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**Effects of Group Singing on Well-Being:  
Empirical Findings and Methodological  
Considerations**

By

**Rita Bento-Allpress**

**Canterbury Christ Church University**

**Thesis Submitted**

**for the degree of Doctor of Philosophy**

January 2013

# Declaration

I hereby declare that this thesis, whether in the same or different form, has not been and will not be submitted in whole or in part to another University for the award of any other degree.

Rita Bento–Allpress

6th September 2013

Canterbury Christ Church University

RITA BENTO-ALLPRESS

EFFECTS OF GROUP SINGING ON WELL-BEING: EMPIRICAL FINDINGS AND

METHODOLOGICAL CONSIDERATIONS

IMPLICATIONS FOR RESEARCH AND PRACTICE

### SUMMARY

The work in this thesis explores the relationship between singing and well-being. In particular, I focus on investigating the potential for *group* singing to promote feelings of hedonic, eudaimonic and social well-being. The theoretical evidence suggests that such is possible because music activities are structured to engage mind and body in overcoming a challenge, generating feelings of achievement and pleasure in the process. However, the empirical evidence on such effects is less conclusive, reflecting the novelty of the field. I start by developing a model capable of generating hypotheses and framing the empirical work on the relationship between group singing and well-being. In this model, I integrate a conceptualization of well-being as a multidimensional concept with a conceptualization of group singing as a challenging multifaceted activity. The model suggests that well-being is promoted by group singing through the effects this activity has on its psychological, bodily and social correlates. However, the model also accounts for possible moderating effects of situational factors and individual differences. My empirical work focus first on clarifying that group singing involves the types of experiences that can generate feelings of hedonic, eudaimonic and social well-being. I then show that singing in a group relates to long-term measures of well-being, particularly social and eudaimonic. In the short-term, group singing is also consistently related to correlates of well-being. It is shown to increase positive affect, decrease negative affect, increase feelings of achievement and connection to others. Situational factors such as the social context in which the singing occurs are shown to have a moderating effect on endocrine effects of group singing. However, gender differences do not emerge. I also show that group singing can have effects over and above those of a similar, though non-musical, group activity. Overall, the evidence suggests a meaningful relationship between group singing and well-being.

# Acknowledgements

The work in this thesis would not have been accomplished had I not been awarded an individual doctoral grant by the Portuguese Foundation for Science and Technology. Unfortunately, it is more and more a privilege to study at this level and I am very fortunate to have had this opportunity.

Further financial support was provided by the Sidney De Haan Research Centre for Arts and Health, without which the physiological data would have not been possible to gather and analyse.

This work would also have not been completed without the collaboration of the many individuals who took part in the studies. I am very thankful to all the singers who took time to participate, particularly the members of Ashtead Choral Society, Cantata Choir and the Canterbury Christ Church University Choral Society. I am also extremely grateful to the individuals who were not singers but took time off their weekend to come and participate in my experimental study. Their help showed me that it is possible to conduct complex research in this field.

I was fortunate to have met many individuals for the past four years who helped me develop and execute my ideas. I have gained great value from discussions with Tiina Kalda, Jesse Allpress, Lucy Legg, Elisabetta Corvo, Stephen Clift and Grenville Hancox. These discussions have forced me to clear my thinking and influenced the work in this thesis greatly. However, two individuals were involved in specific studies: the singing session in study 7 was conducted by Lucy and study 8 was conceived of and designed with Jesse.

Less academically, but no less important, I have also been privileged over the last four years to have the friendship, support and understanding of my family and friends. My husband Jesse, who has constantly cheered for me even when motivation was at its lowest; my parents and aunt Rosária, who have taught me to persevere; my sister Filipa and friends Rébecca, Joana, and Tiina, who were always there to hear my ideas; and, last but not least, my sister Sílvia, who taught me English at a very young age and always believed I would grow up to be a scientist.

My greatest appreciation, however, is to Stephen Clift and Grenville Hancox, my academic supervisors and colleagues. I was at the end of my first year when I found myself without an academic supervisor. I was very fortunate to have been introduced to Stephen and Grenville by Rupert Brown, a Professor at the University of Sussex who was aware of my struggle. This was the most fortunate encounter. We share research interests and goals and both Stephen and Grenville have championed my work. Above all, they were true mentors.

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# Introduction

During the third year of my psychology degree at the University of Lisbon (a five-year degree at the time) I took practical and theoretical courses in clinical psychopathology. This course focused on severe mental illness and I attended several classes in the psychiatric ward of the Hospital Santa Maria, the university hospital and main hospital in Lisbon. In each lesson, we would have a patient come tell us about their problem to the best of their abilities. In these patients I encountered most of the textbook psychoses, from insidious schizophrenia with digressive discourse, to mania and depression. I even encountered mental illnesses that did not translate into any discernible or obvious indication of such by merely talking to the person affected - you had to see how they lived, talk to their family to actually see the extent of their illness. During the theoretical part of the course our professor mentioned several times how the “line between normality and pathology was a thin one and crossing it was not beyond any human being”. By the end of that term I was more curious about mental *health* than illness, particularly about what might help us from crossing that “thin line” from normality to pathology.

In subsequent years I realized that much of the discourse and policies on mental health are actually focused on disease or illness. This intrigued me and made me look for perspectives that actually attempt to understand mental health, how it works, how it can be promoted and sustained. As a developing psychologist, the dominant medical model focused on illness did not satisfy my need to understand and promote mental health. This was when I came across the work and developing perspectives within the field of positive psychology. During the second half of the 20th century, psychologists became more inter-

ested in a more positive outlook on mental health (Secker, 1998). With time, this resulted in the emergence of positive psychology - an area of psychology influenced by humanistic perspectives and dedicated to studying mental health instead of illness. Topics such as happiness, flourishing and well-being are the primary focus of this recent research area. This perspective does not deny that it is important to understand disease or illness but aims to better understand what goes well in human mental health and how we can promote positive outcomes. As a field in itself, positive psychology dates back to 1998 when Martin Seligman had his turn at the presidency of the American Psychological Association, and proposed a new vision for psychology - to look for "health" in mental health (Wallis, 2005). In little more than 10 years, this *salutogenic* perspective has not only promoted research intended to determine how mental health works, but has also encouraged the development of systematic research on human behaviours that promote a healthy mental life. It became clear that it was with this perspective that I wished to approach the questions I had regarding mental health.

According to Seligman (2004), positive psychology concerns itself with three happy lives - the pleasant life, the good life and the meaningful life. Very broadly, the first refers to positive emotions and the pursuit of pleasure; the second refers to a life of engagement, particularly with activities that put the individual in a complete focused and engaged state where time seems to stop; and the third and last, refers to the pursuit of meaning, of a sense that you belong and contribute to something larger than yourself. Although several interventions have been developed and are currently being used to impact on each one of those areas of life, I wondered if one particular set of human behaviours weren't already equipped to promote the happy lives. These were musical behaviours. I am as much of a musician myself as any other human being. That is to say, I have no musical training but I find music to be a fascinating topic. Every time I attended a concert, I would leave with the burning desire to learn what it is about music that has kept it a constant throughout

the history of civilization. Musical tastes may change, but the desire to listen and make music seems to always be there. Could it be possible that what makes musical behaviours special is the potential to make us happy all around?

It is this question that guided the work I will present in this thesis. Of particular interest to me was to investigate the potential of musical behaviours - such as singing in a group - to contribute for human individual and social well-being, as a way to promote and sustain mental health. All this from a positive psychology perspective, where mental health is more than absence of illness and the psychologist adopts a proactive role in looking for ways to increase and maintain an individual's mental health, before it even reaches any state of illness. In this way, the work in this thesis is not about mental health as approached from an illness paradigm. Although I will refer to some instances where music has been used to promote the health of individuals in states of disease, the focus of the work in this thesis is on individuals who have not crossed what my third year professor referred to as "the thin line between mental health and pathology". What are the effects music has on most of us? Is there any potential for musical behaviours to affect well-being in a way that is not only pleasurable but also engaging and meaningful? These are the questions that the work on this thesis attempts to answer.

So what can the reader expect over the coming chapters? Chapters 1 and 2 contain a review and critique of the literature on well-being and music, with a focus on group singing. In Chapter 1 I first contextualize the work presented in this thesis within the framework of positive psychology and its approach to mental health. In order to address mental functioning from a healthy perspective, I focus on well-being, the concept often used to refer to healthy mental states. The literature reviewed suggests that well-being is a multidimensional concept better understood from multifaceted perspectives. However, the current literature on well-being research and promotion focus more often on its single dimensions. Motivated by a wish to understand whether it is possible for multifaceted

activities to promote not just one dimension of well-being at a time but impact well-being fully, I propose that the potential of group singing to achieve this be investigated.

In Chapter 2 I review theoretical and empirical literature containing evidence of the relationship between music and well-being. I discuss the nature of music and the characteristics that may explain its potential. This discussion is focused on the evidence that suggests that music is a widespread and multifunctional activity. These two characteristics are essential to understand the potential of music activities to promote and sustain well-being. After clarifying the broad nature of music activities, I revisit the theoretical evidence from well-being literature. In particular, I focus on the theoretical framework of flow which offers an explanation of the mechanisms through which music activities relate to well-being. Following this theoretical evidence, I proceed to review the empirical literature investigating music and well-being, focusing particularly on singing. I conclude this chapter by describing a model that will be used to frame the empirical work in this thesis and help answer the questions above. In this model, I integrate a conceptualization of well-being as a multifaceted concept with a conceptualization of group singing as a challenging multifaceted activity structured to engage mind and body in interaction with others, i.e., a flow activity with a social nature. The model connects group singing to well-being through the effects the former has on psychological, bodily and social correlates of the latter. It also accounts for possible moderating effects of situational factors and individual differences.

In Chapter 3 I describe the general methodology used to approach the empirical work. The literature shows that this topic has been approached by researchers with different backgrounds and perspectives. At the same time, this is a relatively new field of research lacking common conceptual and theoretical perspectives. As such, it is important for researchers in new and multidisciplinary fields to report not only findings but also be very clear about the methodologies used to obtain such findings.

Chapters 4 to 8 contain the empirical research conducted to investigate the relationship between group singing and well-being. In the first empirical chapter (Chapter 4), I attempt to conceptualize the activity of group singing discussed in this thesis. I will report findings from three studies that help characterize the experience of group singing as investigated in this work. In the second empirical chapter (Chapter 5), I investigate whether singing regularly has measurable effects on the several facets of well-being, and which ones stand out the most in the long run. The survey reported in that chapter was a study meant to explore connections between singing and well-being, as conceptualized in this study. In the third and fourth empirical chapters (Chapters 6 and 7), I move on to test specific hypotheses related to effects of group singing on well-being correlates. These are generated by the model mentioned above. In Chapter 6, I report two studies where I investigate effects of group singing and whether the context in which the singing occurs impacts on these. Chapter 7 describes a study where I experimentally investigate effects of group singing on several well-being correlates. Finally, the last empirical chapter in this thesis, Chapter 8, derives from a question that emerged all throughout the execution of this project: what are the barriers to joining a singing group? I felt it was necessary to investigate as it relates to the practical challenge of getting people to sing in the first place. Group singing may be an activity with potential to promote well-being as a whole but there may be psychological barriers preventing adult non-singers from adhering to it. If group singing is to be used as a well-being promoting activity in community-wide settings, it is essential to understand what these barriers are so that it is possible to develop strategies to overcome them.

Finally, in Chapter 9, I conclude this thesis with a summary and discussion of the significance of the preceding work. I focus on how the programme of research, framed by the adopted model, contributes to a more clear understanding of the relationship between group singing and well-being. More importantly, however, I reflect upon and discuss how



this research and model provide insight into the wider issues related to singing and well-being research and provide directions for future work.

## Chapter 1

# Understanding Well-Being: A positive perspective on mental health

Well-being is a concept that has been thought of as the positive dimension of mental health. The World Health Organisation (WHO) refers to mental health as “*a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community*” (WHO, 2012) . This positive stance on mental *health* can also be found stressed in the 1946 definition of health by the WHO, which states that “*health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*” (WHO, 1946, p. 2).

Despite this, well-being has attracted little academic or practical attention during the second half of the 20th century. However, in the beginning of the second decade of the 21st century, the importance of human well-being and happiness is no longer underestimated nor is its scientific study considered superfluous by governments. At the end of 2010, the

UKs Prime Minister David Cameron presented plans to measure the levels of well-being and happiness in his nation in an attempt to obtain a general picture of whether life is improving, what matters to the population and how the government can help improve well-being. The “Measuring National Well-being” programme represents a clear worldwide tendency to shift away from governance based mainly on the financial or economical model that dominated the previous decades. This shift was first proposed at the Organization for Economic Co-operation and Development (OECD) 2nd World Forum in 2007. As it was concluded at the end of this OECD conference, progress in societies needs to be measured with more than economical measures such as GDP (OECD, 2007). These do not include other measures of social progress that are essential in helping to address current global challenges, from climate change and resource depletion, to poverty and quality of life. If we are to successfully tackle the global challenges of the 21st century, environmental and social indicators of progress need to be considered alongside economic indicators (Beyond GDP, 2012).

Programmes such as the “Measuring National Well-being” suggest well-being is being used as an indicator of social progress, but what is well-being and how can it be promoted? Before moving on to explore what is currently known that can help answer these questions, I would like to briefly address another question that arises. This regards the importance of including measures of individual well-being to assess social progress.

I have mentioned above that well-being has become the focus of interest at more than the academic level. But, after decades of dominance of the economy-driven model of governance in western societies, why is individual well-being starting to become important for governments and society? One of the main reasons might be the recognition of evidence that the individual has an impact in the social, economic and environmental world around them. For instance, research on social contagion, or transfer of emotions between individuals in a group, highlights the power of one individual mood to affect the

moods of other people around them, and influence the entire group dynamics (Barsade, 2002). Well-being has been connected to many factors that are important to maintain a positively developed society. As an example, happy individuals have been found to be healthier, more sociable and productive, thus more capable of contributing positively to society on many levels (Lyubomirsky, King, & Diener, 2005a). For social and economic reasons it is important for societies that individuals *feel* happy, well and healthy. In such ways, promoting individual well-being is also a way to advance other aspects that can lead to a truly flourishing society (Marks & Shah, 2005).

In the next sections I will address the evidence on what well-being is, what determines it and how it can be promoted.

## 1.1 Searching for a conceptualization of Well-being

Despite the positive definition of mental health provided by the WHO, which indicates a will to look at mental health from a positive perspective, the words “mental health” are often followed by the words “problems” or “illness”. Evidence of such way of thinking can be found in the current programmes and websites belonging to official bodies from countries all around the globe. For instance, the Portuguese “National Programme for Mental Health” has, on the main page of its website, links explaining the four different areas targeted by the programme, all of which refer to pathology services available to individuals with mental illness, rehabilitation programs, support for families of individuals with mental illness, and mental illness diagnosis. There is not one single reference to positive states.

Similarly, the first image we come across once opening the website for the Mental Health Foundation in the United Kingdom is an advert for a program called “Changing Minds” where the sentence “It’s ok to say you’ve been affected by mental illness” sits below the face of a young woman.

This trend is also found in the website of the United States of America's National Institute of Mental Health, which actually has under its name the slogan "Transforming the understanding and treatment of mental illness through research".

