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Therapeutic Singing as an Adjunct for Pulmonary Rehabilitation Participants With COPD: Outcomes of a Feasibility Study

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Abstract

In spite of optimized medical management, many individuals living with chronic obstructive pulmonary disease (COPD) experience distressing and disabling symptoms such as breathlessness and poor quality of life. Novel interventions, such as therapeutic singing, hold promise of ameliorating these inhibiting symptoms. This feasibility study compared the outcomes of an 8-week therapeutic singing program conducted by an accredited music therapist for 14 individuals with advanced COPD who attended a pulmonary rehabilitation program targeted to address symptoms with 5 individuals receiving usual care. While the program was enthusiastically and positively endorsed by participants, we did not find improvements in health-related quality of life, exercise capacity, or perceptions of illness for participants in the singing program compared to those receiving usual care. Further studies on optimal duration and intensity of therapeutic singing programs, as well as evaluation of psychological and quality of life specifically related to social interaction, are needed to build the evidence-based practices related to such programs.

Keywords

COPD, breathlessness, therapeutic singing, pulmonary rehabilitation, music therapy

Respiratory illnesses currently affect nearly a billion people worldwide.[1] Although significant advances in diagnosis, management, and treatment have improved the outcomes for individuals with respiratory illness, chronic diseases such as chronic obstructive pulmonary disease (COPD) continue to have devastating effects on the quality of life and wellness of those living with this condition. Breathlessness and poor quality of life, in spite of optimized conventional therapy, are common for many who have this progressive and irreversible disease. The use of nonpharmacological therapies as therapeutic adjuncts to conventional treatment has resulted in a number of studies that have explored how novel interventions seek to improve outcomes of persons with COPD. This article reports the findings from a study examining the effects of a therapeutic singing program for people with COPD attending a pulmonary rehabilitation program.

Singing has been used as a means to enhance well-being across a variety of cultures.[2,3] Singing is an enjoyable, portable, low-cost intervention that has the potential to mitigate breathlessness in persons with respiratory illness by improving breath control and posture.[4-7] However, this is just beginning to receive attention in the literature as a novel intervention for persons with COPD. Our hypothesis sought to answer "Can a therapeutic singing intervention contribute to optimizing outcomes for pulmonary rehabilitation participants?" The primary objectives of this project were to pilot test and examine the feasibility of a therapeutic singing intervention to supplement established pulmonary rehabilitation programs. We also aimed to understand and report the differences in outcomes for the intervention groups as compared with the routine care groups.

Background

Chronic obstructive pulmonary disease is characterized by the presence of expiratory airflow obstruction due to chronic bronchitis or emphysema.[8] It is ranked as the fifth leading cause of disease burden globally.[8] The natural course of advanced COPD consists of repeated exacerbations, progressive airflow limitation, respiratory failure, and premature death. In addition to the pulmonary pathology, individuals with COPD develop systemic manifestations of the disease, including skeletal muscle wasting and cachexia osteoporosis, and psychological

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problems such as anxiety and depression.[9] These extrapulmonary effects have been shown to have a significant impact on quality of life, functional health status, and social isolation in individuals with COPD.[9]

An emerging body of literature illustrates the ways in which people with respiratory conditions perceive their illnesses. This is inclusive of their signs and symptoms, which influence adherence behaviors that determine function and quality of life.[10] Research has demonstrated that *illness perceptions* (the thoughts, ideas, views, and beliefs people have about their symptoms and illness) can influence quality of life, hospitalization, medication use in COPD, and adherence to pulmonary rehabilitation[10-13] and are thus an important consideration in evaluating response to interventions.

Pulmonary rehabilitation is an efficacious and widely accepted intervention for individuals with COPD.[14] A typical pulmonary rehabilitation program is provided by a multidisciplinary team and may consist of exercise, disease-specific education, nutritional, psychological, and social support. There is evidence that pulmonary rehabilitation increases exercise tolerance, reduces symptoms, and improves health-related quality of life in individuals with COPD.[14] As access to programs is often restricted in some jurisdictions,[14,15] efforts related to intervention accessibility are of critical importance.

