



Harmony and well-being: The effects of age, extroversion, and singing experience, on subjective well-being due to choral singing

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### **ABSTRACT**

Research into choral singing suggests that a range of benefits, including improved psychological well-being, mood, and reduced stress, are reported consistently, across a range of backgrounds, nationalities and levels of singing expertise. However, different factors are emphasised by amateur and professional singers (Bailey & Davidson, 2005). Furthermore, only one study to date has considered the effects of age (Livesey, Morrison, Clift & Camic, 2012), and only Busch and Gick (2012) have considered the effects of personality in relation to well-being due to choral singing.

For this study, 182 choir members, aged from 18 to 77 years, completed the 'Wellbeing and Choral Singing Scale' (Clift & Hancox, 2010), and the 'Eysenck Personality Inventory' (Eysenck & Eysenck, 1964). Additionally, one open-ended question provided information on any additional benefits of singing. A three-way ANOVA indicated a significant interaction effect, with differential effects emerging for introverts and extroverts, according to their age and level of expertise. Independent samples *t*-tests indicated a significant difference between the ratings of younger and older introverts with no previous singing experience, with younger participants reporting greater benefits than older participants. Additional results of a content analysis identified six main themes, relating to social benefits, confidence/self-esteem, affect/emotions, cognitive/physiological health, singing/music, and new experiences.

It is concluded that choral singing is beneficial to all, but that personality, age, and singing expertise interact, leading to individual differences in the importance placed on the factors which combine to provide these benefits.

<b>KEY WORDS:</b>	<b>CHORAL SINGING</b>	<b>WELL-BEING</b>	<b>PERSONALITY</b>	<b>EXPERTISE</b>	<b>AGE</b>
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## Introduction

Singing, and in particular, communal singing, is a universal human activity, which has long been considered beneficial to well-being and health. Many human rituals are defined by group singing, from religious services to sporting events, yet choral singing has traditionally been viewed as an elite pastime, with research tending to focus on aspects of performance (Bailey & Davidson, 2005). Research into the benefits of choral singing for well-being is relatively recent, with the majority of studies having been conducted within the last twenty years (Clift, Hancox, Staricoff & Whitmore, 2008). There has also been much recent interest in the media, with television programmes such as 'The Choir – Sing While You Work' (BBC 2013) depicting choral singing as a positive experience.

Research in the area suggests a range of benefits from choral singing and several aspects have been studied within a number of methodological approaches. For example, in a qualitative study, Clift and Hancox (2001) asked members of a university choir to respond to open-ended questions about their perceptions of the benefits of choral singing. Content analysis of their responses suggested four key measurable benefits of singing: social benefits, such as making new friends; emotional benefits, such as improved mood and a reduction in stress; physical benefits, such as improved breathing; and spiritual benefits, such as feeling uplifted. These responses formed the basis of a structured questionnaire, which was completed by the same choir. From this, six benefits of choral singing were identified, well-being and relaxation, breathing and posture, social, spiritual and emotional benefits, and benefits for the heart and immune system, with well-being and relaxation comprising the largest factor. Bailey and Davidson (2003 cited in Bailey & Davidson, 2005) also conducted a qualitative study in which participants were members of a small choir for homeless men. The results of interpretative phenomenological analysis (IPA) following semi-structured interviews indicated that choir members experienced improved emotional well-being and alleviation of depression as a result of choral singing. Bailey and Davidson (2005) aimed to replicate these findings in a second study of two groups of choir members. One group comprised eight participants from a choir whose members were marginalised by poverty, substance abuse or mental illness, and the second comprised eight middle class singers with varying levels of musical experience, recruited from different choirs. Thematic analysis of these interviews suggested that the perceived benefits of participation, such as improved mood and energy, relaxation and release of tension, were the same regardless of the level of training or socioeconomic status, although different cognitive aspects emerged. For example, the marginalised participants reported an increase in self-esteem and confidence, and placed greater importance on the social support and camaraderie which came from belonging to a choir. The experienced singers meanwhile, benefitted from the challenge and achievement of improving their musical skills. Dingle, Brander, Ballantyne and Baker (2012) found similar results when they followed a choir for adults with disabilities and mental health problems, over their first year. The benefits identified using IPA included, a sense of well-being, a reduction in stress, and increased confidence. Together, these studies demonstrate the benefits of choral singing across a wide range of backgrounds and musical abilities.

Building on their earlier work, Clift and Hancox (2010) conducted a large-scale study of existing choir members in Australia, England and Germany. Participants answered

three open-ended questions on the perceived benefits of singing, followed by a newly constructed scale, which described well-being effects of choral singing, to which participants agreed or disagreed. In addition, the World Health Organisation Brief Quality of Life Scale (WHOQOL-BREF) (Power, Harper & Bullinger, 1999 cited in Clift & Hancox, 2010) was completed. The majority of participants considered singing to be beneficial to wellbeing, although men reported fewer benefits than women. Qualitative analysis of responses to the open-ended questions suggested a range of perceived positive benefits, including improved mood, quality of life, emotional and mental wellbeing and happiness, reduced stress and forgetting worries. Based on these findings, Livesey, Morrison, Clift and Camic (2012) selected a sub-sample of those participants who had obtained either a low or high score on the WHOQOL-BREF scale (Power et al., 1999 cited in Clift & Hancox, 2010). Thematic analysis of their responses to the open-ended questions revealed a range of benefits such as, a sense of belonging, stress reduction, improved mood and outlook, distraction from worries, and higher self-confidence and self-esteem. These were combined to form the main themes: social benefits, physiological benefits, mood regulation, cognitive benefits, singing and music, providing meaning and purpose to life, and holistic health. The most frequent sub-theme was 'induces positive affect'. Age, gender, nationality or well-being status were found to have no effect on the consistency of reported benefits.

These studies demonstrate that choral singing may be a useful activity to enhance psychological well-being, and various theories explain its beneficial effects. For example, Clift and Hancox (2001) draw upon the biopsychosocial model of health and illness (Ogden, 1996 cited in Clift & Hancox, 2001), a multidimensional approach which highlights the role of psychological and social factors, such as emotions and stress, on health and wellbeing. According to Engel (1977), psychological, social and biological factors all interact to affect health, and this is the view adopted by the World Health Organization (1948, p.1), who define health as, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". This is consistent with the findings of both Clift and Hancox (2001) and Bailey and Davidson (2005), and is supported by the findings of an intervention study conducted by Cohen et al. (2006), which aimed to assess the impact of choral singing on the health of people over the age of 65. Various self-report measures were used to rate health, morale and depression before and after one year of the intervention, which suggested that choral singing contributed to an improvement in both physical and mental health, and a reduction in feelings of loneliness, compared to a control group.

The objective of a recent study conducted by Vickhoff et al. (2013) was to demonstrate the way in which choral singing promotes well-being. The heart rates of fifteen participants were monitored as they performed three different singing exercises, which suggested that singing in unison caused their heart rates to become synchronised. Vickhoff et al. (2013) argue that the beneficial effects of singing are due to it having a calming effect on the autonomic nervous system, by causing a calm and regular breathing pattern, mirroring the music structure. This in turn has a positive effect on heart rate variability, the regular variations in heart rate, leading to improved cardiovascular function and subjective well-being.

