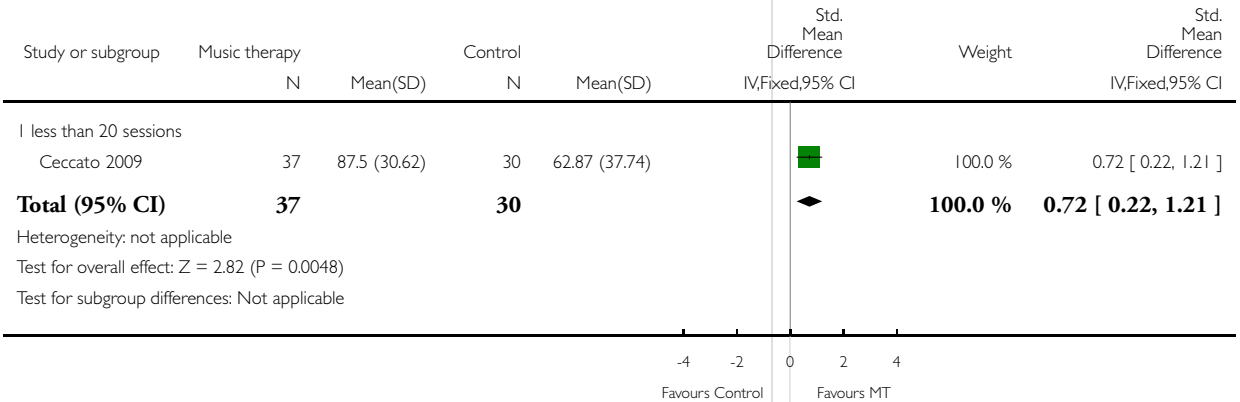


Analysis 1.13. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 13 Cognitive functioning: 1. Attention - average endpoint score (PASAT, high score = good).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 13 Cognitive functioning: 1. Attention - average endpoint score (PASAT, high score = good)



Analysis 1.14. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 14 Cognitive functioning: 2. Vigilance and attention - average endpoint score (CCPT, high score = good).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

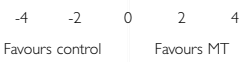
Outcome: 14 Cognitive functioning: 2. Vigilance and attention - average endpoint score (CCPT, high score = good)

Study or subgroup	Music therapy N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 less than 20 sessions							
Ceccato 2009	37	32.86 (4.15)	30	31.77 (4.33)		100.0 %	0.25 [-0.23, 0.74]
Total (95% CI)	**37**		**30**			**100.0 %**	**0.25 [-0.23, 0.74]**

Heterogeneity: not applicable

Test for overall effect: Z = 1.03 (P = 0.30)

Test for subgroup differences: Not applicable

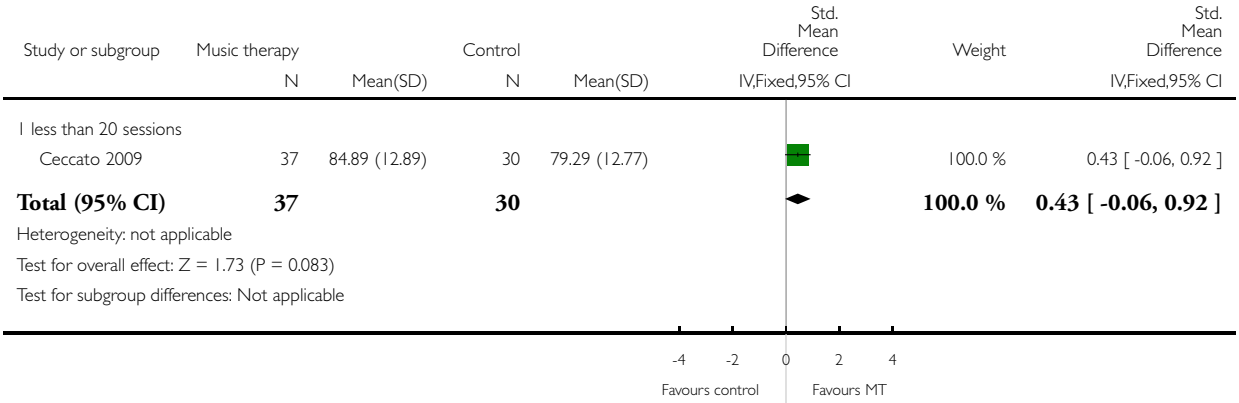


Analysis 1.15. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 15 Cognitive functioning: 3. Memory - average endpoint score (WMS, high score = good).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 15 Cognitive functioning: 3. Memory - average endpoint score (WMS, high score = good)