In an effort to enhance the positive outcomes associated with pulmonary rehabilitation, participants in one qualitative study[16] reported that the most important impact of the program was a change in patient perception of breathlessness, with a concomitant increase in confidence in managing breathlessness and loss of fear of activity. Pulmonary rehabilitation was also noted to provide social support and the opportunity for interaction, subsequently decreasing feelings of social isolation that are typically common in persons with COPD. In order to prevent relapse postpulmonary rehabilitation, it has been suggested that social activities may be considered of equal value as physical exercise as far as people with COPD are concerned, by maintaining the benefits of pulmonary rehabilitation.[17] This supports our contention that a therapeutic program incorporating singing in a group environment has the potential to address symptoms and influence outcomes.

There are a number of potential benefits to therapeutic singing for people with COPD. Singing, or the act of producing musical sounds with the voice, is dependent on strong and fast inspirations, followed by regulated, extended expirations and demands focused control of breathing.[6] The act of singing also involves respiratory exercise that causes diaphragmatic contractions necessary for full inspirations, which are followed by sustained contraction of expiratory muscles against semiclosed vocal cords during expiration.[18,19]

The expiratory flow limitations characteristic of the patient with COPD lead to high operating lung volumes (dynamic hyperinflation) and a disparity between the work of breathing and ventilatory output, which produces symptoms of breathlessness.[20] Changing the pattern of breathing through the conscious effort inherent in strategies such as pursed lip breathing may exacerbate awareness of breathing limitations.[21]

During singing activity, up to 90% of the vital capacity may be used without a conscious effort to increase tidal volume.[20] Attainment of total lung capacity can minimize atelectasis and may increase the force of the cough reflex, helping to clear secretions through airway oscillations.[22] Bonilha and colleagues[6] postulated that routine singing by patients with dyspnea may lead to desensitization of breathlessness due to the development of better breathing coordination and reduction in the fear and anxiety associated with unpleasant respiratory sensations. Participation in therapeutic singing activities has also been associated with improvements in quality of life, depression, and mood in persons with a wide range of health-related concerns.[2,3,7]

Several studies specifically examining the effects of group singing for persons with COPD have been published. Engen[23] evaluated the effects of group singing instruction for 7 individuals participating in 12 singing classes over 6 weeks. They found significant increases in the extent of counting and intensity of speech and a change in breathing pattern from clavicular to diaphragmatic 1 week after the intervention. The effects on quality of life were inconclusive. Bonilha and colleagues[6] reported on a Brazilian study involving 30 patients randomized to either weekly singing or handcraft work. In comparison to controls, the singing group exhibited transitory elevations in the dyspnea Borg scale ($P = .02$) and inspiratory capacity ($P = .01$), with decreases in expiratory reserve volume ($P = .03$) after a short session of singing. The singing group also demonstrated a small improvement in maximal expiratory pressure ($P = .05$). Both groups demonstrated significant improvement in quality of life scores as measured by the St George's Respiratory Questionnaire (SGRQ). The authors conclude that singing is well tolerated and may improve quality of life and preserve the maximal expiratory pressure in persons with moderate to severe COPD. A randomized controlled trial conducted in the United Kingdom by Lord and colleagues[20] with 28 patients with COPD compared the outcomes of a 6-week course of twice weekly singing classes to usual care. Statistically significant improvements were noted in the physical component score of the SF36 (the SF36 is a validated instrument been widely used to evaluate quality of life) and in anxiety scores as measured on the Hospital Anxiety and Depression (HAD) scale. Participants noted positive effects on well-being, community/social support, physical sensation, and achievement efficacy in qualitative interviews. They found the sessions to be enjoyable and many felt a "marked physical difference." The current study contributes to this evidence base through examining the way in which a therapeutic singing intervention contributes to optimizing outcomes for pulmonary rehabilitation participants.

Research Design and Methodology

A pretest and posttest design with intervention (singing) and routine care groups were implemented. Ethics approval for this study was obtained from the University of Saskatchewan Biomedical Review Board.

The setting for this project was an existing pulmonary rehabilitation program in Western Canada. The pulmonary

rehabilitation program involved 8 weeks of classroom instruction as well as structured exercise classes. Participants were able to elect whether or not to continue attending the exercise component indefinitely.

