

# What do Singers Say About the Effects of Choral Singing on Physical Health? Findings from a Survey of Choristers in Australia, England and Germany

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## ABSTRACT

This paper presents evidence on choral singers' perceptions of the physical health benefits of choral singing. It is based on a thematic analysis of answers given to a single open question included in a questionnaire survey of over 1,000 choral singers in Australia, England and Germany: 'What effects, if any, does singing in a choir have on your physical health?' The question was carefully worded to be as open as possible, to allow respondents to say that singing has no effects or to identify both positive and negative effects on health. Four findings stand out from this study. Firstly, many respondents did not answer this question or expressed a belief that singing does not have effects on physical health. Secondly, there was a clear spectrum of confidence in the substantive answers respondents gave when identifying effects – usually benefits. Some answers were given very tentatively, whereas others were given with a great deal of confidence. Thirdly, with respect to the positive benefits identified by choristers, four areas stand out most clearly: effects on breathing and lung function; posture and body control; relaxation and stress relief, and physical activity and energy. And finally, the analysis of choristers' answers has helped to suggest some of the hypothetical mechanisms at work which link the activity of singing to aspects of physical health. The limitations of this study are considered and recommendations made for future research.

## I INTRODUCTION

A recent systematic review (Clift, Hancox, Staricoff and Whitmore 2008) identified 35 research reports addressing connections between singing, wellbeing and health in non-clinical samples and contexts, published since the early 1960s. The literature is highly diverse theoretically and methodologically, and low levels of cross-citation indicate an academic field in an early stage of development. Nevertheless, a number of important findings have emerged from the more substantial studies undertaken to date.

A range of small-scale qualitative studies using ethnographic, interview and focus group techniques with diverse samples have shown that singers commonly report a wide range of social, psychological, spiritual and health benefits associated with singing (e.g. Bailey and Davidson, 2002, 2005; Silber, 2005). These findings are supported by questionnaire surveys in which choral singers were asked to respond to a range of statements about the effects and benefits of singing. Beck, Cesario, Yousefi and Enamoto (2000) report that 67% of semi-professional choral singers in their survey agreed or strongly agreed that 'Singing has contributed to my personal well-being'. Clift and Hancox (2001) in a study of singers in a university choral society found that 71% of participants agreed or strongly agreed that singing was beneficial for their 'mental wellbeing'. Hillman (2002) reports

a significant perceived improvement in 'emotional wellbeing' among participants singing in a large community choir. A number of studies have also shown significant improvements in affective state after singing using previously validated mood questionnaires (e.g. Kreutz, Bongard, Rohrmann, Grebe, Bastian and Hodapp, 2004; Unwin, Kenny and Davis, 2002).

On a more objective level, a range of studies has assessed the impact of singing on physiological variables assumed to have wellbeing and health implications. Several studies, for example, have investigated levels of immunoglobulin A in saliva taken from participants before and after singing, and found significant increases, pointing to enhanced immune system activity (e.g. Beck *et al.*, 2000; Kuhn, 2002; Kreutz *et al.*, 2004; Beck, Gottfried, Hall, Cisler and Bozeman, 2006).

Few studies have employed standardised measures of wellbeing and health, or objective indicators of health status, in assessing the impact of active participation in singing. However, two quasi-experimental studies have reported positive health impacts from group singing for elderly people. Houston, McKee, Carroll and Marsh (1998) report significant reductions in assessed levels of anxiety and depression in nursing home residents using common standardised measures, following a four-week programme of singing, and Cohen, Perlstein, Chapline, Kelly, Firth and Simmens (2006) found significant improvements in both mental and physical health in a group of independent elderly people participating over one year in an especially established community choir.

The three earliest studies identified in the systematic review explored the idea that professional singing would lead to a measurable improvement of lung function (Heller, Hicks and Root, 1960; Gould and Okamura, 1973; Schorr-Lesnicks, Teirstein, Brown, and Miller, 1985). However, the best of these (Schorr-Lesnicks *et al.*) dismissed the idea of improved lung function among singers as 'a myth'. Given the lack of evidence for professional singers, it would seem unlikely that amateur singing, whether on an individual or group basis, would have much impact.