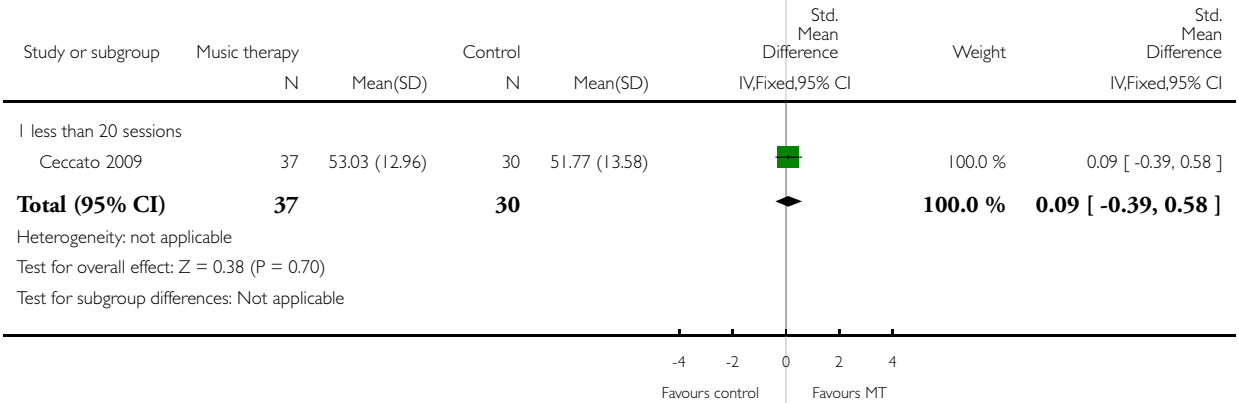


Analysis 1.16. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 16 Cognitive functioning: 4. Abstract thinking - average endpoint score (BCST, high score = good)).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 16 Cognitive functioning: 4. Abstract thinking - average endpoint score (BCST, high score = good))



Analysis 1.17. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 17 Patient satisfaction: Average endpoint score (CSQ, high score = good).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

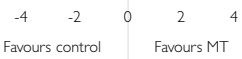
Outcome: 17 Patient satisfaction: Average endpoint score (CSQ, high score = good)

Study or subgroup	Music therapy N	Mean(SD)	Standard care N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 less than 20 sessions							
Talwar 2006	28	22 (5.32)	41	20.46 (4.31)		100.0 %	0.32 [-0.16, 0.80]
Total (95% CI)	**28**		**41**			**100.0 %**	**0.32 [-0.16, 0.80]**

Heterogeneity: not applicable

Test for overall effect: Z = 1.30 (P = 0.19)

Test for subgroup differences: Not applicable

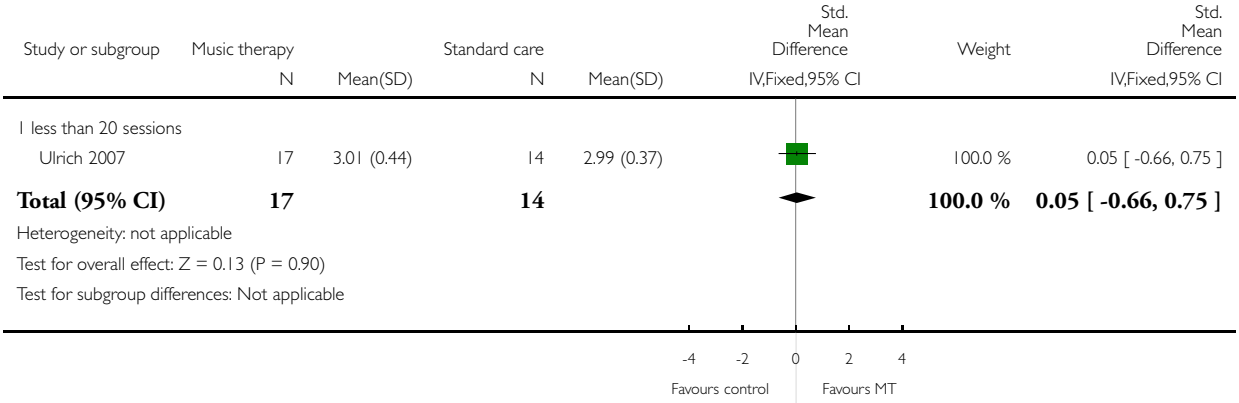


Analysis 1.18. Comparison 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months), Outcome 18 Quality of life: Average endpoint score (SPG, high score = good).