Livesey et al. (2012) draw upon Seligman's theory of happiness (Seligman, 2010), which argues that the experience of positive emotion and pleasure is central to

gaining happiness. In his theory of well-being, Seligman (2011) also argues that engagement, meaning in life, relationships, and achievement are important for well-being, and all have been demonstrated to be evident as a result of choral singing, for example, reported increases in positive mood and self-esteem, and making friends (Bailey & Davidson, 2005; Livesey et al., 2012), and which may go some way to explaining the findings of Cohen et al. (2006).

In his theory of flow, Csikszentmihalyi (1990 cited in Walker, 2010) outlines the potential benefits to wellbeing through participation in engaging and challenging activities. When in a state of flow, the individual is so engrossed, that they lose both their awareness of self, and sense of time (Walker, 2010), and it could be argued that the level of concentration and practice needed in choral singing creates a state of flow, enabling the individual to become completely engaged and so forget their everyday worries. Livesey et al. (2012) suggest that the challenging conditions created by choral singing are ideal for the experience of flow, and Csikszentmihalyi (2002) posits that the blending of skills inherent in choral singing provides an uplifting experience, and that learning to produce harmonies “helps strengthen the self” (Csikszentmihalyi, 2002, p.113). Furthermore, he highlights the importance of social interaction for mental well-being, an inherent aspect of choral singing. Walker (2010) agrees, and demonstrated that social flow is more enjoyable than flow experienced when alone, in a study in which participants played simple bat and ball games either alone or with others. The emotions associated with flow experiences (cheerful, excited, focused and alive) were reported less in the individual games than when playing with a partner, and the higher the level of interdependence in the game, the higher the level of enjoyment reported by the participants. Participants also identified singing in a choir as an example of an interactive social flow experience, requiring social interdependence, and rated social flow activities as more enjoyable than individual flow activities.

Deci and Ryan (2000) argue that flow is experienced when individuals participate in intrinsically motivated activities, for example, sport and leisure activities, and according to self-determination theory (Deci & Ryan, 2000; Ryan & Deci, 2000), psychological growth and well-being are achieved when individual needs for competence, relatedness, and autonomy are met. It can be argued that choral singing engenders each of these three basic psychological needs. For example, Bailey and Davidson (2005) found that increases in musical competence, a feeling of belonging, and increased self-confidence were all reported benefits of choral singing.

It is argued that music improves mood by triggering the release of endorphins in the central nervous system (Dunbar, Kaskatis, MacDonald & Barra, 2012), and listening to music has been shown to elicit emotional responses in areas of the brain linked to pleasure and reward (Blood & Zatorre, 2001). However, Dunbar et al. (2012) suggest that it is the performance of music, rather than the perception of it, which contributes to improvements in mood and sense of well-being; they found that singing, dancing and playing an instrument all led to endorphin release, whilst passive listening to music had no effect. A number of quantitative studies investigating the perceived benefits of, or physiological responses to group singing support this. For example, Unwin, Kenny and Davis (2002) compared the effects of singing, or listening to singing, on mood. Participants recruited from the community were randomly assigned to either a singing group or a group who listened to the singing, and both groups completed the Profile of Mood States Questionnaire (POMS) (McNair &

Droppleman, 1981 cited in Unwin et al., 2002) immediately before, immediately after, and one week after a half hour singing session. This scale measures mood or affective states and has been widely used to measure mood change (Unwin et al., 2002). Significant improvements in mood were found in both groups, and, although the effects were greater for singing, the difference was not significant. It was suggested that longer or repeated singing sessions might result in a significant difference between the groups. This is supported by Kreutz et al. (2003) who assessed the emotional and neurohormonal effects of amateur choral singing compared to listening. Saliva samples and measurements of emotional affect were taken before and after a choir rehearsal on two consecutive weeks. Additionally, mood before and after the sessions was assessed using the Positive and Negative Affect Schedule (PANAS) (Watson, Clarke & Tellegen, 1988 cited in Kreutz et al., 2003) in which participants rated the extent to which words describing positive and negative moods applied to them. Saliva samples were tested for levels of the stress hormone cortisol, and of the antibody, secretory immunoglobulin A (sIgA), which has been found to increase with an improvement in mood (Stone et al., 1994). Results indicated an increase in positive mood, and a decrease in negative mood following singing, with increased negative mood following listening. Choral singing led to a significant increase in levels of sIgA, suggesting increased immune response, but stress levels remained unchanged, with no decrease in cortisol levels. Conversely, listening led to a significant reduction in cortisol but no significant difference in sIgA. This suggests that there are health benefits to singing which may contribute to subjective well-being, and provides support for the biopsychosocial explanation of the benefits of choral singing, however, it was suggested that this may be due to the physical activity involved in singing. Nonetheless, Bailey (2006) obtained similar results in a survey of amateur choral singers, with choral singing perceived as more beneficial to well-being than listening to music.

Beck, Cesario, Yousefi, and Enamoto (2000) also obtained similar results in a study of professional choral singers. Levels of sIgA and cortisol in saliva were measured before, and after, two rehearsals and one performance. In addition, two specially constructed questionnaires were completed, a 28-item questionnaire, the 'Singers Emotional Experiences Scale' (SEES) in which singers rated their agreement with experiences typical of choral singing, and a 10-item 'self-report form' which assessed their experience of two particular rehearsals and one performance. Responses to the questionnaires indicated that the majority of participants felt that singing had a positive effect on well-being, happiness, mood and stress, with 'group fellowship' considered to be an important part of choral singing. There was a significant increase in sIgA in each condition, and a significant decrease in cortisol following the rehearsals, but an increase in cortisol following the performance, suggesting that professional singers found performances stressful. Performance satisfaction was argued to affect physiological responses to singing, leading Beck et al. (2000) to suggest that psychological and physiological responses to singing are interrelated. Supporting this, differences between professional and amateur singers were found by Grape, Sandgren, Hansson, Ericson and Theorell (2003), who used various biological measures to compare the experiences of professional and amateur singers following a singing lesson. Their results indicated that while both groups felt more energetic and relaxed following singing, amateurs reported feelings of joy and a reduction in tension, whilst professional singers focused on achievement and technique, reporting fewer benefits to well-being. These findings also support those

of Bailey and Davidson (2005), with differing levels of musical experience affecting individual perceptions of the benefits of singing. Grape et al. (2003) also reported a significant increase in oxytocin levels in both groups, a hormone which is argued to strengthen trust and social bonds (MacDonald & MacDonald, 2010), and which is linked to increases in self-reported ratings of extroversion (Cardoso, Ellenbogen & Linnen, 2012). Although Grape et al.'s (2003) study was not conducted in a choir and therefore did not account for any social benefits which may be an inherent part of choral singing, it could be argued that a release of oxytocin during singing contributes to the 'feel good' factor, by causing changes in social behaviour, and with choral singing providing an opportunity for bonding amongst members.

As suggested by Kreutz et al. (2003), physical activity has been associated with improved mood and psychological well-being. For example, Berger, Owen and Man (1993) found that the mood of swimmers improved after swimming classes. This was considered by Valentine and Evans (2001), who compared the effects of choral singing, solo singing, and swimming on mood and physiological responses. It was expected that the physical effects of swimming would be greater than those of singing, and solo singing was included to take account of the social aspects of choral singing. Mood was measured immediately before, and after 30 minutes of each activity, using the University of Wales Institute of Science and Technology (UWIST) Mood Adjective Checklist (UMACL) (Matthews, Jones & Chamberlain, 1990), in which participants rate how applicable adjectives such as 'anxious' and 'tired', are to their current mood. Heart rate and blood pressure were also measured. Each of the activities led to positive changes in mood, although the effects were found to be greater for swimming. Heart rate increased after swimming but not after singing, suggesting that the perceived positive effects of singing were due to emotional, rather than physiological factors. However, no significant difference was found between the effects of solo and choral singing, suggesting that the social factors inherent in choral singing do not play a role.