There has in addition been some limited research interest in the value of singing for patients with chronic respiratory disease. Engen (2005) tested seven participants with emphysema involved in 12 singing classes over six weeks. The study found evidence of some positive improvements (e.g. a change of breathing from a shallow upper chest pattern to one that was more diaphragmatic), but the sample was very small and the study lacked a control group. More recently, Bonilha, Onofre, Vieira, Prado, and Martinez (2008) reported a small randomised controlled trial assessing the impact of singing groups on lung function and quality of life among

patients diagnosed with chronic obstructive pulmonary disease (COPD). This study randomised 43 patients to a programme of singing or handcraft classes. Standard spirometric assessments were undertaken pre- and post-intervention. Subjective quality of life was assessed using the St. George's Respiratory Questionnaire. Fifteen participants in each group completed 24 sessions. The major finding was that while the control group showed a decline in measures of maximal expiratory pressure, the group involved in singing showed a small improvement ( $p < 0.05$ , post-hoc power assessment 90%). Both groups showed increased quality of life scores but with no statistically significant difference.

Most of the studies on singing and wellbeing undertaken to date have been small-scale and essentially exploratory; and only one study has specifically built upon and independently replicated a previous study (Kreutz *et al.*, 2004). Further major shortcomings in the literature are the lack of a common conceptual understanding of wellbeing and health, and the absence of a comprehensive theoretical framework that elucidates the key contextual factors and causally generative mechanisms through which singing can be beneficial for wellbeing and health.

A recent study by Clift, Hancox, Morrison, Hess, Steward and Kreutz (2008) has attempted to address the short-comings in the existing research literature, through conducting a large-scale cross-national survey assessing choral singers' perceptions of the effects of singing in Australia, England and Germany. It was considered important to undertake a cross-national study to broaden the potential generalisability of the study. To date only one published study has investigated the significance of singing in different cultural contexts (Louhivuori, Salminen and Lebaka, 2005). In terms of grounding the study in an established framework for conceptualising and measuring health and wellbeing, it was considered appropriate to work on the basis of the World Health Organization's definition of health (WHO, 1946), and the WHO Quality of Life project (Power, Harper and Bullinger, 1999). For the WHO, health is defined as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (WHO, 1946). Quality of life is defined as: 'a person's perception of his/her position in life within the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns' (WHOQOL Group, 2004).

Over a thousand respondents in choirs and choral societies in the three countries were invited to complete a questionnaire structured in three parts. Section one asked for personal data (e.g. sex, age, partnership status, employment) and experience of singing and music making (e.g. time in the choir, ever auditioned, singing lessons). Section two included three open questions on the effects of singing on quality of life, wellbeing and health, followed by a structured 24-item 'Effects of Choral Singing' questionnaire with a five-point 'agree-disagree' response format. Section three contained the WHOQOL-BREF - the World Health Organization Quality of Life Questionnaire (short version). Details of this questionnaire and findings from the structured scales used in the study can be found in Clift, Hancox, Morrison *et al.* (2008).

The concern of the present paper is to present findings from an analysis of written answers to one of the open-ended question included in the questionnaire, which asked respondents: 'What effects, if any, does singing in a choir have on your physical health?' The previous literature and the study by Clift, Hancox, Morrison *et al.* (2008), clearly show that singing can have positive psychological and social effects, but it remains an open question whether singing can have measureable effects on aspects of physical health, and particularly, what the mechanisms might be linking singing with improved health. It is therefore of particular interest to consider what experienced choral singers believe about the possible effects of singing on physical health, and the ideas they hold as to how singing might be beneficial to health.