Review: Music therapy for people with schizophrenia and schizophrenia-like disorders

Comparison: 1 Music therapy versus standard care (all outcomes short-term - 1 to 3 months)

Outcome: 18 Quality of life: Average endpoint score (SPG, high score = good)



ADDITIONAL TABLES

Table 1. Music therapeutic approach: Further characteristics of included studies

	No. of sessions (offered/received)	Adequate method	Adequate training	Modality (active/receptive/both)	Form of therapy						Therapy process (fixed structure/process-oriented)
					Improvisation	Playing and/or singing pre-composed music	Songwriting	Listening to music	Verbal discussion/reflection of therapy process	Others	
Ceccato 2009	Max. 16 (1/week over 4 months)	Yes	Yes	Receptive	No	No	No	Central	No	No	Fixed structure
He 2005	Max. 30 (5/week over 6 weeks)	Yes	Unclear	Receptive	No	No	No	Central	Yes	Dancing, reading po-	Unclear

Table 1. Music therapeutic approach: Further characteristics of included studies (*Continued*)

										ems with music background	
Li 2007	Max. 30 (5/week over 6 weeks)	Yes	Unclear	Receptive	No	No	No	Central	Yes	No	Unclear
Talwar 2006	Max. 12 sessions (1/week over 3 months)	Yes	Yes	Active	Central	Yes	No	No	Central	No	Process-oriented
Tang 1994	19 sessions received	Yes	Unclear	Both	Yes	Yes	No	Central	Yes	No	Fixed structure
Ulrich 2007	7.5 sessions received	Yes	Yes	Active	Yes	Yes	No	No	Yes	No	Process-oriented
Wen 2005	Max. 30 (5/week over 6 weeks)	Yes	Unclear	Receptive	No	No	No	Central	Yes	Dancing	Unclear
Yang 1998	Max. 78 (6/week over 3 months)	Yes	Yes	Both	Yes	Yes	No	Yes	Yes	Learning musicology	Unclear

Adequate music therapeutic method: A "yes" indicates that the method applied considered both musical experiences and relational aspects as dynamic forces of change in music therapy. A "no" indicates that relational aspects are missing.

Adequate music therapy training: A "yes" indicates that the persons conducting the music therapy have attended an appropriate music therapy training. A "no" indicates that the person conducting the music therapy had limited or even no music therapy training.

APPENDICES

Appendix 1. Previous data collection and analysis

Data collection and analysis

Selection of studies

Three review authors independently inspected the citations identified from the search. Potentially relevant abstracts were identified and full papers ordered and reassessed for inclusion and methodological quality. Any disagreement was discussed and reported.

Data extraction and management

Two revew authors independently extracted data and, where further clarification was needed, contacted the authors of trials to provide missing information.

Assessment of risk of bias in included studies

Two review authors, again working independently allocated trials to three quality categories, as described in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2008). When disputes arose as to which category a trial was allocated resolution was attempted by discussion. When this was not possible and further information was necessary, data were not entered into the analyses and the study was allocated to the list of those awaiting assessment. Only trials in Category A (adequate) or B (unclear) were included in the review.

Measures of treatment effect

1. Binary data
For binary outcomes, a standard estimation of the fixed-effect risk ratio (RR) and its 95% confidence interval (CI) was calculated. The number needed to treat statistic (NNT) was also calculated. If heterogeneity was found (see under Assessment of heterogeneity), the following possible sources of heterogeneity were examined: i. treatment 'dosage' (20 sessions or more versus less than 20 sessions); and ii. treatment approach (quality of music therapy method and training).
2. Continuous data
2.1 Skewed data: continuous data on clinical and social outcomes are often not normally distributed. To avoid the pitfall of applying parametric tests to non-parametric data the following standards were applied to all data before inclusion: (a) standard deviations (SDs) and means were reported in the paper or were obtainable from the authors; (b) when a scale started from a finite number (such as zero), the SD, when multiplied by two, was less than the mean (as otherwise the mean was unlikely to be an appropriate measure of the centre of the distribution (Altman 1996)). Endpoint scores on scales often have a finite start and endpoint and this rule can be applied to them.
2.2 Summary statistic: for continuous outcomes a SMD between groups was estimated using a fixed-effect model. Again, if heterogeneity was found (see under Assessment of heterogeneity) possible sources of heterogeneity were examined.
2.3 Valid scales: continuous data from rating scales were included only if the measuring instrument had been described in a peer-reviewed journal and the instrument was either a self-report or completed by an independent rater or relative (not the therapist). Unpublished instruments are more likely to report statistically significant findings than those that have been peer reviewed and published (Marshall 2000).
2.4 Endpoint versus change data: where possible endpoint data were presented and if both endpoint and change data were available for the same outcomes then only the former were reported in this review.