The sample was comprised of individuals with a confirmed medical diagnosis of COPD attending a pulmonary rehabilitation program offered through the local health region. All participants had participated in the program for 3 months or longer. Participants were eligible for the study if they were (1) clinically stable (not experiencing symptoms beyond what was typical for the individual), (2) able to provide their own informed consent, and (3) able to speak and read English. Patients with COPD were excluded if they had concomitant medical conditions considered to significantly limit their exercise tolerance.

Exercise therapists from the pulmonary rehabilitation program promoted the program to potential participants. Participants were offered a nominal honorarium for completing the program and participating in the focus group. Volunteers identified themselves to the site research coordinator, and written consent obtained after eligibility was confirmed.

Participants underwent baseline and postprogram on-site testing session conducted by the trained research coordinator to measure perceptions of dyspnea, perceptions of illness, and health-related quality of life. Exercise capacity (6-minute walk test [6MWT]) was evaluated by a certified exercise therapist. Pulmonary function test results were obtained by reviewing the participants' program health records. Participants were consecutively assigned to the therapeutic singing intervention group until the capacity of 14 was reached, and the remaining participants were assigned to the usual routine care group consisting of the pulmonary rehabilitation program only. Attendance at singing sessions as well as incidence of reported adverse events throughout the duration of the study was monitored at each session. Upon study completion, each participant in the program completed a written, structured evaluation questionnaire.

Measures

Six-Minute Walk Test. The 6MWT is a self-paced test that quantifies functional exercise capacity in terms of the distance walked in 6 minutes.[24] Both heart rate and blood oxygen saturation (oxygen saturation as measured by pulse oximetry [Spo_2]) were monitored during the test and upon completion. The 6MWT was performed according to the standards of the American Thoracic Society[25] over a 30-m level straight using standardized encouragement. It is normally conducted as a standard baseline measure and an outcome measurement of these pulmonary rehabilitation programs and was conducted at initiation and at completion of the 8th week of the program.

The SGRQ, Version 2.1. The SGRQ is a widely used measure of health-related quality of life and health impairment in patients with COPD.[25] The SGRQ is a standardized, self-administered instrument comprising 3 subscales: symptoms (8 items), activity (16 items), and impacts (26 items). An overall score is also calculated. For the subscales and the overall total, scores range from 0 (no impairment) to 100 (maximum impairment). Population-based norms for individuals aged 69 or younger with COPD were reported by Ferrer et al.[26]

The symptoms score (part 1) assesses patients' recollections of their symptoms over a specific time period (in this case, 1 month). For male patients with COPD, the mean population-based score for the symptom subscale is 22.5 ± 18.01, while for females the mean score is 12.43 ± 13.9. The activity and impacts subscale (part 2) addresses the patients' current state. The activity score measures disturbances in the patients' daily activities, while the impacts score measures psychosocial function. For male patients with COPD, the mean population-based score for the activity subscale is 24.28 ± 23.24, while for females the mean score is 19.52 ± 25.45. The impacts score has been demonstrated to correlate with exercise performance, breathlessness, and mood disturbances. For male patients with COPD, the mean population-based score for the impacts subscale is 12.82 ± 15.94, while for females the mean score is 8.05 ± 13.11. The Excel-based scoring calculator available with the SGRQ was used to calculate the scores for the 3 components (symptoms, activities, and impacts) and the total score. A 4-point decrease in the total score represents the minimal important difference (MID) for the SGRQ. The SGRQ was administered at baseline and then immediately following the last therapeutic singing class.

Brief Illness Perceptions Questionnaire.[27] Individuals make sense of their symptoms, assess their health risks, and take direct action based on how they view their illness. The Brief Illness Perceptions Questionnaire (BIPQ) is a 9-item instrument using an 11-point Likert-type scale, where 0 means "no effect at all" and 10 means "severely affects my life." The questionnaire measures the following dimensions of illness perceptions: consequence, time line, personal control, treatment control, identity, coherence, emotional representation, and concern. A higher score reflects a more threatening view of the illness. The BIPQ was administered at baseline and following the final class.