## II METHOD

### A. Questionnaire and Sample

As noted above, the questionnaire included three open questions on the effects of singing on quality of life, psychological and social wellbeing and physical health. Participants gave written answers to these questions. 1124 choristers participated in the survey across the three countries. One choir (N= 60) participated in a pilot investigation of the effects of singing scale and the WHOQOL-BREF, and was not asked the open questions. This means that a total of 1064 participants in the survey were asked about the effects of singing on physical health. This sample consisted of 573 English, 166 Australian and 325 German choristers, and 294 males and 767 females, with an average age of 58. The choristers reported an average of 25 years of experience singing in choirs. Self-reported health in the sample was generally good, very good or excellent, with only 12.6% of participants describing their health as fair or poor.

### B. Analysis

In general, answers to the question on singing and physical health were short and straightforward and required little by way of interpretation. The analysis was supported by MAXQDA2007 qualitative analysis software (see: <http://www.maxqda.com/> for details). The following process was followed in developing and applying a simple descriptive coding scheme:

- All answers were read through carefully and a provisional coding scheme devised, with explanatory memos attached to each code
- Following the preliminary coding, a check was made on the accuracy of the coding. Errors were amended and the coding scheme refined
- Next, all of the segments of text coded under each code were retrieved and examined to ensure that no segments had been inappropriately coded. Any remaining errors detected at this stage were corrected
- Further checks were made with the aid of 'lexical search' and 'intersection' facilities within MAXQDA2007 to ensure that no segments of text had been overlooked in the coding process (e.g. searching for words indicative of tentativeness and checking their intersection with the 'tentativeness' code; searching for words linked with lung function and checking their intersection with the 'lung function and breathing' code)

### III FINDINGS

Findings are presented under the following headings:

- Non-responders and answers indicative of ‘no effects’ or uncertainty
- Tentativeness and confidence in identifying effects
- Coding of substantive benefits identified
- Mechanisms and models in explaining the health benefits of singing

#### A. Non-responders, ‘no effects’ and uncertainty regarding the effects of singing on physical health

Table 1 reports the numbers and percentages of respondents who left this answer blank, and further categories for answers indicating little or no effect or expressing doubt or uncertainty about the effects of singing on health.

The second category includes bald statements that singing has no effects; the third category includes simple statements indicating uncertainty as to whether singing has any effects, and the fourth category includes statements which indicate a lack of awareness of any effects. These might seem to be rather nice distinctions, but they are of interest in reflecting variation in degree of conviction or uncertainty in discounting physical health effects from singing. Answers in the fourth category are interesting as they appear to imply that there may be health effects from singing, but the respondent is not aware of them from their own experience or another credible source. The first four categories are mutually exclusive, giving a total of 246 respondents or 23.1 per cent of the sample unable to provide any indication of physical health effects associated with singing.

**Table 1: Non-responders, ‘no effects’ and uncertainty regarding the effects of singing on physical health**

	n	% of total sample (N=1064)
Missing	102	9.6
Little or no effect	56	5.3
Difficult to say, unsure, don’t know	45	4.3
Not aware of effects	43	4.0

The following examples of comments coded in these categories, show that ‘good health’ is cited by some respondents as a factor accounting for their uncertainly or judgement that singing has little effect on their health:

*This is difficult to comment on as my general health has always, so far, been good.* English male 64

*Difficult to tell as I lead a very active life. I have always been energetic and sporty.* English female 63

*None that I know of – have always enjoyed excellent health.* Australian female 58

*I’ve not yet been able to detect a correlation between singing in a choir and my health.* German female 21

#### B. Tentativeness and confidence in identifying effects

In total, just over three-quarters of respondents (N=818, 76.9%) gave a substantive answer to this question, and most identified one or more positive effect of singing on the body or on physical health, although a small minority of respondents identified negative effects. In addition to the effects identified, however, answers did vary in the degree of tentativeness or certainty with which effects were identified.