The New Zealand Ministry of Health, has the following statement as an highlight on its page on mental health: "According to the WHO, mental illness accounts for 15 percent of the total burden of disease in the developed world, with depression set to become the second leading cause of disability in the world by 2020".

This is a small sample to demonstrate that both small countries and nations which are considered world leaders display a tendency to still refer to mental health from the pathological model point of view. Given the widespread use of the term *mental health* to refer to mental illness, and since the WHO definition does say that mental health is a state of well-being, it is more likely that the term *well-being* better reflects a state of mental *health*.

In recent literature, well-being is considered to be a multifaceted concept (Huppert, Baylis, & Keverne, 2005; Delle Fave, Brdar, Freire, Vella-Brodrick, & Wissing, 2010). Researchers are beginning to agree it comprises different components that provide different and complementary contributions to its structure (Delle Fave et al., 2010) and is more than pleasant emotions (Huppert et al., 2005). In the preface to the book "The Science of Well-being" (Huppert et al., 2005), its editors suggest a definition of well-being as a "*positive and sustainable condition that allows individuals, groups or nations to thrive and flourish*".

Despite this more recent focus on well-being as a multifaceted concept, different facets of well-being have been studied within psychology for over 30 years, although only in a systematic manner since Seligman's mandate at the American Psychological Association in the late 1990s. Nevertheless, this is an extensive field of research which has generated a large body of conceptual work on well-being. Within the positive psychology framework,

well-being has been studied mainly from two perspectives: hedonic (subjective well-being) and eudaimonic (psychological well-being). Recently, perspectives that integrate different facets of well-being, such as the one represented by the concept of flourishing, have started to appear. In this section, I will first outline the hedonic perspective on well-being, where happiness and pleasure are the central notions, and then the eudaimonic perspective, where the focus is on meaning, purpose and the realization of personal potential (Ryff, Singer, & Love, 2004). I will also attempt to make it clear that both these perspectives focus on different facets of well-being and that there is a growing tendency towards a view of well-being that integrates them. Finally, I will suggest that, despite this trend, previous research remains fractured regarding what well-being is and how to measure or characterize it, and that this more recent perspective on well-being encompassing its many different facets is, currently, the best working model to address well-being as an indicator of mental *health*.

### **1.1.1 Hedonic Well-being: The study of happiness, pleasure and satisfaction**

The hedonic perspective on well-being encompasses the study of positive emotions and life satisfaction and includes an articulated framework such as Fredrickson's (2001) Broaden-and-Build model of positive emotions . This theory attempts to capture the unique effects of positive emotions. It proposes that experiencing positive emotions allows an individual to acquire new personal skills and resources that they can draw on when dealing with challenging situations. According to this theory, while negative emotions allow immediate survival, through fight or flight responses, positive emotions help expand a range of skills that can be useful to an individual in dealing with challenging situations that inevitably arise in the course of life (Fredrickson, 2005).

Hedonic well-being has commonly been referred to as “subjective well-being”, and

is thought of as being composed of life satisfaction and positive affect. The absence of negative affect has also been identified as a main characteristic of subjective well-being (Ryff et al., 2004). This type of well-being falls under Seligman's (2002, 2004) concept of "pleasant life" .

The empirical study of subjective well-being can be traced back to studies on mood in the 1920's and post World War II studies designed to measure happiness and life satisfaction. The largest amount of work, however, was developed between the 1960's and 1980's (Diener, Lucas, & Oishi, 2009) which may have reflected an increased academic interest in assessing quality of life in the United States of America (Ryff et al., 2004).

Besides attempts at measuring subjective well-being, empirical research has also focused on what it correlates with. For instance, personality traits like extroversion and neuroticism have been found to be associated with subjective well-being, with extroversion being correlated with pleasant affect, and neuroticism with negative affect (Diener & Lucas, 1999a). Besides personality, several demographic factors have also been studied in relation to subjective well-being. In particular, age and income have been related to subjective well-being. For instance, Diener, Sandvik, Seidlitz, and Diener (1993) investigated the connection between income and subjective well-being in both national (U.S.A.) and cross-national studies. Their findings suggested that the effect of income was higher when related to happiness about material needs such as housing and transportation, but had a smaller effect on happiness with family life and social interactions. Furthermore, their findings indicated that income had a positive effect on happiness, but this effect was stronger on lower income levels and decreased at higher income levels.

In relation to age, initial work in the field suggested youth was related to higher happiness (Wilson, 1967). A more recent review of the findings on the relationship between age and subjective well-being suggests positive affect is lower in older age, but life satisfaction and negative affect do not seem to decline with age. The authors of this review argue that

it is possible these findings reflect people's adaptation skills in face of life changes (Diener & Suh, 1998). These findings suggest effects of age on subjective well-being depend on which component of this construct is being measured.

Other demographic variables such as sex and education have also been related to subjective well-being but their effects are small. For instance, Lucas and Gohm (2003) have found that women from a large cross-national sample reported both higher positive and negative affect than men but the differences were only significant between the levels of negative affect. Similarly, formal education levels have been found to have a small positive effect on subjective well-being, with lower effects on happiness and higher effects on life satisfaction (Witter, Okun, Stock, & Haring, 1984).

Overall, the work in subjective well-being has advanced our knowledge on what happiness and life satisfaction is, how we can measure and promote it. However, as Ryff (1989a) pointed out, theoretical work on optimal psychological functioning has identified aspects of well-being that were not captured by the constructs of life satisfaction, positive affect or happiness. Realizing one's personal potential is an essential facet of well-being that is not taken into account under the hedonic perspective. This other facet of well-being is better understood under the eudaimonic well-being perspective.

### **1.1.2 Eudaimonic Well-being: The study of the development of one's potential**

The eudaimonic perspective focuses on the study of life meaning, self-actualization and personal growth. Or what Seligman (2004) would call the "good and meaningful lives". Eudaimonic perspectives of life date back to Aristotelian thought which posed that an individual comes to life with certain potentials and the main task in life is to discover and realize these unique capacities (Ryff et al., 2004) . Several theoretical works in psychology are based on this view that the human being strives to realize her potential and greater



well-being is associated with doing so ( e.g., Rogers, 1961; Maslow, 1968). Measuring happiness and life satisfaction does not provide insight into these issues and, therefore, the eudaimonic perspective of well-being reflects an attempt to fill in this gap.

Ryff's (1989a) model of psychological well-being attempts to translate these theoretical ideas into the empirical level. In this model, Ryff (1989b) proposes positive functioning is more than momentary pleasure or positive affect it also includes more enduring characteristics such as personal growth, autonomy and positive relations with others. Other components of the model are self-acceptance, purpose in life and environmental mastery. Ryff (1989b) suggests these six dimensions are the operational measures of psychological well-being, and integrate the common features of mental health, clinical and life-span developmental theories.

Ryff (1989a,b), suggests personal growth is essential for optimal psychological functioning, as the acquisition of new skills and knowledge are needed for survival throughout life. An optimal psychological functioning also requires the individual to be self-determining and independent. Autonomy refers, thus, to the ability to regulate behaviour according to personal standards and resist social pressure to think or act in certain ways. A sense of autonomy should also be accompanied by feelings of liberation from norms and social convention. I would like to add here that this autonomy and independence should not be confused with individualism. Ryff (1989a,b) notes that an individual in a state of positive psychological functioning, also establishes and maintains positive relations with others around her. This positive position in society is congruent with characteristics such as empathy, affection and compassion. As for self-acceptance, this refers to a body of positive attitudes towards oneself. It includes an awareness of both good and bad qualities of the self. Self-acceptance also requires the absence of negative feelings, such as regret, regarding past life events. Perhaps the ability to avoid rumination on past events is connected with another essential characteristic of positive psychological functioning a sense

of purpose in life. This refers to the feeling that there is a meaning to present and past life, and provides the individual with a sense of direction. In order to realize goals and objectives for living, it is essential to be able to manage the environment. This leads us to the final dimension suggested by Ryff (1989a), environmental mastery. Besides all the other criteria mentioned above, optimal psychological functioning requires the individual to be competent in controlling, choosing or creating external activities and opportunities that benefit personal needs and values.

The integration of these six dimensions in one model allows an understanding of optimal psychological functioning or eudaimonic well-being which goes beyond pleasure. Ryff and Keys (1995), tested the model and found data that not only confirmed the six-factor structure proposed but also showed that positive and negative affect and life satisfaction measures neglected the proposed facets of positive functioning. The authors correlated the proposed six dimensions with measures of happiness, life satisfaction and depression and found that these were only moderately to strongly associated with two of the proposed dimensions self-acceptance and environmental mastery. This finding led the authors to conclude that measures of well-being that focus solely on happiness and life satisfaction neglect other important aspects of well-being, such as personal growth, autonomy and purpose in life (Ryff & Keys, 1995).

As with the hedonic perspective, several studies have attempted to provide information on how psychological well-being relates to different demographic factors such as age and sex. Findings suggest the different components of eudaimonic well-being suggested by Ryff (1989a) relate to demographic factors differently. For instance, purpose in life and personal growth have been shown to decrease with age, but environmental mastery and autonomy increase with age, while no differences have been found in self-acceptance from youth to old age (e.g., Ryff, 1989a; Ryff & Keys, 1995). Gender differences have consistently been found on positive relations with others, with women scoring higher than men on that

dimension but on no other dimension of eudaimonic well-being (Ryff & Keys, 1995).

Eudaimonic well-being has been found to correlate highly with hedonic well-being but the evidence suggests these are related but distinct constructs (e.g., Keys, Shmotkin, & Ryff, 2002; Marks, Shah, & Westall, 2004). Keys et al. (2002) analysed data from a large US sample where both hedonic and eudaimonic constituents of well-being were assessed. A confirmatory factor analysis revealed that there were two models that fit the data well. One of these models suggested two strongly correlated latent constructs of well-being, with life satisfaction, positive affect and negative affect loading into one of those constructs (consistent with subjective well-being, SWB), and measures of self-acceptance, positive relations with others, purpose in life, environmental mastery and autonomy loading into the other (presumably, psychological well-being, PWB). The other model, a better fitting one, also suggested the same two correlated latent constructs SWB and PWB but allowed for the measures of self-acceptance and environmental mastery to be caused by both latent constructs (Keyes et al., 2002). As noted above, these two dimensions were the only ones that correlated with measures of subjective well-being in previous studies (Ryff & Keys, 1995). Both these models were better fitting than three alternative models: one suggesting that the latent construct of well-being was composed of innumerable independent dimensions; a second model proposing well-being as one general factor; and a third model suggesting well-being was composed of two uncorrelated factors. These findings support the idea that both traditions of well-being research focus on related but unique concepts (Keyes et al., 2002).

Other, more recent advances in the field support this move into a more integrated perspective on well-being by identifying several constituents and sources of well-being such as meaningfulness, life satisfaction, and happiness. Delle Fave et al. (2010), developed a cross-cultural study where definitions and experiences of hedonic and eudaimonic happiness were examined. Those authors argued that happiness has been the primary focus of

much of the research into well-being, and in many instances has been used as a synonym of life satisfaction or well-being itself. However, findings from qualitative and quantitative measures in that study suggest that meaningfulness is also an important aspect of well-being. Furthermore, happiness only contributed a small amount to an overall rating of life satisfaction, suggesting that these constructs are independent of one another. These findings warn against a tendency to equate happiness to life satisfaction and highlight the importance of investigating different aspects of happiness and their relationship with those other dimensions of well-being, such as meaning and life satisfaction (Delle Fave et al., 2010).

Both hedonic and eudaimonic perspectives of well-being have provided important advances in the understanding of what it means to have a healthy mental life in western populations. Due to growing evidence that the constructs in each perspective are related but yet distinct, recent work has started to suggest that to fully understand the concept of well-being, perspectives that integrate both traditions are better fitted. I will now proceed to explore this integrated perspective.

### **1.1.3 Integrated Perspectives on Well-being**

One of such perspectives has developed recently with Keyes (2002, 2005, 2007) introduction of the concept of *flourishing*, which encompasses emotional, social and psychological elements (Delle Fave et al., 2010). Keyes (2002), suggests complete mental health is both positive feelings and positive functioning in life, and its presence can be diagnosed through measures of flourishing. A flourishing individual is one that has not only high levels of emotional, but also high levels of psychological and social well-being. Flourishing is, thus, a concept that integrates hedonic perspectives, where positive affect and life satisfaction are central themes, with eudaimonic perspectives, such as Ryff's model of psychological well-being (1989a,b), where personal growth, autonomy and purpose in life are some of

the main characteristics.

Besides integrating hedonic and eudaimonic perspectives of well-being, flourishing is a concept that also includes social well-being as one major contributor to general well-being. Keyes (1998) suggests social well-being is an essential part of a life that is both public and private. While previous conceptions of well-being focused solely on the private being, the concept of flourishing attempts to include the public side of a life that is constantly embedded in a social context. Arguably, subjective well-being and psychological well-being can be thought of being more clearly related to mental health. However, this inclusion makes the concept of flourishing more consistent with the WHO definition of mental health which also refers to aspects that can be understood as social well-being (e.g., “*mental health is a state of well-being in which every individual (...) is able to make a contribution to her or his community*”).

According to Keyes (1998), the individual faces social challenges that have an impact on a healthy mental life. Social well-being can be thought of as the public facet of human well-being that has traditionally been associated with private facets of mental functioning. When an individual evaluates his or her own situation and functioning in society, they are considering their own social well-being. Keyes (1998) suggests social well-being can be evaluated on five dimensions: social interaction, contribution, coherence, actualization and social acceptance. In depth descriptions for these dimensions can be found in Keyes (1998) so I will briefly refer to each of them. The author suggests individuals face a challenge to feel part of society (social integration), to feel they contribute to it (social contribution), to accept society with its good and bad facets (social acceptance), to feel hopeful about the future of society and trust that its potential will be met by its citizens and institutions (social actualization), and to feel they understand what is going on around them (social coherence). The socially healthy individual is the one that faces these social challenges successfully. There is some empirical support for this model of social well-

being. Two studies were reported where the suggested dimensions of social well-being were tested. Data was collected from a local sample and a sample representative of the US population. A confirmatory factor analysis on this data showed that the model that best fit both sets of data was one proposing five factors loading into one latent construct. Each scale of social well-being correlated, in both studies, with measures of happiness, life satisfaction and dysphoria, suggesting social well-being is also part of an evaluation of a global well-being (Keyes, 1998).

It appears that including measures of social well-being with other measures of well-being, such as subjective well-being and psychological well-being, allows the concept of flourishing to further investigate the healthy mental life more fully, as this seems to be composed of evaluations of emotional, psychological and social stances in an individual's life.

More recently, Seligman (2011) suggested this new integrated view of well-being based on the concept of flourishing could be thought of as containing five dimensions: positive emotion, engagement, relationships, meaning and accomplishment (or PERMA, what Seligman calls the new theory of well-being). Interventions targeting these dimensions would be more successful both in understanding well-being fully and how to promote it.