Feasibility Measures. Feasibility was assessed by the attendance at the therapeutic singing program (ie, number of sessions attended by each participant) and evaluation of adverse event occurrence during the time that the participant was attending the program. The research coordinator recorded attendance at each session and asked the participants to identify any adverse events they had experienced over the past week during the initial socialization period. A postintervention program evaluation survey was used to evaluate acceptability and enjoyment of the therapeutic singing program and additionally served to identify factors that affected sustainability of the intervention. Opportunity to provide written feedback was included on the survey form.

Descriptive Measures. Sex, marital status, self-reported global health rating (10-point scale, where 10 is the best health possible and 0 is the worst health possible), and self-reported

breathlessness (Medical Research Council 10-point scale, where 10 represents the greatest impairment) results were recorded at baseline. Forced expiratory volume in the first second of expiration (FEV_1) percentage predicted scores were abstracted from the intake assessment in the health record. The $FEV_1\%$ predicted value is a marker of the degree of respiratory obstruction and disease severity. It is the amount of air that can be forcefully exhaled in 1 second.

Data Analysis

Analysis was performed using SPSS 19.0. Descriptive analyses were completed using proportions for categorical variables and means (standard deviations) for continuous variables. Associations between continuous variables were evaluated using *t* tests for independent sample or paired samples, as appropriate.

Description of Intervention. Participants assigned to the intervention group were enrolled in 8 weekly 1 hour, on-site group sessions conducted in a private room at the pulmonary rehabilitation facility following the regularly scheduled pulmonary rehabilitation session. Participants were invited to bring a friend or family member to participate with them to the therapeutic singing program. Two family members attended for support of the participant only and hence were not included in the study.

The hour-long, weekly intervention was led by an accredited music therapist (who was blind to participant assessments and outcomes). The music therapist surveyed participants prior to the intervention to determine their musical tastes and to develop a book of lyrics for participants' reference. Diverse genres were represented in the song selection (see Appendix). The music therapist accompanied herself on the guitar. The research coordinator was present at each session to provide assistance in the case of adverse events. Because of music's potential to evoke strong emotions, the research coordinator was trained to assist the music therapist in providing emotional support to any participant who became distressed, either within the class or in a private space, as the participant requested.

The therapeutic singing program was adapted from the interventions described by Bonilha and colleagues[6] and Lord and colleagues[20] and consisted of

1. relaxation and stretching exercises of the neck and arms (5 minutes);
2. singing-related respiratory exercises (10 minutes) including incremental breathing (sequentially increasing the length of time the breath was held accompanied by a metronome); deep inspirations followed by slow, full expirations exhaling on a quiet, controlled "sss" sound; and generating breathing movements against, or with the help of, pressures generated by a hand placed on the upper abdominal region;
3. vocalization exercises (15 minutes) using sounds such as "le," "la," "mi," and "mu" to sing the melody of selected songs; and
4. singing songs (30 minutes) requested by participants. Participants were also asked to practice singing at home on 2 other days that week for at least 15 minutes each time.

Participants were encouraged to focus on posture, standing tall and relaxing the neck, shoulders, and back. These activities were implemented by a music therapist who possessed strong group facilitation skills. Following the class, participants were provided with refreshments and the opportunity to socialize with fellow participants, the music therapist, and the research coordinator.

Table 1. Baseline Characteristics.

	Total, n = 19	Singing Group, n = 14	Control Group, n = 5
Sex			
Female, %	63.2	64.3	60.0
Age			
Mean (SD)	70.5 (5.8)	70.0 (6.0)	72.0 (5.4)
Marital status			
Married, %	68.4	71.4	60.0
Divorced, %	15.8	7.1	40.0
Widowed, %	15.8	21.4	0.0
Global Health Rating			
Mean (SD)	5.8 (1.7)	5.6 (1.8)	6.4 (1.7)
Breathlessness (MRC)			
Mean (SD)	2.3 (0.77)	2.3 (0.86)	2.3 (0.55)
$FEV_1\%$ predicted	33.6 (18.4)	32.3 (16.7)	36.7 (20.9)

Abbreviations: FEV_1, forced expiratory volume in the first second of expiration; SD, standard deviation.