The research discussed indicates that choral singing is a positive experience, providing benefits to well-being for a wide range of individuals. However, psychosocial factors which have an effect on subjective well-being should also be considered. For example, it is argued that social support enhances well-being by reducing the impact of stress (DeLongis, Folkman & Lazarus, 1988) and depression (Peplau, 1985 cited in Salovey, Rothman, Detweiler & Steward, 2000), and by increasing resilience to physical illness (Kiecolt-Glaser & Glaser, 1992). Personality type also has an effect, as demonstrated by Butkovic, Brkovic and Bratko (2012), who found that extroversion correlated with psychological well-being in both adolescents and retirees. Similarly, Landa, Martos and López-Zafra (2010), found that individuals low in neuroticism and high in extraversion were more likely to score highly on Ryff's Psychological Well-Being Scale (Ryff, 1989 cited in Landa et al., 2010). This prompted Busch and Gick (2012) to investigate the role played by these factors, which had previously not been considered, in the well-being changes brought about by choral singing. Members of two choirs were asked to complete the Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet & Farley, 1988 cited in Busch & Gick, 2012) following a choir rehearsal, in addition to completing five well-being scales, before and immediately after the rehearsal. The well-being scales included the Positive and Negative Affect Scale (PANAS) (Watson, Clark & Tellegen, 1988 cited in Busch & Gick, 2012), the Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffin, 1985 cited in Busch & Gick, 2012), the Vitality

Scale (Ryan & Frederick, 1997), the Flourishing Scale (Diener et al., 2009 cited in Busch & Gick, 2012), and the Ryff Scales of Psychological Well-being (Ryff, 1989 cited in Busch & Gick, 2012). Participants were also asked to complete the Ten-Item Personality Inventory (Gosling, Rentfrow & Swann, 2002 cited in Busch & Gick, 2012) before the rehearsal. Following the rehearsal, participants reported significant increases in positive affect, personal growth, and vitality. Scores for perceived social support were found to predict positive affect, however, despite one choir allowing time for socialising, changes in well-being were found to be the same for both choirs. This suggests that changes to well-being were due to the singing itself, in line with the findings of Valentine and Evans (2001). Busch and Gick's (2012) results indicated that personality type did not have an effect on well-being due to singing, however, this study employed a small sample size ( $N = 59$ ), and it was suggested that a larger, more varied sample might detect these effects. This study could be criticised for its use of choirs which required members to have some sight-singing ability, suggesting a level of musical training, as this has been demonstrated to affect perceptions of the benefits of singing (Bailey & Davidson, 2005). Furthermore, all choir members were auditioned, which may have discouraged certain personalities, such as introverts.

Research also suggests that subjective well-being changes over the life span, for example, Stone, Schwartz, Broderick, and Deaton (2010) found that factors such as fluctuations in happiness and enjoyment, and a decline in stress and worry, contributed to an increase in self-reported well-being after the age of fifty. Therefore, it might be expected that perceptions of the benefits of choral singing would vary across different age groups, yet, with the exception of the qualitative study conducted by Livesey et al. (2012), the effect of age on individual perceptions of these benefits has not been considered. Furthermore, as demonstrated by Landa et al. (2010), extroverts may already be high in psychological well-being, therefore Busch and Gick (2012) suggest that personality type might have an impact on the experience of choral singing, yet this effect was not detected in their study, arguably due to their small sample size. It is also suggested that perceptions of the benefits of choral singing vary according to individual levels of musical experience (Bailey & Davidson, 2005). Based on previous findings, it is proposed to conduct a quantitative study, in order to compare perceptions of the benefits of choral singing for psychological well-being, over a wide range of musical abilities and ages. The study will aim to gain a more in depth understanding, by employing a larger sample size than that of Busch and Gick (2012), in order to ascertain whether personality type affects individual perceptions of these benefits. This may provide insight into whether group singing could provide a useful intervention for increasing well-being in a range of age groups and personalities, including those who are shy or lack confidence in their singing ability. Therefore, it is hypothesised that extroverts will report significantly fewer benefits of choral singing than introverts. It is also hypothesised that the level of previous singing experience will have a significant effect on singers' perceptions of the benefits of choral singing, and that the perceptions of the benefits of choral singing will vary according to the age of the participants. Finally, it is hypothesised that there will be an interaction effect, with introverts and extroverts reporting differences in the benefits of choral singing, according to their level of singing experience and age.



## Method

### Design

The study employed a 2 x 2 x 3 between subjects factorial design. Factor one, personality type, comprised two levels, extraversion and introversion. Factor two, age, also comprised two levels, younger and older. Factor three, singing expertise, comprised three levels, no previous singing experience, some singing experience, and highly experienced singers. Self-reported well-being effects of choral singing formed the dependent variable.

In addition, a content analysis of responses to one open-ended question was conducted.

### Participants

Participants were recruited using a combination of convenience and snowball sampling. A total of 196 questionnaires were returned, although thirteen were excluded from the analysis due to being incomplete, and one was removed at the participant's request. One hundred and eighty participants provided data on age, ranging from 18 to 77 years (mean 45.33, SD 18.28). Of those who specified their gender, 34 were male and 143 were female. Initially, the leaders of three choirs based in the south of England were approached, and each consented to their members participating in the study. The choirs had differing repertoires, and two had no auditioning process, ensuring a range of musical backgrounds and personality types amongst the participants. Choir one was a branch of a national community choir, choir two was a village community choir, and choir three was a university chamber choir. Members of a choir of professional singers also participated, and additional participants were recruited from other choirs via snowball sampling. Participants were allocated to groups according to their responses to the questionnaire (see Appendix A):

**Table 1a**

**The allocation of participants to 'singing expertise' by 'personality'**

<b>Personality</b>	<b>Level of expertise</b>			<i>Total</i>
	No previous experience	Some experience	Highly experienced	
Introvert	25	33	20	78
Extrovert	15	33	29	77
<i>Total</i>	40	66	49	155

**Table 1b****The allocation of participants to 'singing expertise' by 'age'**

<b>Age</b>	<b>Level of expertise</b>			<i>Total</i>
	No previous experience Younger 19-57 yrs Older 58-71 yrs	Some experience Younger 19-55 yrs Older 56-77 yrs	Highly experienced Younger 18-23 yrs Older 24-73 yrs	
Younger	23	38	28	89
Older	24	40	27	91
<i>Total</i>	<i>47</i>	<i>78</i>	<i>55</i>	<i>180</i>

**Materials**

Questionnaire packs were compiled, comprising two questionnaires and one open-ended question, which aimed to collect data on choir members' perceptions of the effects of choral singing on well-being, and their personality types. In order to collect data on the impact of choral singing, the 'Wellbeing and Choral Singing Scale' (Clift & Hancox, 2010) was employed. This contains eight positively and four negatively worded items to which participants rate their level of agreement or disagreement on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Example of questions are, "singing doesn't release negative feelings in my life", and "singing has improved my well-being/health". Clift and Hancox (2010) reported a Chronbach's alpha of 0.9 for this questionnaire. Additionally, one open ended question aimed to provide information on any additional benefits of singing which participants may have experienced. The 'Eysenck Personality Inventory' (EPI) (Eysenck & Eysenck, 1964) was also used, in order to collect data on personality types. This widely used scale contains fifteen positively and nine negatively worded items related to extroversion and impulsivity, and utilises a dichotomous response format, to which participants agree or disagree. Examples of questions are, "Generally, do you prefer reading to meeting people?" and, "would you say that you were fairly self-confident?". In addition, demographic information was collected (age, gender, choir attended), as well information on each member's level of singing experience, and the length of time they had been a choir member. A full copy of the questionnaire is provided in Appendix B. Information sheets, consent forms and debrief sheets were also included in the packs, which were approved by the university ethics committee. These are provided in Appendix C.

