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**A systematic review of mental health and wellbeing outcomes of group
singing for adults with a mental health condition**

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Abstract**Background**

A growing body of research has found that participating in choir singing can increase positive emotions, reduce anxiety, and enhance social bonding. Consequently, group singing has been proposed as a social intervention for people diagnosed with mental health problems.

However, it is unclear if group singing is a suitable and effective adjunct to mental health treatment. The current paper systematically reviews the burgeoning empirical research on the efficacy of group singing as a mental health intervention.

Methods

The literature searched uncovered 709 articles which were screened. Thirteen articles representing data from 667 participants were identified which measured mental health and/or wellbeing outcomes of group singing for people living with a mental health condition in a community setting.

Results

The findings of seven longitudinal studies, showed that while people with mental health conditions participated in choir singing, their mental health and wellbeing significantly improved with moderate to large effect sizes. Moreover, six qualitative studies had converging themes, indicating that group singing can provide enjoyment, improve emotional states, develop a sense of belonging and enhance self-confidence in participants.

Conclusion

The current results indicate that group singing could be a promising social intervention for people with mental health conditions. However, these studies had moderate to high risk of bias. Therefore, these findings remain inconclusive and more rigorous research is needed.

Keywords: mental health, singing, qualitative research, longitudinal studies

Introduction

Recent studies indicate that engaging in singing groups has a wide range of benefits which have the potential to improve mental health and wellbeing¹⁻³. Participants in established choirs report benefits including positive affect, social support and cognitive stimulation⁴. Studies have found that while people are engaged in group singing, they experience increased positive emotions and immune functioning, as well as decreased negative emotions including anxiety⁵⁻⁷. Singing in groups is also reported to enhance social bonding⁸, which predicts improvements in anxiety and mental wellbeing⁹⁻¹⁰. These impacts may in part be due to music aiding emotion regulation and social connectedness⁷⁻⁸.

Based on these findings, choirs for people experiencing mental health conditions have been established with the hope that participating in group singing could help to reduce symptoms¹¹. This has coincided with a developing practice in the U.K. of arts-on-referral which involves GPs and other health professionals referring clients to arts community programs, such as singing, poetry, drama, craft and painting groups¹². These programs are used to support recovery from health issues through providing access to increased social supports and engagement in meaningful activities. Recent research on arts-on-referral has shown that while engaging in arts programs participants' mental wellbeing significantly increases¹². Arts programs may be particularly helpful in mental health as it could address the social disadvantage and isolation which often co-occurs with mental health conditions¹³. Social isolation and loneliness are significant perpetuating factors of mental health conditions and are associated with higher levels of depression and suicidality^{14,15}. Gaining social support through new social group memberships has been found to significantly reduce the risk of depression relapse¹⁶. Therefore, referring clients to arts programs, such as choir singing, may facilitate therapeutic goals, such as developing social support and confidence. However, for referrers it is important to know the evidence behind programs before encouraging clients to

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participate. This paper focuses on providing a review of the current literature on the impact of participating in community group singing on mental health symptoms and wellbeing in clinical populations.

Arts-based interventions for mental health have been attracting increasing interest by policy makers¹⁷, however, it is unclear if group singing is a suitable intervention for people with mental health conditions, or if there are contraindications to participating in music interventions^{18,19}. There is a growing number of studies examining community choirs for adults with mental health conditions^{11,20,21}. Thus far, there have been no systematic reviews specifically on the therapeutic impacts of group singing specifically for mental health conditions. Recent reviews on music therapy, indicate that when music therapy is added to the treatment of depression and schizophrenia, people can experience greater symptom improvement^{19,20}, however, it is yet to be established if community group singing can have similar outcomes.

Existing systematic reviews have found that community music and singing activities can promote mental health in people who are not diagnosed with a mental health condition. For example, it has been concluded that there is strong evidence that engaging in music and singing activities decreases depression, anxiety, and loneliness in older people; and moderate evidence that engaging in music and singing activities enhances wellbeing and decreases depression in young adults, marginalised groups and people with chronic physical health conditions^{2,3}. Music interventions may also help people diagnosed with cancer, coronary heart disease, and chronic obstructive pulmonary disease to manage anxiety²²⁻²⁴. Although literature reviews have concluded that singing is a promising intervention for psychological and social functioning, methodological issues in the literature and the lack of a systematic theoretical model have also been acknowledged^{1-3,25}.

