An evaluation of community singing for people with COPD (Chronic Obstructive Pulmonary Disease)

FINAL REPORT

Summary

Aim
The aim of this study was to explore the feasibility of weekly community singing for people with COPD and to assess impact on lung function, functional capacity, breathlessness and quality of life.

Method
An uncontrolled observational study of a weekly group singing programme was undertaken over the period September 2011 to June 2012. The St Georges Respiratory Questionnaire (SGRQ), MRC breathlessness scale, EQ-5D and York SF-12 were administered at baseline, mid-point and end of study, and spirometry to assess lung function at baseline and study end. Written feedback from participants was analysed for the principal themes expressed.

Results
Health-related quality of life assessed by SGRQ showed a 3.3 point change in the direction of health improvement. Improvements were also found in FEV₁, FVC and FVC per cent. Qualitative evidence showed that the singing groups were enjoyable social events and participants reported improvements in their breathing, activity levels and wellbeing.

Conclusions
Health improvements and positive feedback are encouraging as COPD is a progressive illness and a decline in health would be expected over ten months. The study provides a good foundation for designing a more robust controlled community trial.

Documentaries and guide
Three short films and a guide to Singing for People with COPD accompany this report and illustrate the work of the project. They are available from the Sidney De Haan Research Centre for Arts and Health. See inside back cover for details.

Acknowledgments
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An evaluation of community singing for people with Chronic Obstructive Pulmonary Disease (COPD)

Study background

Innovative, cost-effective initiatives are needed to help people with COPD engage in physical and social activity to support independence and maintain quality of life. This study explores the potential effect of regular group singing on the clinical symptoms of COPD. Surveys have shown that choral singers believe that singing improves their breathing (Clift and Hancox 2001; Clift et al. 2009) but comparison of lung function in professional singers versus wind and percussion players, failed to show significant differences in standard spirometric parameters (Clift et al. 2008). There is some evidence, however, that group singing may be beneficial for people with chronic respiratory disease by modifying breathing patterns, reducing breathlessness, and improving quality of life. Macklem (2010) has recently argued that basic considerations of the pathophysiology of COPD suggest that encouraging patients to breathe slowly and deeply during exercise, and avoid rapid upper thoracic patterns of breathing, should help to lessen dyspnoea and improve performance.

Engen (2005) recruited participants from a gerontology clinic and pulmonary rehabilitation clinic who had a diagnosis of emphysema. Twelve participants met in small groups twice a week for six weeks. None of the physical health and quality of life measures employed showed improvements over the six weeks of the study, but measures of breath control and voice intensity both improved significantly. In addition, breathing mode changed from being predominantly clavicular to being diaphragmatic in all cases and this was maintained for two weeks after the treatment sessions ended.

Bonilha et al. (2008) reported a small randomised controlled trial assessing the impact of singing groups on lung function and quality of life among patients diagnosed with COPD. This study randomised 43 patients to a programme of singing or handcraft classes. Fifteen participants in each group completed 24 sessions and were comparable at baseline in their mean forced expiratory volumes at one second as percentage of normative values (FEV₁ %). The singing group showed a small improvement in a measure of maximal expiratory pressure at the end of the study, while the control group showed a decline, with the difference being statistically significant. Both groups showed increased quality of life scores with no significant difference, emphasising the benefits of group participation for perceived quality of life.

Two small trials examining the effects of singing lessons for patients with COPD have been completed at the Royal Brompton Hospital, London. In the first (Lord et al. 2010) thirty-six COPD patients were randomised to either 12 one-hour sessions of singing lessons over six weeks, or usual care. Following attrition 15 patients in the singing group (mean baseline FEV₁ per cent predicted 36.8) were compared with 13 controls (mean baseline FEV₁ per cent predicted 37.7). Significant improvements were found in levels of anxiety and self-assessed physical wellbeing in the singing group. No differences were found between the groups for single breath counting, incremental shuttle walking test (ISWT) scores or recovery time following ISWT and intriguingly breath-hold time increased more in the control group than the singing group. In the second study (Lord et al. 2012) 33 patients with COPD participated in either 16 sessions of singing over eight weeks (mean FEV₁ per cent predicted 44.4), or an active control condition in which participants watched films together and discussed them (mean FEV₁ per cent predicted 63.5). Although the mean FEV₁ per cent predicted value was higher for the control group, this difference was not statistically significant. Follow up assessment showed that the singing group improved significantly in self-assessed physical health compared with the control group, but no differences emerged in direct measures of lung function.
To date, therefore, research on singing and COPD has been limited, with small sample sizes and short interventions in clinical settings focused on the teaching of singing. While existing research has shown that singing is an acceptable activity for people with COPD and that it can have general wellbeing benefits, little or no improvement in measures of lung function have been found. It may be that the interventions have not been long enough and, indeed, the increase in singing sessions between the two Royal Brompton studies from 12 to 16 singing sessions was motivated by a concern that the earlier study was too short to reveal positive benefits. It may be that even the increase to 16 sessions was still insufficient to promote measurable improvements in breathing and lung function. In addition, the groups in the Brompton study were small and individuals may not have experienced the support in singing that comes from being part of a larger choir, nor the impetus to improve that comes from preparation to perform. The present study addresses the limitations of previous research through a community-based singing initiative for people with COPD. A larger group of participants was recruited than in previous studies, and six community singing groups were established meeting weekly over a longer period of time. In addition to teaching good posture, breathing techniques and engaging in singing, the groups worked towards combined performance events in line with a widely followed model of community singing.
Methods

The study was an observational evaluation of the feasibility, acceptability, and potential effectiveness, of regular singing for people with COPD. Ethical approval was given by the Faculty of Health and Social Care Research Ethics Committee of Canterbury Christ Church University and Oxford C NHS Research Ethics Committee (REC ref: 11/SC/0115 120821).

Specific objectives of the study were to provide evidence relating to:

i. The effect of participation in regular singing on clinical measures of COPD.
ii. The effect on measures of health related quality of life.
iii. Recruitment and retention rates and preferences for singing as an intervention in this population.
iv. Patient satisfaction with the intervention (measured by questionnaire and explored by an analysis of written comments).