**Procedure**

The questionnaire packs were distributed in both paper form and online, using an online survey tool, PsychData (Locke & Keiser-Clark, 2014). For choir one, an announcement about the nature of the study was made during a break in a weekly rehearsal, and questionnaire packs were distributed to be completed at home, and returned to a subsequent rehearsal for collection by the researcher. Some members

chose to take a link to the online questionnaire rather than a paper copy, and two participants returned their questionnaires to the university, by post. Additionally, a link to an online version of the questionnaire was posted by the choir leader on a social networking site, which also attracted choir members from other parts of the country. For choir two, the nature of the study was explained to members at the beginning of a weekly rehearsal and questionnaires were distributed, which were returned to rehearsals over consecutive weeks, and collected by the researcher. For choir three, participants were all recruited via a link on a social networking site, directing them to the online questionnaire, which was also shared with members of two other choirs within the same university, and members of various other choirs who were friends of the participants. In addition, a choir of professional singers completed questionnaires following one of their performances, which were distributed and collected by one of their members.

After reading the information sheet and giving their consent, participants were first asked to provide demographic information. In part one of the questionnaire, participants were required to rate their agreement to the twelve items in the Wellbeing and Choral Singing Scale (Clift & Hancox, 2010) and to answer one open ended question, "have you experienced any other effects of singing in the choir, either expected or unexpected? These may be positive or negative. If yes, please provide brief details". Two more questions aimed to ascertain their level of singing experience. In part two of the questionnaire, participants were required to agree or disagree with each of the 24 items of the EPI (Eysenck & Eysenck, 1964). Finally, participants were directed to the debrief sheet.

### **Ethical considerations**

An information sheet was provided for each participant, explaining the aim of the study and a guide to the length of time needed to complete the questionnaires. Furthermore, it advised that participation in the study was voluntary and that all data collected would be anonymous and confidential. Paper questionnaires were numbered for identification, and as questionnaires were to be completed at home, envelopes were supplied to ensure anonymity when they were returned. Online respondents were asked to generate a pseudonym in order that their responses could be identified. The information sheet also advised participants of their right to withdraw and to have their data destroyed at any time up to the point of analysis. The names and contact details of the researcher and supervisor were provided for this purpose, and in case of any queries. Participants were asked to give their consent and to confirm that they were aged 18 years or older before completing the questionnaires. A debrief sheet was also provided, which explained further the aims of the research and how the overall findings of the study could be obtained, ensuring that no deception was involved. Contact details of the researcher and supervisor were provided again. All participants were existing choir members, and so were not placed under any additional physical risk for the purposes of the study. The research was approved by the university ethics committee.

## Results

Prior to analysis, reverse worded questions were re-coded, and total scores for each questionnaire were calculated. Participants were divided into groups based on their responses, in preparation for the data analysis. For the first factor, personality type, participants were divided by the median score (11), with those scoring 11 and under assigned to the level 'introverts', and those scoring 12 and over assigned to the level 'extroverts'. For factor three, singing expertise, participants were divided into three levels, according to the level of choral experience indicated in their responses. The first group, 'no previous singing experience', consisted of individuals who had been members of their choir for six years or less and who had no previous experience of singing before joining. The majority of this group had been choir members for less than two years, and the shortest membership was three weeks. The second group, 'some singing experience', consisted of members who had been in their choir for over six years but with no prior experience, or, were also members of at least one other choir or had some other form of group singing experience, for example, theatrical groups or regular church goers. Individuals who played instruments were also included in this group. The third group, highly experienced singers, consisted of choir members who had been singing in choirs for many years, had received singing tuition to a high level, or were professional singers. Within these three groups, participants were also divided into the two levels of the second factor, 'age', with those who fell below the median for their group comprising the level 'younger', whilst those who fell above the median comprised the level 'older'. The median age of the level 'no previous singing experience' was 58 years, of the level 'some singing experience' the median age was 56 years, and of the 'highly experienced singers' the median age was 23 years (see Appendix D).

For the content analysis of responses to the open ended question, themes were developed inductively from the data, guided by the previous research. The text was divided into units and then coded accordingly. Descriptions of each of the themes were given to a second rater, and inter-rater reliability was calculated, indicating a substantial level of agreement ( $Kappa = .79, p < .001$ ) (see Appendix H).

## Descriptive statistics

The descriptive statistics presented in Tables 2a and 2b suggest that the self-reported benefits of singing are similar for introverts ( $M = 50.02, SD = 5.84$ ) and extroverts ( $M = 50.34, SD = 6.03$ ). The level of singing experience also appears to have little effect on the self-reported benefits of singing, with introverts with some experience reporting fewer benefits ( $M = 49.64, SD = 5.72$ ) than those with no experience ( $M = 50.27, SD = 5.73$ ) or with high experience ( $M = 50.15, SD = 5.72$ ), and extroverts with high experience reporting greater benefits ( $M = 50.69, SD = 5.76$ ) than extroverts with no experience ( $M = 50.49, SD = 5.74$ ) or with some experience ( $M = 49.82, SD = 5.75$ ). The descriptive statistics also suggest that age has little effect, with younger introverts reporting slightly greater benefits of singing ( $M = 50.75, SD = 5.86$ ) than older introverts ( $M = 49.29, SD = 5.81$ ), and younger extroverts reporting slightly greater benefits of singing ( $M = 50.43, SD = 6.07$ ) than older extroverts ( $M = 50.24, SD = 6.00$ ). However, older introverts with no previous singing experience report the lowest wellbeing benefits of choral singing ( $M = 47.55$ ,

SD = 4.74) but this figure increases as their level of experience increases. Younger introverts with no previous singing experience report the highest benefits of singing ( $M = 53.00$ ,  $SD = 6.45$ ), but this figure decreases as their level of singing experience increases. Older extroverts with some experience report higher levels of well-being ( $M = 51.00$ ,  $SD = 4.96$ ) than those with no experience ( $M = 50.13$ ,  $SD = 6.22$ ) or high experience ( $M = 49.58$ ,  $SD = 7.59$ ). Conversely, younger extroverts with some experience report fewer benefits ( $M = 48.64$ ,  $SD = 6.61$ ) than those with no experience ( $M = 50.86$ ,  $SD = 3.29$ ) or with high experience ( $M = 51.80$ ,  $SD = 4.46$ ) (see Appendix E).