While the concept of flourishing was proposed as a diagnostic tool for the presence of mental health at an individual level (Keyes, 2002), this integrated perspective has also been adopted and adapted as a measure of well-being at the societal level. The multi-dimensional model of well-being by Marks, Shah and Westall (2004) has been used in the New Economics Foundation (nef) well-being measurement programme which aims to demonstrate that an individual's well-being should be a main concern for any democratic government wishing to promote growth. This model integrates personal well-being with economical, social and environmental well-being. Following Keyes' conception of flourishing (2002, 2005, 2007), this model suggests that personal well-being consists of two

personal dimensions - satisfaction with life and personal development - and a social context - people's social well-being. These authors suggest that people's satisfaction with life is prone to adaptation effects and only reveals satisfaction, pleasure and enjoyment. Capturing these facets of personal well-being does not provide a complete picture. Thus, the authors suggest that a clearer picture of people's well-being can be drawn if satisfaction with life is complemented with measures of personal development and social well-being. Personal development includes the six dimensions in Ryff's model of psychological well-being, and social well-being refers to Keyes concept described above (Marks & Shah, 2005). This model then expands on previous work by supplementing the information on individual well-being with indicators of economical and environmental well-being, such as employment opportunities and work satisfaction, and the quality of the environment people live in. The authors argue that these indicators are essential because they affect a person's well-being, and, in turn, individuals may affect the communities and societies they live in. For instance, an individual's productivity contributes to economy, and levels of productivity can be affected by lower mental health, as diagnosed by a lower level of well-being (Marks et al., 2004).

There is evidence of real-life applications of these academic considerations. Nef's work with this multi-dimensional model has allowed Nottingham City Council to gain insight into the lives of young people in Nottingham. Interestingly, most academic research on well-being has been done with adult populations. In this pilot study, the sample was comprised of people from the ages of 7-19 and indicators of their personal well-being were accompanied by indicators of social, economic and environmental well-being (Marks et al., 2004). A factor analysis on the data confirmed two dimensions for personal well-being one that included life satisfaction and one that included personal development. These findings are consistent with the previous work that suggested well-being involves more than one single dimension. Furthermore, their findings reveal that there was a drop in well-being as

children got older, that experiences at school had a great impact in the personal well-being dimension of personal development but not as much in life satisfaction, and that poverty within their household and neighbourhood was related to lower life satisfaction. Further evidence also shows that engagement with activities such as sports was related to higher well-being. This finding suggests physically engaging, social activities may be important to promote well-being.

This is an example on how recent academic advances in well-being can be used to aid local government in their decision-making on how to improve the well-being of the individuals in their communities and, by doing so, help these groups to flourish. It appears that a move towards integrated perspectives of well-being provides better insight on what well-being is. It also appears that such integrated perspectives allow, at a practical level, a better understanding of how people in a community are doing and what can be done to improve their well-being.

So far, I have attempted to demonstrate that well-being has been investigated and understood from many different perspectives. The theoretical and empirical evidence reviewed above seems to suggest that well-being is a multifaceted concept that reflects optimal psychological states or mental health. In reality, one could say that “well-being” is how “mental health” is referred to when talking about positive mental states. Keyes (2002) suggests that the presence of mental health can be diagnosed with flourishing measures and it is clear that understanding mental health requires integrated approaches that recognize the relevance of both eudaimonic and hedonic aspects of well-being, but also social context.

It is also clear that this movement towards more integrated perspectives is a recent development and the existing evidence on optimal psychological experience as a reflection of a healthy mental life, still remains quite fractured on how to define and measure well-being. For instance, happiness has been studied within the hedonic well-being perspective and is



often used as a synonym of subjective well-being (e.g. Diener et al., 2009) , even though there is evidence that happiness and life satisfaction are not the same thing (Delle Fave et al., 2010). As another example, Seligman (2002, 2004) proposes that happiness is constituted of pleasure (or positive emotions), engagement and meaning. While this view reflects an integrated perspective on well-being, it uses the word happiness to mean not just subjective well-being, but a full well-being. With some exceptions (e.g. Keyes 2002, 2005, 2007), measures of well-being also vary amongst studies making it difficult to draw comparisons or even be sure that the psychological well-being measured in one study, for instance, is comparable to the psychological well-being measured in another.

Other limitations in the current literature refer to methodological issues. In particular, most studies refer to single-time-point measurements and longitudinal data is lacking to demonstrate changes over time. There is also a focus on the US population and other western societies. The correlational nature of much of the research and a focus on middle and upper class populations are also some of the issues that prevent a generalization of present findings. Nevertheless, evidence such as that provided by nef's work with Nottingham City Council, suggests well-being is better understood if different facets are taken into account.

In this work, I am mostly interested on mental functioning from a healthy perspective. The extensive work developed on this field suggests that a healthy mental functioning involves many domains and a better understanding of it might arise when considering all those facets. It is also clear that well-being is the term more commonly used to refer to mental *health*. For these reasons, in this work, the concept of well-being will be used to refer to healthy mental functioning and will be approached from an integrated perspective where hedonic, eudaimonic and social facets of well-being will be considered. In the next section, I will address the issue of how such a multifaceted concept might be promoted.

## 1.2 Promoting Well-being

In the previous section I demonstrate that well-being is a concept that can be used to refer to different facets of a healthy mental functioning. Systematic research on well-being has evolved from looking solely at happiness as pleasant emotions or life satisfaction into considering well-being as a multi-dimensional concept, as signalled by the work on flourishing. In this section I wish to explore how well-being can be promoted and sustained. I do not wish to attempt an exhaustive review of interventions that have been developed, but rather demonstrate that there are different proposals on how different facets of well-being might be promoted and even sustained. In particular, I wish to highlight that an array of activities have the potential to benefit well-being. However, many target hedonic aspects of well-being while others impact on eudaimonic aspects, and others yet on social aspects. I suggest that very few are as multifaceted as the concept of well-being itself. In fact, even the integrated perspectives of well-being suggest interventions that work on one dimension or another (e.g., Seligman, 2004; Seligman, Parks, & Steen, 2004). I will provide examples and suggest that while it is possible that a mentally healthy individual may be in need to focus on one domain over another throughout life, current work fails to look at activities already in use by humans that can have the potential to promote well-being on many levels in one sitting (e.g., sports, musical activities). It is my view that a proactive approach to health, mental or physical, should be accompanied by proactive interventions that act on different domains even before any issues arise. From a more practical point of view, it is also my belief that, in our fast-passed society, where time and money are always a problem (both at an individual and community level), it is worth to investigate the potential of engaging in such existing activities to promote and sustain well-being throughout life.

In order to develop this argument, I will first identify the different areas that might influence well-being, such as genetic factors, life circumstances and activities we engage

in. I will note how adaptation, social comparison and individual perceptions prevent life circumstances from having a bigger contribution to well-being, and how the activities we engage in add to our experience and knowledge of the world and help promote and sustain well-being. Following this, I will provide examples of specific interventions developed to promote different facets of well-being. I will note that these remain focused on unidimensional aspects of well-being, and conclude by addressing the possibility that existing human activities remain under-explored but might have the potential to have multidimensional effects.

### **1.2.1 Determinants of well-being**

Genes, life circumstances and intentional activities have been suggested as three main areas of influence on well-being. While this suggestion has come from research on hedonic well-being (Lyubomirsky, Sheldon, & Schkade, 2005b), research on eudaimonic and social aspects of well-being can also be found to reflect these areas of influence. I will first refer to genetic influences before moving on to discuss the influences of life circumstances and intentional activities. The main goal of this brief review is to demonstrate that the area that we can have more control over and effectively work on to promote well-being is intentional activities, although there is evidence that working to create positive environments is also relevant.

#### **Genetic predispositions**

Evidence suggests well-being is highly affected by genetic factors. This evidence comes mostly from studies with twins and refers to both hedonic (e.g., Tellegen, Lykken, Bouchard et al., 1988; Stubbe, Posthuma, Boomsma and De Geus, 2005) (e.g., Tellegen et al., 1988; Stubbe, Posthuma, Boomsma, & De Geus, 2005) and eudaimonic domains of well-being (e.g., Keyes, Myers, & Kendler, 2010; Archontaki, Lewis, & Bates, 2012) although one

study also measured social well-being (Keyes et al., 2010).

For example, Stubbe et al. (2005) investigated the effect of genes and environment on life satisfaction indicators of monozygotic twins, dizygotic twins and their siblings. Monozygotic correlations were higher for both men and women than other twin or sibling correlation, and represented 38% of life satisfaction. These findings replicate those by Tellegen et al. (1988) where several personality and subjective well-being measures were compared amongst monozygotic and dizygotic twins that were brought up together and monozygotic and dizygotic twins that were brought up apart. In this study, monozygotic twins brought up together shared 58% of subjective well-being, monozygotic twins brought up apart shared 48%, dizygotic twins brought up together shared 23%, and finally, dizygotic twins who were brought up apart shared 18% of subjective well-being. Interestingly, in both these studies the remaining of the variation in subjective well-being was attributed to non-shared environmental factors (i.e., unique to the individual rather than common family environment, for instance).

In regards to genetic influences on eudaimonic well-being, similar results have been found. Studies using both a brief (Keyes et al., 2010) and a complete scale (Archontaki et al., 2012) of psychological well-being (as suggested by Ryff, 1989a,b) have recently measured psychological well-being on pairs of monozygotic and dizygotic twins. Again, higher correlations were found between monozygotic twins (Archontaki et al., 2012, reported the lowest was 30% in the purpose in life scale, and the highest 47% in the self-acceptance scale) than dizygotic twins (Archontaki et al., 2012, reported the lowest was 4% in the autonomy scale, and the highest 22% in the personal growth scale). These studies also found shared environmental factors had little contribution to psychological well-being of twins while unique environmental influences were mostly trait-specific (Keyes et al., 2010; Archontaki et al., 2012). Genetic influences on social well-being have also been reported by Keyes et al. (2010) but these were also trait-specific.

These findings suggest that genetics play an important role on our hedonic, eudaimonic and social well-being levels. However, we need to be aware that more than determining our life, genes create a predisposition. The genes-environment interaction is essential for some predispositions to be activated. There is, thus, some room for environmental manipulation in order to promote environments that will bring out the best (Marks & Shah, 2005).

### **Life circumstances**

Besides the influences of genetics, life circumstances have also been related to well-being. Aspects such as income, marital status, education, employment status, national and geographical residence, certain life events (e.g., being involved in a car crash), and demographic factors such as sex and age, all fall under this category. Much of the research aimed to investigate influences of life circumstances on well-being have focused on hedonic well-being. Research on this area of influence is still scarce regarding eudaimonic and social well-being, reflecting the novelty of the field, and findings are mostly from studies where recording socio-demographic variables is not the main goal. Since I have already referred to relations between hedonic and eudaionic well-being and variables such as income, age and gender, I will focus on the evidence that refers specifically to the impact of life circumstances on well-being.

In regards to hedonic well-being, evidence suggests the impact of life circumstances is small (Diener, Suh, Lucas, & Smith, 1999b; Lyubomirsky et al., 2005b). For instance, income only predicts subjective well-being up to a certain level. Once basic needs have been met, more money does not bring more happiness (Helliwell & Putnam, 2005; Marks & Shah, 2005). Overall, life circumstances are thought to contribute about 10% to happiness levels (Lyubomirsky et al., 2005b; Sheldon & Lyubomirsky, 2007). While there isn't yet a number that can be related to eudaimonic well-being, there is evidence life circumstances also have little impact on the evaluation of this domain of well-being (e.g., Ryff & Essex,

1992; Heidrich & Ryff, 1993).

Adaptation is a key mechanism thought to explain the small impact life circumstances appear to have on well-being. Personal evaluations and social comparison can also help us understand why the effect of life circumstances is not as large as could be expected.

Humans tend to adapt quickly to the circumstances they are in due to the constancy of these conditions (Lyubomirsky et al., 2005b). For instance, despite the many chronic health problems and decline in physical ability that come with old age, a majority of older adults report feeling healthy (Guindon & Cappeliez, 2010). One source of evidence of adaptation to life circumstances is the finding that life satisfaction does not decrease significantly over time (Diener et al., 1999b). It is believed that following changes in life circumstances, individuals often go back to subjective well-being levels they had before the changes. However, evidence is starting to emerge suggesting that people's perceptions of the event as significant or extreme do have long-term effects on subjective well-being. Individuals who go through a divorce, unemployment or become disabled may not adapt quickly to these changes and some of them do not go back to previous levels of happiness (Lucas, 2007). In a study where effects of change in marital status on life satisfaction were measured longitudinally, researchers found individual differences in the tendency to adapt back to baseline levels. Individuals who had strong positive initial reactions to marriage, for instance, were happier in the long term than they were before marriage. Those who had strong negative reactions to marriage initially, ended up less happy than they were before marriage (Lucas, Clark, Georgellis, & Diener, 2003). Life circumstances may have a small impact on subjective well-being in the short-term due to a tendency to quickly adapt to new circumstances, but it is evident that some long-term effects do occur and these are dependent on individual differences in how the event was perceived initially.

Psychological well-being has also been shown to vary between individuals under similar life circumstances. For instance, a sample of elderly women who experienced community

relocation reported variable levels of psychological well-being, particularly in environmental mastery, purpose in life, and positive relations with others. Individual differences in reasons and interpretation of the event were used to explain these variations in different domains of psychological well-being (Ryff & Essex, 1992). Life circumstances might, thus, have smaller effects than expected because coping mechanisms are employed that help us evaluate our personal circumstance according to our personal experience. This highlights the relevance of accumulating positive experiences throughout life, but I will come back to this point at a later time.

Social comparison is another mechanism that has been used to explain the little overall impact of life circumstances on well-being. Processes of social comparison are a frequent tendency humans have to compare their circumstances to the circumstances of those around them (Diener & Fujita, 1997). This would explain the finding that levels of happiness don't vary between countries: although developed societies have better living standards nowadays, people in these countries don't seem happier than they were 40 or 50 years ago (Marks et al., 2004).

There is also evidence that social comparison helps reduce the impact of changes in life circumstances on psychological well-being. In a study with older female adults with poor or good health, social comparison was shown to be the process through which psychological well-being was maintained or promoted, particularly in females with very poor health who reported psychological well-being levels similar to those in good health (Heidrich & Ryff, 1993).

The evidence presented so far suggests that well-being is not strongly affected by changing life circumstances due to the different mechanisms we employ, consciously or unconsciously, in order to adapt to changes in our circumstances. Some of the evidence suggests that there isn't much that can be done to improve an individual's sense of happiness. This is because any intervention will only have a short-term effect and the individual

will then go back to their previous levels of happiness. On the one hand, if we are thinking about negative events, this is not such a bad thing since we can hope to move on. On the other hand, if we think about positive events, knowing that any happiness we might be feeling now will not last can be a daunting thought. However, the idea that there are no long-term effects of the experiences we go through life is starting to be shown to be a simplistic and inaccurate view (e.g., Lucas et al., 2003; and for a review see Diener, Lucas, & Scollon, 2006) .

This evidence suggests that it is not specific circumstances but rather how each individual interprets the meaning of those circumstances within their own personal context. This notion is particularly important when working with individual cases. Before moving on to tell the person they will be happy if they give it some time, because research shows hedonic adaptation happens, perhaps a better approach is to consider each case individually, investigate what expectations and reactions the individual had and then suggest interventions that can help that person cope, under their particular circumstances.