Design

An observational non-randomised quasi-experimental design was employed. The study was conducted between September 2011 and July 2012 and assessments undertaken at baseline, prior to joining a singing group and again at five and ten months. Following the National Institute of Health and Clinical Excellence guidelines on ‘person-centred care’ in COPD (NICE 2010), this study recruited individuals into singing groups who expressed a preference for participating in this activity. Six singing groups were established in or near Ashford, Whitstable, Dover, Deal, Canterbury and Ramsgate in the county of Kent, South East England. These are areas known to have a high prevalence of COPD (Whitmore and Limentani 2009).

Recruitment

A variety of methods of recruitment were pursued: a mailed invitation to patients on the COPD registers within GPs’ practices serving East Kent, newspaper advertisements and direct contact with three local support groups for people with breathing difficulties (British Lung Foundation Breathe Easy Groups).

Inclusion criteria

i. Mild, moderate, severe or very severe COPD as assessed by post-bronchodilator spirometry at baseline.
ii. Physically mobile and able to travel to sessions independently or with the support of a carer.
iii. Able to speak and hear and willing to commit to participating in the project over the course of 18 months (health permitting).
iv. Able to speak English and complete questionnaires in English.
v. Aged 18 years and over.

Exclusion criteria

i. Severe dementia or other cognitive or communication disabilities which render consent problematic.
ii. Severe co-morbidities which contra-indicate participation on the advice of GPs.
Sample size
The aim of the study was to explore potential effectiveness and cost-effectiveness prior to embarking on a community-based randomised controlled trial with a contemporaneous usual care control group. As a feasibility study no formal sample size calculation was undertaken but it was estimated that a minimum of 50 participants followed up at the end of the study would provide information on feasibility and potential effects. Taking into account a conservative retention of 50% we estimated we would need to recruit 100 participants to the study.

Measures
The following measures were used to assess outcomes for lung function, COPD specific and generic health-related quality of life:

Lung function
Spirometry tests were carried out by a qualified health professional, to assess FEV₁, FEV₁ per cent, FVC, and FVC per cent both before and at the end of the project post bronchodilation.

Lung function data was obtained using a Micro Medical (Care Fusion) MicroLab machine, which is a portable device that uses a turbine sensor to measure air-flow. It was chosen because it as it is widely used within Primary Care and Community settings in the UK due to its portability as well as meeting published recommendations of European Respiratory Society (ERS) and American Thoracic Society (ATS) (Miller et al. 2005). Before each assessment session the device was calibrated with a 3 litre calibration syringe. The stage of COPD was defined by the FEV₁ per cent following the GOLD (2010) and NICE (2010) guidance.

St George’s Respiratory Questionnaire (SGRQ)
A self-assessed measure of health impairment employed in research on chronic respiratory illness and COPD. Four scores are produced: symptoms, activity, impacts and total (SGRQ 2008).
MRC Dyspnoea Scale
A 5-point self-rated breathlessness scale for patients with lung disease (Bestall, et al. 1999; Stenton 2008).

York SF-12
A self-assessed health related quality of life measure (Iglesias et al. 2001) validated for use with older people and for which population norms exist. The twelve multiple choice questions cover both physical and mental domains of health.

EuroQol-5D (EQ-5D)
A short, 3-level, 5-dimensional instrument which provides a health utility score (0–1), and a self-assessed overall rating of health using a 0–100 visual analogue scale (VAS) (Euroqol Group 1990).

SGRQ, EQ-5D and SF-12 have been shown to relate well in a study of quality of life in patients with severe COPD hospitalised for exacerbations (Menn et al. 2010). Generic quality of life as assessed by EQ-5D differentiates between stages of COPD severity (Rutten-van Mölken et al. 2006). The MRC scale has been shown to provide a valid means of categorising levels of disability in COPD patients (Bestall et al. 1999). In studies measuring quality of life of patients with COPD it is recommended that both the clinically specific SGRQ and more generic measures are used (Daudey et al. 2010).

Participants completed spirometry and the battery of questionnaires at baseline. Questionnaires were completed at mid-study (five months) and study end (ten months), and spirometry undertaken at study end. On each occasion, participants also had the opportunity to write any comments they wished to make about their health and their experience of the project (an analysis of their written feedback is given in the second section of this report).

Statistical analysis was performed using SPSS version 19. Change in quantitative outcome measures between baseline and post singing programme was assessed using paired t-tests. Distributional assumptions were checked and where appropriate statistical transformations undertaken. Where no transformation was possible alternative non-parametric equivalents were employed. No missing data imputation was conducted.
The intervention

Singing groups were led by skilled and experienced singing facilitators. The facilitators received five days training and met regularly throughout the project to ensure a broadly consistent approach. Facilitator training for the role was led by the Musical Director, with some input from outside trainers. Singing sessions were weekly during academic term time, from September 2011 to June 2012. Sessions were held in community halls which were booked specifically for the event, were private and afforded acceptable levels of comfort (heating, light, ambient sound, tea making, etc) with close integral car parking and flat access to the hall on the ground floor. Sessions were delivered to groups ranging in size from 20 to 50, including supporters (40% supporters on average). Supporters were health staff or voluntary organisation staff, carers, partners, friends or family members of the person with COPD. Singing groups took place over a total of 36 weeks including workshop/performance events at the end of each term. Sessions were a total of 90 minutes. Thirty minutes were for socialising during the ‘meeting and greeting’ phase, and clearing away after singing. The 60 minute singing session commenced with 20 minutes of relaxation, posture, breathing and vocal exercises followed by 40 minutes singing. A wide common repertoire of familiar and new songs was available in a high quality song book. Participants also steered the musical direction of their group according to their interests. Keeping the programme fresh, enjoyable, stimulating and stretching is essential for a project planned to run over the course of ten months. Songs were taught by ear and were sung mainly without accompaniment (Robb et al. 2011).
Quantitative results

Participants involved in the project and findings from the measures employed.

Recruitment

Of the 145 GP practices contacted in June 2011 in East Kent by the South East Primary Care Research Network (PCRN-SE), only six practices sent out letters to 499 patients, even though practices were offered payment to do so by the PCRN-SE. Of the 106 patients recruited via all routes, 41 were registered with one of the six practices (this would represent an 8 per cent response rate if all of those registered with these practices volunteered on the basis of receiving a letter). The rest (65) were recruited through additional routes: the East Kent Community Respiratory Team, newspaper advertising, and direct contact with the three British Lung Foundation Breathe Easy Groups (BLF BEGs) in East Kent.