**Table 2a**

**Mean scores and standard deviations for wellbeing due to choral singing as a function of age and expertise for introverts**

	Level of expertise							
	No experience		Some experience		High Experience		Total	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>Younger</b>	53.00	6.45	50.94	5.41	48.30	4.90	50.75	5.86
<b>Older</b>	47.55	4.74	48.33	6.91	52.00	4.99	49.29	5.81
<b>Total</b>	50.27	5.73	49.64	5.72	50.15	5.72	50.02	5.84

**Table 2b**

**Mean scores and standard deviations for wellbeing due to choral singing as a function of age and expertise for extroverts**

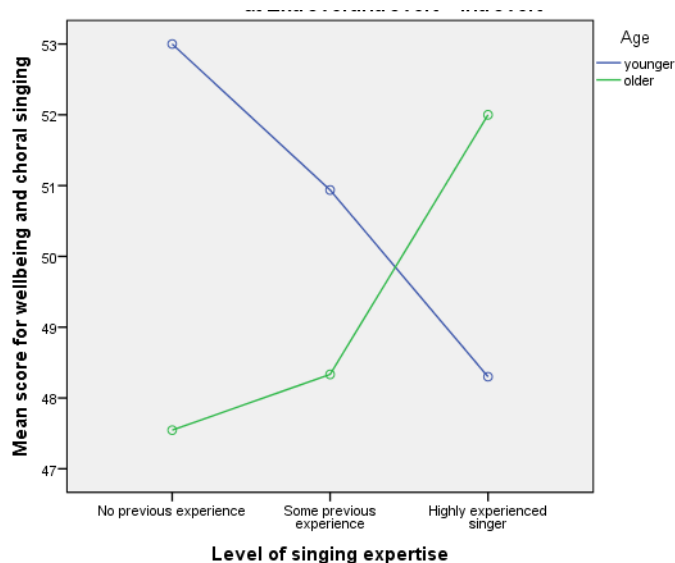
	Level of expertise							
	No experience		Some experience		High Experience		Total	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>Younger</b>	50.86	3.29	48.64	6.61	51.80	4.46	50.43	6.07
<b>Older</b>	50.13	6.22	51.00	4.96	49.58	7.59	50.24	6.00
<b>Total</b>	50.49	5.74	49.82	5.75	50.69	5.76	50.34	6.03

## Inferential statistics

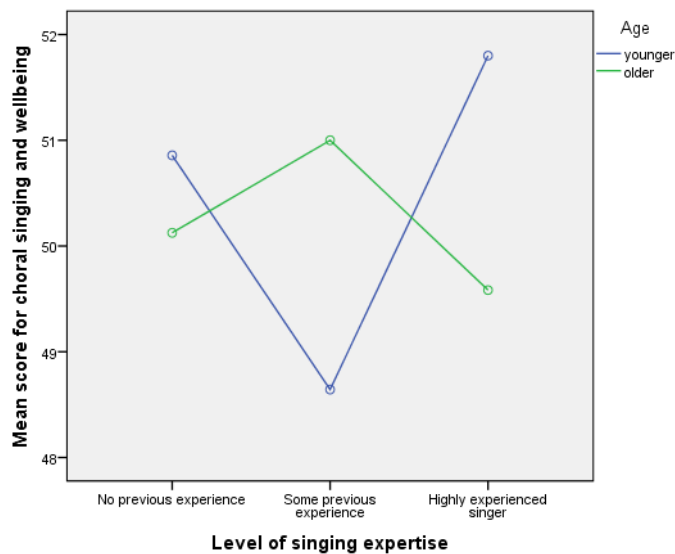
The results of a 2 x 2 x 3 between subjects ANOVA indicated that there was no significant main effect for personality type ( $F(1,133) = .10, p > .05, \eta^2 = .001$ ), suggesting that personality type did not have an effect on the self-reported benefits of choral singing. Therefore, the hypothesis that extroverts would report fewer benefits of choral singing than introverts was rejected.

Results also showed that there was no significant main effect for age ( $F(1,133) = .70, p > .05, \eta^2 = .005$ ), and no significant main effect for the level of singing expertise ( $F(2,133) = .24, p > .05, \eta^2 = .004$ ), therefore these hypotheses were also rejected.

There was, however, a significant three-way interaction, with differential effects emerging for age group and level of singing expertise, in relation to personality type ( $F(2,133) = 3.45, p < .05, \eta^2 = .049$ ). For introverts, older participants with no previous singing experience reported the lowest wellbeing benefits of choral singing over all, with this effect increasing as their level of experience increased. Conversely, younger introverts with no previous singing experience reported the highest benefits of singing over all, with this effect decreasing as their level of singing experience increased (Figure 1a). For extroverts, older participants with some experience reported higher levels of well-being than those with no experience or high experience. Conversely, younger extroverts with some experience reported fewer benefits than those with no experience or with high experience (Figure 1b). For the highly experienced group, younger extroverts reported greater benefits to singing than younger introverts, but older introverts reported greater benefits than older extroverts. For the groups with some previous experience and with no experience, younger introverts reported greater benefits of choral singing than younger extroverts, but older extroverts reported greater benefits than older introverts. These results support the hypothesis that there would be an interaction effect, with introverts and extroverts reporting differences in the benefits of choral singing, according to their level of singing experience and age (see Appendix F).



**Figure 1a: Interaction effect between age and self-reported wellbeing due to choral singing for introverts**



**Figure 1b: Interaction effect between age and self-reported wellbeing due to choral singing for extroverts**

This interaction effect was investigated further, using independent samples *t*-tests to compare the wellbeing scores of younger and older introverts and younger and older extroverts according to their level of singing experience. The results indicated that there was a significant difference between the ratings of younger and older introverts with no previous singing experience,  $t(19) = 2.22, p < .05$ , with younger participants reporting greater benefits than the older participants. The magnitude of the differences in the means was small ( $r = .21$ ). All other effects failed to reach significance, although the difference between the ratings of younger introverts and extroverts with a high level of experience was close to significance  $t(23) = -1.85, p = .08$ , with introverts reporting fewer benefits than extroverts.

### Content analysis

Six themes emerged from the responses to the open ended question, “have you experienced any other effects of singing in the choir, either expected or unexpected?”. There were originally eight themes, but following an inter-rater reliability test, which indicated a substantial level of agreement amongst the themes (Kappa = .79,  $p < .001$ ), some themes were combined due to their low frequency levels. Health/physiological was combined with cognitive stimulation, to form cognitive and physiological health, and purpose to life was integrated into affect and emotion. The most frequently reported theme was social benefits ( $n = 94$ ). This was followed by confidence and self-esteem ( $n = 39$ ), affect and emotions ( $n = 35$ ), singing and music ( $n = 29$ ), cognitive and physiological health ( $n = 18$ ), and new experiences ( $n = 10$ ). The frequencies of these themes, and examples of comments,

are presented in Table 3, and the breakdown of each theme and responses are presented in Appendix H.

