さまざまな健康状態にある人々を対象とした歌唱介入の効果に関する文献検討

資　料

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A literature review of the effects of singing intervention for healthy people or patients with various health conditions

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I　Background

Singing, which is a form of sustained speech, is so natural to humans that it has a become part of everyday life, regardless of whether it is done for pleasure, ritual or profit. Or it is spontaneous reaction that a mother sings a lullaby for a baby to sleep. Thus, singing is a healing behaviour. In recent years, singing has been utilised for those with various health issues or for patients under hospital-based care (Gale et al., 2012; Lord et al., 2010; Bonilha et al., 2009; Kenny et al., 2004).

Performing active music therapy interventions, such as singing, song writing and instrumental improvisation, can influence patients to express emotions, pain relief and a variety of recovery functions (Brad et al., 2011). Several research studies regarding the use of singing in healthy people as well as patients with psychological/physical problems have shown positive results (Gale et al., 2012; Lord et al., 2010; Kenny et al., 2004). For example, the psychological effects of singing intervention in these aforementioned studies included the following: 1) providing comfort and pleasure; 2) reducing anxiety and fatigue; 3) promoting enthusiasm for health management; 4) releasing stress; and 5) enhancing the quality of life (QOL). However, these studies were somewhat limited owing to their quasi experimental (Arakane et al., 2009; Saji et al., 2008) or qualitative approaches (Gale et al., 2012; Carolan et al., 2010). In fact, the experimental studies mostly measured respiration or heart rates, while those that focused on singing include less than 20 adults (Gale et al., 2012; Lord et al., 2010).

Therefore, because some trials have shown that singing can potentially improve health issues (e.g. perceived pain variables (Kenny et al., 2004)). However, at present, there are only two qualitative studies on singing intervention for antenatal women (Carolan et al., 2010; Ravelli et al., 2004). Therefore, it is necessary to investigate research examined and clarified the effects of singing

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intervention on people with various health conditions.

Ⅱ Objectives

The objective of this review is to investigate the effects of singing intervention on the emotional state, well-being, quality of life and physiological functions of people who are healthy or with various health issues. In order to examine the reliability of evidence, particular effect of singing, measurements of the effects and methodological approaches for intervention would have to be clarified. This review would indicate the aspects of singing to be considered in future nursing intervention for antenatal women.

Ⅲ Methods

1. Criteria for considering studies for this review

1) Types of studies

All published randomised controlled trials (RCTs) were included. In the absence of RCTs, the criteria were extended to controlled clinical trials, cross-over studies, prospective studies and comparative studies as well as pre- and post-test.

2) Types of participants

This review included studies of men and women who were healthy people or patients diagnosed with chronic obstructive pulmonary disease (COPD), cancer, chronic pain and traumatic brain injury. The singing intervention included music therapy as a therapeutic program or cultural events in hospitals, outpatient departments or community settings.

3) Types of interventions

All studies in this review included standard care combined with singing and were compared with the following: (1) only standard care and (2) standard care combined with other therapies. The activities included listening to live or pre-recorded music, performing music with instruments, singing, improvising and composing, in addition to respiratory drills. The singing intervention, led by a vocal teacher or music therapist, was conducted in a group (choir) setting in a hospital-based program.

4) Types of outcome measures

(1) Primary outcome measures

Singing intervention improved the emotional state and well-being of the participants, as well decreased their anxiety according to the Hospital

Table 1. Electronic databases search strategy (conducted on 25/6/2013)

#	Search Strategy	MEDLINE	CHINAHL	CENTRAL	ProQuest	JAMAS
1	Randomised controlled trails AND adults AND human	409	1,882	33,062	84,693	914
2	#1 NOT healthy adults	367	1,768	30,797	46,948	890
3	#1 NOT patients AND hospital care	213	1,140	1,247	46,193	914
4	#1 AND comfort AND comfort care	0	0	53	4,313	0
5	Comfort AND comfort care AND music AND music intervention OR music therapy	2	2,724	724	11,964	5
6	Randomised controlled trials AND sing OR singing OR song OR songs AND singing therapy	70,099	2,117	179	55,252	0
7	Controlled clinical trials OR clinical trials OR #6	70,574	2,169	88,938	68,185	78,177
8	Healthy adults AND sing OR singing OR song OR songs AND singing therapy	70,092	2,114	179	55,460	0
9	Patients AND hospital care AND sing OR singing OR song OR songs AND singing therapy	71,146	2,132	179	56,060	0
10	#9 AND adults AND human	71,146	3,132	179	55,345	0
11	sing OR singing OR song OR songs AND pregnancy OR antenatal	90,475	6,911	1,433	79,422	209

