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Group Singing and Health-Related Quality of Life in Parkinson's Disease

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Abstract

Objective: Parkinson's disease (PD) has a negative impact on health-related quality of life (HRQoL). Previous studies have shown that participating in group singing activities can improve quality of life in some patient populations (e.g., people with chronic mental health or neurological conditions). The aim of this study was to investigate the effects of group singing on HRQoL for people diagnosed with PD.

Methods: Eleven participants (mean age 70.6 years) with a formal diagnosis of PD between Hoehn and Yahr Stages I – III were recruited from a community singing group for people with PD, their family and their carers. Participants' perceptions of the effect of group singing on their quality of life were captured in a semi-structured interview. Interpretive Phenomenological Analysis (IPA), a qualitative methodology, informed data collection and analysis.

Results: The IPA analysis revealed six categories that characterised the effects of group singing: physical, mood, cognitive functioning, social connectedness, 'flow-on' effects, and sense-of-self. All participants reported positive effects across at least four of these categories. Three participants reported a negative effect in one category (physical, mood or sense-of-self).

Conclusions: The results suggest that group singing improved HRQoL with all participants reporting positive effects regardless of PD stage or symptom severity. Weekly engagement in group singing resulted in multiple benefits for the participants and counteracted some of the negative effects of PD. These findings suggest that group singing 'gives back' some of what PD 'takes away'.

Key words: Parkinson's disease, group singing, choir, health-related quality of life, quality of life

Group Singing and Health-Related Quality of Life in Parkinson's disease

People with Parkinson's disease (PD) have reduced health-related quality of life (HRQoL; Karlsen, Tandberg, Årslund, & Larsen, 2000; Simpson, Lekwuwa, & Crawford, 2014). HRQoL is defined as 'the patient's own perception and self-evaluation regarding the effects of an illness and its consequences on her or his life' (Martinez-Martin, 1998, p. S2) and is determined by a number of factors including physical, emotional, cognitive, sexual, social and role functioning (Fayers & Machin, 2013). Symptom severity increases with PD progression, with a concomitant decline in HRQoL (Karlsen et al., 2000; Simpson et al., 2014). People at a similar PD stage can often have different levels of perceived HRQoL (Gotham, Brown, & Marsden, 1986).

The non-motor symptoms of PD have been shown to have a greater impact on HRQoL than motor symptoms (Duncan et al., 2013; Matinez-Martin, Rodriguez-Blazquez, Kurtis, & Chaudhuri, 2011). Strong predictors of HRQoL include depressed mood and cognitive impairment (Martinez-Martin et al., 2011; Soh, Morris, & McGinley, 2011), anxiety, incomplete bowel emptying and insomnia (Duncan et al., 2013), fatigue (Larsen, Dupont, & Tandberg, 1994), freezing of gait (Perez-Lloret et al., 2014; Walton et al., 2014), apathy, lack of motivation, loss of purpose and diminished self worth (Martinez-Martin, Marinus, & van Hilten, 2009; Soundy, Stubbs, & Roskell, 2014) as well as reduced social functioning (Schrag, Jahanshahi, & Quinn, 2000).

Communication challenges develop with the progression of PD. Speech deficits occur in 60% - 80% of cases (Adams, Till, & Yorkston, 1994). These include a decrease in volume and quality (dysarthria) and an increase in speech rate. Slurring of words, mumbling, 'breathy' and hoarse quality, and monotone speech are also observed. Emotional communication is impacted, with changes in the perception and production of emotional prosody (Schroder, Nikolova, & Dengler, 2010). Facial masking (amimia) caused by a

reduction in facial muscle activity severely impacts the ability to convey emotions. Small and cramped handwriting (micrographia) can make written communication difficult to read. A decline in communication abilities may reduce the desire to socialise or to communicate one-to-one (Miller, Noble, Jones, & Burn, 2006), resulting to an overall decline in HRQoL (Rinn, 1984).

PD is idiopathic, with no known cure. Current best practice for the management of PD involves a multidisciplinary team (Lee, Shine, & Lewis, 2015) with the primary goals of assessment and interventions designed to manage motor symptoms and simultaneously restore, or maintain, quality of life (QoL, Fung, 2015).