This, after-the-fact solution might be helpful in some circumstances, for instance, when a mental health practitioner wishes to aid a client. However, if we consider a council hoping to understand what they may do to improve the overall well-being of their communities, it might be impracticable to work with each individual in the community to increase their well-being. However, because we interpret events in the light of our accumulated experiences, well-being might be promoted by proactively seeking to create opportunities for positive experiences. It is possible that positive experiences will facilitate feelings of well-being and positively influence interpretations of later experiences through the accumulation of “psychological capital” (Csíkszentmihályi, 2000). Promoting activities that allow the individual to experience well-being can lead to more positive interpretations of life’s events and better coping with life’s many difficulties (Fredrickson, 2005).



## **Intentional activities**

The relevance of taking a more proactive role in managing our well-being, whether at an individual or society level, is substantiated by the evidence that, after genetic predispositions, engaging in intentional activities is the area that can have most impact on our well-being, with some researchers suggesting it accounts for the remaining 40% of our happiness (Lyubomirsky et al., 2005b; Marks & Shah, 2005; Sheldon & Lyubomirsky, 2007). Engaging in regular exercise, for instance, has been found to increase both subjective and psychological well-being (Hassmén, Koivula, & Uutela, 2000; Mochon, Norton, & Ariely, 2008). Regular exercise was also found to contribute to stronger feelings of social integration in a sample of older people (Hassmén et al., 2000), which suggests it also has the potential to contribute to social well-being. Other intentional activities such as volunteering have also been found to increase well-being (Morrow-Howell, Hinterlong, Rozario, & Tang, 2003).

Intentional activities include actions and thoughts that people choose to initiate, and put some effort into. These can include behaviours such as exercising, dedicating time to volunteering to a meaningful cause or cognitive activities such as trying to see things in a better light or savouring the moment. It also includes volitional activities such as defining goals and plan how to reach them. In order for the effects on subjective well-being to be sustained over time, engaging in these activities should become a routine. However, Lyubomirsky et al. (2005b) suggest adaptation is less likely to occur because the nature of intentional activities is episodic and varied. This reduces the constancy that is necessary for adaptation to occur. For instance, going for a run every day may become a routine but the runner can vary the time, length or location of the run and, thus, maintain enough regularity for this activity to have an impact in the long-term but still have variety within the activity that keeps it engaging.

Lyubomirsky et al. (2005b) also suggest that there is an optimal frequency for each

intentional activity to remain meaningful and fresh for each person and that, in order to maintain those qualities the individual should attempt to determine what the optimal frequency of an intentional activity is for them. Personal values and interests should also be considered when selecting which activities to engage in. Because it is important to maintain a certain regularity in engaging with the activity, it is important that the person wants to engage with the activity to start with. Intentionality is, after all, the key characteristic of these types of activities.

In sum, it is possible for us to derive well-being from the activities we engage in our everyday lives but in order for this to be the case, such activities must be positive experiences, fit our personality and needs, involve some effort, and be practised regularly but be varied in their timing and enactment. These main characteristics are based upon the model of sustainable happiness suggested by Lyubomirsky et al. (2005b). This model specifies the conditions under which intentional activities promote and sustain subjective well-being. While eudaimonic or social well-being have not been measured in the framework of this model, there is reason to believe that intentional activities work primarily to promote and sustain these other domains of well-being. For instance, intentional activities such as socializing and doing engaging and meaningful work, can promote subjective well-being, but given their target areas, can be thought to lead first to social and eudaimonic well-being. In fact, although research has focused on how intentional activities affect subjective well-being, intentional activities, as described above, do not seem to be primarily concerned with promoting pleasure. Instead, subjective well-being could be a result of other domains of well-being being promoted. Huppert (2005) suggests these activities mainly act to make the individual feel engaged and fully functional and it is the promotion of these areas that makes the individual feel good.

### 1.2.2 Theoretical understanding of how intentional activities might promote well-being

The relationship between activities that can be thought of as eudaimonic and hedonic can be better understood under the framework of Csíkszentmihályi's Flow theory (1990, 1997). The type of intentional activities Lyubomirsky et al. (2005) suggest, can be thought to be very similar to the conceptualization of optimal experiences in the flow theory, which are, in reality, intentional eudaimonic activities that lead to hedonic feelings. This theory helps understand how engaging in intentional eudaimonic activities not only promotes but has the potential to sustain well-being on both eudaimonic and hedonic level. Because some of these intentional activities are social in nature and require joint participation, they also have the potential to promote and sustain social well-being.

According to this theory, the optimal experience leads to flow, and experiencing flow leads to feelings of positive emotions about the experience, once the experience is over. The concept of *flow* is understood as a mental state of complete focused motivation, a positive perspective on the channelling of emotions to perform a task. The person is completely and actively involved in the task at hands and experiences intense focus. Positive emotions or thoughts do not distract from the activity but might arise once the task is completed. Activities that lead to flow have clear rules and compatible goals, motivating action and making it possible for the person to focus attention. These are activities that also provide immediate feedback and motivation to learn. As its author puts it, "*Flow tends to occur when a person's skills are fully involved in overcoming a challenge that is just about manageable*" (Csíkszentmihályi, 1997, p. 30). If an activity is particularly challenging and the person does not have skills to adequately meet that challenge, instead of flow, one experiences frustration, worry and anxiety. If the challenge is too low relative to one's skills one gets relaxed, or bored. These circumstances may push the person to learn either the adequate set of skills to meet the challenge or develop new levels

of challenges and skills that will allow them to experience flow again (Csíkszentmihályi, 1997). Given these characteristics, flow activities are primarily concerned with eudaimonic aspects but lead to both fulfilment and enjoyment. Often they are social in character, and require individuals to work together in achieving a goal. In this way, the optimal experience promotes eudaimonic, social and hedonic well-being. Optimal experiences also have the potential to sustain well-being as it appears that the more people experience what Csíkszentmihályi called flow, the more they seek to experience it (Csíkszentmihályi, 2000). Since it also appears that there are no limits in our ability to experience flow, continuous development of skills and challenges will help the individual create new opportunities for flow. By accumulating optimal experiences, the individual increases their “psychological capital” and sustains a complete state of well-being (Csíkszentmihályi, 2000).

In this section, I have addressed what is known about determinants of well-being, or where our well-being comes from. Evidence suggests our well-being will result from the interaction between genes, environment and behaviour. Genetic predispositions, such as our temperament and personality, greatly determine our happiness, how we engage with activities and with the people around us. It appears genetics contributes to about 50% of our well-being. Another set of aspects that affect our well-being are socio-demographic factors. These are aspects such as our age, sex, income, education, whether we’re in a relationship or not, and so on. The evidence suggests that these factors actually don’t contribute that much to our well-being. They have an impact but usually only on the short-term and is something around 10%. This leaves about 40% of our well-being that comes from somewhere other than our genes and life circumstances. Intentional activities, things we do in our everyday lives, are thought to contribute to the remaining 40%. Looking at these three areas that determine our well-being, it is easy to see that the one we have more control over is the last one. Since genetic predispositions can be manifested or not, depending on the environment, activities we decide to engage ourselves in can end

up having the biggest impact on our well-being. These intentional activities can lead to momentary pleasure but it is their potential to be continuously enacted that makes them sources of sustained well-being.

Now that I have discussed what our current knowledge considers well-being to be and where it may come from, in the next section I will provide some examples of specific interventions developed to promote well-being. I will note that these remain focused on unidimensional aspects of well-being and ignore the evidence on flow and optimal experiences. I will conclude by addressing the possibility that some human activities that fall under the description of activities that can lead to flow, remain under-explored but are, in fact, geared to have multidimensional effects.

### **1.3 Well-being interventions**

First, let me take the opportunity to remind the reader that I am solely referring to well-being from a positive mental health perspective. Interventions designed to decrease depression or anxiety, for instance, will not be approached in this work. Instead, the focus of this work is on interventions researched within the framework of hedonic, eudaimonic and social well-being. Unfortunately, there is much more evidence base for what helps decrease mental disorder, than promote mental health (Huppert, 2005).

Within the hedonic perspective on well-being, interventions have been investigated since the late 1970s. These interventions are mostly based on the idea that subjective well-being can be increased if the habits of happy people are emulated. Fordyce (1977), firstly tested this hypothesis with a sample of college students where participants were asked to take part in a self-study program where they were taught how to develop certain behaviours and attitudes such as stay organized, keep busy, develop a positive outlook, work on a healthy personality and spend more time socializing. Compared to a placebo control, the group that took part in the program had significantly higher happiness. In

a subsequent study, Fordyce (1983) found effects of the intervention program 9 to 28 months after participation, suggesting that these activities are capable of promoting and sustaining happiness. Unfortunately, only measures of hedonic well-being were collected with this intervention. It is possible that some of the tasks included in the intervention affected both eudaimonic and social well-being as well.

The subsequent interventions developed are based on this idea that individuals can increase happiness if they imitate behaviours and attitudes of people who are already happy (Seligman et al., 2004). For instance, happy people appear to be more altruistic, or emotionally kind (for a review see Post, 2005). In this way, aiming to perform acts of kindness is one possible behaviour that can increase happiness (Sheldon & Lyubomirsky, 2004; Lyubomirsky et al., 2005b; Otake, Shimai, Tanaka-Matsumi, Otsui, & Fredrickson, 2006).

Other interventions found to increase subjective well-being include asking participants to perform regular gratitude-related exercises, such as counting their blessings (Emmons & McCullough, 2003; Lyubomirsky et al., 2005b), write about unhappy, traumatic or stressful events, or apply repetitive, circular replay to thoughts about happy moments (Lyubomirsky, Sousa, & Dickerhoof, 2006).

Based on their model of sustainable happiness, Lyubomirsky et al. (2005b) (see also Sheldon & Lyubomirsky, 2007) propose behavioral (e.g., socialize more often), cognitive (e.g., look at thing under a positive light) and volitional activities (e.g., get more organized) aimed to promote subjective well-being will have better results if they meet the conditions mentioned in the previous section: be positive experiences, have a high activity-person fit, be practiced with an optimal frequency and duration, and allow for some variation to be introduced on each engagement in order to keep it compelling. Presumably, it is also possible this is the case when we wish to promote other domains of well-being as many of the suggested interventions have the potential to promote eudaimonic and social

well-being. This idea, however, remains untested.

Nevertheless, there is some work within integrated perspectives of well-being, namely on interventions thought to promote the three different areas of happiness suggested by Seligman (2002, 2004). These are designed to teach people about the different proposed “lives”. Assignments focus on developing tasks that promote the pleasant life, the good life and the meaningful life. For instance, one intervention designed to lead to pleasure is the “have a beautiful day assignment”, where the person is told to set a day aside and design a beautiful day for themselves. Skills such as being able to be present in the moment and being able to savour the moment are necessary for the person to be able to experience the pleasures they create in this assignment (Seligman, 2004). An example of an intervention designed to promote the good life (or increase engagement), is a task where people are taught to identify their highest strengths so they can use these more often and more creatively (Seligman et al., 2004). Finally, an example of an intervention designed to promote the meaningful life is one where people are asked to do something altruistic. This task is particularly sensitive to individual differences since the ways in which individuals find meaning vary from person to person (for a review see Baumeister & Vohs, 2002). This research is still in its early stages but initial data suggests that, just as with the interventions designed to increase subjective well-being, these interventions not only have immediate effects, but often lasting ones (Seligman et al., 2004).

These examples demonstrate that, as with the literature attempting to define well-being, more work has been done on designing and testing interventions aimed to increase hedonic well-being. Often, these may target other domains of well-being as well (e.g., when the task is socialize more often, it is likely that this will have an impact on social well-being as well), but no empirical evidence of the effects on these other domains has been obtained. As mentioned in the previous section, it is possible these activities are leading primarily to eudaimonic and social well-being, and hedonic well-being as a by-product

(Huppert, 2005).

The current work on designing interventions has, in my opinion, two main limitations. The first is that it is not in accordance with the theoretical and empirical suggestions of the field. The second is that it ignores the potential of some of these interventions to be affecting more than one domain of well-being at the same time. Theoretical and empirical work suggests that well-being should be approached as a multifaceted concept and, indeed, that it is better understood from an integrated perspective. At the same time, these interventions seem to already be promoting other domains of well-being that researchers are not measuring. For instance, if we take the “beautiful day” task mentioned above, this was designed as an intervention to promote pleasure. However, the individual may derive pleasure from socializing with friends or visit relatives. This activity may lead to pleasure but what it is promoting primarily is social well-being, a domain that remains unaccounted for when pleasure is all the researcher is measuring.

While designing specific interventions might be helpful when an individual might feel one area of their lives needs more work than another, researchers also suggest complete mental health involves well-being on all its domains (e.g., Keyes, 2002; Huppert, 2005). We will not be able to control many of the events that will occur in our lives but it seems we can work to build strong minds that will help us cope with negative experiences successfully. Because it is believed we can work to promote our own well-being, why focus on one part of it at a time? The main message from positive psychology is that we can proactively engage in promoting and maintaining our mental health. With the limited time we have in our lives, we might as well focus our efforts on continuously promoting our entire well-being instead of waiting to remedy one area or the other.

The work on flow suggests it is possible for an activity to lead to optimal experiences that boost well-being as a whole. It also suggests that every culture has developed such activities that are structured specifically to induce flow (Csíkszentmihályi, 2000). These



would be activities with potential to promote well-being on its many domains not only on the short-term, but also on the long-term. Csikszentmihályi (2000) suggests sports, games, music and rituals are all activities that provide clear goals, the opportunity to balance skills and challenges, and immediate feedback. They also require the participant to focus their attention and concentrate on the different tasks they involve. The work presented in this thesis reflects efforts to investigate the potential of one of these universal human activities - music - to impact on well-being on its hedonic, eudaimonic and social domains.

## 1.4 Chapter Summary

In this chapter I have attempted to contextualize the work presented in this thesis within the framework of positive psychology and its approach to mental health. I have demonstrated that well-being is the concept more commonly used to refer to healthy mental states, and that the extensive research work in this field has conceptualized it from multiple perspectives. I have stressed that, while unidimensional conceptualizations of well-being are essential to advance understanding in this field, the integrated model of well-being that I adopt in this work reflects a concern for obtaining a multidimensional picture. I have also noted that, in this work, I wish to address mental functioning from a healthy perspective and understand whether it is possible for particular human activities, such as musical activities, to promote not just one dimension of well-being at a time but impact well-being fully.

Numerous anecdotal reports suggest music-making is one such activity that may positively affect individuals in all domains of well-being. This work is, therefore, anchored on the idea that music-related activities, especially those which require high levels of involvement such as group singing, operate on hedonic, eudaimonic and social domains and, therefore, have the potential to benefit well-being in a holistic way. Figure 1.1 illustrates

this idea.

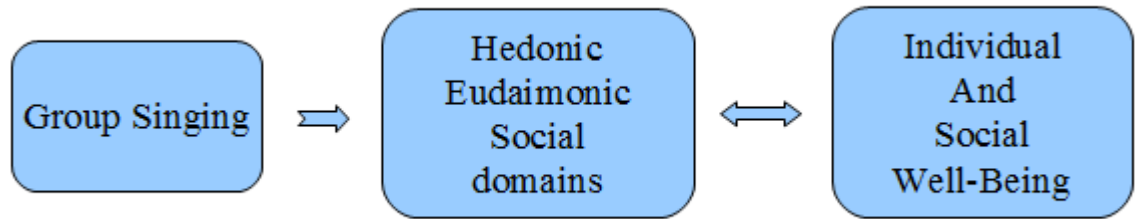


Figure 1.1: Illustration of the relationship between group singing and well-being, mediated by effects of group singing on hedonic, eudaimonic and social domains.