Anxiety and Depression (HAD) scale (Bjelland et al., 2002) and the Rating Anxiety in Dementia (RAID) (Shankar et al., 1999). In addition, it improved the QOL of COPD and Parkinson's patients, which was measured by the St. George's Respiratory Questionnaire (SGRQ) (Jones et al., 1992) and the Parkinson's Disease Quality of Life Questionnaire (PDQL) (de Boer et al., 1996), respectively.

(2) Secondary outcome measures

Secondary outcome measures in this review included the following:

① Physiological outcomes: improving physical functions (e.g. respiration function with COPD patients, the cognitive state of elderly people and those with dementia, the motor function of patients with Parkinson's disease and the behavioural function)

② Psychological outcomes: improving mental state (e.g. general mental health and mental state affected by disease characteristics)

2. Search method for identification of studies

An electronic search was conducted on June 25, 2013 in the MEDLINE, CHINAHL, COCHRANE, CENTRAL, ProQuest Digital Dissertations and JAMAS (Japan Medical Abstracts Society; Igaku Chuo Zassi) databases. As shown in Table 1, these databases include studies dating from 1980 to the third week of June 2013. A hand search of the last five years in the Japanese Journal of Music Therapy produced no pertinent studies. Any language restrictions were not applied.

3. Data collection and analysis

1) Selection of studies

One author of this review conducted the electronic searches while two review authors independently assessed the full text of articles identified by the search. All studies were critically analysed by applying a standard tool for assessing methodological quality, randomisation process and measurements. Finally, one author evaluated the selection for disagreements or uncertainties. Excluded studies were recorded along with their reason for exclusion.

2) Data extraction and management

One author of this review independently extracted data from the selected studies, whilst two review authors discussed any differences in the data extraction. The following data were extracted: general information (author, years of publication, title, journal (title, volume, pages) and language of the publication); trial information (study design, randomisation method, allocation concealment method and blinding); intervention information (types of intervention, singing technique, other music combinations) song selection, length of intervention and comparison intervention); participant information (total sample size, number of the experimental or control group, gender, age, diagnosis, level of health or disease, settings and inclusion criteria); and statistical information (mood and emotion, level of symptoms (pain responses) and parameters of lung and respiratory functions).

4. Assessment of risk bias included studies

1) Method of randomization

Randomisation was rated as appropriate if the participants were equally selected.

2) Allocation concealment

Allocation was assessed as adequate, unclear or inadequate. Adequate indicated the situation wherein a method included randomisation, and serially numbered, sealed envelopes, while unclear denoted a situation wherein authors did not adequately report on the method of concealment.

3) Blinding

In this review, blinding was marked as 'yes', 'no' or 'unclear' as it pertained to the blinding of outcome assessors for the objective.

4) Incomplete data addressed

Each study was rated depending on the numbers and reasons for the dropouts/ withdrawals.

5. Dealing with missing data

Data were analysed by focusing on the endpoint, which included only the participants for whom final data point measurements were obtained.

6. Assessment of heterogeneity

Differences between the singing and control groups were calculated and estimated. The results of the I-squared test ($I^2 > 50\%$) indicated significant heterogeneity.

7. Assessment of reporting biases

To check the existence of publication bias, a funnel plot was utilised. However, this proved to be ineffective because the outcomes were based on a limited number of studies.

8. Data synthesis

The main outcomes in this review were presented as continuous variables while the mean differences (MD) for the results were calculated using the same scales. The summary weighted odds ratio and 95% confidence intervals (CI) (fixed-effect model) were calculated (Cochrane statistical package, RevMan version 5.2), and the level of heterogeneity was determined by using the I-square test. The following QOL comparison was made: singing versus control (standard care).

9. Subgroup analysis and investigation of heterogeneity

The following a priori subgroup analysis compared the following:

・Participants type (healthy people or patients with various health issues)

・Type of singing intervention (e.g. short term: less than one month; medium term: 1-6 months; long term: > 6 months; and type of training)

However, this proved to be ineffective owing to insufficient number of studies.