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The current systematic review is the first to focus on the mental health impacts of group singing for people experiencing mental health conditions, including substance abuse. This review aimed to assess the viability of choir singing to improve mental health and wellbeing in people with a mental health condition. It also reviewed the methodology used in this research to make recommendations for future research in this emerging field.

Method

Inclusion Criteria

Participants. This literature review focused on people living with mental health conditions, therefore the participants in the studies must either have reported a mental health diagnosis, including substance use disorders, or score in the clinical range on mental health measures. Studies with participants who experienced other cognitive or neurological conditions were not included (e.g., dementia, intellectual disabilities). Participants were aged 18 years old or over. There were no limits on gender or ethnicity.

Intervention. This review assessed the effects of participating in a community singing group, therefore, the intervention used in the studies predominately involved group singing. Only interventions undertaken in community settings were included. Singing interventions implemented in a hospital or clinical context were excluded, as this review focused on non-clinical settings. Interventions were excluded if they involved other music modalities, additional therapy or singing individually, however, the groups could be facilitated by musicians, music educators, or music therapists.

Methodology. Studies with quantitative and qualitative methodologies exploring the impact of participating in a choir were included. Quantitative studies were confined to longitudinal studies which assessed participants mental health or wellbeing. These studies included a baseline measure when the participants started the singing intervention. Participants were then assessed after several weeks or months during which the participants

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had taken part in the singing intervention. Whether or not studies had a randomised control group was considered in the assessment of the quality of their methodology. Control or comparison samples included other interventions, treatment as usual, or a waiting list control. Studies using experimental designs that measured effects of a single choir session, such as effects on emotional states, were excluded.

Outcomes. We extracted outcome measures relating to mental health and wellbeing, including validated measures of anxiety, depression, mental wellbeing, general mental health or quality of life. Self-report outcome measures, diagnostic interviews and observational measures were included. State self-report or physiological measures of emotions were excluded as the literature review focused on long term outcomes. The measures of mental health used by the studies in this review were (see supplementary appendix for references):

- Clinical Outcomes in Routine Evaluation (CORE)
- Beck Depression Inventory II (BDI-II)
- Brief Symptom Inventory (BSI)
- Indigenous Risk Impact Screen
- Edinburgh Postnatal Depression Scale

The measures of mental wellbeing and quality of life included:

- Warwick-Edinburgh Mental Wellbeing Scale
- World Health Organisation Quality of Life – BREF
- Quality of Life Enjoyment and Satisfaction Questionnaire

In relation to qualitative studies, outcomes were the themes generated from the analysis.

Searches

Before commencing our searches, we pre-published our protocol on PROSPERO for methodological transparency (PROSPERO Record ID = 60115). We used multiple strategies to identify studies. First, electronic bibliographic databases were searched. The following

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databases were used: Scopus, Web-of-Science, PsycINFO, MEDLINE (Ovid), CINAHL, PubMed, The Cochrane Library, and Google Scholar. The search strategy included terms related to group singing (“choir”, “singing group”, “group singing”), mental health and wellbeing (“mental health”, “anxiety”, “depression”, “wellbeing”, “well-being”). Second, we conducted a manual search of relevant journals from 1990 to 2017. The searches began at 1990 as only one study relating to choir singing (from 1989) had been identified prior to 1997 in the database searches. These journals included “Psychology of Music”, “Musicae Scientiae”, “Journal of Music Therapy”, and “Arts and Health.” Third, we checked references in sources found and previous literature reviews. Fourth, we contacted researchers in the field to identify relevant unpublished studies and work in progress. The search through databases and other sources found 709 records.

Data extraction (selection and coding)

Initially titles and abstracts of the articles yielded during the literature searches were screened by the first author to decide if the study related to a group singing intervention with mental health or wellbeing outcomes for adults. Of the 709 records, 464 were excluded as they did not relate to the review topic. An additional 140 were removed as they were duplicates. The remaining 105 full-text articles were screened by the first author in relation to eligibility criteria. All authors reviewed the extracted information to decide which papers meet the inclusion criteria. See Figure 1 for flow chart of record screening.

A standardised form was used to extract data from the selected articles. The following information was extracted: sample size (and attrition rates), population (age, gender, and diagnoses), intervention (setting, type of facilitator, duration, and frequency), summary of outcomes, and analysis of risk of bias. In addition, for quantitative studies the following was recorded: type of control or comparison group, and outcome measures. Outcomes extracted

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included changes in the outcome variables over time, and differences between the treatment and control/comparison groups.