A total of 77 respondents (7.2%) identified effects in a tentative way, using expressions such as: ‘possibly’, ‘might’, ‘perhaps’, ‘probably’, ‘I suppose’, ‘I guess’, ‘I imagine’, ‘I like to think’, ‘I suspect’ and ‘hopefully’. For the majority of respondents identifying effects their comments were positive and expressed affirmatively with no tentative qualification. At the other end of the spectrum of ‘tentativeness-certainty’, however, 85 respondents (8.0%) answered this question with more certainty, and strongly endorsed the benefits of singing for their physical health, using words and phrases such as: ‘definitely’, ‘certainly’, ‘there is no doubt’, ‘I am convinced’, ‘I am sure’, and ‘it must’.

Whereas ‘good health’ was a factor accounting for some choristers being unable to say whether singing had been beneficial for their health, experience of acute or chronic health problems appeared to be an important factor for some respondents leading to a conviction that singing had been beneficial for their health:

*A physiotherapist giving me breathing exercises after an operation could recognise that I sang, because of the lung capacity – so it must be good for my health.* English female 79

*Have mild asthma (recent recurrence, since childhood) fully under control but I’m sure the necessary controlled breathing in singing has helped when it was worse.* English female 61

#### C. Coding of substantive benefits identified

Table 2 reports the codes employed in categorising the substantive answers given by respondents to the question on singing and physical health. Only categories used by 50+ participants are reported here.

It is clear from Table 2 that the most commonly expressed belief among choristers is that singing improves lung function and promotes deep controlled breathing. Beyond this most common response, singers highlight the impact of engagement in singing on posture and body control, and point to the physical work involved serving to exercise the body, and raise energy levels. A further important theme running through choristers’ accounts is the feeling that singing can reduce feelings of ‘stress’ and help to promote a sense of ‘relaxation’, both of which have strong physical and psychological components. In addition, despite the focus on physical health in the open question considered here, choristers commonly made reference to singing promoting positive mood and a sense of happiness, and entailing significant cognitive demands.

*1. Lung function and breathing.* Improvements in lung function and breathing was the most commonly expressed physical health benefit. Over a third of the total sample made

reference to perceived improvements, and among those giving any substantive information, 45 per cent referred to benefits for lungs and/or breathing. Most commonly respondents gave simple statements such as ‘improved lung function’, ‘improves breathing’ and ‘beneficially exercises my lungs’. A few respondents noted changes in their pattern of breathing and an increased ability to hold longer notes when singing:

*The normally careless “chest breathing” is replaced by the healthier “stomach breathing”.* German female 39

*Also it has helped my breathing, I can now hold notes for much longer.* English female 71

**Table 2: What effects, if any, does singing have on physical health? Main categories of answers**

Categories of effect	n	% of total sample (N=1064)	% of sample answering (N=818)
Lung function and breathing	364	34.2	44.5
Posture and body control	101	9.5	12.3
Relaxation, calmness	71	6.7	8.7
Stress relief	52	4.9	6.4
Physical activity, exercise	91	8.6	11.1
Energy levels	54	5.1	6.6
Positive affect and happiness	199	18.7	24.3
Cognitive demands	77	7.2	9.4

NB: These categories are not mutually exclusive and percentages cannot be summed

Twenty-six respondents explicitly mentioned problems with asthma, and a few more choristers noted health problems affecting their breathing, and reported improvements with their breathing:

*Have mild asthma (recent recurrence, since childhood) fully under control but I’m sure the necessary controlled breathing in singing has helped when it was worse.* English female 61

*It helps manage my chronic asthma.* Australian male 54

*Regular weekly rehearsals are definitely beneficial health wise. Singing requires lots of breathing exercise and breath control.* English female 61

*My breathing has improved and the bronchitis from which I’ve often suffered has got a lot better.* German female, 68

Some respondents were also able to report on comments they had received from health professionals on the condition or capacity of their lungs:

*... I am convinced the breathing has a beneficial effect.*

*At an examination for a life insurance the doctor was surprised and I can put a peak flow meter on the stops.* English male 60

*I am a mild asthmatic and apparently I have fairly good lung function and the doctor believes this is due to breathing improvements from singing.* Australian female 50

*I am unsure, but I imagine there are benefits to my lung function and posture. I am told I have asthmatic even “tuberculosis” lungs, but still perform well on a lung function test and rarely get sick.* Australian female 58