In particular, I suggest that group singing has psychological, bodily, and social effects that interact to create feelings of well-being. Understanding what these effects are, in specific ways, is the main goal of this work. In the next chapter I will outline the main evidence that supports this thesis and specify the working model that framed the empirical work conducted.

## Chapter 2

# Music and Well-Being

In the previous chapter, I highlighted the importance of approaching mental health positively and proactively, not only where individual mental health is concerned but for society as a whole. I noted that well-being is the concept more commonly used to refer to healthy mental states, and outlined the different ways in which it has been approached in the positive psychology literature. Throughout the chapter, I hoped to make clear that theoretical and empirical evidence suggest well-being is better understood from a multifaceted perspective. Both the work on what well-being is (e.g., Keyes, 2002, 2005, 2007) and how it is promoted and sustained (Csikszentmihályi, 1990, 1997), suggest multidimensional approaches are, to our current knowledge, the most advantageous way to promote and sustain individual and social well-being. Despite this, intervention work is still focused on unidimensional characteristics of different interventions. I noted that it is possible that certain activities require the individual to engage at many levels and have, thus, the potential to impact on more than one dimension of well-being in one event. I concluded by proposing that music activities, particularly those that require high levels of multidimensional involvement, such as group singing, operate on levels that have effects on hedonic, eudaimonic and social well-being and, thus, can impact well-being in a holistic way.

In this chapter, I will review the theoretical and empirical arguments that support

this thesis. The main argument that will be analysed throughout this chapter is that music activities, particularly those involving music production, can promote and sustain well-being on its many different levels.

I will start by highlighting two main characteristics of music, namely its universal and multifunctional character, in order to note that music is a flexible phenomenon which all cultures, and consequently, most human beings, are equipped to engage with, perceptually and behaviourally. These, I believe, are essential features of any well-being promoting activities that would appeal to a wide range of individuals and communities.

I will then analyse how the theoretical framework proposed by the flow theory explains the relationship between music activities and well-being. In this section, I will argue that this theory conceives musical activities as flow activities and have, thus, the potential to promote and sustain well-being as a whole. In particular, I will note that although music activities involving perception of music (i.e., listening), can lead to flow, music activities involving music production are structured to require the engagement of both body and mind, thus providing more opportunities for flow in each experience. I will conclude by stating that, under this theoretical framework, it is not only possible for different music activities to promote and sustain well-being, but those that are structured to engage our minds and bodies in interaction with others provide more opportunities to have multidimensional effects in one event.

I will also review the empirical literature on the relationship between music and well-being. I will start by noting that the empirical evidence of connections between music activities and the different domains of well-being is a recent development that stems from three main bodies of research: studies that focus on understanding the effects of music listening on the mind and body; studies that report attempts to utilize music activities (listening, singing or instrument playing) to improve the well-being of clinical populations; and finally, studies that are concerned with understanding the relationship between music

production and well-being. I will proceed to review the literature on effects of music listening on well-being correlates, following by the effects of music production on well-being correlates. I will conclude this section by focusing on the literature referring to the effects of the particular activity of music production that is the focus of the work in this thesis - group singing.

Finally, I will conclude by highlighting the main limitations in this literature and how the work in this thesis proposes a way forward.

## **2.1 The nature of music**

The focus on music in this work reflects my personal interest in understanding the power of this phenomenon in human interactions and, in particular, any potential music activities may have to promote and sustain our well-being both at an individual and societal level.

Before moving on to discuss the relationship between music and well-being at a theoretical and empirical level, I wish to address a couple of aspects surrounding the nature of music, namely its widespread nature and multifunctional character (Brown, Merker, & Wallin, 2000). These, I believe, are directly relevant to understanding any potential this phenomenon might have to promote and sustain human and societal well-being. The first instance indicates that humans in every society share biological features that allow them to perceive and produce music. The second indicates that music is a multimodal phenomenon that can impact on different domains of well-being.

Music can be thought of as a form of art which, like all arts, has the main role to provide us with aesthetic pleasure. This reductionistic view of the arts in general, and music in particular, limits the potential of these activities. It is possible that such a view is also at the basis of the second class role the arts can be found to have in mainstream education systems in western societies.

I do not deny that music is connected to the biology of pleasure. In fact, I agree with

the supposition that pleasure is an important evolutionary tool - nature's way of telling us to behave in ways that increase our adaptive fitness (Huron, 2010). Evidence suggests that music can impact on brain regions connected to the biology of pleasure and reward (Blood & Zatorre, 2001). As Huron (2010) points out, music would have not achieved and sustained such a prominent role in human societies and cultures if it wasn't connected to the biology of pleasure. But the point I wish to make is that music can be much more than a source of pleasure. In this section, I will further elaborate on these arguments.

### 2.1.1 A definition of Music

Firstly, let me clarify what I refer to as music. There is no single agreed-upon and clear definition of music currently available (Brown et al., 2000). Nettl (1983/2005) pointed out that we, in the western cultures, have difficulties conceptualizing and defining music in our own culture and much more so in cultures we are not familiar with. One of the most influential definitions of music was suggested by Blacking (1973) and refers to it as humanly organized sound. This definition can be thought to have limited usefulness for being so broad (Brown et al., 2000) but it points out the fact that music exists within human cultures and individuals and shouldn't be dissociated from the social, cultural and biological contexts it belongs to. It is not the goal of this work to discuss definitions of music, particularly because it seems clear that *"there is no interculturally valid conceptualization or definition of music"* (Nettl, 1983/2005, p. 17). Nevertheless, I wish to clarify that music here refers to the human ability to organize sound, perceptually and behaviourally, into temporally structured patterns as forms of non-linguistic expression or communication<sup>1</sup>.

That said, I believe that, for the purpose of this work, it is more useful to draw attention to the aspects in music's nature that make it a relevant phenomenon to consider

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<sup>1</sup>This definition is based on Blacking's definition (1973) but also Stevens and Byron's (2009)

within the context of human well-being, such as its widespread nature and multifaceted character.

### 2.1.2 Music is everywhere

Ethnographic evidence suggests music has a culturally universal character (Brown et al., 2000; Huron, 2001; Fitch, 2006). While a general definition of music has not been agreed upon and many authors regard attempts at doing so as unnecessary (Nettl, 2000; Fitch, 2006), every culture is thought to be able to identify and isolate musical behaviours from language and other vocalizations (Nettl, 2000). Cross-cultural data indicates musical behaviours are present in all human societies even when some of these societies don't have a unique term that refers to music as western societies do (Blacking, 1973; Nettl, 2000, 2005) .

Such findings suggest that while the content of musical knowledge or action might change across cultures, and even ages, there are common biological features that allow humans in any culture, at any point in history, to understand and engage in musical behaviours (Harwood, 1976; Stevens & Byron, 2009). These common biological features include psychological processes and physical characteristics most human adults share <sup>2</sup>. For instance, the cognitive ability to perceptually organize information under grouping principles such as proximity or similarity, is a basic property of our nervous system and essential to organize acoustic information into music events. Other possible common psychological abilities that are essential to process music, refer to higher-order cognitive processes such as perception of temporal structures based on expectations and the ability to entrain and synchronize (for a review see Stevens & Byron, 2009). Together with these cognitive abilities, we share some physical characteristics that allow us to produce music, such as our bimanual coordination skills and complex vocal organ, with the ability to

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<sup>2</sup>This refers to statistical universals as Nettl (2000) conceptualizes them: aspects that most adult humans share; It does not ignore the fact that some humans have congenital amusia, for instance (Stevens and Byron, 2009)

control our breathing.

Musical behaviours can be thought to originate from the human capacity for vocal utterance and the innate tendency for rhythmic coordination and entrainment (Clayton, 2009). The psychological, neurological and physical characteristics that permit those capacities are common human traits. Just as with language, our common biological features allow us to be musical even if the musical products are different from one culture to another or one musical style to another.

### 2.1.3 Music is multifunctional

“In every known culture, the ordering of sound in ways that please the ear has been used extensively to improve the quality of life”

Csikszentmihályi (1990, p. 108)

Just considering the western societies and our current day and age, music can be found in many different circumstances. We find music as a background to an evening meal when we go to a restaurant, or when we are out shopping. We find music in movies, TV commercials, or even political campaigns. We put music on when we get home from work or listen to it while commuting to and from work. Often we listen to music while we are at work. We use music to mark many of life’s milestones such as our birthdays, weddings and even funerals. We use music to protest and even to make revolutions<sup>3</sup>. Groups of teenagers can be found listening and singing to their favourite music together. As adults we can be found singing to our children or even with our partner. We go to concerts and, judging by the size and popularity of the music industry, invest a great deal of time and money listening to and buying music. These examples are enough to illustrate the pervasiveness of music in human interactions in our current day, age and society.

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<sup>3</sup>Two good historical examples of this are Estonia’s song revolutions throughout the 19th and 20th centuries; but also the UK miner’s strike in the 1980s;



But the multitude of uses we can identify for musical behaviours is not limited to our society or the times we live in. In my country, Portugal, my previous generation could be found singing their way through a hard working day in the fields under the hot Summer sun or the cold Winter rains. Similar behaviours can be found in work gangs today in other places such as the working fields of Africa or Asia. Across all cultures music is and has been an integral part of a wider range of everyday activities from rituals and courtship, to entertainment and the caregiver-infant interaction (Cross, 2009).

The great variety of ways, contexts and cultures, that music can be used in, suggest that musical behaviours involve several domains of the human individual and social functioning. But why do we use music in all these different ways? What is the broader purpose attached to each of those events? To answer this question I will draw information from evolutionary, ethnographic and anthropological discussions of the functions of music.

Music may have first evolved to promote a specific behaviour, such as social bonding or sexual attraction. For instance, Edward Hagen and Gregory Bryant in their work on music and dance as a coalition signalling system argue that music is an evolutionary adaptation which evolved from animal territorial signals, eventually becoming a method of signalling a group's cohesion to other groups for the purposes of making beneficial multi-group alliances (Hagen & Bryant, 2003). On the other hand, Darwin underlined the importance of music for sexual selection in "The Descent of Man" (1871) and proposed that music precedes speech as means of courtship. In these same lines, Levitin (2006) suggests that music may indicate biological and sexual fitness, serving to attract mates. This idea is further developed in recent work by Riggle (2010) who proposed an evolutionary theory of music which suggests that sexual selection is the driving force behind the development of music. Based on the idea that one of the ways evolution motivates behaviour is by making it pleasurable, Riggle (2010) argues that evolution started to create different pleasure sources from music about 4 million years ago - entrainment pleasure, creation pleasure,

listen-as-creation pleasure, learn new rules pleasure, motivate movement and vocalization to reproduce sounds pleasure, and a female enhanced pleasure of evaluation - that form the basis of selecting behaviours that depend on musical capabilities. All these forms of pleasure would ultimately promote sexual selection (Riggle, 2010).

While it is possible that music first evolved to promote a specific behaviour such as social bonding or sexual attraction (Huron, 2010), the reality is that music integrates a wide variety of domains (physical, psychological, social) and is constituted of components that have different evolutionary histories (e.g., vocal learning and bimanual coordination) so it is likely that it serves a variety of functions (Fitch, 2006). There are several suggestions on what these functions might be. For instance, Merriam (1964, p. 219-227) first suggested musical behaviours serve ten main functions:

- emotional expression;
- aesthetic enjoyment;
- entertainment;
- communication;
- symbolic representation;
- physical response;
- enforcing conformity to social norms;
- validation of social institutions and religious rituals;
- contributions to the continuity and stability of culture;
- contribution to the integration of society

Nettl (1983/2005) suggested the last six functions could be combined into one function: symbolic expression of the main values, patterns or themes of a culture. More recently,

Clayton (2009) suggested musical behaviours can be expressed in endless ways, but the functions of those behaviours can be synthesized in a global set: to regulate emotional, cognitive and physiological states; to mediate self and other; as a medium of symbolic representation; and to facilitate coordinated action. All these, Clayton (2009) argues, can be performed simultaneously, with more or less emphasis on one or another, and are all important levels of music's role as a flexible tool for managing relations between self and other.

We can reason that all these functions have relevance for one or more levels of human well-being. The discussions above suggest musical behaviours can provide us with pleasure, but also require complex skills and abilities, physical and psychological, to be performed and even perceived. At the same time, while music can be considered as an isolated object in itself (Merriam, 1964; Clayton, 2009), it is also acted within the social and biological context the individual is embedded in. Furthermore, the different uses of music in different societies suggest we use musical behaviours to improve our quality of life (Csíkszentmihályi, 1990) and manage the relations between the self and other (Clayton, 2009). It seems that musical behaviours can perform these functions at multiple levels simultaneously. It is likely, therefore, that musical behaviours lead to interactions between hedonic, eudaimonic and social levels and these interactions then translate into overall feelings of well-being.

In this section I attempted to demonstrate that music is a widespread phenomenon in our species not only because most humans have the biological capacities to perceive and produce music but also because music serves many useful purposes in our individual and societal functioning. These may directly contribute to our hedonic, eudaimonic and social well-being. When considering activities that may be as multifaceted as the concept of well-being itself, I believe the biological and culturally widespread nature of music

and its multifunctional character, suggest this phenomenon is a possible candidate. The first suggests most humans would find some form of musical behaviour attractive and the second that the way music is structured makes it capable of acting on many levels, often simultaneously, thus providing overall positive experiences in short amounts of time. From the point of view of the psychologist looking to suggest a well-being intervention to a wide variety of individuals and communities, music behaviours, or activities as I will refer to from now on, appear to be flexible enough to function on all the necessary levels.

In the next sections, I will first address the theoretical considerations that explain the potential relationship between musical behaviours or activities and well-being, and then will proceed to review the empirical literature on such relationship.

## 2.2 Music activities under the Flow theory

“Other things being equal, a life filled with complex flow activities is more worth living than one spent consuming passive entertainment”

Csikszentmihályi (1997, p. 116)

In the previous chapter, I noted that the flow theory explains how certain intentional activities have the potential to promote and sustain well-being. In this section, I wish to note that the work on flow theory suggests music activities are flow activities, and thus, under that theory, have the potential to promote and sustain well-being.

I will first remind the reader of the main points put forwarded by that theory and then explore how music activities fit within that framework. In order to do so, I will start with a brief summary of how the flow theory explains the connection between flow experiences and well-being, followed by an outline of the main conditions activities have to comply with to lead to flow and a description of the main characteristics of the experience. Finally, I will explore the arguments in this theory that suggest that music activities have

the potential to lead to flow and, thus, promote and sustain well-being.

