

Full-Length Article

Group singing enhances positive affect in people with Parkinson's DiseaseAmee D. Baird^{1,2}, Romane Abell³, William Forde Thompson^{1,2}, Nicolas J. Bullot^{1,5}, Maggie Haertsch⁴, & Kerry A. Chalmers³¹Australian Research Council Centre of Excellence in Cognition and its Disorders²Psychology Department, Macquarie University, Sydney, Australia.³Department of Psychology, University of Newcastle, Newcastle, Australia⁴Arts Health Institute, Sydney, Australia⁵School of Creative Arts and Humanities, Charles Darwin University, Darwin, Australia.**Abstract**

There is increasing evidence of the benefits of music, in particular singing, for people with Parkinson's disease (PD). Current research has primarily focused on vocal or motor symptoms. Our aim was to examine the immediate emotional effects of group singing in people with PD, and whether the type of music sung (familiar vs. unfamiliar songs) moderates these effects. We also explored whether differences in music reward modulate the emotional effects of group singing in people with PD. 11 participants with PD completed the *Positive And Negative Affect Schedule* in three conditions: immediately after group singing (1) familiar songs, (2) unfamiliar songs, and (3) no singing. They also completed the *Barcelona Music Reward Questionnaire*. Positive affect scores were higher in the singing (collapsed across familiar and unfamiliar songs) than no-singing condition. There was no significant difference in positive affect scores between the two singing conditions (familiar/unfamiliar songs). There was a positive but not statistically significant relationship between music reward and positive affect scores after singing. This study documents enhanced positive affect in people with PD immediately after group singing. This has clinical implications for the use of singing as a therapeutic intervention in people with PD.

Keywords: *music, singing, Parkinson's disease, affect, music reward.*multilingual abstract | mmd.iamonline.com**Introduction**

Recent research has identified the powerful beneficial effects that group singing can have on wellbeing in healthy and patient populations. In healthy people, reduced pain thresholds and increased social bonding have been documented after participation in group singing [1]. Rapid social bonding has been found to be specific to singing compared with other group activities, such as craft or creative writing [2]. These observations provide support for the proposal that group singing evolved to promote social cohesion [1, 2]. Group singing has also been found to have

wide ranging positive effects across cognitive, mood and social domains in different patient populations, including people with chronic mental health [3] and neurological conditions such as stroke [4] or dementia [5]. For example, people with dementia and carers participating in group singing reported improved social relationships, mood and acceptance of the diagnosis [5]. A recent systematic review of quantitative and qualitative studies of the effects of group singing on people with chronic health conditions identified beneficial effects on health-related quality of life, anxiety and depression [6].

Parkinson's Disease (PD) is a neurological condition that is classified as a 'movement disorder' due to its prominent motor symptoms, which include tremor, rigidity and bradykinesia (slow movement). Non-motor symptoms, including mood changes such as apathy, anxiety and depression, are also very common in people with PD, and have been found to have a greater impact on quality of life than the motor symptoms [7]. There is no cure for PD, but various treatments (medications or brain stimulation techniques) for symptoms are available, although they can be associated with various side effects, including exacerbation of symptoms [e.g. 8]. Therefore, there is a need for the development of effective psychosocial and non-pharmacological interventions for PD, particularly the non-

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Amee Baird, PhD, Psychology Department, Macquarie University, Sydney, Australia. E-mail: amee.baird@mq.edu.au | COI statement: The authors declared that this research was supported by a Discovery Award from the Australian Research Council (ARC) to Nicolas Bullot, DECRA DP120102055 and an ARC Discovery Grant DP130101084 awarded to William Forde Thompson. Amee Baird is currently funded by an NHMRC-ARC Dementia Research Development Fellowship (1104833). The authors have no conflict of interest to declare.

motor symptoms, to improve well-being and quality of life in this population [9]. One such intervention is group music activities.