Group Singing as an intervention to improve HRQoL

The effect of group singing on quality of life has been examined in both healthy and patient populations, including persons with chronic mental health, physical and intellectual disabilities, and neurological conditions. Group singing is defined here as singing in a choir led by a choir maestro or music therapist (Talmage, Ludlam, Leao, Fogg-Rogers, & Purdy, 2013; Vella-Burrows & Hancox, 2012). In healthy populations, group singing has been shown to impact positively on the wellbeing of older adults (Davidson et al., 2014). Clift et al. (2010) conducted a cross-national mixed-methods study of choral singers (633 older adults) and concluded that the group singing experience exerts a counteractive influence on factors potentially detrimental to health and wellbeing. In patient populations, group singing has been found to provide a form of psychosocial rehabilitation (Tavormina, Tavormina, & Nemoianni, 2014), allowing participants to form a new and valued group identity (as a choir member) that is associated with emotional and health benefits including improved self perception, mood, emotional regulation, social functioning and employment capacity (Dingle, Brander, Ballantyne, & Baker, 2013).

There is accumulating evidence that group singing can provide cognitive, mood and

social benefits for people with neurological conditions. Qualitative studies of persons with dementia have described improved memory, mood, and social functioning such as feelings of social inclusiveness (e.g., Osman, Tischler, & Schneider, 2014). Similarly, group singing for people who have sustained a stroke has been found to facilitate communication, social and mood functions (e.g., Tamplin, Baker, Jones, Way, & Lee, 2013). Specific benefits for stroke patients with non-fluent aphasia include strengthened breathing and vocal ability, improved articulation and prosody of speech, and increased verbal and nonverbal communicative behaviours (Tomaino, 2012).

Group Singing and HRQoL for people with PD

Over the past 15 years, seven studies have examined the effects of group singing in PD populations. A summary of the main design features and results of these studies is presented in Table 1. The main research focus for the majority (six) of these studies is physical symptomatology. Three studies reported physical benefits including improvements in bradykinesia (Pacchetti, Mancini, Aglieri, Martignoni, & Nappi, 2000), facial masking (Elefant, Lotan, Baker, & Skeie, 2012) and breathing (Fogg-Rogers et al., 2015). Four studies reported improvements in aspects of voice, including voice and speech parameters (Di Benedetto et al., 2009), singing quality and voice range (Elefant, Baker, Lotan, Lagesen, & Skeie, 2012), laryngeal elements (Evans, Canavan, Foy, Langford, & Proctor, 2012) and loudness, tone, prosody and voice confidence (Fogg-Rogers et al., 2015), while one reported no change in vocal loudness, maximum loudness, pitch range or phonation (Shih et al., 2012).

There has been limited research into the psychological effects experienced by PD participants involved in group singing. Three studies reported improvements in aspects of HRQoL: emotional wellbeing (Pacchetti et al., 2000), communication abilities (Evans et al., 2012; Fogg-Rogers et al., 2015) and social engagement (Fogg-Rogers et al., 2015). Improved mood was found by Fogg-Rogers et al., however Elefant, Baker et al. (2012) found no

changes in depressive symptoms during their intervention or at follow-up two months later. Fogg-Rogers et al. also found higher HRQoL for their PD and stroke participants when compared to quality of life disability norms. The impact of group singing on cognitive functioning in a PD population has not yet been explored.

[insert Table 1 here]

As shown in Table 1, there are a number of methodological differences between the studies with respect to the intervention employed, including frequency and duration of sessions and length of the intervention. The type of intervention also differed across studies, with most employing group singing only, whereas others combined both group singing and playing musical instruments during each session (Pacchetti et al., 2000) or combined group singing with a non-musical intervention (e.g., Di Benedetto et al., 2009, applied a speech therapy intervention before the commencement of the group singing intervention). The difference in type of intervention across these studies makes interpretation and comparison of outcomes difficult. It is not always clear which activity underpinned the positive outcomes.

Fogg-Rogers et al. (2015) explored the experiences of, and factors influencing, participation in choral singing by people with PD or stroke. Although they separate their qualitative results by neurological condition, the themes generated in their analysis were derived from the combined PD and stroke sample, making it difficult to form conclusions about the outcomes for PD patients specifically.

Present Research

The aim of the present study was to explore the effects of group singing for PD. Interpretive Phenomenological Analysis (IPA; Smith, 1996) was used to better understand PD patients' perceptions of HRQoL across a range of domains. Given the previous research findings in PD and other patient populations reviewed above, it was predicted that participants would report positive benefits of group singing in physical, mood, and cognitive

functioning.

Method

Participants and Recruitment

Eleven participants (mean age 70.6 years) with a formal diagnosis of PD were recruited from a community singing group (the 'Shake, Rattle and Roll Choir'). All 12 choir members with PD initially volunteered to participate in the study, but one member withdrew due to illness. There were three inclusion criteria: a formal diagnosis of PD made by a neurologist; a score of 26 or above on the Standardised Mini-Mental State Examination (SMMSE); and nil to mild symptoms of depression and/or anxiety as measured by the Hospital Anxiety and Depression Scale (HADS). All participants had been choir members for a minimum of six months prior to participating in the study (average length 12 months). Written informed consent was obtained from all participants. 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 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 qualified choir maestro who holds an Advanced Diploma in Theatre and Music. The position of choir maestro 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. The choir regularly 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.