*Affects and facilitates breathing – have pleural plaques so singing in a choir has a very beneficial effect – anything that keeps the airflow open.* Australian female 77

*Because I’ve been singing for so many years I’ve got a very good breathing capacity which is above average for my age group. (It has been measured by a pulmologist).* German female 67

2. *Posture and body control.* Just over 100 respondents suggested that singing helps to improve their posture. Generally, this benefit was simply stated with little elaboration. Some of the fuller comments, however, highlight the sense of greater awareness of the body and give some indications of the specific benefits assumed to follow from attention to posture:

*Because it requires a particular quality of posture it helps to maintain a degree of spinal integrity.* English female 65

*Helps with posture and correct alignment of the spine (as in the Alexander Technique).* English female 59

*It’s a weekly reminder to sit well – good for spinal column, a positive in general.* Australian female 47

*It also helps you singing if you have good posture as it should keep you more aware of using postural muscles correctly.* Australian female 62

*Physically it’s beneficial because of the constant implied reminder to pay attention to your posture.* German female 53

*I notice how singing is able to literally straighten you: correct breathing, standing, straight sitting is particularly good for your spine.* German female 64

3. *Relaxation and stress relief.* Seventy-one respondents mentioned ‘relaxation’ as an effect of singing and 52 mentioned ‘stress relief’ or used similar expressions. To some extent these may refer to the same phenomenon expressed in different ways, although only 8 respondents indicated that

singing both relieved stress and promoted relaxation. If they can be combined, a total of 115 choristers indicated that singing helped them either relax or relieved stress. This would represent the second most commonly mentioned effect after 'improved lung function and breathing.' Here are some of the fuller comments about relaxation and stress relief:

*Music helps me to relax. Breathing and gaining self-esteem through achieving an improved performance reduce tension. Being involved in complex, interwoven music can produce a tremendous release.*  
English female 50

*Singing helps me forget frustrations and pressures I may feel and it helps me to relax.* English male 70

*I feel relaxed after a choral meeting and although invigorated usually fall into a good sleep that night. Neck and shoulder tensions are after relieved due to correct breathing and attention to posture.*  
English female 49

*Probably I'm more relaxed because I sing in a choir than I would be otherwise, As I have a tendency to be a bit melancholic this is surely worth a lot!*  
German female 39

*Generally find it unwinds and relaxes me. Always feel "looser" after rehearsals.* Australian male 38

4. *Physical activity, exercise and energy.* Most respondents referring to physical activity suggest that singing can be seen as a form of physical exercise that helps to promote physical health and fitness. Interestingly, 54 respondents identified the energising effects of singing whereas 26 choristers specifically mentioned that rehearsals and performance left them feeling 'tired' and this can be seen as a reflection of the exertion involved:

*I see singing as part of a way of keeping fit and always feel well exercised by the end of a rehearsal.*  
English female 65

*I am sure that singing is a great cardiovascular exercise.*  
English male 64

*I always remove a cardigan as singing invigorates the whole body.* English female 65

*A form of physical activity, better than any sport because it is natural and fun.* German male 23

*I think that you are kept fit by choral singing because you breathe correctly and you engage your whole body in the activity, like you do when practising yoga or when doing sports (walking for fitness).* Australian female 50

No fewer than 199 respondents also mentioned the impact of singing on personal wellbeing and positive affect (happiness, being uplifted, feeling good etc.), and 77 mentioned the promotion of cognitive functions (memory,

concentration etc.), even though the question focused on effects of singing on physical health. These responses are discussed further in the following sections on mechanisms and models.

#### **D. Mechanisms linking singing with health**

Many of the benefits identified in Table 2 above could also be regarded as pointing towards mechanisms or processes through which singing could promote physical health. The clearest candidates are deep breathing, stress relief/relaxation, the promotion of positive affect and distraction from on-going worries due to the cognitive demands of singing.