10. Sensitivity analysis

Methodological quality was examined by using sensitivity analysis in which the results included and excluded lower-quality studies.

Ⅳ Results

1. Description of studies

1) Results of the search

The electronic and hand searches identified 1,795 citations. Of which, 26 references were retrieved for possible inclusion. No unpublished studies were identified, and a number of trials that focused on music intervention without singing were excluded. In addition, several trials reported on the effects of singing such as symptom relief, mood improvement, and decreased tiredness. However, they were also excluded because the majority of these trials consisted of one group pre- and post-test design or lacked RCT. Thus, the search initially identified 26 relevant studies. Of which, five were eligible for inclusion.

2) Included studies

Five studies with a total of 259 participants were included. Three studies focused primarily on singing intervention (Bonilha et al., 2009; Lord et al., 2010; Noice et al., 2007) and two studies conducted music therapy activities, which included singing for 10 min or more (Cooke et al., 2010; Pacchetti et al., 2000). Four studies included people with an average age of 71 years (Bonilha et al., 2009; Lord et al., 2010; Noice et al., 2007; Pacchetti et al., 2000), while one study included participants ranging between 75 and 94 years of age (87.2%) (Cooke et al., 2010). In three studies, 38% of the participants were females (Bonilha et al., 2009; Cooke et al., 2010; Pacchetti et al., 2000), and the trial sample ranged from 13 to 40 participants. In one study, music intervention was provided to healthy elderly people living in subsidised retirement homes (Noice et al., 2007), whereas the other studies offered singing to patients with various diagnoses such as COPD (Bonilha et al., 2009; Lord et al., 2010), dementia (Cooke et al., 2010) and Parkinson's disease (Pacchetti et al., 2000).

These selected studies were conducted in five different countries: Brazil (Bonilha et al., 2009), Australia (Cooke et al., 2010), United Kingdom (Lord et al., 2010), United States (Noice et al., 2007) and Italy (Pacchetti et al., 2000).

The singing interventions included singing exercises (song-singing, vocalisation and vocal training) and respiratory exercises, which were combined with breathing techniques (Bonilha et al., 2009; Lord et al., 2010) for COPD patients or healthy elderly people (Noice et al., 2007), relaxation (Bonilha et al., 2009; Lord et al., 2010; Pacchetti et al., 2000), visualisation (Pacchetti et

Table 2. Characteristics of included studies

Study	Methods	Participants	Interventions	Outcomes	Adequate sequence generation?	Allocation concealment?	Blinding?	Incomplete outcome data addressed?
Bonilha 2009 (Brazil)	RCT two-arm parallel group design	Adults with COPD. N singing group: 15 N control group: 15 Mean age: not reported Sex: 6 F, 24 M	• **Singing group:** enrolled in weekly classes with an approximate duration of 1 h for at least two weeks. The classes were coordinated by a vocal teacher and a physiotherapist. The patients participated in the classes as a group and the activities included relaxation, singing related respiratory exercises, vocal exercises, vocal training. • **Control group**: attended a similar number of weekly classes. These lessons were coordinated by a handcraft artist and the same physiotherapist.	• Spirometry with measurements of FVC, FEV, FEV/FVC, IC, and ERV • Maximal aspiratory and expiratory pressures at the mouth level; PI_{max}, PE_{max} • Artificial blood gases while breathing room air; BDI • St. George's Respiratory Questionnaire	Unclear, not reported	Unclear, not reported	Unclear, not reported	Yes, 13 patients discontinued the study owing to non-pulmonary medical conditions or acute COPD exacerbation
Cooke 2010 (Australia)	RCT Randomized cross-over design	Adults (older people) with dementia. N music (included singing) group: 24 N reading control group: 23 Mean age: not reported, aged 75-94. Sex: not reported, but 70.2% were female.	• **Music group:** the 40-min activities ran for three mornings a week for eight weeks. The intervention was a group music program delivered by two musicians. Each music session involved 30 min of musician-led song-singing and 10 min of active listening to pre-recorded instrumental music. • **Reading control group:** led by a trained facilitator, the participants were involved activities such as reading the local news and short stories, telling jokes and undertaking quiz activities.	• CMAI-SF: an internationally validated instrument developed for use in nursing homes to measure behavioural disturbance in people with dementia. • RAID: a specifically designed instrument for measuring anxiety symptoms in people with dementia • MMSE: Mini -Mental State Examination	Yes, using a computer-generated programme	Yes, conducted by the study's biostatistician who was blinded to the identity of the potential participants	Yes, all of the data collectors were blinded to the group assign ments	Yes, three withdrawals due to death and those who refused attendance
Lord 2010 (U.K)	RCT 2-arm parallel group design	Adults with COPD. N singing group: 15 N control group: 13 Mean age: 67.3 Sex: not reported	• **Singing group**: attended a hospital-based workshop (led by a vocal teacher (PC)) twice a week for six weeks. Each session lasted approximately one hour and included instruction regarding vocalisation, posture and relaxation.	• Hospital Anxiety and Depression (HAD) Questionnaire • St. George's Respiratory Questionnaire • Short Form 36 Questionnaire	Yes, using block randomisa-tion	Yes, consecutive sealed envelopes	Yes, assessed by the same respirator	Yes, three withdrawals due to those who did not