Half the articles (51 articles) were excluded as the study did not provide any indication of the mental health status of the participants. Mental health status was indicated in the remaining 55 studies by either diagnosis, scores on self-report measures or regular use of mental health services. Of these studies 28 articles were excluded due to most participants not indicating mental health problems. This was established by either having a low percentage of participants with a mental health diagnosis, or only few participants scoring above clinical cut off on a self-report measure of anxiety or depression. Five of the qualitative papers did not include any formal analysis of the data. Finally, there were eight studies which were excluded as they were not conducted in a community setting (e.g., mental health facility or prison). Moreover, most of the studies excluded due to being conducted in a mental health facility, also involved other music therapy activities beyond group singing (e.g., instrument use, improvising, and song writing). In the end, seven quantitative studies and six qualitative studies were included in the literature review. Due to the small number of studies and variety of self-report measures used, we were unable to aggregate the results in a meta-analysis.

Risk of bias (quality) assessment

The risk of bias assessments were conducted independently by the first two review authors. Then they were moderated by the third author and another colleague.

Quantitative studies. The Cochrane risk of bias tool was used to assess the risk of bias in the studies²⁶. This tool considers six domains of bias. The first two relate to the extent of selection bias. (1) Randomised sequence generation – the extent to which participants are randomly allocated to treatment or control condition. (2) Treatment allocation concealment – the extent to which allocation was concealed from participants and researchers prior to treatment. The following four domains relate to performance bias, detection bias, attrition

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bias, and reporting bias. (3) Blinding of participants and personnel – the extent to which the participants and researchers are unaware of the participants' conditions. (4) Blinding of outcome assessment – the extent to which the assessors are unaware of the allocated conditions. (5) Incomplete outcome data – the extent of attrition, and whether the extent and reasons for attrition varied between groups. (6) Selective reporting – the extent that certain outcomes were not reported.

Qualitative studies. To ensure that qualitative studies are of high quality, Tong, Sainsbury, and Craig²⁷ developed a 32-item checklist – Consolidated criteria for reporting qualitative research (COREQ). The quality of the qualitative papers was assessed using this checklist. This included taking measures to reduce experimenter bias (variation in researchers' background, and no conflict of interest), sample bias (choir members declining to participate, and sample size), biased interviewing (non-leading questions, confidentiality, repeat interviews, verbatim recordings, and adequate duration), biased analysis (methodological orientation, number of data coders, grounded analysis and data saturation), and reporting bias (quotations and clarity of themes).

Results

Quantitative studies

The seven studies represented data from a total of 576 participants in Australia and the United Kingdom. Overall, there were high risk of biases within all these studies. However, there were convergent results across the studies indicating that, while people participated in group singing, their mental distress decreased, and quality of life and wellbeing improved with moderate effect sizes, see Table 1. Whilst these results are encouraging of using group singing in mental health community care, they should be treated with caution until more robust evidence is acquired.

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Clift and Morrison²⁸ were the first to conduct a quantitative evaluative study on community choirs facilitated by singing instructors for mental health service users in the UK. The mental health of 42 choir members was tracked over seven months. These members were found to experience a moderate reduction ($d = 0.44$) in mental distress over that time period. Clift and colleagues¹¹ followed on from this study with a sample of 26 choir members participating in similar programs as their previous study. They replicated a moderate reduction in mental distress ($d = 0.39$), and additionally found a significant increase in mental wellbeing ($d = 0.29$).

A similar study was conducted in Australia by Williams, Dingle, Jetten, and Rowan²⁹ with a sample of 35 participants with chronic mental health conditions in a community choir run by a singing instructor. Their study found a moderate increase in mental wellbeing during the first year of taking part in the choir ($d = 0.52$). Williams and colleagues²⁹ compared the choir sample to a creative writing group (25 participants), also comprised of people experiencing mental health conditions. They found the rate of improvement in mental wellbeing was the same for both the choir and creative writing group, indicating that the two activities provided similar benefit to participants.