Choir members meet for afternoon tea prior to the choir session proper. Choir sessions commence with a warm-up (approximately 20 minutes) which consists of deep breathing,

stretching, and vocal exercises led by the choir maestro. Singing takes place for the following 90 minutes. The choir maestro selects the musical repertoire in consultation with the choir members. Printed lyric sheets are distributed to members but participants are strongly encouraged to commit the song lyrics to memory, particularly for performances.

Measures

Psychological screening. The Standardised Mini-Mental State Examination (SMMSE, Molloy & Clarnette, 1999) was used to screen for cognitive impairment. Depression and anxiety symptoms were assessed using the Hospital Anxiety and Depression Scale (HADS), a self-report questionnaire (Zigmond & Snaith, 1983).

PD symptom severity. The HY staging scale was used to assess the severity of motor symptoms (Hoehn & Yahr, 1967). The HY comprises five Stages (level I through level V), ranging from mild to severe, and captures typical patterns of progressive motor impairment in PD based on the presenting motor symptoms and level of disability observed. Non-motor symptom burden was assessed by the Non-Motor Symptom Scale (NMSS), a PD specific validated self-report questionnaire (Chaudhuri & Martinez-Martin, 2008; Chaudhuri et al., 2007) comprising 30 items across nine domains. Each item is scored by multiplying the severity (on a scale of 0 to 3) by the frequency over the previous 30 days (on a scale of 1 to 4), and summing the scores. A measure of total burden, ranging from mild to very severe, is derived from the summed item scores (Chaudhuri et al., 2013).

Health-related quality of life. The Parkinson's Disease Questionnaire-39 (PDQ-39; Jenkinson et al., 2012) was used to quantitatively assess HRQoL. The PDQ-39 is a validated self-report questionnaire consisting of 39 items covering eight dimensions: mobility; activities of daily living; emotional well-being; stigma; social support; cognition; communication; and bodily discomfort. Responses are made on a 5-point scale (0 = never; 1 = occasionally; 2 = sometimes; 3 = often; 4 = always). Scores on each dimension are

converted to a percentage score (0 = no problem at all; 100 = maximum level of problem).

Choir participation interview. The semi-structured 'Choir Participation Interview' (see Table 2) was specifically designed for the present research. The interview consists of open-ended questions addressing the perceived effects of group singing on both the motor and non-motor symptoms of PD. During the interview, participants are referred to a rating scale (ranging from 1 = much worse, through to 20 = much better) to assist them in describing the magnitude of any perceived changes in body, voice, mood and thinking skills from attending a choir session. The semi-structured interview incorporates the principle of IPA; open-ended questions and minimal probes allowing the interviewees to be the 'primary experts'. The phenomenological aspect of this study comprised the participants' descriptions of their singing experience.

[insert Table 2 here]

Procedure

Informed written consent and demographic information were obtained at an initial meeting at the participant's home. The SMMSE, HADS and NMSS were administered in this session. The Choir Participation Interview took place approximately 4 months later, also in the participant's home. Interview duration was typically 1.5 hours. All Choir Participation Interviews were conducted within a 10 day period, to minimise the potential for interviewees to share their experiences with fellow participants. For three participants, their spouse was present during the interview and contributed comments regarding their own experience of choir participation as well as their perspective of the impact of the choir on their partner. The initial meeting (including administration of assessments) and the semi-structured interview were conducted by the same researcher (RA).

Responses to the Choir Participation Interview were audio-recorded (Sony digital voice recorder, ICD-UX533F) and hand transcribed verbatim into a Microsoft Word

document. Participants were invited to comment on their transcript prior to analysis, as per the IPA protocol. Only minor changes were requested and transcripts were edited accordingly. Transcripts were read a minimum of five times to gain a thorough understanding of the data and hand coding commenced at this time. Transcripts were transferred into QSR International's NVivo10 qualitative data analysis software (Richards, 2005) for electronic assistance in the following: language selection and frequency, further coding and the identification and collation of key themes. Themes were transformed into sub-categories and then merged into categories.

Post-analysis, an independent and confidential review of the transcripts (all identifiers removed) was conducted by another member of the research team (AB). No additional themes or categories were identified by this process. The rhetorical power of this study (Brocki & Wearden, 2006; Shaw, 2010) was enhanced through incorporating the recommendations of the Consolidated Criteria for Reporting Qualitative Studies (COREQ) into the research design (Booth et al., 2014; Tong, Sainsbury, & Craig, 2007).