			• **Control group**: had no further intervention	• Functional exercise capacity using the incremental shuttle walk test (ISWT) • Time to recovery of oxygen saturation, Borg dyspnoea score • heart rate following a walk • Control of breathing: Breath hold test, and single breath counting subjects			y physio-therapists, who were blinded to treatment allocation.	wish to continue with the study and five who did not attend the final assessment.
Noice 2007 (U.S)	Quasi-randomised trial three-arm parallel group design	Older adults living in subsidised retirement homes. N music group: 40 N theatre group: 42 N control group: 40 Mean age: 81.7 Sex: not reported	• **Music group**: teaching proper breathing techniques, supervising vocal exercises and providing song lyrics to refresh participants' memories of the songs known to most Americans. • **Theatre group**: increasingly demanding exercises designed to have participants experience the essence of acting. • **Control group**: no treatment controls The intervention included a total of 10 sessions (eight, one-hour classes held twice a week, plus the pre- and post-tests)	• Word List Recall • Delayed Word List Recall • Category Fluency • Digit Span • Story Recall Task • Problem solving • Self-reported Personal Growth • Memory Controllability Inventory • Lifestyle Activities Questionnaire	Unclear, not reported	Unclear, not reported	Unclear, not reported	Unclear, 15 dropouts, but the reasons were not reported
Pacchetti 2000 (Italy)	RCT Prospective randomised controlled study	Adults with Parkinson's disease. N music therapy:16 N physical therapy:16 Mean age: 62.4 Sex: 4 F, 12 M	• **Music therapy group (MT)**: 10 min listening to relaxing music and visualising images; 10 min choral singing and doing vocal exercises as well as working on facial expressions and breathing; 15 -20 min working on rhythmic movements; 30 min actively listening to music; 30 -40 min making free body expressions to melodic and rhythmic music; 20 -30 min in conversation; and 10 min using all of the instruments while adopting a free technique. • **Physical therapy group (PT)**: a series of passive muscle stretching exercises; specific motor tasks for hypokinesia; weight shifting and balance training for posture; movement strategies to prevent falls as well as to initiate and maintain gait. The MT group participated in 13 weekly sessions lasting approximately 2 h each. The PT group attended weekly sessions lasting approximately 1.5 h each.	• UPDR-MS, UPDR-ADL: motor impairment and disability • HM: emotional functions • PDQL: quality of life	Yes, using a computer-generated programme number list	Yes, consecutive sealed envelopes	Yes, blinded to the patient's study group	Unclear, whether there were any participant withdrawals

al., 2000), posture (Lord et al., 2010) and conversation (Cooke et al., 2010; Pacchetti et al., 2000). Familiar songs or national folk songs were chosen on three studies, while no descriptions of the songs were provided on two studies. Other music interventions included active listening (Cooke et al., 2010; Pacchetti et al., 2000), body movement to melodic and rhythmic music (Pacchetti et al., 2000), and using musical instruments (Cooke et al., 2010; Pacchetti et al., 2000). In two studies, the COPD participants were instructed to practice the songs at home (Bonilha et al., 2009; Lord et al., 2010). For all studies, the participants attended the classes as a group, and these classes were coordinated under the following situations: a vocal teacher and a physiotherapist (Bonilha et al., 2009); two musicians (Cooke et al., 2010); no musicians but just an instructor (Noice et al., 2007); and a neurologist (Pacchetti et al., 2000).