Sample

Of the 126 people who volunteered to participate in the study, 121 attended for baseline assessment during which questionnaires were completed and standard spirometry administered. Fifteen (12.3 per cent) volunteers were found not to meet the inclusion criteria for COPD, and were excluded from the study, but not from participating in a singing group. The sample of 106 participants with COPD varied in the stage of their COPD with 15 per cent mild, 45 per cent moderate, 30 per cent severe and 10 per cent very severe. The mean age of the sample was 69.5 (SD 7.64) with a third being male. The majority of participants were retired (75.1 per cent), with 14 (13.5 per cent) who retired due to the effects of COPD. The majority of the sample were previous smokers (69.5 per cent); 11.4 per cent currently smoked, and 19.0 per cent had never smoked. Ninety-nine per cent considered themselves white, and 51.4 per cent had continued in education, with over a third holding a degree or equivalent qualification. The majority had a joint income with partner of less than £20k (63.0 per cent), and 36.2 per cent less than £10k jointly. Over the course of the study 34 (32.1 per cent) participants withdrew because of competing commitments and health problems. In only three cases, however, were the health issues related to COPD.

A network of six singing groups for patients with COPD was successfully established and maintained over the period of ten months. Three of the singing groups formed were fairly large, with an average of 26 members, and three were smaller, with an average of 9 members. The larger groups were in areas where a Breathe Easy support group operated.

Assessments of lung function

Table 1 reports the results from the spirometry undertaken at baseline and the end of the singing programme. Significant improvements were found for FEV₁ per cent (Mean change 1.94; 95% CI 0.58 to 3.30; p=0.006), FVC (0.11; 0.01 to 0.20; p=0.027) and FVC per cent (3.63; 0.28 to 6.98; p=0.034).

Table 1: Measures of lung function at baseline and end of programme

<table>
<thead>
<tr>
<th>Measure</th>
<th>n</th>
<th>Baseline</th>
<th>End of programme</th>
<th>Mean difference (95% CI)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV₁</td>
<td>66</td>
<td>1.29 (0.49)</td>
<td>1.32 (0.51)</td>
<td>0.03 (-0.01; 0.58)</td>
<td>0.094</td>
</tr>
<tr>
<td>FEV₁% predicted</td>
<td>67</td>
<td>54.34 (20.45)</td>
<td>56.28 (21.98)</td>
<td>1.94 (0.58; 3.30)</td>
<td>0.006</td>
</tr>
<tr>
<td>FVC</td>
<td>64</td>
<td>2.43 (0.75)</td>
<td>2.54 (0.075)</td>
<td>0.11 (0.01; 0.20)</td>
<td>0.027</td>
</tr>
<tr>
<td>FVC% predicted</td>
<td>65</td>
<td>81.72 (22.60)</td>
<td>85.35 (21.70)</td>
<td>3.63 (0.28; 6.98)</td>
<td>0.034</td>
</tr>
</tbody>
</table>
Self-assessed health

Participants in the study completed a battery of questionnaires at baseline, mid-point in the study and at the end of the programme. No significant changes were found between baseline and mid-point assessments on any measure. Table 2 reports the results from the St George’s Respiratory Questionnaire, MRC breathlessness scale, EQ-5D and SF-12 for baseline and the final assessment.

Significant improvements emerged for the SGRQ total (-3.29; -6.14 to -0.45; \( p=0.024 \)) and impacts scores (-3.45; -6.77 to -0.13; \( p=0.042 \)) between baseline and the end of the programme. No significant changes were found, however, for breathlessness assessed by the MRC scale, nor for generic measures of mental and physical health-related quality of life as measured by York SF-12 and the EQ-5D.

Table 2: Measures of self-assessed health at baseline and end of programme

<table>
<thead>
<tr>
<th>Measure</th>
<th>n</th>
<th>Baseline</th>
<th>End of programme</th>
<th>Mean difference (95% CI)</th>
<th>( p ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGRQ total</td>
<td>71</td>
<td>48.71 (16.95)</td>
<td>45.42 (16.96)</td>
<td>-3.29 (-6.14; -0.45)</td>
<td>0.024</td>
</tr>
<tr>
<td>SGRQ symptoms</td>
<td>71</td>
<td>59.16 (23.49)</td>
<td>56.04 (22.05)</td>
<td>-3.13 (-7.35; 1.08)</td>
<td>0.143</td>
</tr>
<tr>
<td>SGRQ activities</td>
<td>71</td>
<td>65.46 (22.41)</td>
<td>63.33 (22.14)</td>
<td>-2.13 (-5.44; 1.18)</td>
<td>0.204</td>
</tr>
<tr>
<td>SGRQ impact</td>
<td>70</td>
<td>35.65 (17.56)</td>
<td>32.21 (15.90)</td>
<td>-3.45 (-6.77; -0.13)</td>
<td>0.042</td>
</tr>
<tr>
<td>MRC dyspnoea</td>
<td>68</td>
<td>2.68 (0.98)</td>
<td>2.54 (1.03)</td>
<td>-0.13 (-0.34; 0.08)</td>
<td>0.210</td>
</tr>
<tr>
<td>EQ-5D utility score</td>
<td>65</td>
<td>0.71 (0.22)</td>
<td>0.75 (0.22)</td>
<td>0.04 (-0.01; 0.08)</td>
<td>0.152</td>
</tr>
<tr>
<td>EQ-5D VAS</td>
<td>65</td>
<td>66.61 (17.96)</td>
<td>68.86 (18.99)</td>
<td>3.24 (-1.2; 7.68)</td>
<td>0.150</td>
</tr>
<tr>
<td>SF-12 mental</td>
<td>65</td>
<td>53.48 (9.87)</td>
<td>54.99 (9.06)</td>
<td>1.50 (-0.90; 3.91)</td>
<td>0.216</td>
</tr>
<tr>
<td>SF-12 physical</td>
<td>65</td>
<td>28.91 (7.98)</td>
<td>28.82 (7.87)</td>
<td>0.09 (-1.14; 1.33)</td>
<td>0.882</td>
</tr>
</tbody>
</table>
Quantitative discussion

Recruitment

It was possible to recruit over a hundred COPD patients to a community singing project. However, participation by GP practices in this process was limited, even though they were offered payment to do so. This has recruitment implications for future larger-scale controlled studies on singing and COPD, and the ability to build an evidence base. The six practices that took part varied from large practices with dedicated research support, to single GP practices with minimal administration support. Discussions with Practice Managers revealed that in large Practices, it could take up to 3 months to gain agreement from GPs to take part in research. This issue will be built into future study design timelines, including more attention to involving GPs in the design and recruitment processes initially. This will also be useful in explaining to GPs the expected benefits of the study to them, and gaining their support. Also influencing recruitment was the presence of a BLF BEG in the geographic area of the larger groups. The influence of the three BLF BEGs was due to the encouragement possible by presenting the project to the members at their monthly meeting, and the consequent peer support received. East Kent has an excellent Community Respiratory Team, and they informed patients on their lists, and also those taking part in pulmonary rehabilitation (PR). Members from the BEGs visit the PR Groups to promote the local BEG, and they also promoted the singing groups as well. Advertising in the local papers was also successful for harder to reach people, but was relatively expensive on a per head basis.