**Table 3**  
**Content analysis: frequencies of the themes identified**

<b>Theme</b>	<b>Frequency</b>	<b>Example</b>
<b>1. Social benefits</b>	94	“Improved my social life and expanded my circle of friends and acquaintances” (48)
<b>2. Confidence and self-esteem</b>	39	“As a result of joining the choir I have gained a confidence that I never had in my life before” (43)
<b>3. Affect/emotions</b>	35	“I can’t describe my change in mood. The high I get after singing, especially in such as amazing choir” (181)
<b>4. Singing/music</b>	29	“Voice is louder now, and able to sing higher. Better at music generally, able to sight read better” (185)
<b>5. Cognitive and physiological health</b>	18	“Singing with the choirs has also improved my speech which had suffered as a result of having Parkinson’s” (130)
<b>6. New experiences</b>	10	“Had experiences such as singing at Wembley and the O2, which I wouldn’t have dreamed of” (51)
<b>Total</b>	<b>225</b>	

## **Discussion**

The aim of the current study was to test the hypothesis that self-perceptions of the benefits of choral singing for well-being would be affected by choir members’ personality type, level of previous singing experience, and age. All participants reported that choral singing was beneficial to their well-being, however, no significant main effect was found for personality type, and therefore the hypothesis that extroverts would report fewer benefits of choral singing than introverts was not supported. No significant difference was found between highly experienced singers, those with some previous singing experience, and those with no previous experience, therefore, the hypothesis that the level of previous singing experience



would have an effect on singers' perceptions of the benefits of choral singing was not supported. Furthermore, no significant difference was found for age, therefore, the hypothesis that the perceptions of the benefits of choral singing would vary according to the age of the participants was also not supported. However, there was a significant three-way interaction effect, with differential effects emerging in relation to personality type, according to age group and level of singing experience. This supported the hypothesis that the self-reported well-being benefits of choral singing would vary for introverts and extroverts, according to their level of singing experience and age. The key effect here was found to be between the ratings of younger and older introverts who had no previous singing experience. Younger introverts with no previous singing experience were shown to have the highest benefits of choral singing over all, an effect which decreased as the level of singing experience increased. For older introverts with no previous experience the opposite effect was found, as they reported the least benefits of singing overall, with this effect increasing as the level of singing experience increased.

The results of the current study support previous research which suggests that choral singing is beneficial to the well-being of a wide range of individuals (Clift & Hancox, 2010; Livesey et al., 2012), with high mean scores for the 'Wellbeing and Choral Singing Scale' (Clift & Hancox, 2010) across all groups. The finding that there was no significant difference in the well-being benefits reported by extroverts and introverts, supports the results of Busch and Gick (2012), who found that personality type did not predict a change in well-being due to singing. However, personality has been found to have an impact on subjective well-being (Landa et al., 2010; Butkovic, Brkovic & Bratko, 2012), and it was suggested by Busch and Gick (2012) that a larger sample than that employed in their study, might detect this effect. The current study did employ a larger sample size, and unlike Busch and Gick (2012), the participants were drawn predominantly from choirs which did not audition their members, as it was expected that this would result in a wider variation in personality types, for example, more introverts. As previous research suggests that extroverts are higher in well-being than introverts (Landa et al., 2010), it was expected that extroverts would report fewer well-being benefits of choral singing, yet in the current study, the opposite effect was observed, with extroverts actually reporting slightly greater benefits than introverts overall. This discrepancy suggests that other factors are involved when personality is considered in relation to well-being due to choral singing, for example, introverts may feel more self-conscious, countering any beneficial effects of singing, or extroverts may enjoy the social aspects of choir membership and thus benefit from choral singing more than introverts; DeLongis et al. (1988), Csikszentmihalyi (2002), Walker (2010), and Seligman (2011) and all highlight the importance of social interaction for well-being. Furthermore, Grape et al. (2003) reported elevated levels of oxytocin following singing, which has been linked to increases in self-reported ratings of extroversion (Cardoso et al., 2012), and this may also be a factor when considering the effect of personality on perceptions of the benefits of choral singing.

There was a wide range of singing expertise amongst the participants in the current study, ranging from as little as three weeks experience, to professional singers with many years of choral singing experience behind them. However, the analysis failed to detect any significant difference between those with no previous singing experience, those with some previous experience, or highly experienced singers. Previous research suggests that singing expertise affects perceptions of the benefits

of singing for soloists (Grape et al., 2003), however, only one qualitative study of choral singing had considered this factor (Bailey & Davidson, 2005), concluding that choir members reported differences in the benefits of choral singing according to the level of expertise, for example, experienced singers felt that they benefited from the challenge of improving their musical skills, whilst inexperienced singers were more likely to report social benefits, and increases in self-esteem and confidence. The suggestion that singing expertise has an effect on the well-being benefits of choral singing is also supported by Beck et al. (2000), who studied a group of professional choral singers, comparing their experiences of performances with their experiences of rehearsals, and concluding that physiological responses to singing were affected by psychological responses to factors such as performance satisfaction. The non-significant result in the current study in relation to level of singing experience, suggests other factors are involved in choral singing which may counteract any negative effects of singing expertise. For example, Grape et al. (2003) found that professional singers reported fewer well-being benefits of singing than amateurs overall, yet their study was concerned with the experiences of solo singers, so did not account for any social benefits of choral singing, and this may be affected by personality. Stone et al. (2010) found that levels of stress decreased with increasing age, and this may counter factors such as performance anxiety (Beck et al., 2000), or worries about singing technique (Grape et al., 2003).

The current study employed participants from a wide age group, and the results supported previous research, which suggested that choral singing was beneficial to the well-being of individuals of all ages. For example, benefits to well-being and relaxation were the largest factor in a study of a university choir (Clift & Hancox, 2001), and an intervention study investigating the impact of choral singing on elderly people reported improved physical and mental health (Cohen et al., 2006). Similarly, Livesey et al. (2012) concluded that the reported well-being benefits of choral singing were consistent across all ages. However, there is evidence that subjective well-being changes over the life span (Stone et al., 2010), therefore it was expected that there would be variations in the perceptions of the benefits of choral singing across different age groups. Nonetheless, the current study found no significant main effect for age, suggesting an interaction with other factors when age is considered in relation to well-being due to choral singing. For example, fluctuations in happiness and enjoyment over the life span, and decreasing levels of stress with increasing age (Stone et al., 2010), may have an impact on the perceptions of the benefits of choral singing, affecting aspects such as enjoyment of the music, or stressful factors such as performance anxiety or concerns about singing ability.

Despite no significant main effects being found, the current study did detect a significant interaction effect, with self-reported well-being benefits of choral singing varying for introverts and extroverts, according to their level of singing experience and age. The key effect here was found to be between the ratings of younger and older introverts who had no previous singing experience. Younger introverts with no previous singing experience were shown to have the highest benefits of choral singing overall, an effect which decreased as the level of singing experience increased. This finding is not surprising when previous research is considered, for example, as Busch and Gick (2012) suggest that extroverts are higher in well-being than introverts, it was hypothesised that introverts would report higher well-being benefits of singing. Furthermore, Stone et al. (2010) found that older people were higher in well-being than younger people, and when the level of singing experience

was considered, Grape et al. (2003) found that professional solo singers reported fewer well-being benefits of singing than amateurs. Therefore it would be reasonable to expect that younger introverts with no previous singing experience would report the greatest well-being benefits of choral singing, with this effect decreasing as singing experience is gained. Choral singing may also provide an easy way for introverts to socialise, and this may be valued more by younger people than older people. Conversely, for older introverts with no previous experience the opposite effect was found, as they reported the least benefits of singing overall. One explanation is that older adults are higher in well-being generally (Stone et al., 2010), so would benefit less from choral singing. However, it was expected that introverts would report greater benefits than extroverts, and this was not the case, with the benefits of singing for older introverts only increasing as the level of singing experience increased. But Stone et al.'s (2010) findings may also provide an explanation for this. As previously discussed, they found that levels of happiness and enjoyment increased after the age of fifty, and this, combined with decreasing levels of stress and worry, may counter the negative effects of singing expertise found by Grape et al. (2003). Also, as discussed earlier, factors such as the social aspect of choral singing may be enjoyed less by introverts, and this group may be lower in confidence than older singers with more singing experience, and therefore more likely to make negative evaluations of themselves in comparison to others. This could have a negative effect on their perceptions of the benefits of choral singing, and also explain why, for this group, perceptions of the benefits of singing increased as the level of expertise increased. This is consistent with research suggesting that choral singing leads to an increase in self-esteem and confidence (Bailey & Davidson, 2005; Livesey et al., 2012), and from a theoretical standpoint, is consistent with Deci and Ryan's (2000) suggestion that psychological growth and well-being are achieved when individual needs for autonomy are met.