Results

Demographic Information

All participants (n=11, three females) were retired (three medically retired due to PD) and six regularly engaged in volunteer work. Five participants held university degrees: PhD (2), Masters (1), undergraduate (2). The majority (8) had held professional positions.

Eight participants joined the choir at its inception, 18 months prior to the conduct of this study. The remainder joined the choir between 6 and 12 months prior to this study. Excluding the participant who was instrumental in forming the choir, participants learned of the choir through a PD support group (7), word of mouth (2) or from an advertising poster (1). Six participants had joined the choir of their own volition; the other five had joined on the recommendation of their spouse or children. Three spouses disclosed their self-interest in

joining the choir, seeking social contact and support.

All participants were living at home: seven with their spouse and four alone (two were divorced and two were widowers). Seven of the participants managed daily living independently while the remainder relied on their spouse for assistance with transportation, household organisation, medication regimes and personal management. Six participants had voluntarily surrendered their drivers' licence after their PD diagnosis.

Parkinson's Symptom Duration and Severity

The average age at PD diagnosis was 64.3 years, slightly higher than the Australian average of 60 years (Deloitte Access Economics, 2011). The average time since diagnosis was 6.3 years. All but one participant reported a prodromal phase; the presence of non-motor symptoms prior to the emergence of motor symptoms and a formal diagnosis (Berg et al., 2014), which ranged from 2 to 28 years across this sample.

Participants presented with mild to moderate severity and disability of motor symptoms (HY levels I to III), moderate to very severe levels of non-motor symptom burden (as assessed by the NMSS) and low to significantly impacted HRQoL (PDQ-39 scores ranged from 6.93 to 43.59). A summary of each participant's symptom severity matched with responses from the Choir Participation Interview is presented in Table 3.

Impact of Participating in Group Singing

Participants' perceived changes in their body, voice, mood and thinking skills from attending a choir session were assessed using the semi-structured 'Choir Participation Interview' and associated rating scale.

Ratings scale. The reported intensity of change in each domain ranged from 'much better' to 'worse' across participants. The duration of positive change lasted from the length of the choir session up to 2-3 days, with the majority of participants experiencing a positive change for the remainder of the day (Half Day). These results are presented in Table 3.

[insert Table 3 here]

Interpretive Phenomenological Analysis. A combined deductive and inductive approach to coding and theme generation was applied. A literature review directed the initial areas for exploration with additional themes emerging over successive interviews. Data saturation occurred after the ninth interview. All participants reported an improvement in overall wellbeing since commencing group singing and further, all participants stated that they would recommend group singing to others with PD. Participants' reported experiences of the benefits of group singing were coded into six categories: physical, mood, cognitive functioning, social connectedness, flow-on effects and sense-of-self. A description of each category, along with an example provided from participants' transcripts, is presented below.

Category 1: physical. Engagement in group singing has a strong physical component. Improvement in voice quality was reported by the majority (nine) of participants. Participant descriptions included: "sharper", "you can speak clearly", "better clarity", and "I feel I'm doing my vocal chords good and potential to have volume" (P3). One participant who lived alone rated their voice quality as worse due to 'overuse' at choir practice compared to seldom speaking at home.

The majority of participants (nine) did not report any changes in their motor symptoms as a result of ongoing choir participation, however, two participants reported significant improvements in their motor symptoms, including balance, gait and reduced falls. "The only thing I notice is that I'm less likely to fall over; I'm controlling my balance while I'm with the choir. I don't know [why]. That's more psychological I think . . . I have had stumbles, but very few" (P11).

Group singing is an energising experience. Eight participants reported increased energy and motivation to engage in physical activities: "They get a buzz out of it. As I do. We get a buzz out of watching other people get a buzz. The buzz is we are doing something

pleasurable, something that is constructive in the context of Parkinson's" (P6).

Category 2: mood. Group singing is mood enhancing and helps to foster optimism. Ten participants reported enhanced mood: "Complete change of mood. Not that I had a bad mood before. Before I joined the choir I would sometimes think 'why me?' and since I have been in the choir those types of thoughts have completely vanished. Acceptance." (P9). One participant reported a decline in mood after a singing session due to frustration with the session length lasting too long and becoming tired.

Category 3: cognitive functioning. Ongoing participation in group singing was identified by six participants as beneficial for their 'thinking skills' including memory and concentration: "They all go together – thinking, memory, and concentration. Because you are doing something where you have to make an effort. It is not just singing. . . . trying to remember the notes, or the ups and downs. . . .A mental workout" (P8). One participant reported feeling frustrated when choir attendance highlighted the deterioration in their cognitive functioning due to PD.