Attrition

Over the course of the study a total of 34 participants left the study and did not complete the final questionnaire (32.1 per cent attrition). A further six participants were unable to attend for the final spirometry assessments due to other commitments and illness (37.7 per cent attrition). The rate of loss to the study is less than the conservative estimate of 50% made in designing the study and considering the length of the study compares well with attrition rates in previous studies of singing and COPD (Bonilha et al, 2008, 30 per cent over 24 weeks; Lord et al, 2010, 22 per cent over six weeks; Lord et al, 2012, 19 per cent over eight weeks). Comparisons were made between those dropping out and those remaining in the study and no significant differences emerged on any measure taken at baseline, so attrition did not introduce bias into the study. In addition, only a small number of withdrawals (2.8 per cent) were due specifically to COPD related health issues, and only a small proportion of missed attendances during the programme were due to COPD related health issues (1.5 per cent). This indicates that participants seemed to have stayed generally quite well and active whilst participating in weekly singing. Qualitative evidence also indicates that some participants had not been as ill as in previous years during the particularly harsh winter of 2011, when GPs were warned by the UK Department of Health to expect increased illness rates in COPD patients (DH, 2011).
Improvements in lung function

The positive improvements in the standard spirometry measures are encouraging findings, especially given that a decline in these measures might have been expected as COPD is a deteriorating disease. While the improvement for FEV₁ was 30ml and not statistically significant, Dewar and Curry (2006) suggest that after 25 years of age, a non-smoking adult’s FEV₁ declines each year by an average of 20–40ml and that in susceptible smokers this decline can be as much as two to five times greater. Recent evidence suggests that improvements of 120ml or more in FEV₁ are associated with clinically significant improvements in perceived health status measured by the SGRQ (Jones et al., 2011; Jones, personal communication, 2012). In the present study seven people showed deterioration of 120ml or more over the course of the study, and 16 people showed an improvement of at least 120ml beyond baseline.

While the FEV₁ change is not statistically significant, FEV₁ expressed as a percentage of expected values (taking account of age, gender, body-mass index and ethnicity) does show a clearly significant improvement of almost 2 per cent. Interestingly, both FVC and FVC per cent have also improved. As FEV₁ cannot exceed FVC, and increased FVC can be regarded as an indicator of reduced gas-trapping (Macklem 2010), the changes in FVC seen may be of greater clinical and functional significance than changes in FEV₁.

St George’s Respiratory Questionnaire

The finding of an improvement in the total SGRQ score was encouraging. While the change of 3.3 is less than what is considered a clinically important change value of 4, the change was statistically significant. Over time a rise in SGRQ of approximately two points annually is to be expected given that COPD is a progressive illness (Jones, personal communication, 2012). The improvement in SGRQ is also consistent with the improvements found in the lung function measures (Jones et al, 2011).

MRC Dyspnoea Scale

The mean MRC rating showed some slight improvement, but the change was not significant. The correlations between the MRC scale and SGRQ total at baseline and end of programme were 0.68 and 0.54 respectively. While positive and significant, these correlations are moderate. Breathlessness is part of a more comprehensive self-assessment given by the SGRQ and appears to be more sensitive to change than the MRC scale.

York SF-12 Physical and Mental Wellbeing

SF-12 scores suggested mental health was similar to the population norm, but physical health was poor, and no change was found in either over the period of the study. The lack of change in the physical component of the York SF-12 contrasts with the positive changes found by Lord et al. (2012) in the physical health component assessed by the SF-36. Previous studies on singing have shown improvements in mental health and wellbeing for mental health service users (Clift and Morrison, 2011), and for older people over 60 years old (Skingley et al. 2011; Clift et al. 2012). However, mental health was quite good amongst the current sample of COPD patients, and conversations with participants when they were attending to complete questionnaires, revealed they were in good spirits and had adjusted to their condition. This may explain the lack of change in their mental health status.

EQ-5D

As with the York SF-12, measures from the EQ-5D did not show significant change over the course of the study. While EQ-5D utility and VAS scores can differentiate groups of patients with severe and very severe COPD, (Rutten-van Mölken et al. 2006), they appeared to lack sensitivity in the current study to detect changes in response to the singing intervention.
Study limitations

The current study was designed to assess the feasibility and acceptability of establishing and running community singing groups for people with COPD over the course of almost a year, and to gather data on changes which would allow us to explore the potential effect for consideration for a subsequent community-based randomised controlled trial. It was clear from the study that the singing intervention was feasible and acceptable to the population and positive effects were observed on a number of important clinical measures of COPD including condition specific quality of life. In the current study participants volunteered on the basis of information received through a variety of channels and expressed an explicit preference to engage in singing groups, and while this may not be representative of the COPD population as a whole it was representative of those who would be willing and able to engage in group singing.

Implications

The improvement in FEV\(_1\) per cent, FVC and FVC per cent, and SGRQ suggests that the singing programme followed, including the attention paid to posture and breathing technique, may have an exercise training effect on lung function. Lung function is an important aspect of health, ensuring efficient evacuation of the lungs and providing the oxygen supply to the circulation system. As singing can be performed sitting down, it is suitable for almost anybody. This enables a training regimen to be individually graded both by varying the position of the participant, e.g. sitting, standing, or walking around, and the exposure to the graded singing delivery of the vocal exercises and song difficulty. Therefore it could be classed as a form of moderate cardiovascular exercise suitable for all. This aspect is being discussed with the Community Respiratory Team in East Kent with a view to integrating some singing within PR provision, but also as an option for those not able to take up PR, for those on the waiting list for PR, and also as a post-PR maintenance activity.
Quantitative conclusions

The improvement in FEV₁ per cent, FVC and FVC per cent indicates that community singing (including attention to posture and breathing techniques) can have an exercise training effect on the lung function of people with mild to very severe COPD. Singing could be considered as a form of moderate cardiovascular exercise for this group of chronically ill patients and as such is worthy of attention from Health Service Pulmonary Rehabilitation Teams, Respiratory Nurses, Health Promotion Services, and voluntary organisations working to support people with COPD in the community.