Results

This study took place between February and April 2011. A total of 22 participants volunteered to participate in the study, of whom 21 met the eligibility criteria. The first 14 participants were assigned to the singing intervention. The remaining 7 were assigned to the control group receiving usual care. Two of those assigned to the control group declined to participate as they were interested in the singing intervention, leaving 5 individuals to act as controls. Baseline characteristics of both groups are described in Table 1, which indicate that the groups were matched in terms of age and sex. Comparison of global health ratings and level of breathlessness (MRC score; see supplemental material, available online) using *t* tests indicated no significant difference between the groups on these parameters. The $FEV_1\%$ predicted values demonstrate that both groups had severe respiratory obstruction.

Table 2 displays the scores for SGRQ subscale and total scores, the 6MWT results, and the BIPQ at baseline and following the program for both the intervention and control groups. Participants in both groups experienced significant impairment in respiratory-related quality of life as measured by the SGRQ. Higher scores on the 100-point scale of the SGRQ indicate greater impairment. Scores on the SGRQ subscales and total

Table 2. Comparisons Within and Between Intervention and Control Groups.

	Singing Group T1, n = 14	Singing Group T2, n = 14	Difference in Score	Control Group T1, n = 5	Control Group T2, n = 5	Difference in Score
SGRQ symptoms scale	46.23 (28.07)	53.71 (24.99)	+7.48[a]	31.20 (12.26)	33.20 (21.75)	+2.10
SGRQ activity	60.73 (24.03)	63.83 (15.21)	+3.10	54.58 (12.52)	56.97 (19.97)	+2.39
SGRQ impacts	32.13 (16.12)	33.66 (16.47)	+1.53	28.10 (9.59)	28.41 (8.85)	+0.30
SGRQ total mean	43.31 (17.07)	48.52 (16.00)	+5.21[a]	36.25 (12.52)	37.99 (11.77)	+1.74
6MWT (feet), mean (SD)	401.25 (98.35)	399.57 (104.09)	NA	442.69 (83.16)	443.60 (71.18)	NA
BIPQ (Possible 80)	41.92 (10.85)	44.33 (9.75)	NA	45.40 (5.22)	43.80 (4.97)	NA

Abbreviations: SGRQ, St George's Respiratory Questionnaire; BIPQ, Brief Illness Perceptions Questionnaire; 6MWT, 6-minute walk test.
[a]Differences greater than minimally important difference (MID) of 4 points for the SGRQ subscale and total scores.

scores ranged between 32 and 61 for the intervention group and between 28 and 57 for the control groups. The differences between the groups on the SGRQ scales were not statistically significant at baseline or following the intervention. Within the groups, the intervention group scores deteriorated between baseline and program completion on the symptom subscale and the overall SGRQ scores. Using the MID criterion of a 4-point difference being clinically significant, however, the mean SGRQ subscale score for symptoms and the mean SGRQ total score for the intervention group went up by 7.5 and 5.2 points, respectively.

There were no significant differences in either the 6MWT or the BIPQ within or between the groups at baseline or following the program. Attendance was used as one proxy measure for evaluating the feasibility of the singing intervention program. Of the 8 classes, 2 participants missed 1 class each. One absence was due to illness and the other due to a planned vacation. No adverse events were reported during the intervention period.

All 14 participants in the intervention group completed the structured questionnaire at the end of the program. Feedback was uniformly positive about the experience of participating in the singing intervention. In all, 12 participants indicated that they felt singing helped their breathing during the session itself; 10 believed that the program helped their breathing overall.

Participant satisfaction with both the program and the therapist was high, with typical comments being "This was a wonderful group of people. Each session was so uplifting and this was certainly a pleasurable experience"; "I especially enjoyed reminiscing about old times as well as learning new songs"; and "The best part was the opportunity to use my voice and lungs in music, which is my passion. I also enjoyed the therapist. She is a relaxing, joyful spirit." All participants enjoyed the social aspect of the sessions. In terms of physical well-being, there was agreement among participants that learning to better control the breath through singing was valuable in helping to managing their breathlessness. The mean score for program quality on the survey was 10/10. All participants would recommend the program to someone else with COPD, and the time frame of 1 hour was considered appropriate for each session. Half of the participants felt it would be appropriate to have the sessions offered more than once per week. Participants indicated that the honorarium was not important in their decision to participate in the program. The only negative comments related to the temperature of the refreshments and the room where the program was conducted. All participants said they intended to continue singing on their own following the completion of the program.