Category 4: social connectedness. All participants reported social benefits. The initiative to join the singing group was often socially motivated; to reduce loneliness and isolation. All participants described a sense of camaraderie that is highly valued and contributes to group cohesion. The acquisition of new friends and the role of friendship are both important and motivate attendance. The exclusive nature of the group, for people with PD, provides additional group cohesion and access to a rich and valued source of information about PD: "There is a big social aspect to it [the singing group]. . . . And more importantly good friends who are walking the same path with Parkinson's" (P6).

Category 5: flow-on effects. This category is eclectic and includes external activities participants engage in as a consequence of choir membership. Participants engage in social activities including weekly bike rides, group dinners, film nights and an annual Christmas

party. There is also a semi-regular social gathering that is exclusively for the spouses of the PD choir members. The performance aspect of group singing (at PD support meetings, conferences and public events) provides goal-setting opportunities, additional challenges to master, as well as a sense of achievement upon completion: "I was all for the concept of a choir, of performance. I wasn't sure of what it would produce necessarily, but I was pretty confident that it would be good, and it has proved to be" (P6). Three participants and their spouses reported increased activity in creative arts, including writing poetry, drawing and painting, and creating greetings cards.

Category 6: sense-of-self. All participants reported at least one psychological benefit that had significantly improved their sense-of-self since joining the choir. These benefits included increased self-confidence, independence, a sense of control over day-to-day activities, and a sense of control over PD. "I think if you do something you are taking control. You are accepting. It takes a while to accept that you have Parkinson's" (P3). One participant reported a negative impact on their self-confidence as the experience highlighted a decline in their abilities.

Discussion

This study employed an IPA methodology to investigate the effect of group singing on HRQoL for people with PD. Six categories emerged to capture the positive effects experienced by participants: physical, mood, cognitive functioning, social connectedness, flow-on effects and enhanced 'sense-of-self'.

The most common sub-categories reported by participants were related to social connectedness, with all participants reporting camaraderie and new friendships as important aspects of attending the choir. Other sub-categories identified by participants included improved voice quality, raised energy levels, enhanced mood, increased self-confidence and greater control over day-to-day activities.

The Benefits of Group Singing for PD.

All participants in this study reported benefits across at least four of the six categories (physical, mood, cognitive functioning, social connection, flow-on effects and sense-of-self) from their participation in group singing. This finding is consistent with previous research showing that the presence of multiple non-motor symptoms of PD is a better predictor of low HRQoL when compared to motor symptoms (Duncan et al., 2013; Martinez-Martin et al., 2011). This finding is also consistent with previous research of positive impacts of group singing on the wellbeing of healthy older adults (e.g., Clift et al., 2010; Davidson et al., 2014) and quality of life in PD (Pacchetti et al., 2000; Evans et al., 2012). These findings were observed irrespective of motor symptom severity, level of non-motor symptom burden, and HRQoL as assessed by the PDQ-39, supporting the notion that improvement in HRQoL from participation choir singing is not necessarily dependent on PD stage (Gotham et al., 1986).

The physical benefits of group singing reported by participants in this study are consistent with previous findings in the PD literature. Two participants reported significant improvements in motor symptoms (walking, standing, balance, gait and reduced falls), which is similar to Pacchetti et al.'s (2000) finding of a reduction in bradykinesia. Improvements in voice quality were reported by the majority of participants, supporting previous findings reported by Di Benedetto et al. (2009), Elefant, Baker et al. (2012), and Fogg-Rogers et al. (2015). 'Freer' facial muscles was reported by only one participant, which differs from Elefant, Lotan et al.'s (2012) findings of reduced facial masking in all 10 of their participants over a 17 week period of weekly choir singing. These contrasting results warrant further exploration with respect to HY level of participants, especially given Rinn's observation (1984) that facial masking impacts severely on communication abilities and heightens isolating behaviours in the later stages of PD.

Enhanced mood, sustained for up to three days, was reported by all but one

participant. This outcome is similar to Fogg-Rogers et al.'s (2015) finding of improved mood that was maintained post singing, although they did not specify the duration of this sustained effect. A sense-of-control over day-to-day activities was reported by most participants, which may be similar to Pacchetti et al. (2000)'s finding of improvement in the activities of daily living. With mood disturbance (Chaudhuri et al., 2009; Martinez-Martin et al., 2011; Soh et al., 2011; Soundy et al., 2014; Walton et al., 2014), apathy, lack of motivation, loss of purpose and diminished self-worth (Chaudhuri et al., 2009; Soundy et al., 2014) all strong predictors of HRQoL, it appears that group singing may hold significant benefits for people with PD.