The reported study suggests the need for a larger-scale controlled study on community singing and COPD. A further planned study will pay more attention to processes of recruitment into the trial to assess the factors associated with willingness to participate in singing groups among people with COPD.

Regular group singing is an innovative initiative to help people with COPD engage in physical and social activity to support independence and quality of life.
Qualitative findings

Participants’ experiences of the singing groups and benefits gained.

Collecting feedback from participants

As noted above, participants had the opportunity to write comments on each of the questionnaires completed about their experience of the project and give feedback on their health. Such information provides valuable insights into how people experienced the singing groups and the benefits they felt they gained from participation.

Data analysis

All written comments were transcribed and imported into NVivo9® (QSR International 2010), a qualitative data analysis programme. Analysis proceeded as a two-stage operation. Initially, following familiarisation of the content through reading the whole text, the complete data set was subjected to a broad content analysis, to allow reduction of data into categories linked to simple quantification (Breakwell et al. 2006). This was guided by an analysis of word frequencies as generated by the software, when particular terms were highlighted. For example, it was anticipated that participants would comment on breathing, as all had respiratory problems, so we ran a text search query for ‘breathing’ and similar matches through the use of a wildcard (breath*) to indicate the addition of any other characters (e.g. ‘breathe’ ‘breathing’). Breathing then became one category (or ‘node’ as it is termed in NVivo). Becoming familiar with the text allowed the initial identification of a further four major categories: physical health (other than breathing); psychological health; social wellbeing; and comments on the project and singing programme. This was achieved by two researchers working independently and then resolving any differences emerging, all of which were minor.

Following this, the categories were overlaid with a thematic analysis, which involved a more interpretive approach to the data through careful examination of the language used. A theme may be defined as a data extract (an individual chunk of coded data) which captures something important in relation to the overall research question (Braun and Clarke 2006). The questions in this qualitative part of the study related to assessing acceptability and effectiveness in the broadest sense, of the singing programme and the research procedures as perceived by participants. Therefore we interrogated the comments for qualitative statements (positive or negative indicators of acceptability); for terms indicative of attribution of any change in wellbeing to the singing intervention (indicators of effectiveness); and also for whether perceptions changed over time, that is, over the three administrations of the questionnaire (baseline, mid-study, end of study). A visual representation of how this was conceptualised is provided in Figure 1. A quantitative element was retained for this stage of the analysis, since we felt it was useful to explore any change in terms of the number of data extracts expressing positive, negative or attribution comments over the course of the research intervention. Data extracts were ‘counted’ if they pertained to a comment by the same individual at different data collection periods, but not to more than one comment repeated within the same questionnaire.
Comments were received from 96 individuals (total sample = 106) over the course of the project, with 66 at baseline, 77 at mid-study follow-up and 73 at final follow-up. As expected, baseline comments were very much briefer than the later ones. Presentation of findings based on these comments is guided by the broad themes as described above, and, within them, where relevant, the dimensions of quality (positive-negative), strength of any attribution of change to intervention, and timing.

Figure 1: Conceptual framework for data analysis
Breathing

Baseline spirometry measures confirmed that participants were diagnosed with COPD (Mild 15%, Moderate 45%, Severe 30%, Very Severe 10%). Overall the data generated 97 extracts related to breathing. General comments relating to on-going respiratory conditions were overwhelmingly negatively framed and broadly distributed across all three time bands. These provided a fuller picture of additional respiratory diagnoses (asthma, chest infection, pneumonia, bronchiectasis – 7 individuals) as well as how participants experienced their respiratory limitations, in terms of being out of breath or wheezy, having chest problems, having poor lung power, drug side-effects or having to use medication pumps more frequently:

“I have noticed that my breathing is poor when walking and talking simultaneously. A chest infection leaves me ‘voiceless’, the longest being 9½ weeks. I am under the care of a chest consultant and have bronchiectasis.”

Female, group 2, age 76

A few individuals commented in more positive terms on their existing health. For example two participants noted that their current medication was controlling their condition. However, the majority of breathing-related comments from the second and third data collection periods concerned improvements noted by participants since the singing groups started. Although most just stated that breathing had improved, many individuals were able to identify particular mechanisms through which these were achieved (see below).

Mechanisms for achieving health improvements

- Promotes learning for breathing properly (including breath control, techniques for daily activities, muscle control, understanding, monitoring and awareness of breathing)
- Improves posture
- Promotes relaxation
- Helps concentration/provides distraction
- Provides a good workout/more energy
- Opens lungs/increases lung capacity
- Makes physiotherapy easier
- Helps prevent panic/hyperventilation
Moreover, a large number of the comments (64) expressed strong beliefs that the singing was the reason for improvement noted:

“I believe that the project is teaching me how to understand my breathing and how to control it. This is very useful; it stops me hyperventilating when my breathing is under pressure i.e. climbing a steep hill.”

Female, group 5, age 74

In two cases there was an inference that the intervention had led to reduced uptake of health services:

“Since first time in joining the singing group I have not had to spend time in casualty this winter or spring for COPD.”

Female, group 1, age 64

Looking at the distribution of the comments on breathing (26 at second data collection; 37 at third data collection) it may be that participants experienced incremental gain in respiratory health over the intervention period. Fourteen individuals commented at both of these time periods and, while some simply reiterated statements made earlier, in others the strength of attribution appears from the language to have increased. For example:

Female, group 2, age 71:

“I feel that I will benefit from all the singing and breathing techniques that I have been taught.” (Data collection time 2).

“I feel that the benefits I have had from the course has been great, my breathing has improved no end.” (Data collection time 3).