Petchkovsky, Robertson-Gillam, Kropotov, & Petchkovsky³⁰ recruited a sample of 32 people in the community with a diagnosis of Major Depressive Disorder (MDD). They had planned a randomised controlled trial however due to having a small number of participants, people on the waitlist were given the option to join the choir. Therefore, there were discrepancies between the intervention (21 participants) and control (11 participants) during the initial assessment, for example the controls had significantly worse quality of life than the choir participants. The choir was directed by a music therapist for eight weeks, and the focus of the program was predominantly on singing. Their results demonstrated that choir participants' depression reduced with a large effect size ($d = 0.83$). Moreover, after

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participating in the choir, participants' depression was significantly lower than the control, when controlling for baseline levels of depression. They found no significant results for quality of life between the choir and waitlist participants when controlling for baseline test scores, however, the analyses were underpowered. Petchkovsky and colleagues³⁰ supplemented their self-report findings with clinical diagnostic interviews by a psychiatrist and neurological markers of depression using quantitative electroencephalography (QEEG). Both of these additional outcome measures confirmed that participants involved in the choir experienced a reduction in depressive symptoms during the eight weeks they participated in the choir.

Grocke et al.²¹ recruited 73 participants of mental health service users living in the community and stabilised on medication in Australia. The study used a cross-over design where all participants alternated between group singing and standard care for thirteen weeks each. Standard care involved scheduled appointments with case managers and psychiatrists, as well as optional activities at the community clinic. Similar to Petchkovsky et al.³⁰, they had planned a randomised control trial, however due to slow recruitment in the later stages, they added a non-randomised group so there would be sufficient numbers. The intervention was primarily group singing facilitated by four music therapists, however, the therapists also composed songs with their participants. There were no significant differences in the extent to which psychiatric symptoms, measured by the Brief Symptom Inventory, decreased between when participants were in the singing group or receiving standard care. However, quality of life increased significantly more for participants when involved in group singing, than when they were on the waitlist ($d = 0.47$).

Likewise, Sun and Buys³¹ study with 210 Australian Aboriginal and Torres Strait Islanders also used a non-randomised comparison group due to ethical constraints, meaning that participants were allocated to the waitlist if they had work and other commitments

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preventing their enrolment in the singing groups. Consequently, the participants on the waitlist started with better mental health. Singing instructors directed the weekly singing groups for eighteen months. In the 108 people who participated in the singing groups, the proportion of people experiencing clinical mental distress significantly reduced from 54.8% to 38.3%. In the control condition, of 102 waitlist participants, there was no reduction in the proportion of people experiencing clinical mental distress (44.3% at preintervention and 45.7% at postintervention).

Fancourt and Perkins³² were the first to complete a full randomised controlled trial. Their study focused on 134 women with post-natal depression in London partaking in a singing group intervention which engaged both the mothers and their babies. Participants were randomly allocated to either the singing group, creative play group (comparison), or treatment as usual (control). Both the singing and creative play groups were run by the same professional instructors to ensure consistency between the conditions. The groups were conducted over ten weeks. Post-natal depression symptoms reduced over time regardless of what group the participants were allocated. However, among the women with moderate to severe depression symptoms ($n = 75$), the participants of the singing group experienced a significantly faster reduction in depression symptoms ($d = 0.78$) than the participants of the play group or treatment as usual.

Risk of Bias. There are consistent difficulties in this line of research relating to using an appropriate randomised control group, blinding the conditions, small sample sizes, and attrition. Some of these risks (such as random allocation) can be relatively easily addressed with sufficient resources. Though there have been difficulties in executing large randomised controlled trials in these studies, this methodology is ideal for inferring cause and effect. Due to the lack of randomised control groups in most of the studies reviewed, it is difficult to specify causality or effect size of the observed mental health improvements. However, even

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randomised control trials have self-selection limitations as participants must be willing to take part in a singing group before randomisation. Detection bias could also be reduced by blinding outcome assessors. In the studies reviewed, this was not reported, although Grocke et al.²¹ had an independent statistician analyse the data.

However, other limitations are more difficult to address. For instance, it is not possible to blind participants to the singing conditions to which they were allocated. This problem is inherent in any psychological or social intervention trial as participants must actively partake in these interventions³³. Therefore, participants could experience a placebo effect or otherwise be motivated to inflate the benefits of participating in these groups. Though this is an inherently difficult issue to address, methodology can be strengthened in clinical trials by understanding the mechanisms through which the treatment works, and including measures of bias to allow for post-hoc adjustment of confounding effects³³.

Attrition bias was also a common issue in the studies, though again this reflects a comparable problem experienced in many psychotherapy trials³⁴. This may occur due to positive reasons (e.g., gaining employment), or negative reasons (e.g., worsening mental health, family problems, or accommodation issues). Therefore, the final sample may be experiencing more or less problems in their lives than the people who dropped out of the study. Furthermore, 5 out of 7 of the studies had a relatively short follow-up period of 2 to 7 months. This makes the longevity of the impacts of choir singing difficult to determine. Despite these methodological limitations, the studies reviewed consistently demonstrate that choir participation can have a positive impact on mental health among people living with a mental health condition.