Discussion

Findings from this study suggest that an 8-week program of once weekly therapeutic singing program did not result in improvements in health-related quality of life, exercise capacity, or perceptions of illness in individuals with COPD enrolled in a pulmonary rehabilitation program compared to those receiving usual care, although the program was enthusiastically and positively reviewed by participants. We found that a substantial number of individuals enrolled in a conventional pulmonary rehabilitation was interested in a singing group and demonstrated a high level of commitment to attending this program.

No statistically significant change in the disease-specific (SGRQ) quality of life scores was noted for either the intervention and control group following the singing program in the present study, although there was a clinically significant deterioration in the scores for the intervention group (increase of 5.2 points). The change in the total score primarily reflected respiratory symptoms experienced by participants, as the impact and activities subscale scores remained below the MID, denoting clinical significance.

In previous studies evaluating health-related quality of life outcomes using the disease-specific SGRQ scores following a singing intervention, the results have been mixed. Bonilha and colleagues[6] found that both intervention and control groups demonstrated equal improvements (decrease of 5-6 points) in SGRQ scores following a 6-week singing program. Participants in Bonilha et al's[6] study had less severe obstruction ($FEV_1\%$ predicted of 50%) than did those in the present study ($FEV_1\%$ predicted mean of 34%), although the baseline SGRQ scores were similar to those reported here. No significant improvement in total SGRQ scores, however, was reported following a twice weekly, 6-week singing program by Lord and colleagues.[20]

The nondisease-specific SF-36 instrument, however, may be more sensitive than the SGRQ for identifying health-related quality of life outcomes that occur in response to a singing

intervention. In 2 separate studies, Lord and colleagues[4,20] noted significant improvements in the Physical Component Summary of the SF-36 following singing interventions.

No improvements in exercise capacity as assessed by the 6MWT were found in either the intervention or control groups, in spite of both groups continuing to participate in conventional pulmonary rehabilitation programs during the 8 weeks of the therapeutic singing program. The 6MWT is frequently used as a clinical, performance-based measure of exercise capacity, which provides some indication of change but may lack the sensitivity to detect small improvements. The test requires a relatively large change in distance walked (25 m or 82 ft), in order for the individual being tested to detect a clinically important improvement.[28] While participation in a pulmonary rehabilitation program has often been reported to result in an increased distance of 30 to 50 m on the 6MWT, Dolmage and colleagues[29] note that a large, test-to-test variability on 6MWT test distances is common. In addition, a plateau effect was also reported after 8 weeks of program participation.[30] All of the participants had been enrolled in the pulmonary program for 3 months or longer and likely achieved a physiological plateau in terms of exercise training. Given that short programs of singing may improve single breath counting[4,23] and possibly maximum expiratory capacity,[6] but have not yet been proved to impact spirometry,[23] inspiratory muscle strength,[23] or exercise capacity,[4,23] it is critical that future evaluation includes sensitive outcome measures. According to Lord and colleagues,[4] the lack of demonstrable improvement in conventional physiological measures used in pulmonary rehabilitation following a singing program may point to the need for refinement of the ''dose'' (eg, the number of classes). Longer duration programs that include a greater number of weekly classes may prove to be of more tangible benefit. The physiological outcomes of singing programs can be affected by important confounders such as intensity of effort, which are not easily measurable in most settings. Our finding that 6MWT distance did not change for either group following 8 weeks of traditional pulmonary rehabilitation or a similar course of pulmonary rehabilitation plus a singing adjunct may reflect the low sensitivity of the test, the small sample size, and/or a change in effort required while performing the test. Future studies examining the effects of therapeutic singing interventions should consider the use of more sensitive test.