Three participants made anticipatory statements in the baseline questionnaire, expressing hope that singing would improve their COPD, looking forward to seeing improvement and in one case being ‘convinced’ that the singing would bring benefit. This suggests that some of our sample embarked on the project with certain expectations, though the extent to which this might have affected later responses is unknown as, too, is the number of other individuals who may have held, but not expressed, similar views.

Not all participants were so convinced of the effectiveness of the intervention. Twelve statements (mostly from time 2) referred to being unsure of benefits, as yet not able to judge, not noticing vast improvement, maintaining an open mind, effectiveness being hard to evaluate, noting change may be a coincidence or not feeling worse. For three of these individuals later comments at collection time 3 indicated a more certain attribution:

Female, group 5, age 77:

“As yet, any health/breathing improvement has not been apparent.”
(Data collection time 2).

“It certainly appears to have helped with my general breathing.”
(Data collection time 3)
Physical health

A number of individuals (n=26) commented on their existing physical health status, supplementing the baseline standardised research measures and providing a detailed picture of how this affected their everyday lives. These were expressed in largely negative terms, indicating that, for many, co-morbidities existed alongside their primary diagnosis. Physical health issues related to poor mobility, general tiredness and sleep problems, episodes of flu, voice problems, pain, cancer, stroke and general ‘poor health’. Some of these health problems, often unrelated to COPD, kept people away from the singing groups:

“Due to flu, ‘maybe Asian flu’ I have had to have 4–6 weeks away so I am still suffering the ‘dregs’ of the infection...”

Female, group 6, age 66

A large number of comments also reported improvements to physical health (other than breathing) at either mid-term (n=5) or end point (n=11). These included comments related to more positive energy levels, vocal capacity, mobility, physiotherapy being easier post-singing and general physical health improvement, and most of these improvements were explicitly ascribed to the singing intervention:

“I love coming to COPD Singing Research Project and I always feel much better physically and emotionally afterwards.”

Female, group 5, age 70

All those commenting on the benefits to physical health appeared to have no doubt that it was the singing that had given rise to this.
Psychological health
A few participants commented on pre-existing psychological health issues in terms of anxiety, feeling down and depressed and panic attacks. While for some this was unattributed, a focus among others was on the psychological sequelae of COPD:

“You need to understand that being severely out of breath ALL THE TIME can be so emotionally draining, you cannot do anything energetic. You need to stay away from any environment where the air is less than really fresh, you have to think about everything. Fit and healthy people don’t understand, so you can’t talk to them.”

Male, group 5, age 58

For a few individuals, mental health issues were unconnected to their respiratory diagnosis:

“I suffer from emotional and slight depression. This is due mainly because my son died 4 years ago for no obvious reason.”

Male, group 4, age 56

“My husband is ill at the present time so I am a little preoccupied and probably not quite as cheerful as per normal.”

Female, group 3, age 77

The fact that these comments were made across all data collection periods suggests that certain states of health were not amenable to improvement over the timescale of the research. However, much more numerous were comments relating to areas where psychological health was perceived to have improved as a result of the singing groups. Ninety-one data extracts alone referred to ‘enjoyment’ or a derivative of the term, and a further 18 to ‘fun’. Notably, this sense of enjoyment was maintained throughout the whole duration of the project and was even mentioned by a few individuals in relation to the taster sessions, so may have served as a contributor to the retention rate within the groups.

Of greater importance for understanding the mechanisms through which psychological health was felt to improve were more specific comments than those relating to enjoyment alone. The range of areas referred to is illustrated below in order of frequency.

<table>
<thead>
<tr>
<th>Areas of perceived benefits to psychological health</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lifts spirits (feel uplifted, contributes to spiritual health)</td>
</tr>
<tr>
<td>• Promotes general psychological/mental/emotional wellbeing/feeling better/therapeutic</td>
</tr>
<tr>
<td>• Boosts confidence/provides sense of achievement and pride</td>
</tr>
<tr>
<td>• Provides a feel-good factor/adrenaline buzz</td>
</tr>
<tr>
<td>• Provides a purpose in life/reason to get out of the house/something to look forward to</td>
</tr>
<tr>
<td>• Helps relaxation</td>
</tr>
<tr>
<td>• Promotes a positive attitude/feeling upbeat/counteracts feeling low</td>
</tr>
<tr>
<td>• Helps coping/dealing with illness</td>
</tr>
<tr>
<td>• Reduces anxiety and depression</td>
</tr>
<tr>
<td>• Encourages self-help</td>
</tr>
</tbody>
</table>
Once again, comments were incremental over the three data collection points, adding credence to the suggestion that a longer exposure to the singing groups led to greater perception of benefit. Once again, too, baseline comments revealed a positive expectation on the part of some individuals:

“I have recently lost my husband and therefore have been very low and run down. I am sure that this course will help me and I shall benefit as we progress.”

Female, group 2, age 71

In other respects, comments on psychological health differed from those related to breathing, in the absence of any doubt that the singing groups were responsible for improvements. This may be because there was a pre-existing suggestion (given that COPD was a major focus) that singing may alleviate breathing problems, whereas there was no reference to potential psychological benefits (therefore no reason to comment on lack of effect). However, looking at those who responded at different times in relation to psychological health illustrates a confirmation of on-going benefit and sometimes a marked tendency for greater detail of particular improvements to emerge:

Female, group 3, age 64:

“I am looking forward to seeing an improvement with both my breathing and wellbeing.”

Baseline feedback

“I always feel better after the singing session.”

Midpoint feedback

“I now have 3 friends as supporters and they also enjoy singing. One friend has dementia and he really ‘comes alive’ during the session.”

Final feedback

This final quotation provides a clue to the popularity of the groups in that the focus is not just on the individual and his/her health status but on the fact that the singing took place in a social context. This was remarked upon by a large number of participants.
Social wellbeing

In total, 110 data extracts made reference to the social aspects of the singing groups and these were universally positive in nature. This exceeded the number of comments related to breathing and content broadly pertained to either friendship and company generally, or to the support gained from meeting those similarly experiencing COPD. Distribution across data collection points suggested some expectation at baseline (n=7) moving to establishment and sustaining of social interaction at mid and end-points (n=50 and 53 respectively). This relative stability from time 2 to 3 suggests that the same friendships may have been maintained over the course of the intervention period.