The difference between the ratings of younger introverts and extroverts with a high level of experience was close to significance, however the direction of this result was contrary to the hypothesis for personality, with introverts reporting fewer benefits than extroverts. As discussed previously, this may be due to an interaction with other factors, for example, younger introverts with a high level of musical training may be less self-confident and more likely to make negative comparisons of themselves with others, or to experience more performance anxiety, and so benefit less from choral singing than extroverts. This is supported by the finding that younger introverts with no singing experience reported the highest benefits of choral singing overall, with this effect decreasing as the level of singing experience increased.

The themes emerging from the content analysis suggested a number of additional factors which may have contributed to the overall well-being effects of choral singing, and which also provide an explanation for the main findings of the current study. The most frequently reported theme was social benefits, which related to aspects such as building friendships, providing a sense of belonging, social support, and respect for others. The majority of comments were positive, for example, "*it is an amazing support network, where you feel safe and understood by those around you. Friendships are building*" (20). Negative comments related to evaluations of others, such as being egotistical, and one participant reported that they found the social aspect of choir 'scary', due to shyness, while another described feeling 'pressure' to make time to socialise with other choir members. Therefore, it is suggested that the social aspect of choir membership affects people's perceptions of the benefits of

choral singing and contributes to the main findings of the current study. Despite previous quantitative research suggesting that social factors do not play a role in the well-being benefits of choral singing (Valentine & Evans, 2001; Busch & Gick, 2012), it is suggested that social factors contribute to the interaction between personality type, age group, and level of singing experience. For example, the negative comments provide evidence that the social aspect may differentially affect the enjoyment of choral singing for introverts and extroverts, and therefore its beneficial effects. The positive comments suggest that the social aspect of choral singing is a positive factor for many, which may counter any negative effects, such as performance anxiety, and the negative effects of singing expertise reported by Grape et al. (2003). Social support is argued to enhance well-being (DeLongis et al., 1988), and it could also be argued that oxytocin released during singing (Grape et al., 2003) might contribute to the sense of belonging reported by many participants in the current study. This theme is very similar in content to Livesey et al.'s (2012) 'social benefits', and was also one of the key benefits of choral singing identified by Clift and Hancox (2001). From a theoretical perspective, this theme is consistent with the biopsychosocial model of health and illness (Ogden, 1996 cited in Clift & Hancox, 2001), which highlights the interaction of social, psychological and biological factors on well-being, and Csikszentmihalyi (2002) and Seligman (2011) also highlight the importance of social interaction for well-being. The high percentage of responses in the current study relating positively to this aspect, suggests that choral singing is a cohesive activity, and fulfils individual needs for relatedness, one of the basic needs which engender psychological growth and well-being (Deci & Ryan, 2000).

The second theme to emerge from the data was confidence and self-esteem, which related to aspects such as comparisons with others, self-consciousness, feelings of pride and achievement, and increases in confidence and self-esteem. Again, the majority of comments were positive, for example, "*as a result of joining the choir I have gained a confidence that I never had in my life before*" (43). Negative comments related to comparisons with others, such as jealousy and insecurity, therefore it is suggested that this aspect may also contribute to the main findings of the current study, with benefits to confidence and self-esteem differentially affected by personality, age and level of singing expertise. For example, Bailey and Davidson (2005) found that inexperienced choir members who were marginalised by poverty and mental illness, were more likely than professional singers to report an increase in self-esteem and confidence. The positive comments suggest that choral singing fulfils individual needs for competence and autonomy, which Ryan and Deci (2000) argue are necessary for psychological growth and well-being. This theme also emerged in previous studies (Dingle et al., 2012; Livesey et al., 2012).

The third theme was affect and emotion, which related to changes in mood, stress, and outlook, for example providing a sense of purpose in life, and a distraction from worries. Several participants reported finding choral singing to be a moving experience, and an outlet for emotions. Comments were predominantly positive, for example, "*the choir has the ability to provide something which can improve any bad mood/stressful situation, even if you don't want it to*" (191), and, "*strong sense of purpose and drive in everything I do on rehearsal day*" (184). Negative comments tended to refer to stress due to performances, or frustration at making mistakes, again, providing evidence for the main findings of the current study. For example, as previously discussed, age, personality and level of singing expertise may interact to affect perceptions of factors such as performance anxiety (Beck et al., 2000), or the

negative effects of singing expertise (Grape et al., 2003). This theme reflected the questions in the 'Wellbeing and Choral Singing Scale' (Clift & Hancox, 2010) used in the current study, to which all participants responded positively, and was a recurrent theme in previous research (Clift & Hancox, 2001; Unwin et al., 2002; Kreutz et al., 2003; Bailey & Davidson, 2005; Busch & Gick, 2012; Dingle et al., 2012). From a theoretical perspective, Vickhoff et al. (2013) posit that singing has a calming effect on the autonomic nervous system, explaining the ability of choral singing to lower stress, and Walker (2010) argues that individuals are able to forget their worries whilst in a state of flow, the conditions for which are argued to be created by choral singing (Livesey et al., 2012).

The fourth theme, singing and music, related to enjoyment of the music and the sound produced by the choir, and improvements in musical skills. Comments were generally positive, for example, *"I am more confident in singing in public and my vocal range has increased since I started with the choir"* (90). Negative comments related to enjoyment of the music, or the standard of the choir, again providing evidence for the results of the current study. For example, levels of happiness and enjoyment vary over the life span (Stone et al., 2010), which could be argued to affect aspects such as enjoyment of the music or concerns about the standard of singing. Similarly, levels of extroversion may also affect enjoyment, and the level of singing expertise may affect individual perceptions of the benefits of choral singing due to differences in the emphasis placed on the factors enjoyed by professional and amateur singers (Grape et al., 2003; Bailey & Davidson, 2005), for example, professional singers may be more likely to be critical of the performance of the choir. From a theoretical perspective, enjoyment of music and a desire to improve one's skills contributes to making choral singing an intrinsically motivated activity, thus making the experience of flow more likely (Deci & Ryan, 2000), and thereby increasing the benefits to well-being.

The fifth theme, cognitive and physiological health, related to benefits to existing medical conditions and to breathing, aerobic capacity and cardiac health. Comments which referred to choir being mentally stimulating or challenging were also included. For example, *"I have Multiple Sclerosis and attending class each week is helpful in keeping me and mind active"* (212; 213). All comments were positive, with the exception of one participant, who reported that singing gave them a cough. Physical benefits were also identified in previous research (Clift & Hancox, 2001; Livesey et al., 2012) and choral singing contributed to an improvement in the physical and mental health of the elderly (Cohen et al., 2006). Furthermore, quantitative studies which measured physiological responses to singing, reported increases in sIgA following singing, suggesting improved immune functioning (Beck et al., 2000; Kreutz et al., 2003). This finding is consistent with the biopsychosocial model of health (Ogden, 1996 cited in Clift & Hancox, 2001), suggesting that choral singing provides health benefits which contribute to overall psychological well-being, and with Vickhoff et al. (2013), who argue that singing in unison has a calming effect on heart rate variability, leading to improved cardiovascular function.