Previous work examining illness perceptions in individuals with COPD has found that patients displaying decreased attention to symptoms, more positive beliefs about their conditions, and weaker emotional reactions to the illness had more positive quality of life scores.[10] Singing may affect illness perceptions by taking attention away from the conscious effort of breathing while engaging in an activity that participants enjoy in the context of a supportive social environment. In the present study, no change in scores on the BIPQ was noted for either the intervention or control groups. It may be that this intervention was insufficient to affect long-lasting change in illness perceptions perhaps because of the short duration of the program.

We acknowledge the limitations of this study. As a cross-sectional study examining the feasibility of a therapeutic singing intervention within a single program of pulmonary rehabilitation, our intent was to evaluate the presence of associations and not establish causality. The sample was composed of volunteers interested in singing, and our intervention and control groups were not matched. The measures were selected based on a balance of obtaining relevant data without unduly burdening participants. Future studies may wish to include measures that focus more specifically on the psychological and social quality of life outcomes of this activity for people with COPD.

Conclusion

Given that the evidence base for short-term singing programs effecting physiological and psychological improvements is still developing, our study found that a singing program for pulmonary rehabilitation participants led by a music therapist is an acceptable, enjoyable, and feasible program that imposes no adverse effects. Ongoing work is needed to establish whether longer duration and intensity of singing programs may demonstrate improvements in outcomes for persons with COPD.

Appendix

Song Titles

Amazing Grace
Brown Eyed Girl
Blowing in the Wind
Can't Help Falling in Love
Church in the Wildwood
Dancing Queen
Danny Boy
Don't Fence Me In
Don't Stop
Don't Worry, Be Happy
Down on the Corner
Drift Away
Edelweiss
Feeling Groovy
Four Strong Winds
Happy Wanderer
Have You Ever Seen the Rain
Heart of Gold
He's Got the Whole World in His Hands
Home on the Range
I Walk the Line
In the Jungle
King of the Road
Leaving on a Jet Plane
Loch Lomond
Maggie May
Old Rugged Cross
On the Road Again

Sentimental Journey
Side by Side
This Land Is Your Land
Under the Boardwalk
We're Here for a Good Time
When You're Smiling
Whispering Hope
You Are My Sunshine