Looking more closely at content, the most frequently used word was ‘friend’ (or associated words). This was followed closely by references to the social side, the company, camaraderie, the group/’bunch’ or meeting other people:

“...the friendship, team spirit etc. is wonderful ...personally I have benefited (sic) from seeing friends, which makes me feel cheery.”

Female, group 4, age 62

“...as I am retired, the social ‘get together’ has been wonderful.“

Male, group 5, age 77

Other comments related the social/group side to the singing itself, indicating the importance of the fact that, through this, they were becoming part of something to be proud of:

“...group has become very friendly and we seem to becoming a ‘choir’ under excellent guidance.”

Male, group 5, age 68

A total of 33 data extracts specifically mentioned the social/group aspect vis-à-vis the unifying factor of a COPD diagnosis. Again comments were all positive and spread across the timescale, including some expectation at baseline:

“would be good to meet with other people to see how they cope with people that think you are alright.”

Female, group 4, age 70

Benefits of meeting others with the same diagnosis included: sharing and discussing experiences and learning, being with people who understand, feeling someone cares, being able to care for each other, mutual support and bonding, receiving reassurance, meeting people in a worse condition, and feeling less isolated:

“COPD is socially isolating and the singing class has allowed me to share experiences about my condition and pick up tips from others on how to cope. There’s always a welcoming comforting atmosphere at singing, it’s the one place I don’t feel unusual or different from other folk and you don’t get comments or looks from those around you if you experience discomfort as they understand your condition and its limitations.”

Male, group 3, age 70
Comments on the project and singing programme

Participants were explicitly invited to comment on positive experiences during the project as well as areas which could be improved. Most chose to do so, with roughly equal distribution across all three data collection points but with positive comments outweighing others in a ratio of five to one. Comments related to the following areas: facilitation and leading; organisation and administration; the topic of the research; the programme and content of the sessions; the venue and environment; and the ending of the project and future plans.

While a number of comments related to facilitation simply used words such as ‘brilliant’, ‘superb’ or ‘excellent’, others provided an indication of the qualities appreciated by participants in running the singing groups (see below).

Facilitator qualities valued by participants

- Encouraging, ‘can do’ attitude
- Enthusiasm
- Motivational/inspirational
- Sense of humour/fun
- Caring, understanding, kind, helpful
- Sociable, good rapport, friendly
- Welcoming
- Dedicated
- Good leadership
- Knowledgeable
- Professional and competent
- Able to maintain interest
- ‘No pressure’

Predictably the competence and knowledge of facilitators were seen as important, however equal, if not greater value was put on social and emotional intelligence:

“The ‘facilitators’ (sic) ... were excellent. They made sessions light-hearted as well as instructive. In particular they did well to encourage folk like me, who hadn’t sung since he was 8 years old except at church services, to overcome a natural reluctance to dare to make a noise.”

Male, group 1, age 79

The majority of comments on administration and organisation appeared within the baseline questionnaires and related to the recruitment procedures (quality of instructions, the questionnaire itself or contacting the Centre). Three quarters of these comments were very positive:

“not having attended any preliminary sessions, I am impressed by service when I phoned for information at almost the last day before a singing session. Joining instructions were concise and complete.”

Male, group 1, age 79

A small minority made less favourable comments, finding communication with the Research Centre problematical, the questions in the questionnaire difficult, too many forms to complete or insufficient information provided.

Some individuals commented on the general topic of the research. Not surprisingly, because they had volunteered to take part, these comments were very supportive. Although a number just noted finding the subject interesting or intriguing, others expressed a hope that some benefit would come out of the project, either personally, or more generally in terms of medical research. This sense of altruism, which has already been noted in previous research literature (Robinson et al., 2005) is worth emphasising in recruitment strategies:

“the more research into lung disease and also publicity will help people of the future generation.”

Female, group 4, age 66
With regard to the singing programme, there was much approval of the range of songs with both old and new items introduced, and only a few individuals commented negatively in terms of not liking songs which were sung at school or not coping with the pitch (too high for one, too low for another). There was a similar disagreement about the warm-up exercises, with some specifically liking these and some disliking them, with a corresponding split over the emphasis on breathing. Other areas of approval were the structure of the programme, the inclusion of harmonising and the Christmas party! Other suggestions included wanting longer sessions or the whole project run continuously rather than in terms, while a few felt that the singing of Christmas carols began too early.

Positive comments on the environment referred to a welcoming, relaxing or friendly atmosphere and the quality of the venue with ample parking. However four of the venues attracted comments that they felt cold in the winter months and for three venues individuals drew attention to poor audibility. Other comments concerned the distance travelled to the venue and a problem with parking.

Finally, in data collection times 2 and (increasingly) 3, some 40 comments referred to the approaching ending of the research project. Some simply stated that they would be sorry, disappointed or sadly miss the singing, but one individual wrote more negatively about being “left out in the cold at the very end with no director or future, felt dumped” (Female, group 1, age 64). More numerous, however, were those expressing hope that the singing groups could continue, some volunteering to contribute to this end, either financially or in other ways:

“I have come to regard the social get together and singing as an important part of my life, which in other circumstances I wouldn’t have got involved in and I intend to help in any way to keep our ‘choir’ going after the end of the project.”

Male, group 5, age 77

The ultimate end for many of those expressing such hope was that the findings of the research would be positive and so be disseminated sufficiently widely to effect a change in the management of people with COPD like themselves:

“I wish the project would carry on as it has been a great help to me. I hope in future all doctors and respiratory nurses will find a way of getting people with lung problems to start another project in singing.”

Female, group 4, age 66
Qualitative discussion

This section of the report presents the analysis of the written comments from 97 individuals participating in singing groups for people with COPD. Wording on the questionnaires was purposely broad, asking about experiences of participation in the project, but with two sections steering respondents to making positive or negative points. The main contributions from this phase of the research were:

• To provide a more comprehensive picture of the overall health profile of the sample.
• To generate complementary, as well as confirmatory, evidence to supplement the quantitative element of the study.
• To contribute to the evidence base already existing in this area in terms of previous research.

Participants were included in the project by virtue of their diagnosis of COPD, a long-term, progressive and potentially disabling condition. However, as the literature suggests (Maurer et al. 2008), both physical and psychological co-morbidities were found to be present at baseline in a number of participants who chose to share this information with researchers. While, for some, this entailed concomitant respiratory diagnoses, the list of (largely unrelated) physical conditions was striking. In addition and also linked by some to the COPD, there were examples of expressed anxiety and depression. Overall, a picture of a somewhat diverse sample emerged with regard to pre-existing health; the general profile of good mental health demonstrated in the quantitative data was obviously subject to exceptions as demonstrated in participant perceptions, while evidence of overall poor physical health was supported and well illustrated.