The number of sessions per week varied between the five studies: weekly (Bonilha et al., 2009; Pacchetti et al., 2000), twice a week (Lord et al., 2010; Noice et al., 2007) and three times a week (Cooke et al., 2010). The sessions were 40 min (Cooke M, et al., 2010), 1 h (Bonilha et al., 2009; Lord et al., 2010) and 2 h (Pacchetti et al., 2000) in length. The maximum number of sessions were 2 (Bonilha et al., 2009), 12 (Lord et al., 2010), 13 (Pacchetti et al., 2000), 16 (Noice et al., 2007) and 24 (Cooke et al., 2010).

Four studies were RCTs that used parallel group designs, whereas one study (Cooke et al., 2010) employed a randomised cross-over design. In addition, one study utilised a quasi- randomised trial design (Noice et al., 2007).

Finally, the studies offered the following control conditions: lessons coordinated by a physiotherapist and an art teacher (Bonilha et al., 2009); a reading control group (Cooke et al., 2010); therapeutic physical exercises (Pacchetti et al., 2000) and no further intervention (Lord et al., 2010; Noice et al., 2007). Further details of the studies included in this review are described in Table 2.

3) Excluded studies

A total of 21 additional experimental research studies were identified. However, these were excluded due to the following reasons: (a) no control group within a group pre- and post-test design (Gale et al., 2012; Guétin et al., 2008; Krout 2001; Lim 2008; Magee et al., 2002; McDonald et al., 2008; Sawada et al., 2009); (b) no random allocation (Aldridge et al., 2005; Arakane et al., 2009; Asano et al., 2008; Grape et al., 2008; Saji et al., 2008); (c) short-term interventions on singing (Aldridge et al., 2005; Hanser et al., 2006; Tang et al., 1994); (d) singing intervention in both experimental and control group (Kenny et al., 2004; Leung et al., 1998); and not all of the participants experienced singing in the experimental group (Bygren et al., 2009); and (e) only one participant (Takahashi et al., 2010; Yamada et al., 2008), less than 10 participants (Giaquinto et al., 2006) or a qualitative study (Carolan et al., 2010).

2. Risk of bias in included studies

Using appropriate methods of randomisation were included (e.g. computer-generated programme number lists, block randomisation) (Cooke et al., 2010; Lord et al., 2010; Pacchetti et al., 2000). Two studies did not specify the randomisation method (Bonilha et al., 2009; Noice et al., 2007), while three studies utilised allocation concealment (Cooke et al., 2010; Lord et al., 2010; Pacchetti et al., 2000). In three trials, blinding of data collectors or respiratory physiotherapists were used (Cooke et al., 2010; Lord et al., 2010; Pacchetti et al., 2000). In addition, the dropout rate was less than 20% for two of the trials (Cooke et al., 2010; Noice et al., 2007), whereas two studies had a dropout rate between 22% and 30% (Lord et al., 2010; Bonilha et al., 2009) and one study did not report a dropout rate (Pacchetti et al., 2000). More details concerning the dropout reasons shown in Table 2.

As a result, three studies were rated to have a high risk of bias, and two studies were rated to have moderate risk of bias. More details regarding the risk of bias are shown in Table 2.

3. Effects of interventions

1) Primary outcomes

(1) Emotional state

Two studies (Cooke et al., 2010; Lord et al.,

2010) focused on anxiety by using the Cohen-Mansfield Agitation Inventory Short Form (CMAI-SF) scale, while one study employed the RAID scale (Cooke et al., 2010). In addition, HAD (Lord et al., 2010) was used to measure patients with dementia (Cooke et al., 2010) and COPD (Load et al., 2010). One study (Lord et al., 2010) indicated that singing intervention for COPD patients had a statistically significant difference on decreasing anxiety (MD = 5.2, 95% CI 2.5 to 7.9, p = 0.033). However, there was a no difference in anxiety on older people with dementia (MD = 7.5, 95% CI 3.88 to 11.12). Finally, one study (Pacchetti et al., 2000) showed the emotional states of the participants by using the Happiness Measure, combination of scores showed considerable improvement throughout the therapy period, thus revealing the beneficial effect of emotional well-being (MD = 7.75, 95% CI 7.2 to 8.3).