There is increasing evidence that music activities can be beneficial for people with PD. Current research on music and PD has primarily focused on the impact of rhythm on motor symptoms, specifically gait [10]. There has been less research attention on the impact of music on non-motor symptoms, specifically mood changes. Relatively few studies have explored the effects of group singing on mood in people with PD. One study [11] found no change in mood, specifically depression symptoms measured by the *Montgomery & Asberg Depression Rating Scale* at 10 and 20 weeks after a group singing intervention. Other studies have reported improved mood after singing interventions using purposefully developed semi-structured interviews [12, 13] or a standardised quality of life questionnaire, *Parkinson's Disease Quality of Life Questionnaire* [14] that included assessment of emotional wellbeing. Pacchetti et al. [14] found improved scores on the *Happiness Measure* (Fordyce, 1988) over 13 weeks of weekly active music therapy (MT) sessions that included singing compared with physiotherapy sessions, but this emotional benefit was no longer evident 2 months after the intervention. The immediate emotional effects of exclusive group singing for people with PD (rather than in the context of MT), however, has not been previously explored.

We are also unaware of any previous investigation of the impact of the type of music or individual differences in responses to music on the therapeutic benefit of singing in people with PD. The types of songs that are sung, in particular whether the songs are familiar or unfamiliar, could modify the effects that singing has on mood. Familiar songs are easier to sing given that people are familiar with the melody and lyrics, and potentially more liked due to previous exposure. Familiar songs are also more likely to stimulate personal memories and associated emotions. In contrast, discovering unfamiliar or new songs are more cognitively demanding because the singer must learn new melodies and lyrics. This could remind people of cognitive difficulties, or alternatively, be stimulating for those who enjoy a challenge. Variance in familiarity with music could therefore moderate the benefits of singing. Individuals who are highly responsive to and enjoy music (high music reward) may be more likely to gain therapeutic benefits from singing, compared with those who report low music reward.

The main objective of this study was to examine the immediate emotional effects of group singing in people with PD. We also aimed to explore the impact of two specific variables: 1) the familiarity of a song; and 2) individual differences in music reward, as assessed using the *Barcelona Music Reward Questionnaire* (BMRQ); and on positive and negative affect, as measured by the *Positive Affect And Negative Affect Schedule*, (PANAS). We predicted that

compared with a no-singing condition, singing would increase positive emotion (or positive affect scores). Furthermore, we hypothesised that singing familiar (compared with unfamiliar) songs would be more likely to result in enhanced positive affect. Finally, we predicted a positive relationship between music reward (as measured by the BMRQ) and positive affect after singing. That is, individuals who report higher music reward would also report higher positive affect immediately after singing.

Methods

Participants

Participants (n=11, mean age 70.6 years, 3 females) were recruited from the 'Shake Rattle and Roll Choir', a dedicated choir for people with PD. All 12 of the choir members volunteered to participate in the study, but one became too ill to complete the semi-structured interview. The participants had been in the choir for an average length of 12 months (with a minimum of 6 months) prior to participating in the study. Written informed consent was obtained from all participants and approval for the research was granted by both the University of Newcastle Human Research Ethics Committee and the Macquarie University Human Research Ethics Committee.

The 'Shake, Rattle and Roll Choir'

The 'Shake, Rattle and Roll Choir' was established in 2013 in Newcastle, Australia as a dedicated choir for people with PD, their family and their carers. The choir is an *à cappella* group led by a choir maestro with an Advanced Diploma in Theatre and Music, whose position is funded by the Arts Health Institute Ltd., a not-for-profit, social enterprise organisation whose purpose is to integrate the arts into health care. The choir meets weekly at a local community centre and participates in public performances, which may require up to two additional rehearsals per week. Solo parts, role playing and costumes are incorporated in these performances.

Participants meet for afternoon tea for approximately 30 minutes prior to the choir session. They commence with a warm-up (approximately 20 minutes) which involves deep breathing, stretching, and vocal exercises led by the choir maestro. They then sing for 90 minutes. The choir maestro selects the musical repertoire in consultation with the choir members. The original version of the song was played for participants to hear and sing along to, and the choir maestro (who was a singer herself) also sang by example and along with participants. Printed lyric sheets are distributed to members but participants are strongly encouraged to commit the song lyrics to memory, particularly for performances.

Song repertoire

Familiar songs were chosen by the participants in discussion with the choir maestro and were songs they had either heard or sung previously (e.g., ‘Hey Jude’ by The Beatles, 1968). Unfamiliar songs (recent popular songs such as ‘Geronimo’ by Sheppard, 2014) were chosen by the choir maestro in consultation with research team members. The original versions of these songs were played to participants to check familiarity but they were also rated post session by all participants on a purposefully designed likert-type scale after each session (see below).