### 2.2.1 Revisiting the Flow Theory

According to the flow theory (Csíkszentmihályi, 1990, 1997, 2000), the way some experiences lead to well-being is by promoting a mental state that our nervous systems deeply appreciate, which the author called flow. This, according to Csíkszentmihályi, is more than a feeling of pleasure. Pleasure, the author states, is *“a feeling of contentment that one achieves whenever information in consciousness says that expectations set by biological programs or social conditioning have been met.”* (Csíkszentmihályi, 1990, p.45). Instead, flow is a feeling of enjoyment which involves psychological growth. Enjoyment occurs when *“a person has not only met some prior expectation or satisfied a need or a desire but also gone beyond what he or she has been programmed to do and achieved something unexpected, perhaps something even unimagined before.”* (Csíkszentmihályi, 1990, p.46). An enjoyable experience doesn't necessarily involve feelings of pleasure when it is occurring, but the feeling of having achieved a goal, having gone beyond previous limits and accomplished something new, is rewarding and involves positive emotions. In this way, positive experiences are not limited to pleasurable experiences and both hedonic and eudaimonic well-being can be promoted in the course of one session. Furthermore, because individuals deeply enjoy positive experiences, it makes them want to go through them again and again. This factor makes such activities ideal to sustain well-being over time (Csíkszentmihályi, 1990, 1997, 2000).

However, not all activities lead to flow. As was stated in the previous chapter, in order for flow, or enjoyment, to happen, certain conditions have to be met. First of all, flow activities have to have clear goals, a knowledge of what needs to be done on each moment. These are essential to keep the action from stopping. Another main aspect of activities that lead to flow is that they need to involve immediate feedback on how one

is performing. This allows an immediate knowledge on whether the action performed is correct or not and permits any adjustments to be made to meet the desired goals. Finally, activities that lead to flow require a strict balance between the skills one possesses and the challenge one faces. This also means that if the activity possesses a high level of challenge, it is possible for the individual to acquire the necessary skills to face it. At the same time, an activity that can increase the level of challenge motivates the acquisition of new skills and allows for continuous possibilities of flow (Csíkszentmihályi, 1990, 1997, 2000).

According to the flow theory, activities that are structured in ways that allow for those conditions to be met, *promote* optimal experiences. What is important to note regarding flow activities is that they require involvement and dedication. Flow activities *are* complex activities that require an initial investment of effort in the form of dedicated attention before any feelings of flow can emerge (Csíkszentmihályi, 1997, p.68). One must cultivate the necessary skills to get the best out of each experience. Some activities will be structured in such ways that can *promote* flow experiences but our skills must match the challenge in order for the experience to *actually* take place (Csíkszentmihályi, 1990). But the more actively involved we are in an activity, the more enjoyment we will draw from it (Csíkszentmihályi, 1997).

Csíkszentmihályi (1990, 2000) has also described the main characteristics of these experiences, where flow or enjoyment is felt. Flow experiences have to involve, first and foremost, an intense focus and concentration on the task at hands in such a way that no thoughts or feelings related to other aspects of our lives cross our minds in that moment. Activities that require us to be aware of our actions are more likely to focus our attention in this way. Secondly, flow experiences involve a sense of control. This is more a feeling of having everything under control than thinking about being in control or fearing loosing it. Control is just present, no question about it. Another characteristic of flow experiences is that they do not involve thinking about oneself. By demanding we focus on what needs

to be done, our attentional resources are taken away from any considerations about the shortcomings of our self. Csíkszentmihályi (1990, p.64) argues that being able to forget about the concept we have of who we are allows us to focus our attention on acquiring new information, living new experiences, that may end up expanding the concept of our selves. A loss of self-consciousness can, thus, lead to feelings of transcendence, of our limits having been pushed forward. While this concept can be dismissed as a metaphor, Csíkszentmihályi (1990) argues that there is nothing mysterious or mystical about self-transcendence. The reason for this, he says, is the fact that, in reality, when someone focus their attention in an interaction with something outside their selves, they become *“part of system of action greater than what the individual self had been before”* (Csíkszentmihályi, 1990, p.65). Finally, the optimal experience involves a distortion of the sense of time, particularly a feeling that time passes much faster than usual (Csíkszentmihályi, 1990, 2000).

Csíkszentmihályi (1990) argued we could bring about such flow experiences through several bodily processes if we worked to develop the potential stored within our human frame body and mind. In this context, Csíkszentmihályi (1990, p.94-116) reviewed the potential for flow of physical activities such as sports and dance, but also sex, Eastern disciplines for controlling the mind through the training of the body (e.g., Yoga), and, more importantly for the current work, music.

Music activities, whether in the form of music perception or production, provide numerous opportunities for flow given the way they are structured (Csíkszentmihályi, 2000). In most instances, music activities have clear goals (e.g., sing a song, listen to the new album by our favourite artist, attend a concert, etc.), provide immediate feedback (as an auditory stimuli, music can be immediately processed) and represent challenges for which the skills required are either in place or can be developed (unlike what many might think, learning to sing, listen carefully to the structure of a composition or play an instrument

is not beyond most human beings).

### **2.2.2 Music activities as Flow activities**

Focusing on music listening first, the sound of music is inherently challenging to our brain in every note. Because, most of the time, our brains are adequately equipped to face the perceptual challenge presented by music, listening to music at a sensory level becomes a pleasant experience. Csíkszentmihályi (1990, p.110-111) argued that the challenge of music listening can be increased if we go beyond this sensory experience and focus on the narrative and structural elements of music. First, we can derive enjoyment from music listening if we focus attention on the patterns of sound and try to derive images and feelings associated with them. If a piece of music has lyrics, we can also focus on those and what feelings they convey to derive enjoyment at this level of listening. To further increase listening challenges, Csíkszentmihályi (1990, p.111) suggests we focus on the structural elements of music. In this level, the challenge is higher and more effort is required to develop the listening skills necessary to attend to the underlying structure of music. These might include the ability to critically compare and analyse different versions of the same music, played by the same musician in different performances or performed by different musicians.

It is, thus, possible to actively engage in music listening at these different perceptual and cognitive processing levels and derive enjoyment from such an activity. However, Csíkszentmihályi (1990, p.111) argues that activities that involve the production of music provide more opportunities for flow. Such activities require more attention, more energy and the development of both cognitive and physical skills to face the challenge ordering sound presents. Just as music listening engages a multitude of brain regions while listening to music (Menon & Levitin, 2005; Levitin, 2006), it is also likely it will engage many more when a person is producing the music herself thus requiring more energy and concentration,



increasing the chances for flow.

For most of us, music production is a bigger challenge than music listening but all the elements required for flow are either present or can be developed: music making has clear goals (to sing or play a piece of music), produces immediate feedback, and any skills required to produce music can be developed to a level that is compatible with the challenge of ordering sound in a beautiful way. When singing or instrumental skills are developed to a level that meets the challenge of producing a piece of music from start to finish, music production leads to flow.

Under the flow theory, greater enjoyment comes to those who try to push their own boundaries (Csíkszentmihályi, 1990). Music production requires us to push the limits of both our minds and bodies. This represents a greater challenge than music listening but it is this single fact that makes music production have more potential for flow. In fact, music production can be thought of as an activity that brings together both the challenge of physical activities and music listening. Under this theory, we can, thus, assume that music production sums the opportunities to experience flow created by both physical and mental effort.

Finally, as Csíkszentmihályi (1990) also points out, the joy of overcoming the limits of the body and the mind is opened to all. Music production need not be considered enjoyable only to those who undertake it in a professional manner. In fact, flow is only brought into place when the activity is intrinsically rewarding (even if we initially engage in it for external reasons) and sometimes professional constraints force us to focus on how we perform instead on what we experience, which limit any potential the activity might have for flow.

Throughout this section, I attempted to demonstrate that the flow theory provides a theoretical explanation on how music activities might lead to well-being. According

to the flow theory, musical activities are flow activities and, thus, have the potential to improve the overall quality of life. Although music activities that involve perception of music can lead to flow, Csíkszentmihályi (1990) argues that activities of music production are structured in ways that require more mental and bodily involvement, thus, have, under this theory, more potential to promote eudaimonic and hedonic well-being. Since music activities are also social in nature, with some being expressions of other human beings and others requiring joint participation and cooperation, they allow for flow to be experienced under social contexts, thus having potential to promote social well-being as well.

The main goal of this section was to demonstrate that it is theoretically possible for music activities, particularly those that involve production of music, to have effects that impact on well-being as a whole. At an empirical level this should translate into measurable effects on bodily, psychological and social domains of the human functioning that are directly related to well-being. In the next section, I will review the empirical literature on the relationship between music activities and well-being correlates, in order to determine whether our current empirical knowledge of this relationship is consistent with this theoretical perspective.

### **2.3 Empirical evidence of the relationship between music activities and well-being**

The empirical literature on the relationship between music activities and well-being is not a defined field in itself. It is constituted of studies that focus on understanding the effects of music listening on the mind and body, studies that are concerned with understanding the relationship between music production and well-being and health correlates, and studies that report attempts to utilize music activities (listening, singing or instrument playing) to improve the quality of life of clinical populations. This diversity can be encountered in the

multidisciplinary work gathered in the book “Music, Health and Wellbeing” (MacDonald, Kreutz, & Mitchell, 2012),

Much like the literature on well-being, and understandably so, this is a relatively new body of research where there is more systematic research on the connection between music listening and well-being correlates, particularly those related to hedonic well-being, while the evidence on effects of music production clearly reflects a field in its early stages (i.e., more descriptive, exploratory research and very little experimental studies). Nevertheless, the empirical evidence that will be reviewed in this section will help understand how both types of music activities relate to well-being, and further suggest that activities involving music production are better structured to impact on well-being as a whole.

I will first review the literature that provides evidence of the connection between music listening and several well-being correlates. While the aim of the work presented in this thesis is to understand the potential of an activity of music production to promote and sustain well-being, it is essential to understand that music production also involves active listening and the ability to perceptually organize sound. It is, therefore, essential to understand what levels of our functioning are engaged in the process of perceiving music and what effects it has on our mind and body that can contribute to well-being.

I will then address the existing evidence on connections between music production activities and well-being. Whenever relevant, I will include evidence provided by attempts to use music activities as well-being improvement instruments in therapeutic settings. This literature is essential to understand the potential of music activities to promote well-being in real-life situations.

Throughout this section, I hope to make clear that the existing empirical literature, particularly on the connection between music production activities and well-being, is very limited. Nevertheless, the existing evidence is consistent with the theoretical framework described above and suggests it is worth investigating the thesis proposed in this work,

namely that group singing is structured to impact on hedonic, eudaimonic and social well-being, and can thus promote it as a whole.

### 2.3.1 Effects of music listening on well-being correlates

“One of the most ancient and perhaps most popular functions of music is to focus the listener’s attention on patterns appropriate to a desired mood”

Csikszentmihályi (1990, p. 108)

This sentence by Csikszentmihályi highlights the power of music to capture and focus our attention, convey emotion and manage our mood. It also suggests that music stimuli have effects at cognitive, emotional and physiological levels that can be related to well-being, particularly hedonic well-being. The available empirical evidence supports this notion.

At a neurological level, there is evidence that music listening engages a multitude of processes and brain regions responsible for sensory, cognitive, motor and emotional processing. The perception of musical sound starts in the auditory cortex, which analyses the sound, and is then followed by frontal regions responsible for processing music at a cognitive level, such as structure and expectations. The mesolimbic system, involved in arousal and pleasure, is then activated and produces dopamine, further activating the *nucleus accumbens*. The *cerebellum* and *basal ganglia* are active throughout, processing rhythm and meter, connecting to the frontal regions and the mesolimbic system (Menon & Levitin, 2005; Hodges, 2009). Levitin (2006) explains that this cascade of activations helps understand why we may perceive music has having such a great impact and cant seem to be able to ignore it. The rewarding and reinforcing aspects of listening to music are mediated by those increased dopamine levels in the *nucleus accumbens*, and by the *cerebellums* contribution to regulating emotion through its connections to the frontal lobe and the limbic system (Levitin, 2006).

This evidence of the neurological effects of music listening suggests organized auditory stimuli can have effects outside the central nervous system. Basically, if the stimuli is strong enough to initiate the above-mentioned cascade of neural events, it will be more likely to affect the peripheral nervous system as well. For instance, the limbic system is connected to both the autonomic nervous system and the endocrine system. Evidence that music listening activates the limbic system (Blood, Zatorre, Mermudez, & Parsons, 1999; Blood & Zatorre, 2001; Brown, Martinez, & Parsons, 2004) suggests that it can influence endocrine and autonomic activity as well. This would mean that listening to music has both neural and physiological effects.

The available psychophysiological accounts are consistent with this notion, showing music stimuli to have effects on the autonomic nervous system (Sudheesh & Joseph, 2000; Khalfa, Peretz, Blondin, & Manon, 2002; Iwanaga, Kobayashi, & Kawasaki, 2005; Ohisa, Yoshida, Yanbe, & Kaku, 2005), endocrine (Gerra et al., 1998; Fukui & Yamashita, 2003; Kreutz, Murcia, & Bongard, 2012) and immune system (Bartlett, Kaufman, & Smeltekop, 1993). These effects are particularly evident when the emotional content of the music stimuli is salient and elicits emotional responses. For instance, Blood and Zatorre (2001) examined brain changes to music that was subjectively perceived as intensely pleasant, and found that blood flow increased and decreased in several regions thought to be connected to emotion and arousal. These changes were accompanied by autonomic changes in heart rate, muscle cells and respiration. Khalfa et al. (2002) also found that music which conveyed more arousing emotions, such as sadness and happiness, was able to elicit autonomic nervous system responses as measured by skin conductance. Music listening has also been found to affect the endocrine system at both its central and peripheral levels. Gerra et al. (1998) found that fast-passed music, such as techno music, but not slow-passed classical music, activated neurohormonal responses related to psychophysiological responses to stress, with increases in neurohormones and neurotransmitters such as adrenocortico-

tropic hormone, norepinephrine, growth hormone, and beta-endorphins. These findings demonstrate that music is able to elicit emotional responses, at a neuro-hormonal level, as strong as the fight or flight response. Further to these findings, Fukui and Yamashita (2003) reported that listening to music participants were fond of, decreased testosterone in male participants, increased testosterone in female participants, and decreased cortisol levels in both male and female participants. The findings reported in this study relating to cortisol are consistent with Bartlett et al. (1993) who also found music listening to decrease levels of this hormone, which is considered a biomarker of stress. In this study, Bartlett et al. (1993) also reported music listening increased levels of interleukin-1, responsible for immune and inflammatory responses. Fukui and Toyoshima (2008) suggested that it is through effects on the endocrine system, particularly on secretion of steroid hormones, that music listening promotes growth of new nerve cells, cell regeneration and repair, and, ultimately, neuroplasticity, which may prevent or delay dementia (Fukui & Toyoshima, 2008).