Significant social benefits were reported by all participants, including new friendships, camaraderie, and a sense of community and companionship. This result is similar to Fogg-Rogers et al.'s (2015) finding of improved social engagement in their PD participants. This is an important finding given the reduced desire to socialise and communicate one-on-one (Miller et al., 2006) and the high incidence of isolating behaviours (Rinn, 1984) in this population. Together, these findings show the potential of group singing to increase social functioning, which is a strong predictor of HRQoL in PD patients (Schrag et al., 2000).

In the cognitive domain, five of the eleven participants reported improvements in 'thinking skills', especially memory and concentration. The duration of this improvement in cognitive function was reported to continue for up to two days. While previous research in other neurological populations (e.g., dementia) has found cognitive benefits for people who engage in group singing (Osman et al., 2014), the present study extends this finding to people with PD. With cognitive impairment a strong predictor of HRQoL in PD (Martinez-Martin et al 2011; Soh et al., 2011) more investigation is required.

The 'Shake, Rattle and Roll' choir is exclusively for people with PD, their family and

carers. Participants reported finding acceptance, validation and emotional support within this community, and rated highly the opportunity to share experiences and information relevant to fellow PD sufferers. This finding could be contrasted with Fogg-Rogers et al. (2015) who reported that their PD participants found a mixed-community group-setting helpful in enabling people with stroke or PD to help others with a condition different from themselves.

A framework for exploring the effect of group singing on HRQoL. The present findings suggest group singing enables participants to engage in a variety of experiences that may enhance HRQoL. These experiences include physical, emotional and cognitive activities as well as social interactions and external activities that flow from the established core of the choir. A framework for exploring the effect of group singing on HRQoL for people with PD is presented in Figure 1. The positive impact of group singing on HRQoL is represented by the solid arrows leading from group singing to each of the six categories emerging from the qualitative analysis (IPA). Improvements in any or all of these categories are assumed to enhance HRQoL, as depicted by the 'dotted' arrows pointing towards HRQoL.

[insert Figure 1 here]

Implications of Findings

Group singing: a social intervention for PD. People with PD are vulnerable to apathy, fatigue, mood disorders, stigma, and in turn, social isolation. Group singing enables people with PD to be 'heard' again. They are heard by their fellow choir members and the audiences to whom they perform, but most importantly they are heard because they are re-engaging in life. Our results suggest that the positive effects of group singing can counteract some of the negative effects of PD symptoms.

Group singing: a complementary intervention. Current best practice for treatment of PD includes both the assessment of, and interventions for improving HRQoL, to

complement the traditional approach of motor symptoms management with medications (Chaudhuri & Martinez-Martin, 2008; Chaudhuri et al., 2007; Fung, 2015) and the more recent surgical procedures (Fung, 2015). The results of this study suggest that group singing could become an effective complementary intervention for improving factors that contribute to HRQoL (Fayers & Machin, 2013) in people with PD. Our study shows that group singing enables people with PD to experience reprieve from some disease symptoms for half a day, and up to 3 days in a limited number of cases. The framework conceived in this study could be further developed to create education material for General Practitioners and Allied Health Professionals managing people with PD.

Negative effects of group singing. Three participants reported negative experiences in one of three categories: (1) physical, an irritated throat due to overuse; (2) sense-of-self, reduced self-confidence due to a decline in singing ability; and (3) mood, due to frustration with the song type, fatigue from session duration, or the reminder of memory decline when unable to recall lyrics. These negative reactions appear to mirror the functional limitations of PD that prevent participants from engaging to their full desire based on past abilities and expectations.

Negative effects related to group singing have not been reported in previous PD studies. However, in a study of participants with mental health and social disadvantage attending group singing, Dingle et al. (2013) found negative emotional effects related to difficulties remembering song lyrics. The authors also found the organisation required to attend rehearsals, while managing symptoms, was stressful for participants. Together, these findings suggest that provision of information about possible negative effects and strategies for dealing with them could be provided to new choir members.

Limitations of this study. It is acknowledged that the participants in this study were self-selected. They had independently chosen to attend the PD choir, presumably in the

expectation that they would benefit from the experience, hence their responses may have been influenced by the 'halo effect' (Thorndike, 1920) of their participation and membership in the choir. Similarly, the attention afforded participants by the interviewer may also have influenced their responses. Further, whilst the sample-size was ideal for qualitative analysis (between 5-10 participants), the small number of participants limits the ability for triangulation of methods.