Study design

This study was a within-subjects repeated measures design. All participants completed all three study conditions (familiar singing, unfamiliar singing, no singing), thus serving as their own controls. No music therapist was involved in the study.

Measures

All participants completed the following four measures:
 (1) A semi-structured interview regarding the effects of group singing on motor, voice, mood and thinking skills which was purposefully developed to explore qualitative self-reported effects of group singing in these domains. The interview questions and results have been previously published (see Abell et al. [12]).
 (2) The *Barcelona Music Reward Questionnaire* (BMRQ), [15] which is a self-report Likert scale measure (from 1 = completely disagree to 5 = completely agree) that assesses five domains of music reward: (a) emotional evocation (e.g., *I get emotional listening to certain pieces of music*); (b) sensory motor (e.g., *Music often makes me dance*); (c) mood regulation (e.g., *Music calms and relaxes me*); (d) music seeking (e.g., *I’m always looking for new music*); and (e) social reward (e.g., *Music makes me bond with other people*).
 (3) The *Positive And Negative Affect Schedule* (PANAS) [16] is a brief self-report measure of current positive and negative affective status. Participants are asked to indicate to what extent they feel certain emotions (10 positive words such as ‘excited’ and 10 negative words such as ‘nervous’) ‘right now’, that is, at the present moment, according to a Likert type scale from 1 = not at all to 5 = extremely.
 (4) *Song Familiarity*. A brief, purpose designed questionnaire to assess participants’ familiarity with the song repertoire (on a 5-point Likert scale; from 1 = ‘I don’t know it at all’ to 5 = ‘I know it perfectly’).

Procedure

Participants completed the PANAS (with authors AB or RA) at the location of the choir practice (community hall) under three conditions: (1) ‘familiar singing’ (i.e. immediately after singing familiar songs); (2) ‘unfamiliar singing’ (i.e. immediately after singing unfamiliar songs); and (3) ‘no

singing’ (i.e. prior to participating in a singing session). The brief questionnaire regarding song familiarity was completed after both singing conditions. Participants completed the semi-structured interview (with author RA) and the BMQR at their own home.

Results

Participants’ mean rating of familiarity of the songs sung during the ‘familiar song’ condition was 3.8, compared with 1.3 in the ‘unfamiliar song’ condition. Two participants reported some familiarity with the unfamiliar songs. The analyses were conducted with and without their data included, but there was no difference in the pattern of results. The data from all participants were therefore included in the analyses reported below.

Median PANAS scores for each condition (singing familiar songs, singing unfamiliar songs and no singing) are shown in Table 1. Results of Wilcoxon Signed Rank Tests showed no significant difference in negative or positive affect scores between singing conditions (familiar versus unfamiliar songs). Therefore, a new ‘singing’ score was created by collapsing scores for familiar and unfamiliar singing conditions (i.e., creating a mean for each participant for the familiar and unfamiliar singing conditions). When comparing this ‘singing’ score to the no-singing condition, there was a significant difference in positive affect scores ($p < .01$). Positive affect scores were higher in the singing compared with the no-singing condition. There was no significant difference in negative affect scores between the singing and no-singing conditions ($p > .05$).

Total music reward scores (as measured by the BMRQ) for each participant are shown in Table 2. One participant reported high music reward, three reported low music reward, and the remainder indicated standard music reward according to categories specified by Mas-Herrero et al. [11]. Spearman’s correlation was used to examine the relationship between music reward (total score) and positive affect after singing (i.e., PANAS positive affect scores collapsed over familiar and unfamiliar singing conditions). The analysis revealed a positive but not statistically significant relationship between music reward and positive affect ($\rho = .52, p = .098$).

Table 1: Median PANAS scores for each condition

PANAS score ^a	Condition			
	No singing	Familiar songs	Unfamiliar songs	Singing (averaged over familiarity)
Positive affect	31	38	38	38
Negative affect	11	12	11	12

^aMaximum possible score=50

Participant	Singing Positive Affect Score ^a	Barcelona Music Reward Questionnaire	
		Total Score ^b	Level ^c
1	44.0	1	high
2	29.5	3	standard
3	43.0	6	standard
4	38.0	2	standard
5	36.0	1	standard
6	39.0	6	standard
7	41.5	7	standard
8	42.0	2	standard
9	34.0	6	low
10	31.0	0	low
11	16.5	6	low

^a This score was calculated by averaging each individual’s positive affect scores for the singing and no-singing conditions.