Qualitative

Outcomes. The six qualitative studies report similar themes relating to emotional, social and occupational wellbeing, see Table 2. These studies included two studies by Bailey

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and Davidson^{35,36} with choirs for homeless people in Canada. These were the first studies to draw attention to the therapeutic benefits of participating in an amateur choir for people experiencing mental health issues and homelessness. Both Dingle and colleagues²⁰ and Williams, Dingle, Calligeros, Sharman, and Jetten²⁷ explored the experience of participants in community choirs for people with chronic mental health conditions in Australia. Similarly, Plumb and Stickley³⁸ and Shakespeare and Whieldon³⁹ interviewed participants of community choirs in the UK. All the qualitative studies were on choirs run by singing instructors, without any focus on clinical treatment.

The qualitative studies in this review either used interpretive phenomenological analysis or thematic analysis to process interview data. There was considerable consensus between the studies on the types of perceived benefits that participants with mental health issues experience in a singing group. In particular, enjoyment of singing, experiencing improved emotional states, developing a sense of belonging, and self-confidence were reported in all the studies reviewed. These qualitative analyses provide a more in-depth understanding of the mechanisms by which group singing may improve mental health compared with studies using standardised scales.

These studies focused primarily on the positive impacts of participating in group singing. However, performance anxiety was noted by most studies as a challenging aspect of group singing for people with mental health conditions. Potentially anxiety could be a barrier to some people participating in singing programs, however, these studies also indicate that overcoming performance anxiety while participating in choir singing could be an empowering experience. Moreover, to reduce pressure on participants, the programs place more emphasis on enjoyment than quality of the singing.

Risk of bias. The methodology of the qualitative studies reviewed tended to be sound, though this is partly due to the exclusion of qualitative studies where details were not given

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on how the data were processed. Strengths of the studies included that they were conducted by independent researchers, used data grounded analysis, had confidential interviews that were audio recorded, and reported both quotes and themes clearly in their articles. However, weaknesses were apparent in some of the studies which had researchers with backgrounds in only one academic discipline, insufficient coders to check reliability of the themes, leading questions in the semi-structured interview, only interviewing participants once, and not reporting if data saturation was achieved. Overall, the studies were of an acceptable quality, and demonstrated a high degree of consensus in themes found between each of the four studies. Although efforts were made to reduce experimenter bias, it can be argued that it is unavoidable for some experimenter subjectivity to influence qualitative research.

Discussion

The results of this literature review indicate that choir singing could be a promising adjunct to community-based mental health treatment. People participating in these programs ascribed improvements in their emotional, social and occupational wellbeing to participating in group singing. Moreover, when people with mental health conditions were engaging in these programs their mental health and wellbeing significantly improved. No contraindications for participating in these programs have been identified by the reviewed studies, however, performance anxiety was recognised as a challenge. Therefore, to harness the benefits of group singing it is important for facilitators to be mindful of the anxiety that participants may experience.

The overall quality of evidence in this review is of moderate to high risk of bias, therefore, further research is needed to gain stronger evidence of the impacts of choir singing on mental health. This review demonstrates that this area of research is growing as publications have become more frequent in recent years. The field has been developing from exploratory qualitative studies, to more rigorous research trials. This research extends on

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previous findings which have found similar wellbeing benefits of choir participation for older adults, young adults, and people with physical health conditions^{1-3,22-24}.

Implications

The studies reviewed indicate that choir singing can help people with mental health conditions to overcome problems pertaining anxiety, depression, and social disconnection. Despite social disadvantage and isolation contributing to the onset and maintenance of mental health conditions, there are limited evidence-based social interventions in mental health care¹⁴. It is imperative that the social difficulties which perpetuate mental health conditions are addressed, as 14% of the global burden of disease is attributed to neuropsychiatric disorders, such as depression, anxiety, psychoses and substance use⁴⁰. There is growing evidence that arts-based interventions may be a cost-effective intervention for mental health¹⁷. However, the cost-effectiveness of choir singing is yet to be assessed for people with mental health conditions in community-integrated settings. The current review supports that choir singing could promote mental health recovery by providing social connectedness, emotional enhancement, and meaning in life. Moreover, this review demonstrates that these programs do not need to be facilitated by mental health professionals. In fact, non-clinical groups may provide a non-stigmatising solution to providing social support to people living with a mental health condition in the community.