1. *Deep breathing.* As noted above, a number of respondents were explicit in making such a link between singing and benefits for lung function. In addition, many respondents suggested that the breathing required for singing is good for general health and fitness, with specific benefits for the cardiovascular system, delivery of oxygen to the body, stress relief and increased relaxation:

*...it also helps with breathing deeply – oxygenating my system and helping to clear breathing apparatus following coughs and colds.* English female 65

*I guess using all your breathing mechanisms is physiologically good and keeps the brain oxygenated.*  
Australia female 62

*I wonder if the different types of breathing involved in singing helps to get more oxygen to the brain and improve blood circulation.* Australian female 39

*The high level of singing demands great breath control which is excellent for the cardiovascular system.*  
Australian male 63

*I feel that the breathing exercises and control of breathing necessary for singing is beneficial to my general health.* English female 60

*Improves breathing rate (i.e. slows) and therefore reduces stress.* Australian female 24

2. *Relaxation and stress relief.* An enormous research literature points to the damaging consequences of 'stress' for physical health. If singing helps some people to reduce stressful feelings on a regular basis, this may potentially be an important mechanism linking participation in singing with general physical wellbeing. As noted above, the physical exercise involved in singing and particularly the role of deep regular breathing may be central to the stress relieving power of singing.

3. *Positive affect and distraction.* Psycho-social and cognitive mechanisms were also identified by respondents in explaining the linkage between singing and health. The two most common were: the promotion of positive affect and a sense of wellbeing which counteract negative feelings; and the focused concentration required by singing which distracts attention from ongoing stresses and personal concerns:

*Having a good 'quality of life' and feeling at ease psychologically and socially helps me maintain a good mental state of health (at times in my life I have felt anxious/despair etc). This, for me, is inextricably linked with my physical health – i.e. feeling happy helps my physical health.* English female 66

*I believe I have a better immunity because I am happier than if I didn't sing... and I believe that if you're happier then you're healthier.* English male 36

*I am never happier than when I am singing this can only have a positive effect on my health and wellbeing.* English female 69

*Because of the emotional experience of singing and the feeling of well-being it engenders, a positive attitude to life follows, which must have a positive effect on physical health.* Australian male 54

*Gives me something else to think about, stops me becoming depressed, after having had a breakdown. I hope I will gain more confidence.* English female 65

*One cannot sing and think of other things (worry) at the same time.* English male 81

*Positive – distraction from everyday concerns and relaxation.* German male 35

*"Switching off" of professional private problems because of having to concentrate intently.* German female 47

#### **E. Holistic models of health**

Sixteen respondents gave accounts in which several factors potentially contributing to physical health were given. In some cases, there appeared to be an underpinning holistic model of health involving mind-brain-body linkages used to explain the value of singing for health:

*I would say that choral singing has a big part to play in my physical health as not only is it a physical activity, but a mental one, combining the two to create an overall sense of wellbeing. The concentration needed is such that it can often be a case of 'mind over matter'.* English female 62

*Singing in the choir intensifies my feelings of gratefulness. Thankfulness in one extensive sense: also for "negative" experiences and resistances. Neurobiology has proved today that feeling of thankfulness and sympathy are decisive for our health. Plus singing in a choir contributes indirectly to promoting my health, to lose myself and everybody/everything around me.* German female 51

*Presumably it affects the psychological and social well-being which in its turn has a positive effect on your health.* German female 65

*... physical well-being derives from mental, emotional and spiritual health (which I believe are enhanced by choral singing)...* Australian male 56

#### **IV DISCUSSION**

This paper has presented evidence on choral singers' perceptions of the physical health benefits of choral singing. It is based on a thematic analysis of answers given to a single open question included in a questionnaire survey of over 1,000 choral singers in Australia, England and Germany: 'What effects, if any, does singing in a choir have on your physical health?' The question was carefully worded to be as open as possible, to allow respondents to deny that it has any effects or to identify both positive and negative effects on health. Four findings stand out from this study.