Unit of analysis issues

Studies may employ 'cluster randomisation' (such as randomisation by clinician or practice) but analysis and pooling of clustered data poses problems: Authors often fail to account for intra-class correlation in clustered studies, leading to a 'unit of analysis' error (Divine 1992) where P values are spuriously low, confidence intervals (CI) unduly narrow and statistical significance overestimated causing type I errors (Bland 1997; Gulliford 1999). Although no cluster trials were identified for this review, the planned procedure for analysis would have been as follows. Where clustering was not accounted for in primary studies, we would have presented the data in a table, with an (*) symbol to indicate the presence of a probable unit of analysis error. We would have attempted to contact first authors of studies to seek intra-class correlation coefficients of their clustered data and to adjust for this using the 'design effect' (Gulliford 1999; Higgins 2008). If the intra-class correlation was not available, we would have used an external estimate from similar studies (Higgins 2008).

Dealing with missing data

We excluded data from studies where more than 30% of participants in any group were lost to follow-up (this did not include the outcome of 'leaving the study early'). In studies with less than 30% dropout rate, people leaving early were considered to have had the negative outcome for dichotomous outcomes, except for the event of death. We analysed the impact of including studies with high attrition rates (20% to 30%) in a sensitivity analysis. If inclusion of data from this latter group did result in a substantive change in the estimate of effect, these data were not added to trials with less attrition but presented separately.

Assessment of heterogeneity

Firstly, we considered all the included studies within any comparison to judge clinical heterogeneity. Then we visually inspected graphs to investigate the possibility of statistical heterogeneity. This was supplemented, primarily, by employing the I^2 statistic. This provides an estimate of the percentage of inconsistency thought to be due to chance. Where the I^2 estimate was greater than or equal to 75%, this was interpreted as evidence of high levels of heterogeneity (Higgins 2003). If it was not possible to explain this heterogeneity by i. number of sessions (20 sessions or more versus less than 20 sessions) or ii. treatment approach (quality of music therapy method and training), a random-effects model was used to describe and account for this unexplained heterogeneity.

Assessment of reporting biases

We entered data from all included studies into a funnel graph (trial effect against trial size) in an attempt to investigate the likelihood of overt publication bias (Davey 1997).

Data synthesis

Authors entered data in such a way that the area to the left of the line of no effect indicated a favourable outcome for music therapy when the outcome was negative (where "high" means "poor"), and reversed for positive outcomes (where "high" means "good").

Sensitivity analysis

We would have analysed the effect of including studies with high attrition rates in a sensitivity analysis, but no such studies were identified in this review.

WHAT'S NEW

Last assessed as up-to-date: 31 January 2011.

Date	Event	Description
12 December 2012	Amended	Contact details updated.

HISTORY

Protocol first published: Issue 1, 2003

Review first published: Issue 2, 2005

Date	Event	Description
31 January 2011	New citation required and conclusions have changed	Conclusions changed after new data entered.
31 January 2011	New search has been performed	Updated searches resulted in four new included studies.
24 April 2008	Amended	Converted to new review format.
24 January 2005	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

Karin Mössler - co-ordinated data extraction and classification and wrote the report.

XiJing Chen - helped with translation, data extraction and classification.

Tor Olav Heldal - helped with data extraction and classification.

Christian Gold - designed the protocol, co-ordinated the reviewing, developed and ran the search strategy, extracted and analysed data, and wrote the report.

DECLARATIONS OF INTEREST

Karin Mössler - clinically trained music therapist.

XiJing Chen - clinically trained music therapist.

Tor Olav Heldal - clinically trained music therapist.

Christian Gold - clinically trained music therapist.

SOURCES OF SUPPORT

Internal sources

- University of Bergen, Norway.
- Uni Research, Bergen, Norway.

External sources

- The Research Council of Norway, Norway.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

No differences between the protocol and the 2005 publication.

In the 2011 update (2010 search), clarifications have been added concerning the definition of the intervention and methods of analysis.

INDEX TERMS

Medical Subject Headings (MeSH)

Music Therapy [*methods]; Randomized Controlled Trials as Topic; Schizophrenia [*therapy]; Schizophrenic Psychology

MeSH check words

Humans