Taken together, these findings suggest music listening can evoke and modulate emotional responses at several physiological levels. Kreutz et al. (2012) point out in their recent review of this literature, that the evidence suggests psychoendocrine effects are of particular importance to understand the links between music stimulation, activations in the brain during music processing and emotional responses both at physiological and psychological levels

Consistent with this view, psychological research has also shown music listening to have effects on emotions at psychological levels (e.g., Kreutz, Ott, Teichmann, Osawa, & Vaitl, 2008; Lundqvist, Carlsson, Hilmersson, & Juslin, 2009; Graham, Robinson, & Mulhall, 2009). For example, Kreutz et al. (2008) presented participants with several musical excerpts thought to represent different emotional categories, such as fear and happiness, and found that participants reported feeling the intended emotions, particularly when

the pieces were thought to elicit happiness and peace. Although this type of subjective reports may raise the question of whether participants really felt the emotion or simply reported the emotion they perceived was being expressed by the music, Lundqvist et al. (2009) found that emotion self-reports were consistent with physiological and expressive measures. In this study, participants listened to music with either happy or sad emotional expression, and several expressive and autonomic measures were collected, such as facial muscle activity and skin conductance, together with subjective reports. Happy music, for instance, was found to elicit more facial muscle activity, greater skin conductance, more reported happiness and less sadness than sad music. These findings suggest that music does induce emotion in the listener at both psychological and physiological levels.

The neurological evidence mentioned at the start of this section suggests music listening can have effects not only at psychophysiological levels, but physical as well. Music listening often leads to motor responses (Hodges, 2009) and this may be due to the fact that music stimuli possess temporal structures that are related to movement, for instance, rhythm and meter. It is, then, not surprising that these would be processed by the *cerebellum* and *basal ganglia*, which are part of the motor system. The main role of these neuronal structures is to coordinate sensory input and cortical output related to movement on a moment-to-moment basis, through their connections with the spine, inner ear and motor cortex. Auditory information might be first received directly through the connections between the cerebellum and inner ear (Levitin, 2006, p.184) which may be responsible for attracting and focusing our attention to the auditory stimuli. Motor and auditory areas of the cortex are also interconnected, which allows any auditory information containing movement-related cues (such as rhythm) to contribute for the coordination of movement (Baumann et al., 2007). Hodges (2009) noted that when we listen to music our bodies respond with gestures such as head nodding or foot tapping, that are mostly automatic and involuntary (for an empirical example see Tecchio, Salustri, Thaut, Pasqualetti, &

Rossini, 2000). It is likely this results from that audiomotor connection, which allows auditory rhythms to rapidly elicit and entrain motor responses (Thaut, 2003; Hodges, 2009). Entrainment is a biological process that underlies temporal perception. It occurs when two rhythmic processes (such as neural oscillators and auditory temporal information) interact with each other and end up locking into a shared temporal structure, that is, synchronize (Jones, 2009; Stevens & Byron, 2009). Motor synchronization to external temporal cues provided by rhythm has been shown to occur even in people with neurological disease and disability (LaGasse & Thaut, 2012). The immediate effect of rhythm in the motor system, even in individuals where this system is impaired, speaks to the power of music to engage the human brain. It also helps understand the potential of using music in a clinical setting for the purpose of rehabilitation. Clinical music therapy studies have shown rhythmic entrainment can be used to rehabilitate sensorimotor, cognitive and communication functions. For instance, these functions can be recovered in individuals who have lost them due to a stroke, traumatic brain injury or Parkinson's disease (for a review of such findings see LaGasse and Thaut (2012)). Such evidence suggests that music can have measurable effects in neurological motor function through its ability to entrain with internal rhythms.

I will return to the entrainment process at a later stage, as it is quite important to understand synchronization and feelings of bonding that arise from coordinated action, but for now it suffices to say that music stimuli are structured in ways that engage both auditory and motor systems, thus impacting on neuronal and physical domains, both in healthy individuals and those with loss of motor functions.

The evidence reviewed so far indicates that music listening has several neurological effects that also elicit physiological, psychological, and physical responses. Some of these responses might be automatic and uncontrollable, for instance, experiencing chills, but others might be under our control, such as being able not to burst into singing or dancing



when we hear our favourite tune in the supermarket, (sadly) preventing our daily lives from transforming into one big musical.

Biology appears to have a significant role in the way we respond to music. The structure of the auditory stimuli is, in itself, quite effective in eliciting numerous responses in our minds and bodies. However, the personal, social and cultural background in which the experience of music listening occurs in, also appears to have an important impact (Hodges, 2009). For instance, at a psychophysiological level, Kreutz et al. (2008) not only found that pre-selected pieces of music did induce corresponding emotions in participants, but also that preference for classical music (the main genre of the excerpts presented in this study) enhanced both intensity and specificity of induced emotions. The social context in which we listen to music also appears to determine the effects that activity may have. For instance, there is evidence that listening to music in a group may result in an individual experiencing emotional effects less strongly than when listening alone (Sutherland, Grewe, Egermann, Nagel, & Altenmüller, 2009). And while for many cultures around the world, music listening is still inseparable from physical responses such as dancing and singing, in western societies there is a tendency to control such responses (Hodges, 2009). In western cultures, music listening is mostly a hedonic experience, where, for instance, it is culturally unacceptable to sing along to the performers on stage during your favourite classical music concert.

I do not wish to suggest that the impact of music listening is limited to hedonic well-being. The empirical evidence, consistent with the theoretical approach of the flow theory, does indicate that music listening has strong effects on correlates of hedonic well-being, such as positive affect. But the evidence also suggests that music listening impacts on many domains that are relevant for social and eudaimonic well-being, such as self-actualization and social identification. For instance, people put a large amount of time and effort in choosing what to listen, how, where and for what purpose (Sloboda, Lamont,

& Greasley, 2009). Judging by internet evidence <sup>4</sup>, such time and effort also translates into hours spent on internet forums or blog posts, discussing the musical influences of Lady Gaga's work, how Michael Bubbl puts more emotion into songs than Frank Sinatra <sup>5</sup>, or how Hans Zimmer's compositions for the film "Inception" has traces of the work he did for the soundtrack of the film "Batman: The Dark Knight Begins" (one of my personal favourites). Such discussions can, in most instances, only result from dedicated listening, or listening at the levels that are mentioned in the flow theory (i.e., at a structural level), which require more effort, are a bigger challenge, and can lead to personal growth through the acquisition of knowledge.

There are also social effects in music listening. One of the reasons people listen to music is for self identity purposes. Music can be a tool to discover, manipulate and project individual identity, which is inherently social (Clayton, 2009, p.42; Sloboda et al., 2009). Rentfrow and Gosling (2003), for example, found that people choose music according to how well it reflects the self and how well it transmits a desired message to others. North, Hargreaves, and O'Neill (2000), found that adolescents use music to satisfy emotional needs and present an image to others. Music is, thus, an important mediator between the self and other (Clayton, 2009, p. 41) and listening to music is one of the ways people in western societies do so nowadays.

It seems, therefore, possible that music listening activities can affect well-being as a whole. However, in western societies, the ethnographic context of the work presented here, music listening is more often passively engaged with, and rarely linked to performance skill or participation (Sloboda et al., 2009). Although this lack of engagement with performance or participation does not necessarily exclude all forms of active engagement, music listening does not necessarily require or elicit active engagement. We listen to music on the radio

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<sup>4</sup>For instance, the music section on Reddit, the popular social news website where users submit content, has 1,139,306 subscribers.

<sup>5</sup>A quick google search shows there are about 1,130,000 places online where the Bubbl vs Sinatra topic is approached.

as we drive to work, are out shopping, or have dinner with friends but often have no active role in choosing that music or even pay much attention to it. The use of music to manipulate consumer behaviour, for instance, is a good example of how music stimuli can be used to impact on someone's behaviour without that person having an active role in the experience or even be aware it is happening. Milliman (1982), investigated whether slow or fast music had any effect in supermarket shopping experience from the business point of view. Slow music led to customers shopping 15% more slowly than when fast music was played. The slow music condition also led customers to spend 33% more money. In another study, Milliman (1986) found that music's tempo also affected the speed and spending of restaurant customers. These examples highlight how, consistent with the flow theory perspective, music listening can be an activity solely engaged at sensory levels. Music production, on the other hand, is structured in such a way that requires physical and psychological engagement, making it more likely to elicit active engagement. Thus, it provides more opportunities for well-being to be affected as a whole in one single experience. In the next section, I will review the current knowledge of the effects of music production activities on domains that are relevant in the context of well-being.

### **2.3.2 Effects of Music Production on Well-being correlates**

Empirical evidence of the relationship between activities of music production and well-being is currently sparse. Research on what effects music production has and the mechanisms underlying those effects is still very limited. For instance, while it is possible that different activities of music production, and different circumstances in which the experience occurs, may lead to different effects, the current literature does not yet provide a clear picture on what specific effects different activities and circumstances may have. This literature is also characterized by a lack of a common theoretical framework that would guide systematic research and hypotheses testing. Nevertheless, a growing body of evid-

ence is steadily demonstrating that music production has potential to benefit well-being in its many domains. This body of evidence is composed of research discussed previously that shows music can affect the emotion and reward systems in the brain (Levitin, 2006), and studies that show music-making to be an intense, multisensory and motor experience ( Schlaug, 2009), capable of inducing short and long term changes in functional networks (LaGasse & Thaut, 2012) and structural components of the brain (Altenmuller & Schlaug, 2012).

For instance, several neuroimaging studies have reported significant structural and functional differences between the brains of musicians and non-musicians (e.g., Gaser & Schlaug, 2003; or, for a review, see Schlaug, 2009) that provide an indication of the impact making music can have. Gaser and Schlaug (2003) compared professional instrumental musicians (keyboard players) with amateur musicians and non-musicians and found grey matter volume differences in motor, auditory, and visual-spatial brain regions. Musicians were found to have more grey matter than non-musicians in those areas. The authors suggested the greater volume of grey matter in musicians was related to skill acquisition and repetitive rehearsal of those skills involved in playing an instrument, which led to structural changes in response to such motor training. Differences were also found between professional and amateur musicians, particularly in visual-spatial regions (which integrate visual information with other sensory information, e.g., auditory), which were related to the greater amount of time dedicated by professional musicians to playing (Gaser & Schlaug, 2003). These findings are also consistent with a previous study by Pantev, Roberts, Schulz, Engelien, and Ross (2001) who found brain structural differences amongst musicians. In this study, wind and string players were found to have more pronounced cortical responses to sounds of their respective instruments (i.e., trumpet and string tones). The authors suggested this was due to structural adaptations dependent on which instrument the participants played and listened to constantly (Pantev et al., 2001). Evidence from

therapeutic settings further stresses the potential of music-making to promote functional and structural brain changes (Altenmuller & Schlaug, 2012). For instance, neurological changes induced by music-making have been reported in studies using Music Intonation Therapy (MIT) to treat speech-motor abnormalities associated with neurological conditions such as non-fluent aphasia, a condition where stroke patients have impaired articulation and speech production. Schlaug, Marchina, and Norton (2008) reported a study where a patient with non-fluent aphasia underwent 40 daily sessions of MIT, and another patient with a similar impairment and stroke size and location, underwent a control intervention of non-intoned speech therapy (speech repetition). The authors noted that both interventions significantly improved all outcome measures for both patients but such improvement was greater for the patient who underwent MIT. These effects of MIT on function can also be detected by a change in relevant brain structures. Schlaug, Marchina, and Norton (2009) conducted a neuroimaging study with six patients with large left-hemisphere lesions who underwent intensive MIT. Pre and post treatment comparisons revealed a significant increase in the number and volume of fibres in the arcuate fasciculus, a tract that connects right-hemisphere regions homologous to left-hemisphere language regions (superior temporal lobe, premotor regions/posterior inferior frontal gyrus, and primary motor cortex). This evidence explains how MIT promotes recovery of language functions through facilitating structural changes.

Such evidence supports the notion that music-making activities involve a multitude of brain areas, and, in the long-term, lead to structural changes at the neurological level. It also suggests that different activities of music production may have different neurological effects according to the domains that they focus on the most.

While different music-making activities, involving different motor actions, may lead to different long-term neurological or even physical (e.g., neuromuscular) changes, it is not yet clear whether the psychophysiological short-term effects do differ, or what those unique

effects would be. The available evidence seems to indicate that music-making activities do have the potential to impact on important psychophysiological systems, but it seems more likely any short-term differences depend on the emotional characteristics of the experience and the circumstances in which the experience takes place. This idea resonates in a study by Harmat and Theorell (2010). These authors focused on comparing heart rate changes during singing with heart rate changes during flute playing of two pieces of music, one rated as easy and the other as strenuous, during a rehearsal and a concert. The mean heart rate was found to be significantly higher during the concert than rehearsal, and overall higher when the strenuous piece was being played/sung in comparison to the easy piece (though this difference was not significant). No significant differences were found between the two types of activities. These two situations might involve different emotional characteristics as a public performance, such as a concert, is a more exposing situation than a rehearsal. These findings indicate that both activities might involve similar physical and psychological systems - they both require acute control of the respiratory system, for instance, and are both similarly affected by the emotional characteristics attached to the social context in which they occur.

The same activity of music-making might also have different physiological effects depending on the emotional content of the piece of music being performed. For instance, Nakahara, Furuya, Obata, Masuko, and Kinoshita (2009), compared effects of different music-evoked emotions on cardiac autonomic nerve activity during piano playing and listening. Expressive pieces of music had higher levels of valence (more positive/negative) and arousal than non-expressive pieces, and led to significantly higher heart rate during performance. In this study, playing the piano was also associated with significantly higher heart rate changes than the listening condition, suggesting that the production of music can lead to greater effects of emotions on the autonomic nervous system (Nakahara et al., 2009).

Although it is not clear whether different activities of music-making lead to different short-term effects, the current literature does seem to suggest that *both* instrumental and vocal activities of music-making can benefit well-being. For instance, Wachi et al. (2007) found instrumental music-making to be effective in eliciting immune responses related to stress reduction (it is important to note that stress is seen as multifaceted condition opposite to well-being). Using a recreational music-making (RMM) protocol involving drumming, these authors designed an experimental (repeated measures and counterbalanced) study where male participants recruited from the corporate world, took part in one session of RMM and one session of the control activity (reading). After RMM, natural killer cell activity, a biomarker of immunochemical changes, tended to increase among participants who had low levels before the session, and decrease in participants who had high levels to start with. Both deviations from normal levels can indicate differing levels and types of stress. Furthermore, the levels of a stress-induced cytokine also decreased significantly in the RMM group, and this was significantly different from control. The authors interpreted these results to indicate that RMM has effects at the immune system level, particularly on immune functions related to stress. These findings were replicated by Koyama et al. (2009), in a study that compared older adults with younger adults. Following the same instrumental music-making protocol, these authors also found recreational music-making to have effects on several immune responses, particularly in the group of older adults. These immunological changes were opposite to those associated with ageing and chronic stress. Bittman et al. (2005), also found this protocol of instrumental music-making to improve mood, through increases in vigor/activity and decreases in fatigue/inertia. More importantly, this experimental study found RMM to be an experience where stress-induced genomic expression is reduced or reversed.

Activities combining instrumental and vocal music-making have also been found to be effective in providing some quality of life in disorders, such as substance use disorder

(Baker, Gleadhill, & Dingle, 2007) and autism spectrum disorders (for reviews, see Accordino, Comer, & Heller, 2007).

Music production activities involving vocal music-making, i.e., singing, have also been found to have beneficial effects in clinical conditions such as asthma (Wade, 2002) and chronic obstructive pulmonary disease (COPD) (Bonhila, Onofre, Vieira, Prado, & Martinez, 2009). There are also indications that singing can be effective in eliciting immune and endocrine responses, particularly related to stress reduction (e.g., Beck, Cesari, Yousefi, & Enamoto, 2000), improve mood (Kuhn, 2002), increase positive affect and decrease negative affect (e.g., Kreutz, Bongard, Rohrmann, Hodapp, & Grebe, 2004). A growing body of research is also focusing on the positive effects singing might have on aspects that relate to personal growth and social well-being (e.g., Bailey & Davidson, 2002, 2005; Silber, 2005; Tonneijck, Kinbanian, & Josephsson, 2008; Clift & Hancox, 2010).