This study was not designed to evaluate the effect of singing, independent of the group setting. Future research could compare and contrast the benefits of participation in PD group activities, for example 'Dance PD' (Jeffery, 2014) and 'PD Warrior' (McConaghy, 2014), with participation in a dedicated Parkinson's singing group. Future research could also compare the benefits for people with PD attending a dedicated Parkinson's singing group versus attending a singing group that is independent of disease focus.

Conclusion

This study examined group singing and HRQoL in a choir specifically established for people with PD, their family and their carers. All participants reported improved functioning in at least four of the six categories that emerged from the IPA of our Choir Participation Interview: physical, mood, cognitive functioning, social connectedness, flow-on effects and sense-of-self, suggesting group singing may help to enhance HRQoL for people with PD.

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Table 1

Summary of Previous Studies Reporting on the Benefits of Group Singing for Persons with Parkinson's Disease

Authors	Participants	Design	Symptom	Choir sessions - Frequency - Duration - Time period	Intervention(s)	Results
Pacchetti et al. (2000)	16 PD	Quantitative Prospective, single-blinded	Motor Symptoms Emotional & Behavioural functioning	- Weekly - 2 hours - 12 weeks	Group singing Playing musical instruments (combined)	Improved bradykinesia Improved activities of daily living Improved QoL
Di Benedetto et al., (2009)	20 PD	Quantitative	Voice	- Weekly - 2x1 hour - 10 weeks - Weekly - 1x2 hours - 13 weeks	Speech therapy (propedeutic) Choral singing	Improved speech and voice parameters: functional residual capacity, maximum inspiratory and expiratory pressures, maximum duration of sustained vowel phonation; and prosodia reading a passage
Evans et al. (2012)	8 PD	Quantitative	Voice QoL	- Fortnightly - 2 hours - 2 years	Group singing (lessons)	Improved speech Improved communication abilities Small improvement in QoL
Elefant, Baker, et al. (2012)	10 PD	Quantitative Follow-up: 10 weeks 2 months	Voice Mood	- Weekly - 1 hour - 20 weeks	Group singing	Improved singing quality Improved voice range No change in depression symptoms
Elefant, Lotan et al. (2012)	10 PD ^a	Quantitative	Facial masking	- Weekly - 1 hour - 20 weeks	Music therapy	Improved facial expression
Shih et al. (2012)	13 PD	Quantitative	Voice Voice related QoL	- Weekly - 1.5 hours - 12 weeks	Choral singing	No changes in vocal loudness, pitch range, phonation time or maximum loudness No change in voice related QoL
Fogg-Rogers et al. (2015)	8 PD 8 stroke 7 significant others n=23	Qualitative evaluation (detailed interview)	Mood Psychosocial Factors QoL	- Weekly - 1.5 hours - An established, and ongoing choir	Choral Singing Therapy ^b	Improved mood Improved language (stroke participants) Improved breathing & voice parameters Improved social communication QoL scores were higher than published normative data for people with disabilities.

Note. PD: Parkinson's Disease; QoL: quality of life

^a Research conducted as two separate groups (n=5) to limit the physical size for effective videotaping purposes.

^b See Talmage, Ludlam, Leao, Fogg-Rogers and Purdy (2013).

Table 2

Questions from the Semi-structured Choir Participation Interview

Section	Question
Immediate impact of participating in a choir session	<p><i>How does your [body, voice, mood, thinking skills] feel immediately after a choir practice session?</i></p> <p><i>Can you indicate on the rating scale?</i></p> <p><i>How long does this feeling last for?</i></p>
Choir involvement	<p><i>How did you find out about the choir?</i></p> <p><i>What were your initial reasons for joining the choir?</i></p> <p><i>What do you enjoy most about attending the choir?</i></p> <p><i>How long have you been attending the choir?</i></p> <p><i>How frequently do you attend the choir?</i></p> <p><i>What brings you back to choir practice each week?</i></p> <p><i>Has attending the choir been helpful in any ways? If yes, in what ways?</i></p> <p><i>Has participating in the choir had an impact on your overall wellbeing?</i></p>
Ongoing impact of participating in choir sessions	<p><i>Since joining the choir have you noticed any changes in your Parkinson's Disease symptoms?</i></p> <p><i>Since joining the choir have you noticed any changes to the following:</i></p> <ul style="list-style-type: none"> • <i>mood</i> • <i>self confidence</i> • <i>sense of independence</i> • <i>sense-of-control</i> • <i>voice</i> • <i>cognitive skills</i> • <i>ability to concentrate</i>
General	<p><i>Would you recommend attending the choir to others?</i></p> <p><i>How do you suggest others could find out about the choir?</i></p> <p><i>Is there anything else that you would like to share about attending the choir?</i></p>