Strengths and Limitations of the Review

This review used a comprehensive search strategy, though there may be studies in the grey literature and in the process of publication which were not identified. Thus, it is possible that publication bias may have affected the findings in this literature review. Nevertheless, through contacting authors in this area we attempted to reduce this bias. Moreover, by pre-registering our protocol on PROSPERO we were explicit in advance of our intentions. As was predicted in our protocol, there was not an adequate number of studies to conduct a meta-

analysis. The limited number of studies in the area precluded reaching definite conclusions. We aimed to increase objectivity when assessing the quality of the studies by using pre-determined criteria in the Cochrane risk of bias tool for quantitative studies, and the COREQ checklist for qualitative studies. These were independently assessed by the authors to reduce bias. However, the screening of the searches was only conducted by one author. Furthermore, the review authors are also authors of five of the included studies in the review.

Future Research Directions

The studies reviewed provided consistent conclusions that choir singing can help people with mental health conditions improve their mental health and wellbeing, however there were major limitations in their methodology. Most of the studies included in the review either did not have a control group or the control was not fully randomised. Therefore, there is an ongoing need to conduct more fully randomised controlled trials, such as Fancourt and Perkins³², with a large sample. Future randomised controlled trials could test the cost-effectiveness of group singing interventions in mental health care. Furthermore, longer long-term follow-up assessments could be used to track the longevity of the impacts of choir singing and impacts on hospital admissions for psychiatric relapse. Future research could also test the consistent benefits identified in the qualitative research. For example, future studies on choirs could measure belonging, self-efficacy and purpose. Moreover, comparing choir singing and other group activities could be helpful to ascertain whether these benefits are unique to choirs or are experienced in other arts and recreational group activities.

Improvements could also be made to outcome measurement. Assessors should be blind to the participants conditions. Furthermore, researchers could follow Petchkovsky and colleagues³⁰ by using clinical and objective assessments which could provide further information on the validity of mental health outcomes assessed by self-report questionnaires. Some of the qualitative studies have also found that participants report cognitive benefits,

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therefore, cognitive assessments may also be explored as an outcome measure. Overall, it would be of value to have more consistency in outcome measures used in this field, to build stronger links between studies.

Regarding the samples used, research is yet to explore if there are any differences between people with various diagnoses. It is unclear if choir singing may lead to larger or lesser impacts depending on the severity of the problems faced. Although none of studies reviewed indicated any negative impacts of choir singing, further research could explore if there are any contraindications for participating in a group singing intervention. Finally, the studies found in this review are all from English-speaking countries (Australia, UK and Canada), therefore research in more diverse cultural settings is needed. Choir singing is likely to be culturally appropriate in a wide variety of backgrounds. For instance, Sun and Buys³¹ had high retention rates with Aboriginal and Torres Strait Islander Australians.

In conclusion, group singing interventions for people with mental health conditions is a burgeoning field of research. The current results are promising, indicating that many people with mental health conditions have experienced benefits to their mental health and wellbeing through participating in community singing groups. Therefore, choir singing is a viable option for arts-on-referral in mental health. However, further research is needed to determine the cost-effectiveness, how far these findings can be generalised, and to define indicators on when to refer to group singing for mental health conditions.

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Conflicts of Interest

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None declared

Key points

- Seven longitudinal studies have demonstrated that mental health and/or wellbeing improved during participation in community singing groups
- Participants consistently reported across six qualitative studies that group singing enhanced their positive emotions, sense of belonging and confidence
- These studies had a significant risk of bias and more rigorous research is needed
- Choir singing is a viable option for arts-on-referral in mental health