(2) Quality of Life (QOL)

Three trials (Bonilha et al., 2009; Lord et al., 2010; Pacchetti et al., 2000) considered QOL as an outcome. Pacchetti (2000) indicated that patients with Parkinson's disease displayed considerable improvement on the basis of their Parkinson's Disease Quality of Life (PDQL) score, especially with regard to variations in their emotional, social and functional scores (MD = 132.3, 95% CI 129.4 to 135.2, p < 0.0001). Two studies (Bonilha et al., 2009; Lord et al., 2010) with a total of 57 COPD participants compared QOL with other care. Both studies used SGRQ. However, the effect of singing was not statistically significant (MD = −4.25, 95% CI −8.10 to −0.41) (Table 3), and the results indicated significant heterogeneity between the two studies (p = 0.03; I^2 = 93%) (Figure 1).

2) Secondary outcomes

(1) Physiological outcomes

Three studies included physiological outcomes: pulmonary function of patients with COPD (Bonilha et al., 2009; Lord et al., 2010) and the bradykinesia factor in Parkinson's disease (Pacchetti et al., 2000). Bonilha (2009) examined spirometry, inspiratory and expiratory pressures as well as arterial blood gases, and discovered one physiological response: the maximal expiratory pressure at the mouth level (PEmax: cmH_2O) showed significant improvement in the singing group (MD = 122.7, 95% CI 115.5 to 139.9, p = 0.05). Lord (2010) found that the physical component score in the Short Form 36 Questionnaire (SF-36) improved, and that the participants felt that singing had improved their everyday lives (MD = 39.5, 95% CI 24.9 to 54.1, p = 0.02). However, there were no significant differences in single breath counting, functional exercise capacity or recovery times (Lord et al., 2010). Furthermore, the bradykinesia factor

Table 3. Comparison of singing versus control

Outcome or Subgroup Title	No. of Studies	No. of Participants	Statistical Method	Effect Size
QOL (SGRQ)	2	57	Mean Difference (IV, Fixed, 95% CI)	−4.25[−8.10, −0.41]

SGRQ: St. George's Respiratory Questionnaire

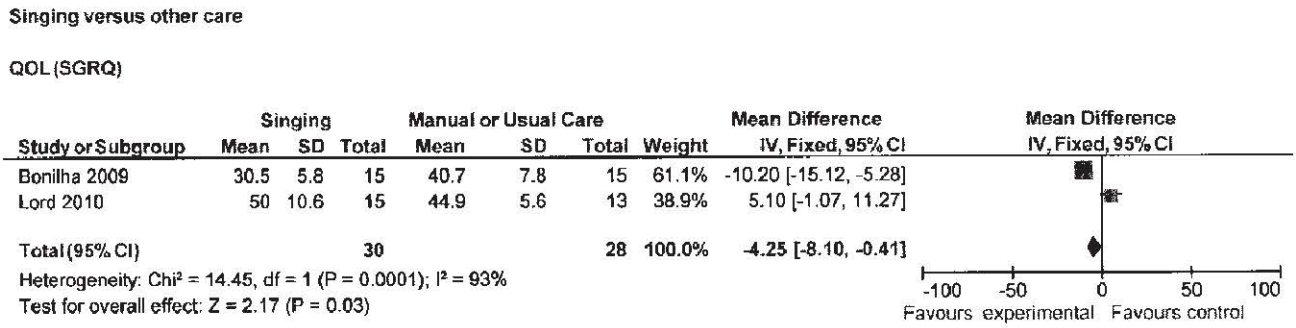

Figure 1. Comparison of singing versus usual care (results of the SGRQ)

values in Parkinson's disease patients revealed a statistically significant effect of the music therapy group ($p < 0.0001$). However, Pacchetti (2000) described that this improvement in bradykinesia could be due to the effect of external rhythmic cues.

(2) Psychological outcomes

With regard to psychological outcomes, there were no significant differences found between the music (singing included) and other care group, which included the anxiety level of older people with dementia (Cooke et al., 2010), and the HAD depression score and mental component score from the SF-36 in COPD patients (Lord et al., 2010). Noice (2007) indicated higher pre- and post-test ratings in personal growth ($p < 0.01$) compared to the no-treatment control participants.