^b Maximum possible total score = 100

^c Music reward level according to categories defined by Mas-Harero et al. (2013).

Discussion

This study examined the immediate emotional effects of singing in people with PD. It is also the first to explore how song familiarity and individual differences in music reward may impact on the relationship between group singing and emotional affect. In support of our first hypothesis, we found that group singing significantly increased positive affect. This finding is in keeping with previous studies of the positive effects of group singing using the same assessment tool (PANAS) in healthy people [2] and an alternative ‘Happiness Measure’ in an MT intervention for PD that included singing ([14]. It is also consistent with previous qualitative studies that documented improved mood associated with group singing in people with PD using semi-structured interviews [12, 13]. The comparison condition in our study was no singing, that is, completion of the PANAS prior to a group singing session. Of note, the lack of group interaction in our comparison (‘no singing’) activity means that we cannot disentangle the effects of singing per se versus social interaction. Future research could examine whether singing offers unique benefits compared with other social/group-based activities in PD. Furthermore, we did not assess affect over time, precluding

any analysis of change over the course of group singing participation. Future longitudinal assessments could document emotional changes over time.

We found no difference in positive affect scores between group singing of familiar or unfamiliar songs. This finding failed to support our second hypothesis, that singing familiar songs would be more likely to increase positive affect. This is an unexpected finding given previous research of music evoked autobiographical memories and associated positive emotions in response to familiar songs. This suggests that group singing has holistic emotional benefits, regardless of the familiarity of the songs. Interestingly, participants expressed opposing assessments about the novelty of songs. Some participants specifically commented on their perceived cognitive benefits of learning unfamiliar songs, while others complained that this only reminded them of their cognitive difficulties [12]. For the former category of participants, learning and recalling new information in the face of cognitive impairments can boost self-esteem and confidence, which may have corresponding positive emotional effects. This finding has important clinical implications for group based music activities for neurological patient populations, which typically use familiar music. Incorporating new music and songs that are novel to participants can be challenging but also cognitively stimulating and have associated emotional benefits.

Our final hypothesis of a positive relationship between self-reported music reward (as assessed by the BMRQ) and positive affect immediately after singing was supported, but failed to reach statistical significance. This may be due to the small sample size. To the best of our knowledge, this research is the first study to examine individual differences in music reward and how that factor relates to the emotional effects of group singing, or any music intervention. Only three participants in the current study reported low music reward according to their total BMRQ scores. Interestingly, these three participants still reported higher positive affect after singing. This suggests that although those with high music reward may receive the greatest emotional benefit from singing interventions, positive emotional effects can also be experienced by individuals who do not typically experience reward from music. It is likely that for individuals who have low music reward, the positive emotional effects relate to the social benefits of participating in a group event, rather than the music per se, but this needs to be explored further in future studies.

Limitations of this study include the small sample size, but this was determined by the size of the singing group itself. In addition, the likelihood of some familiarity with ‘unfamiliar’ songs, as found in two participants, may be a confounding factor, although this did not appear to have any impact on their results. Future research using specifically designed novel tunes to ensure complete unfamiliarity could

be used to further examine differences in cognitive and emotional effects of singing familiar and unfamiliar songs. Furthermore, as noted above, the absence of social interaction in the no-singing condition precludes us from determining the specific effects of singing over and above social interaction. Future studies should include a comparison activity that is group based and pleasurable (e.g., group cooking, art class) in order to explore if there are any unique and specific effects of group singing. Ideally, a randomised control trial would be conducted to explore this.

Conclusion

This study contributes novel evidence of the immediate positive emotional effects of group singing exclusively (i.e., in the absence of other components of MT) in people with PD that is independent of participants' familiarity with the songs. Our findings provide further support for the use of singing as an effective treatment for mood or other non-motor symptoms of PD, and highlight the need for further research into the unique benefits that group singing can offer people with neurological conditions.

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