The sixth theme, new experiences, referred to new opportunities which had arisen due to choir membership, for example, *"pushed me to do things I wouldn't have wanted to do before. Had experiences such as singing at Wembley and the O2, which I wouldn't have dreamed of"* (51). This may also be a factor which contributes to the findings of the current study, for example, by contributing to an increase in

confidence and self-esteem, and may be differentially experienced by introverts and extroverts, or by people of different age groups. New opportunities contribute to provide engagement, meaning in life, and a sense of achievement, which Seligman (2011) argues are important for achieving well-being. They could also be argued to play a role in fulfilling an individual need for competence, one of the basic psychological needs identified by Deci and Ryan (2000).

### **Limitations and future recommendations**

In the current study, it was expected that self-perceptions of the benefits of choral singing for well-being would be affected by singers' personality, age, or level of singing expertise, yet no significant main effects were found. Despite this, a significant three-way interaction effect was found, suggesting that a combination of factors leads to individual differences in perceptions of the benefits of choral singing. It is therefore suggested that the study may have been limited by the choice of questionnaire used to measure the benefits of choral singing for well-being, to which all participants responded positively. It could be argued that different underlying factors are important to different people, depending on their age, personality or singing experience, meaning that the questionnaire may not have discriminated sufficiently to uncover individual differences. The results of the content analysis would support this. As the social aspect of choral singing was clearly important to choir members, the study could have been further enhanced by consideration of the way in which this aspect affected well-being, and the way in which it was affected by the interaction of personality, age and level of singing expertise. This could have been facilitated by the inclusion of specific questions related to social benefits, or by further analysis of the responses relating to this theme, for example, whether younger introverts were more likely than older introverts, to report social benefits. Future research which considers the differential effects of personality and age, on both solo and choral singing, might provide insight into the role of the social aspect of choral singing in promoting well-being. Similarly, consideration could have been given to the way in which well-being was enhanced by increasing confidence and self-esteem, and whether this was affected by age, personality or singing expertise, for example, whether inexperienced singers were more likely than professional singers to report improvements in confidence and self-esteem, or to compare themselves negatively with others. Consideration of these factors would also encompass the three basic psychological needs, competence, relatedness, and autonomy, which were identified as essential for well-being (Ryan & Deci, 2000). Thematic analysis of short interviews would be a useful approach in order to gain further insight into the processes underlying the well-being benefits of choral singing.

Although a significant three-way interaction effect was found, the effect size was small, accounting for less than one percent of the total variance. Similarly, the effect size accounted for approximately four percent of the variance between the ratings of younger and older introverts with no previous singing experience. This could be explained by the small sample sizes once the data had been split, for example, there were only twenty-one participants in the independent samples *t*-test which yielded a significant result. The finding that younger introverts with a high level of experience reported fewer benefits of choral singing than younger extroverts with a high level of experience was surprising, as the direction of this effect was contrary to the

hypothesis for personality. However, this result may have been confounded by the low median age of participants in the high experience group compared to the other groups, which was due to a high proportion of younger individuals who had studied music. It is suggested that a larger sample size would mediate for any potential errors caused by the number of variables, and issues such as the low median age of the highly experienced singers. It is also possible that the different response formats used in the questionnaires may have contributed to this, as a large proportion of responses to the personality questionnaire were missing, suggesting that participants were indefinite in their responses.

There was a strong female gender bias in the study, however, this was representative of the choir membership in the current study, and was also reported in previous research (Clift & Hancox, 2010; Livesey et al., 2012). Although not directly addressed in the current study, gender distribution suggested that the majority of men who join choirs already have an interest in music, and therefore some level of previous experience, resulting in very few men in the group with no previous singing experience (see Appendix A). Although Livesey et al. (2012) found that gender did not affect the consistency of the reported benefits of choral singing, it would be interesting for future research to consider whether there are gender differences specifically between males and females with no previous singing experience, as this would provide insight into the potential therapeutic benefits of choral singing.

All participants were existing members of their choirs and so clearly enjoyed singing, therefore it is possible that the results of this study may have been confounded by a response bias. This could be avoided in the future by approaching new choir members, although this was not appropriate for the current study, as differing levels of singing experience were being compared. However, with the increasing popularity of choral singing, the growing number of community choirs would facilitate this for future research. Similarly, comparing singers with non-singers would provide a control group, and increase the generalisability of the study, for example, a comparison of choir and gym members. A further understanding of the benefits of choral singing for well-being could be gained by the use of longitudinal studies, such as following new choir and gym members over the course of their first year. This would provide insight into whether the benefits of choral singing are cumulative, or change over time, and would also provide insight into whether choral singing could be particularly beneficial to those who are physically unable to participate in exercise programmes.

Despite previous research suggesting that choral singing was no more beneficial to well-being than solo singing, (Valentine & Evans, 2001), the results of the content analysis suggest that choral singing is a cohesive activity. Therefore, it would also be interesting for future research to compare choral singing with other group leisure activities which also require a level of interdependency and social interaction, such as dancing or rowing, and which, like singing, have been shown to stimulate endorphin release (Cohen, Ejsmond-Frey, Knight & Dunbar, 2010). In common with choral singing, these activities are intrinsically motivated, and also involve a level of synchrony, so would be helpful for highlighting whether there are any benefits to well-being which are unique to choral singing, and increase the generalisability of research linking choral singing to well-being.

Busch and Gick (2012) found that personality type did not have an effect on levels of well-being due to choral singing, and this was supported by the current study, in relation to extroversion. However, a significant interaction effect was found when extroversion was considered in relation to age and level of singing experience. In light of this, suggestions for future research also include consideration of other aspects of personality which might interact with age and singing expertise to affect individual perceptions of the benefits of choral singing, for example, neuroticism and conscientiousness. The content analysis in the current study did reveal some negative aspects, such as stress due to performing, and negative evaluations with others. Therefore choral singing may not be beneficial for all, and this may also be a consideration for future research.

## **Conclusion**

Previous research indicates that choral singing is beneficial to the psychological well-being of individuals from a wide range of backgrounds and ages. The results of this study support previous research, and also suggest that levels of introversion and extroversion interact with age, and levels of previous singing experience, to affect individual perceptions of these benefits. It is also suggested that these benefits are multifaceted, with social, psychological and biological benefits all reported, such as improving mood, reducing stress, increasing confidence and self-esteem, providing a sense of belonging and improvements in physiological health, all of which have a positive effect on well-being (Engel, 1977). Therefore it is suggested that although choral singing appears to be beneficial to all who partake in it, the interaction of different personalities, ages and levels of singing expertise result in differences in the levels of importance placed on each of these benefits, which in turn affect individual perceptions of the benefits of choral singing. As a result, future research needs to further address the interaction of the underlying factors, in order to gain a more in depth understanding of the way in which choral singing promotes well-being. This study provides further empirical evidence that choral singing provides an invaluable tool for improving well-being.



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