V Discussion

1. Summary of the results

The results of this review based on two studies that received a moderate risk of bias suggest that singing interventions may be beneficial for decreasing anxiety. One study (Pacchetti et al., 2000) indicated that the effect of singing enhanced the quality of life in older participants with Parkinson's disease. However, two studies regarding COPD patients indicated significant heterogeneity in the total sample size of 57 participants and produced no considerable evidence for the effect of singing on their quality of life. Because these primary outcomes (anxiety and quality of life) are based only on a few studies with relatively small sample sizes (90 participants), additional research is required.

In addition, there was no strong evidence regarding the effect of singing on the emotional states of depression. Only one study (Pacchetti et al., 2000) showed a beneficial effect of singing on emotional well-being by using the Happiness Measure (Fordyce, 1988). Therefore, it may be effective to determine positive emotions such as happiness, comfortability and relaxation by applying a general emotional measurement on singing intervention for adults with various health conditions. For example, three studies used the Profile of Mood States (Kenny et al., 2004; Magee et al., 2002; Takahashi et al., 2010) to clarify the positive or negative effects of singing intervention on emotional state.

None of the studies focused on providing comfort, reducing fatigue, promoting enthusiasm for health management, releasing stress or physiological outcomes other than respiration or symptoms of Parkinson's disease. Therefore, more RCTs of intervention for healthy people and antenatal women are necessary.

2. Quality, overall completeness and applicability of the evidence

In general, the quality of the trials was poor; however, two studies (Cooke et al., 2010; Lord et al., 2010) provided details regarding the method of randomisation, allocation concealment and blinding. There was no study receiving a low risk of bias rating and the included studies were generally small sample sizes (average n = 23.5, range: 13 to 42). Thus, the outcomes on the QOL, anxiety and well-being need to be interpreted with caution.

It is important to consider the potential bias introduced by some incomplete outcome data. In two studies (Cooke et al., 2010; Lord et al., 2010), there were three withdrawals, whereas in Bonilha (2009) and Noice (2007), and the number of dropouts was much higher. The reasons for the withdrawals were either medical conditions or absence. Because both studies (Bonilha et al., 2009; Lord et al., 2010) conducted the same singing intervention, their results included significant heterogeneity ($I^2 = 93\%$), which suggests that the participants with health issues might be affected by respiratory issues, which can affect their interest in singing.

This review included only five controlled trials. There is insufficient high-quality evidence to support the effect of singing intervention on reducing anxiety, enhancing the quality of life and well-being. Although many clinical reports from non-controlled, randomised trials indicated other beneficial effects of singing, such as the improvement of relaxation and comfort, reduced depression, fatigue and pain (Lim et al., 2008; Sawada et al., 2009; Krout 2001; Kenny et al., 2004; Guétin et al., 2008), it is evident that more trials and RCTs are required to clarify the applicability

of the evidence. Because it is still possible that there are some missing data from published and unpublished trails, more research is needed.

3. Implications for singing intervention with pregnant women

The review indicated emotional effects of singing and its measurement, and methodological approach for intervention. The effects of singing for pregnant women would be estimated by enhancing positive emotion and decreasing anxiety. Additional research requires the emotional state of the attachment with their foetus. The measurements of positive emotion would be useful, for example HM, POMS or well-being for healthy people.

The five included studies utilised singing sessions coordinated by several music or physiological specialists. The sessions not only focused on singing but it also combined other important aspects (e.g. relaxation exercises, respiratory and vocalisation exercises and communication). These methods of intervention, considered as an educational nursing approach to promote health conditions, had an overall positive effect on the emotional states of the participants. In the future research, it would be effective to consider methodological approach for singing with health education.

These five studies originated from five different countries; however, they did not include information regarding ethnicity. In this regard, the participants' countries and cultures may have a strong influence on their song preferences, their views of singing as an agent of therapy and its use to promote a healthy attitude. For example, it can be assumed that a Japanese lullaby will influence antenatal Japanese women to feel relaxed with their infant (Carolan et al., 2010).

Ⅵ Conclusions

The randomised trials of group singing intervention for a small number of people have posed some problems, especially with regard to clarifying the outcome of emotional promotion because it might be affected by individual preferences, specific health conditions or cultures. In addition, more focus should be placed on the effects of singing interventions on healthy people in research designs. To ensure that such research includes a low risk of bias, concealment and blinding should naturally be a part of the design. Perhaps future research could effectively explore the differences in the outcomes associated with the different singing interventions and/or the participants' individual preferences.

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