Where there was an overlap in content matter, qualitative data broadly supported that derived from the structured measures. Spirometry showed a mean significant improvement in forced expiratory volume in one second FEV\(_1\) and forced vital capacity FVC as a percentage of expected values at final follow-up, along with significant improvement in the St George’s Respiratory Questionnaire (SGRQ) scores, although minimal change was found on the SGRQ at midpoint. Participant comments, however, suggested that improvements in respiratory symptoms were clearly experienced by the midpoint data collection date and, increasingly, by the endpoint. They also provided evidence of how this improvement was experienced, therefore yielding a more nuanced picture of the impact of singing on COPD than that derived from quantitative data alone.

No change was detected in the generic mental or physical components of quality of life from the quantitative analysis (SF-12) at the end of the study. This contrasted with the benefits, especially in mental health, being experienced by participants and a clear attribution to the singing programme as the cause. It may be that the instruments used were insufficiently sensitive to detect this experienced change in health status or it may be, bearing in mind that some individuals expressed difficulty in completing the questionnaires, that the limited response format of the instruments failed to capture what they wished to convey. There is also the finding that, on the mental health component, scores were close to the population mean at baseline. For the physical health component, in contrast, mean scores were low and the lack of change may indicate that the intervention, while positive in specific ways, was not sufficient to improve general physical health status.

One area not well reflected in the quantitative evidence related to the social benefits which participants experienced as a result of the singing groups. This appeared as an important and sustaining motivation for continuing to attend and a reason for the enjoyment expressed by many, with comments outnumbering those related to breathing. This benefit is, perhaps, less readily measurable by research instruments but clearly relates to coping with an otherwise isolating condition.

The evidence from participant comments in our study adds to the research base on singing for
breathing. Improvements in breathing, in physical health more generally and in mental wellbeing, experienced by our sample as a result of singing, is supported in the responses to interviews conducted in the two studies by Lord et al. (2010; 2012). In addition, the Lord studies also reported social benefits and support from the group nature of the intervention, adding credence to our findings.

The varying degrees of certainty with which our respondents attributed improvements in physical health and breathing to singing is echoed in a study conducted with choral singers (Clift et al. 2009). In that study, where recruitment was not based on any physical condition, a ‘tentativeness-certainty’ spectrum of attribution was created and it was noted that those experiencing acute or chronic health conditions (especially affecting breathing) were more likely to be convinced that singing had been beneficial.

Sonia Page
Leading members of the Folkestone pilot group performing for World COPD Day 2011
Qualitative conclusions
The qualitative analysis of written comments reported here aimed to explore the feasibility, acceptability and effectiveness of singing for breathing as experienced by people with COPD. The majority of participants chose to write comments to supplement quantitative information resulting in a broader picture of individuals’ pre-existing state of health and subjective accounts of any health benefits accruing from the singing to supplement our quantitative measures. Findings suggest that singing is perceived as both acceptable and beneficial to this group, not only for breathing but also in relation to general physical, psychological and social wellbeing. Participants were able to identify various mechanisms whereby benefits were accrued and also commented on aspects of the programme which were more and less favoured. Such information is useful for the future planning of such groups.

Limitations
The study took place in a limited geographical area in the south east of England, therefore is not necessarily representative of the population of people with COPD. Results should therefore be treated with caution when considering generalizability. Participants in the study were volunteers who purposely chose to become involved and often with some expectation of benefit. This may limit the validity of the findings. As with most qualitative studies, there is a potential for a social desirability response bias – though this is less likely where, as here, data collection is anonymous, rather than merely confidential (where the respondent known to the researcher as in an interview). Finally, though the thematic analysis was based on a rigorous process, it necessarily involved a degree of inference, which might have been minimised through additional measures such as member checking.

Implications for future research
Following on from this research we would suggest the inclusion of qualitative/experiential data in studies investigating the effects of singing on wellbeing, since this has the potential to pick up complementary areas of impact (such as the social element). There is also a need to build on existing knowledge through a large or multi-site randomised controlled trial to identify more reliably whether significant changes result from the singing intervention, to support external validity and to enable a cost effectiveness calculation. Lastly, research may benefit from recruitment through a system of referral from healthcare staff, rather than relying solely on volunteers, who may come with certain expectations of outcome from the study and therefore lead to some bias in reporting.
A participant in the project with portable oxygen

Sonia Page
Preparing the Whitstable group to sing
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Documentaries accompanying this report

DVD 1: Facilitating singing for people with breathing difficulties, with Sonia Page, Project Musical Director

DVD 2: The benefits of regular group singing for breathing, with Ingrid Falcke who is Living with COPD

DVD 3: Researchers, facilitators and participants talk about the value of singing for breathing, with images and sounds of group singing

To obtain copies please contact Isobel Salisbury, Research Administrator, Sidney De Haan Research Centre for Arts and Health, Canterbury Christ Church University, Folkestone, Kent CT20 1JG

Guide to Singing and COPD


This is one of a series of guides on singing and health produced by the Centre. Further details can be found on the Centre’s website: www.canterbury.ac.uk/Research/Centres/SDHR
“Standing to sing helps posture, you begin to think ‘upright’ automatically as this gives maximum output from your lungs. The relaxation exercises do just that, and learning to breathe bringing the muscles of the abdomen into play, as well as controlled exhalation, has helped me enormously.”

“This is the first winter I have not had to call an ambulance or be on lots of antibiotics or steroids. This maybe a coincidence or it may be better because of the breathing help I have received.”

“I believe that the project is teaching me how to understand my breathing and how to control it. This is very useful; it stops me hyperventilating when my breathing is under pressure i.e. climbing a steep hill.”

“I have enjoyed the project the singing has help me to understand how breathing and singing can help me to breathe better.”

“This helped mentally and physically. It’s somewhere to go with like-minded people. For the first time in five years I have not been admitted to hospital or casualty over the winter period. It opened up doors i.e. joining the (BLF) Breathe Easy group.”

“Have enjoyed being in the project and liked the singing bit. I gave up going to the gym as found the singing exhausting and as good as exercise.”