Firstly, many respondents did not answer this question or expressed a belief that singing does not have any effects on physical health. The wording of some these 'denials' were interesting in signalling a lack of awareness of any effects. Such answers seem to imply that the respondents felt that there might be some effects on physical health, but that they were not aware of them.

Secondly, there was variation in the levels of confidence in the answers given by respondents when identifying effects – usually benefits. Some answers were given very tentatively, whereas others were given with a great deal of certainty. Interestingly, there was some evidence that tentative expressions might arise when singers felt that their general health was very good, and consequently they were not in a position to say whether singing was beneficial for them. On the other hand, some of the more confident assertions came from people with health problems, who from experience felt they could attest to the beneficial effects of active engagement with singing. This was particularly true in relation to problems with breathing.

Thirdly, with respect to the positive benefits identified by choristers, four areas stand out most clearly: effects on breathing and lung function; posture and body control; relaxation and stress relief, and physical activity and energy. The fact that over a third of the entire sample appeared to believe that the depth and control of their breathing benefits from singing, and that even measures of lung function can be improved, is very striking. Previous research findings on this issue in which lung function measures have been taken from singers is mixed, and the best controlled of these studies in which lung performance measures were taken among professional singers and wind players compared with string instrumentals led the authors to suggest that the idea that singing improves lung function is a 'myth' (Schorr-Lesnicks et al., 1985). Recently, however, studies of the effects of singing for patients with emphysema and chronic obstructive pulmonary disease (Engen, 2005; Bonilha et al., 2008) have produced some indications of physical and psychological benefits from singing, which may have clinical significance. This is clearly an area which deserves greater attention in future research on singing and health. The factors of posture, relaxation, stress relief, exercise and energy expenditure in the context of singing are also all areas which could be researched objectively in future studies.

And fourthly, the analysis of choristers' answers has helped

to suggest some of the hypothetical mechanisms at work which link the activity of singing to aspects of physical health. Interestingly, the principal benefits identified also serve an explanatory function with respect to health. Singing, for example, promotes deep and controlled breathing – which is a benefit in itself – but deep breathing is also one of the mechanisms which accounts for the experience of relaxation and stress relief. In addition, it is very striking that many singers referred to affective and cognitive dimensions of singing in answering this question about physical health. This suggests that both the experience of positive emotions and happiness generated by singing and also high levels of concentration and attention needed to sing in a group, are important mechanisms implicated in the health promoting effects of singing. A few respondents in fact provided succinct accounts of a holistic bio-psycho-social perspective on health, as an explanation of why and how singing is beneficial for health. Such explanations are of course entirely in line with the WHO definition of health which served as one of the conceptual starting points for the whole survey.

A final point which should be stressed is that the sample participating in this survey had a relatively high mean age of 58 years. Indeed, just over half of the sample were aged 60 and above, and 17.3 per cent were in their 70s and 80s. Just under half of the sample identified on-going health problems, but only 12.6 per cent of the sample described their general health as less than ‘good’. Most participants were also relatively well educated and were financially secure. This study is concerned therefore with a relatively older and even elderly group of people, many of whom regard singing as an activity which helps to keep them active, fit and healthy. The restricted character of the sample may be regarded as one of the main limitations of this study, and clearly further research is needed to explore the perceptions of more diverse samples of people engaged in singing. The findings from this study are very much in line with the ground-breaking work of Cohen et al. (2006) in which the social, psychological and physical health benefits of singing were investigated in especially established singing groups for older people post-retirement. More studies of the kind undertaken by Cohen et al. are needed, in order to establish a secure evidence-base related to the potential health benefits of singing.

### ACKNOWLEDGEMENTS

Thanks are due to the members of choirs and choral societies in Australia, England and Germany who participated in this survey. Thanks also to: Bärbel Hess translated the questionnaire from English to German, and Dr. Elisabeth Gibbels, Humboldt University Berlin provided an independent commentary on the translation and advice on modifications; Therese Sellin for translating written comments on the German language questionnaire into English; Isobel Salisbury for all of her efficient administrative support through this study.

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