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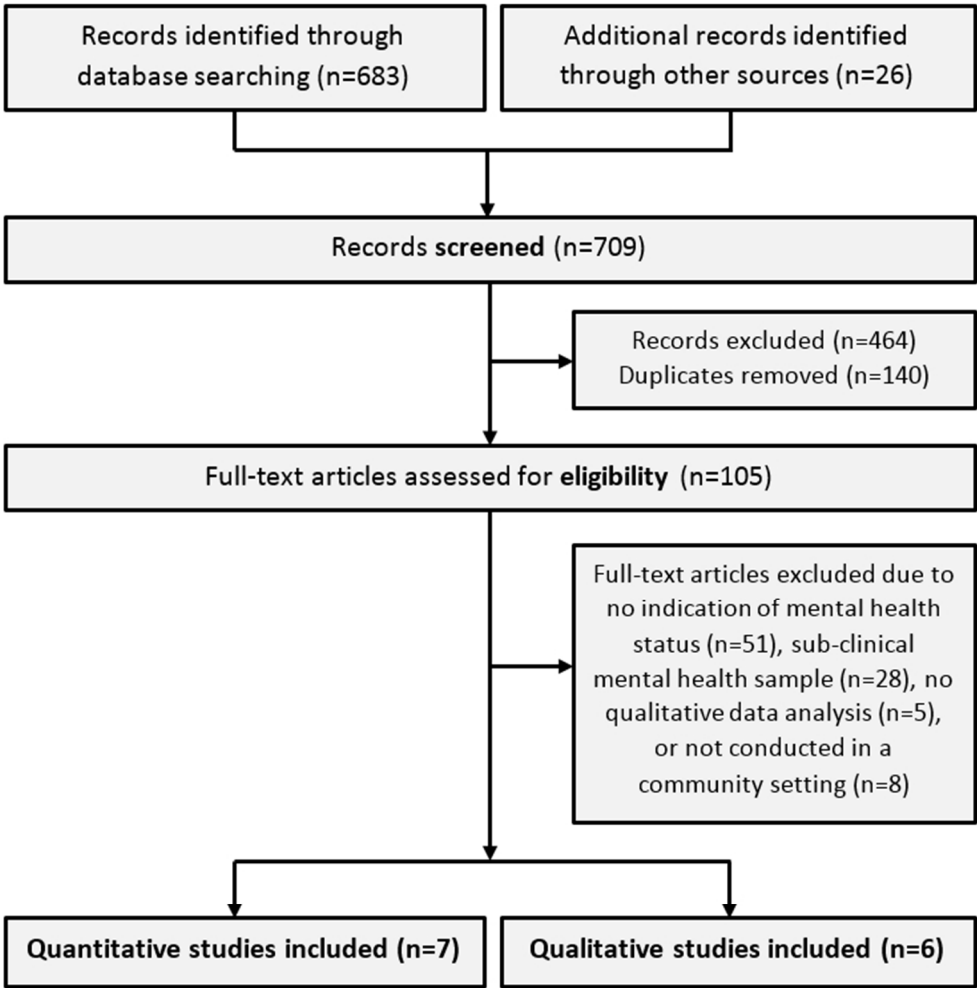


Figure 1. Flow chart of record screening

Table 1. Details of quantitative studies and analysis of risk bias (Cochrane)

	Clift & Morrison, 2011	Petchkovsky et al., 2013	Grocke et al., 2014	Sun & Buys, 2016	Clift et al., 2017	Fancourt & Perkins, 2018	Williams et al., 2018
N	42 choir	21 choir + 11 waitlist	48 choir + 25 waitlist	108 choir + 102 waitlist	26 choir	48 singing + 42 play + 44 TAU	34 choir +25 writing
M _{age}	60	60	Not reported	46	55	35	46
Female	74%	91%	60%	68%	73%	100%	51%
Population	Community mental health service users	Major Depressive Disorder diagnosis in community	Community mental health service users	Aboriginal and Torres Strait Islander mental health service users	Community mental health service users	Mothers with Post-Natal Depression	Community mental health service users
Country	UK	Australia	Australia	Australia	UK	UK	Australia
Duration	7 months	8 weeks	13 weeks	18 months	6 months	10 weeks	15 months
Mental health measure	CORE - OM	Beck Depression Inventory II	Brief Symptom Inventory	Indigenous Risk Impact Screen	CORE - 10	Edinburgh Postnatal Depression Scale	None used
Outcomes	Mental distress significantly improved during participation in the choir with a moderate effect size ($d = 0.44$)	Depression was lower after choir participation than in the control when controlling for pre-treatment scores. There was a large reduction in depression ($d = 0.83$)	Mental health did not significantly improve more when participants were participating in group singing than when they were on waitlist	Percentage of people experiencing clinical levels of psychological distress significantly reduced in the choir, but did not on the waitlist.	Mental health significantly improved during participation in the choir with a moderate effect size ($d = 0.39$)	Mothers with moderate to severe PND experienced faster improvement in symptoms when participating in singing ($d = 0.78$) as opposed to play group or TAU	
Wellbeing measure	None used	WHOQOL – BREF	QoL Enjoyment and Satisfaction Qu.	None used	Warwick-Edinburgh Mental Wellbeing	None used	Warwick-Edinburgh Mental Wellbeing
Outcomes		No significant differences in QoL between choir and control after treatment, when controlling for pre-treatment scores.	QoL improved significantly more during group singing than on waitlist with a moderate effect size ($d = 0.47$)		Mental wellbeing significantly improved during participation in the choir with a small effect size ($d = 0.29$)		Mental wellbeing significantly improved in the choir, and at the same rate as the creative writing group ($d = 0.52$)