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Supplemental Material

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References

1. Siafakas NM, DeCramer M, Rabe KF. 2010: year of the lung. *Eur Respir J*. 2011;37(11):1-2.
2. Clift S, Nicol JJ, Raisbeck M, Whitmore C, Morrison I. Group singing, wellbeing and health: a systematic mapping of research evidence. *UNESCO J. Multi-Disciplinary Res Arts*. 2010;2(1):1-25. http://stage2.abp.unimelb.edu.au/unesco/ejournal/pdf/clift-paper.pdf. Accessed May 30, 2013.
3. Gick ML. Singing, health and well-being: a health psychologist's review. *Psychomusicology*. 2011;21(1-2):176-207.
4. Lord VM, Hume VJ, Kelly JL, et al. Singing classes for chronic obstructive pulmonary disease: a randomized controlled trial. *BMC Pulm Med*. 2012;12:69-76.
5. Raskin J, Azoulay R. Music therapy and integrative pulmonary care. In: Azoulay R, Loewy JV, eds. *Music, the Breath and Health: Advances in Integrative Music Therapy*. New York, NY: Satchnote Press; 2009:69-86.
6. Bonilha AG, Onofre F, Vieira ML, Prado MY, Martinez JA. Effect of singing classes on pulmonary function and quality of life of COPD patients. *Int J Chron Obstruct Pulm Dis*. 2009;4:1-8.
7. Irons JY, Kenny DT, McElrea M, Chang AB. Singing therapy for young people with cystic fibrosis: a randomized controlled trial. *Music Med*. 2012;4(3):136-145.
8. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management and prevention of COPD. 2013. http://www.goldcopd.org/Guidelines/guidelines-resources.html. Accessed May 30, 2013.
9. Barnes PJ. Chronic obstructive pulmonary disease: effects beyond the lungs. *PLoS Med.* 2010;7(3):e1000220. doi:10.1371/journal.pmed.1000220.
10. Scharloo M, Kaptein AA, Schlosser M, et al. Illness perceptions and quality of life in patients with chronic obstructive pulmonary disease. *J Asthma*. 2007;44(7):575-581.
11. Hagger MS, Orbell S. A meta-analysis of the common sense model of illness representations. *Psychol Health*. 2003;18(2):141-184.
12. Scharloo M, Kaptein AA, Weinman J, et al. Illness perceptions, coping and functioning in patients with rheumatoid arthritis, chronic obstructive pulmonary disease and psoriasis. *J Psychosom Res*. 1998;44(5):573-585.
13. Scharloo M, Kaptein AA, Weinman JA, Willems LN, Rooijmans HG. Physical and psychological correlates of functioning in patients with chronic obstructive pulmonary disease. *J Asthma*. 2000;37(1):17-29.
14. Marciniuk DM, Brooks D, Butcher S, et al; for the Canadian Thoracic Society COPD Committee Expert Working Group. Optimizing pulmonary rehabilitation in chronic obstructive pulmonary disease—practical issues: a Canadian Thoracic Society Clinical Practice Guidelines. *Can Respir J.* 2010;17(4):159-168.
15. Mallia P, Patel A, Kaiser R, Stone RA, Buckingham R, Roberts CM. Provision of pulmonary rehabilitation in the UK: results from the National Chronic Obstructive Pulmonary Disease Audit 2008. *Thorax*. 2008;63(suppl 7):A15-A18.
16. Williams V, Bruton A, Ellis-Hall C, McPherson K. The effect of pulmonary rehabilitation of perceptions of breathlessness and activity in COPD patients: a qualitative study. *Prim Care Respir J*. 2009;19(1):45-51.
17. Wempe JB, Wijkstra PI. The influence of rehabilitation on behavior modification in COPD. *Patient Educ Couns*. 2004;52(3):237-241.
18. Hoit JD, Jenks CL, Watson PJ, Cleveland TF. Respiratory function during speaking and singing in professional country singers. *J Voice*. 1996;10(1):39-49.
19. Pettersen V. Muscular patterns and activation levels of auxiliary breathing muscles and thorax movement in classical singers. *Folia Phoniatr Logop*. 2005;57(5-6):255-277.
20. Lord VM, Cave P, Hume VJ, et al. Singing teaching as a therapy for chronic respiratory disease – a randomized controlled trial and qualitative evaluation. *BMC Pulm Med*. 2010;10:41.
21. Bott J, Blumenthal S, Buxton M, et al. Guidelines for the physiotherapy management of the adult, medical, spontaneously breathing patients. *Thorax*. 2009;64(suppl 1):i1-i51.
22. Bolger EP, Judson MA. The therapeutic value of singing. *N Engl J Med*. 1984;311(26):1704.
23. Engen R. The singer's breath: implications for treatment of persons with emphysema. *J Music Ther*. 2005;42(1):20-48.
24. American Thoracic Society. American Thoracic Society statement: guidelines for the six-minute walk test. *Am J Respir Crit Care Med*. 2002;166(1):111-117.

25. Jones PW, Spencer S, Adie S. *The St. George's Respiratory Questionnaire Manual* [computer program]. Version 2.1. London, England: St George's Hospital Medical School; 2003.
26. Ferrer M, Villasante C, Alonso J, et al. Interpretation of quality of life scores from the St. George's Respiratory Questionnaire. *Eur Respir J.* 2002;19(1):405-413.
27. Broadbent E, Petrie KJ, Main J, Weinman J. The brief illness perception questionnaire. *J Psychosom Res*. 2006;60(6): 631-637.
28. Holland AE, Hill CJ, Rasekaba T, Lee A, Naughton MT, McDonald CF. Updating the minimal important difference for six minute walk distance in patients with chronic obstructive pulmonary disease. *Arch Phys Med Rehab*. 2010;91(2): 221-225.
29. Dolmage T, Hill K, Evans RA, Goldstein RS. Has my patients responded? Interpreting clinical measurements such as the six minute walk test. *Am J Respir Crit Care Med.* 2011;184(6): 642-646.
30. Rejbi IB, Trabelsi Y, Couchene A, et al. Changes in six-minute walk distance during pulmonary rehabilitation in patients with COPD and in healthy subjects. *Int J Chron Obstruct Pulmon Dis*. 2010;5:209-215.

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