Table 3

Individual Participant's Scores for Symptom Severity (HY, PDQ-39, NMSS) Matched with Perceived Impact of Group Singing on Body, Voice, Mood and Thinking Skills (Choir Participation Interview)

Participant	Choir Participation Interview										
			Body		Voice		Mood		Thinking Skills		
	HY	PDQ-39	NMSS	Change	Duration	Change	Duration	Change	Duration	Change	Duration
1	3	43.59	Severe	Much Better	Half Day	Better	Half Day	Much Better	2-3 Days	Better	2-3 Days
2	1	7.55	Very Severe	Same	N/A	Better	Half Day	Better	Half Day	Same	N/A
3	1	22.08	Severe	Much Better	2-3 days	Much Better	Half Day	Much Better	1 Day	Much Better	2-3 Days
4	2	22.66	Severe	^a	N/A	Much Better	2-3 Days	Better	Half Day	Same	N/A
5	2	22.97	Severe	Much Better	Half Day	Much Better	Half Day	Better	Half Day	Same	N/A
6	1	9.64	Moderate	Better	0	Better	0	Better	Half Day	Worse	Half Day
7	1	28.65	Severe	Same	N/A	Same	N/A	Worse	0	Same	N/A
8	1	15.57	Moderate	Much Better	2-3 Days	Much Better	Half Day	Much Better	2-3 Days	Much Better	Half Day
9	2	12.92	Very Severe	Better	Half Day	Much Better	2-3 Days	Better	Half Day	Better	Half Day
10	1	12.40	Moderate	Worse	Half Day	Worse	Half Day	Better	1 Day	Same	N/A
11	3	6.93	Moderate	Same	N/A	Same	N/A	Much Better	Half Day	Much Better	Half Day

^a Participant 4 appeared to not understand the question. No rating obtained.

Note: N/A = Not Applicable; HY = Hoehn & Yahr Scale; PDQ-39 = Parkinson's Disease Questionnaire -39; NMSS = Non Motor Symptoms Scale.

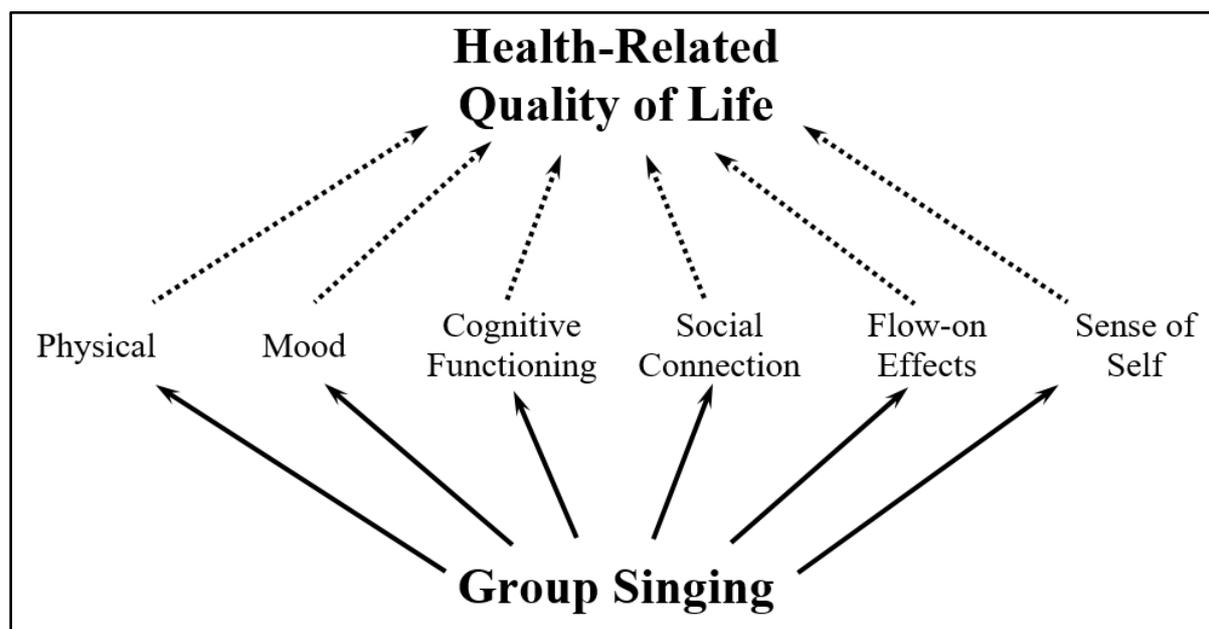


Figure 1. A framework for exploring the effect of group singing on health-related quality of life for people with Parkinson's disease.