Random sequence generation	High risk: No control group	High risk: Planned randomised control, but then gave controls the option to join the choir.	Moderate risk: 52/73 participants were randomly allocated	High risk: Comparison group were allocated based on having other commitments	High risk: No control group	Low risk: Randomised control trial	High risk: No control group; participants chose to join choir or creative writing group
Treatment allocation concealment	High risk: No control group	Unclear risk: No explanation of concealment	Unclear risk: No explanation of concealment	Unclear risk: No explanation of concealment	High risk: No control group	Unclear risk: No explanation of concealment	High risk: No random allocation
Blinding of participants and personnel	High risk: Not possible for participants to be blinded	High risk: Not possible for participants to be blinded	High risk: Not possible for participants to be blinded	High risk: Not possible for participants to be blinded	High risk: Not possible for participants to be blinded	High risk: Not possible for participants to be blinded	High risk: Not possible for participants to be blinded
Blinding of outcome assessment	Unclear risk: Use self-report measures, blinding not reported	Unclear risk: No mention of concealment from psychiatrists undertaking clinical interviews and QEEGs	High risk: Data collection was not concealed but an independent statistician analysed the data	Unclear risk: Use self-report measures, blinding not reported	Unclear risk: Use self-report measures, blinding not reported	Unclear risk: Use self-report measures, blinding not reported	High risk: Use self-report measures, data collection was not blinded
Incomplete outcome data	Moderate risk: 30% of all people participating over the year included due to participants joining and leaving at different times.	Low risk: 100% retention rate; only one drop out before data collection began	Moderate risk: 74% retention rate; Reasons for attrition: family issues, other commitments, mental illness, accommodation issues, and death	Low risk: 89% retention rate	Moderate risk: 62% retention rate; Reasons: participants leaving the group or irregular attendance	Low risk: 92% retention rate; No difference at baseline between attrition and retention	Moderate risk: Low retention rate (56%); Reasons: other commitments, and health; Attrition not significantly different from retention at baseline
Selective reporting	Low risk: Reported all relevant outcomes	Low risk: Reported all relevant outcomes	Low risk: Reported all relevant outcomes	Moderate risk: M(SD) of MHPD not included (only % over cut off)	Low risk: Reported all relevant outcomes	Low Risk Reported all relevant outcomes	Low risk: Reported all relevant outcomes

Table 2. Details of qualitative studies and analysis of risk bias (COREQ)

		Bailey & Davidson, 2002	Bailey & Davidson, 2005	Dingle et al., 2013	Plumb & Stickley, 2017	Shakespeare & Whieldon, 2017	Williams et al., 2018
N		7	8	21	10	20	25
M _{age}		52	52	47	Not reported	Not reported	46
% Female		0%	25%	57%	Not reported	70%	51%
Population		Homeless with substance use or mental health issues	Homeless with substance use or schizophrenia	Community mental health users	Community mental health users	Community mental health users	Community mental health users
Country		Canada	Canada	Australia	UK	UK	Australia
Emotional Wellbeing							
Enjoyment of singing	6	X	X	X	X	X	X
Uplift mood/reduce stress	6	X	X	X	X	X	X
Self-expression	5	X	X	X		X	X
Performance anxiety	4	X	X	X			X
Diversion from worries	3	X	X		X		
Social Wellbeing							
Belonging to the group	6	X	X	X	X	X	X
Connection to community	4	X	X	X		X	
Social support/ acceptance	4		X		X	X	X
Improved social functioning	4	X		X		X	X
Occupational Wellbeing							
Self-efficacy/confidence	6	X	X	X	X	X	X
Structure/purpose	5	X	X	X		X	X
Learning/improved ability	5	X	X	X		X	X
Accomplishment	5	X		X	X	X	X
Health benefits	4	X		X	X	X	
Cognitive benefits	3	X	X				X

[illegible]

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