The evidence mentioned above seems to indicate that, in the short term, different types of music-making activities can have similar effects on well-being correlates, such as positive affect and immune and endocrine markers of stress reduction. Because this field of research is fairly new, dating back little over ten years, it is possible differences are still to emerge. A clearer picture should emerge as more systematic research is accumulated on different types of music-making activities. The work presented and discussed in this thesis is an attempt to contribute to this effort of systematically researching the effects of one of these activities of music production - group singing - on well-being. In the next section, I will review the literature that constitutes our current empirical knowledge on how this particular activity of music production may relate to well-being.

## 2.4 Group Singing and Well-being

“He who sings scares away his woes” - Don Quixote



Before moving on to review the literature on the relationship between group singing and well-being, allow me to define what I will refer to as ‘group singing’. Arguably, two or more humans singing together in any given situation can be considered group singing. Characterizing the different types of group singing and their predominance in society can be an interesting and worthwhile endeavour but it is not the focus of this work. In this work, group singing will refer to a structured and organized social situation where several people come together to sing under the guidance of a conductor or facilitator. Under this definition, community singing groups, choirs and other similarly organized vocal ensembles will be considered as “group singing activities” or “group singing”. When and where necessary, distinctions will be highlighted. Otherwise, the phenomenon studied and defined above will be referred to as “group singing”.

The current body of research investigating connections between group singing and well-being reflects a field in its early stages of development. As with many other group activities, singing in a group is complex human activity involving social, psychological, physical and physiological components of the human nature. It is then not surprising that reviews of the literature investigating the effects of singing on health and well-being (e.g., Clift, Hancox, Staricoff, & Whitmore, 2008; Gick, 2011) suggest that the evidence stems from a variety of disciplines, using a variety of methodologies and with different degrees of scientific strength. There is a predominance of exploratory studies and descriptive data, and a serious lack of experimental evidence. There is also a female bias in the current evidence, where most studies are with groups where females outnumber male participants (Clift et al., 2008). As mentioned in the previous section, the current limitations in the literature could be due to an absence of a theoretical framework that could originate hypotheses. On the other hand, for any phenomenon being studied, it is important to start with careful and systematic descriptive research so any subsequent theoretical and

experimental work has strong basis (Field & Hole, 2003; Rozin, 2009). With a majority of studies dated 2000 onwards, there may not yet have been time to develop working models and hypotheses testing research. In any case, I suggest the current evidence be considered keeping these aspects in mind.

The available literature investigating effects of group singing on variables connected to well-being and health can be found to reflect the multifaceted nature of both the activity of group singing and the concept of well-being. This literature can be found to address a combination of psychological, physiological and social variables. Much of this research is observational or correlational with only a small number of experimental studies. Research is also a mix of comparisons between group singing and listening, group singing under different circumstances (rehearsals and performances), group singing and solo singing, and group singing and other physical activities. Choral singing is the most common form of group singing investigated but alternative ways to this traditional western format of group singing can also be found in the literature. I will address this literature focusing on the evidence of effects that can be related to each domain of well-being concerned in this thesis, that is, hedonic, eudaimonic and social well-being.

#### **2.4.1 Effects on hedonic well-being**

##### **Psychological Effects**

Group singing involves emotional and cognitive functions and psychological effects of group singing could be considered at both these levels. However, the current literature on psychological effects of group singing has focused on emotional effects of singing, with mood as the variable most consistently investigated and of particular relevance to hedonic well-being. The existing studies indicate that group singing benefits mood but raise questions on whether these benefits are greater than other activities, musical or not.

For instance, in a seminal study, Clift and Hancox (2001) found mood improvement to

be reported as one of the top benefits of group singing. On two exploratory surveys, these authors investigated the perceived benefits of group singing on well-being and health. On the first survey, choral singers from a University choral society were first asked to answer “yes” or “no” to whether they had felt any benefits from singing in the choir on four different areas – physically, emotionally, socially and spiritually. They were then asked to explain further any “yes” answer. In this initial survey, singers were also asked to state any ways in which they felt participating in the choir was good for their health. The majority of the singers who answered “yes” to emotional benefits, reported that these were related to benefits on mood and happiness - *“Makes me feel really positive/feel good/feel happier/raises my mood”*. Of those who answered the question on the benefits to their health, the second most common answer (30% of the respondents) was also related to psychological improvements on mood, positive feelings and happiness. On the second survey, choir singers were asked to rate their agreement with statements derived from the common themes that emerged in the first survey. Once again, statements referring to positive mood were amongst the most agreed with - 93% of the respondents agreed that singing in the choir makes their mood more positive (Clift & Hancox, 2001). These exploratory findings regarding mood were replicated in a large sample, cross-national survey with English choirs (Clift et al., 2007). In this study, 633 choral singers agreed that choral singing improved their mood

However, in an experimental study, Unwin, Kenny, and Davis (2002), did not find significant differences in mood improvement between group singing and music listening. In this study, participants were randomly allocated to either a singing or a listening group. The experimental group participated in a 30 minute group singing session, while the control group sat listening to the singing group. Mood was measured with the profile of mood states questionnaire (POMS) which was administered immediately before and after the session and one week later. The researchers found singing to have greater positive effects

on mood than listening but the differences between groups were not statistically significant. These findings suggest that singing does alter mood in a positive way, but they are also in line with previous research on effects of music listening on mood (McKinney, Antoni, Kumar, Tims, & McCabe, 1997). Kenny and Faunce (2004) replicated the findings on short-term effects of group singing on mood. Participants in this study were chronic pain patients and effects on mood were also measured with the POMS before and after 30-minute sessions. The control group listened to music while exercising. Improvements on mood were found on both the singing group and the listening group.

It is important to note that the exploratory surveys by Clift and Hancox (2001) and Clift et al. (2007), are referring to an activity the respondents have chosen to engage with, and do not ask respondents to compare their feelings towards group singing with another music activity. On the other hand, the experimental studies described in the previous paragraph, are referring to short-term effects of group singing and compare them with an activity that, as we saw in the previous section, can be very enjoyable. Nevertheless, Unwin et al. (2002) point out that it is possible that singing has greater benefits on mood than listening but a longer singing session could be needed to demonstrate that.

Consistent with this view, Kreutz et al. (2004), found positive affect to increase significantly after 60 minutes of choral singing but not after 60 minutes of listening to choral music. In this study, members of a choir were asked to answer the positive and negative affect schedule (PANAS, an instrument that measures those two valences of mood descriptors, i.e., whether they refer to positive or negative emotional states) before and after two sessions, one week apart. Both the singing and listening sessions lasted for 60 minutes. While group singing led to an increase in positive affect and decrease in negative affect, the listening session only led to an increase in negative affect. These findings support the idea put forward by Unwin et al. (2002) above, that a longer singing session could be needed to demonstrate enhanced benefits of singing over listening. It is important to

note, however, that the listening circumstances were different in both studies and these might also explain the differing findings. Participants in Unwin et al. (2002) were randomly allocated to singing and listening groups for the single purpose of the experiment. They were also listening to live music. On the other hand, Kreutz et al. (2004) asked members of an existing choir to take part in those two conditions during two rehearsals. While on the singing session they did what they expected to do (sing), on the listening session they sat and listened to recorded choral music. As the authors pointed out, while this may be an enjoyable experience under different circumstances, it may not be something a choral singer would really like to do during a rehearsal, and particularly for 60 minutes in the presence of others (Kreutz et al., 2004). As noted above, there is evidence that listening to music with others, under such artificial conditions, may reduce the impact of any emotional content the music may have. Sutherland et al. (2009) investigated the influences of listening to music in a group on listeners' emotions and expected individuals to experience stronger emotions while listening to music with others than while listening to the same music on their own. However, they found individuals did not experience stronger emotions in the group condition. This, they stated, was possibly due to attentional factors, with the group condition preventing the individuals from concentrating better on the music (Sutherland et al., 2009).

Further evidence that group singing can have positive effects on mood, but perhaps no more than other music or physical activities, is provided by Valentine and Evans (2001). In this study, the authors compared effects of solo singing, choral singing and swimming on mood, heart rate and blood pressure. Using the UWIST mood adjective checklist (UMACL) to measure mood, the authors recruited volunteers at their singing lesson (solo singers), rehearsals (choral singers) and swimming pool (swimmers). Measures were taken before and after 30-minute sessions for each activity. Although swimming had the strongest effects on mood, both solo singing and choral singing improved mood significantly (as

measured by a reduction in tense arousal, and increase in energetic arousal and positive hedonic tone). These findings suggest that singing has positive effects on mood, but no more so than a self-chosen physical activity. There is also no evidence, in this study, that group singing has stronger benefits on mood than solo singing. These findings are not surprising given that the researchers did not control which activity participants were engaged in each participant was taking part in an activity they had chosen to be engaged in and preference issues could be at play.

Finally, effects of group singing on mood might also depend on other contextual variables such as the social context. Beck et al. (2000), investigated effects of choral singing on emotions, immune and hormonal systems. Participants in this study were members of a professional choir and provided evidence before and after two rehearsals and one performance. Emotional experiences were measured with two scales developed by the authors for this study. One of the scales intended to gather evidence about the general experiences of choir singing, and the other aimed to obtain information about experiences during specific singing sessions. Consistent with Clift and Hancox (2001), the authors found that singers associated their choral experience with positive emotions, such as happiness. In the short-term, however, singers reported different emotional responses on the different singing sessions: the performance was associated with both positive and negative emotions more so than both rehearsals. Higher levels of satisfaction, enjoyment and excitement were reported in the performance and these were significantly higher than the ones reported for both rehearsals. Relaxation also emerged as an important feeling during singing in a performance. As for negative emotions, the performance was rated as significantly less frustrating than the rehearsals, but anxiety was significantly higher in the performance than the rehearsals (Beck et al., 2000). These findings suggest that, consistent with the flow theory, choral singing can be an activity that involves effort and sometimes negative emotions but has an overall positive pay-off. Furthermore, these findings are also con-

sistent with those by Harmat and Theorell (2010) reported above, in that the emotional content of the experience, as provided by the social context, seems to determine effects of this activity.

### **Physiological Effects**

As for effects at physiological levels, the evidence suggests group singing can also have important effects, particularly at the endocrine and immune systems. For instance, Beck et al. (2000), focused on effects of choral singing on immune and hormonal biomarkers of stress. Comparing the two rehearsals with the performance of a professional choir, Beck et al. (2000), found significant increases in secretory immunoglobulin A (S-IgA), a product of immune function at the upper respiratory level, on all three conditions, with highest levels after performance. These authors also found cortisol, a stress hormone, to decrease during rehearsals but increase during performance. Kreutz et al. (2004) also focused on S-IgA and cortisol, finding several significant effects. Consistent with Beck et al. (2000), levels of S-IgA increased significantly during the singing session, but had no significant changes in the listening condition. Levels of cortisol decreased significantly in the listening condition but did not change significantly in the singing condition.

Findings on S-IgA are consistent across studies - S-IgA is consistently reported to increase after singing (Beck et al., 2000; Kuhn, 2002; Kreutz et al., 2004; Beck, Gottfried, Hall, Cisler, & Bozeman, 2006). Kuhn (2002), for instance, compared effects of music listening and music production on the immune system. In this study, participants were asked to either listen to music, play and sing, or just be in the room (allowed to walk, stand or talk to each other but not sing, hum, or do anything music-related). Saliva samples were collected before and after each 30-minute session. Kuhn (2002) found that all groups were significantly different from each other, with the music production group showing a significantly greater increase in S-IgA levels.

While there seems to be a clear indication that making music together stimulates immune system function at the upper respiratory level, the effects on cortisol are less clear. It seems the effects of group singing on cortisol levels are highly dependent on the context in which the singing occurs. This idea has support from the extensive literature on cortisol. It is understood that cortisol has a daily rhythm, with higher levels in the morning and decreasing levels towards the end of the day. But it is also released as a response to external (or internal) challenges or emergencies, often referred to as *stressors* (Clow, 2004). For this reason it has been called the stress hormone (Soares et al., 2010) and is seen as a biomarker of stress (Clow, 2004). Higher levels of cortisol are, thus, seen as an indication of a stress response. Higher cortisol levels were found in the performance condition, where performance stress and anxiety is known to be a natural response (Beck et al., 2000). Also, the strongest emotional responses seem to be experienced in performance contexts (Beck et al., 2000; Louhivuori, 2006). Rehearsals can be less stress inducing and, therefore, cortisol levels would be less affected under those circumstances. In any case, more experimental evidence is needed before we have a better understanding on how singing affects this important hormone.

This is as far as the evidence goes regarding effects of group singing on psychological and physiological variables related to well-being and health. Overall, this evidence seems to indicate that group singing can impact on psychological and physiological facets of human functioning, particularly those related to emotional experiences. This is of particular interest if we want to identify connections between group singing and hedonic well-being, as the evidence seems to suggest that group singing can lead to psychological and physiological experiences of positive emotions.



#### 2.4.2 Effects on eudaimonic well-being

There is also evidence that group singing may impact on domains that relate to eudaimonic well-being. Considering that this facet of well-being relates to personal growth, self-actualization and life meaning, there is evidence from exploratory and qualitative studies that the experience of group singing promotes opportunities to experience well-being at this level. For instance, in their review of the current literature on benefits of singing on well-being and health, Clift et al. (2008) identified several common themes arising from the existing literature, including that the experience of group singing is reported to give a feeling of *“being engaged in a valued, meaningful, worthwhile activity that gives a sense of purpose and motivation”*.

Bailey and Davidson (2002, 2005), reported two qualitative studies where members of a choir for homeless men (study one) and middle-class singers (together with homeless men, study two) were interviewed about their experience of group singing. These qualitative studies provide evidence that amateur group singing can impact on eudaimonic well-being of individuals from different socio-economic contexts. For instance, choir singers reported experiencing several benefits from joining the choir, including benefits related to mental engagement or cognitive stimulation. These included concentration, challenge and a sense of achievement. In another qualitative study, Tonneijck et al. (2008) suggested that choir singing, as a leisure activity, provides a challenge that allows participants to experience something different from their ordinary lives in a safe environment. In this study, it emerged that members of such singing groups perceive the challenge provided by the choir as a source of focus, motivating engagement and providing opportunities to grow. In accordance with the flow theory, participants in this study also reported the challenge was not always easy to manage but when it was, the experience provided a positive feeling, a satisfaction about having learned something new and met the challenge.

### 2.4.3 Effects on social well-being

Finally, well-being is also composed of a social domain (Keys et al., 2002). Given that group singing is, by nature, a social activity, it seems likely it also has the potential to impact on that domain. Several studies seem to indicate that group singing has effects not only on group processes related to individual well-being, such as feelings of belonging (Clift and Hancox, 2001; Bailey and Davidson, 2002, 2005; Louhivuori, Salminen, & Lebaka, 2005; Silber, 2005; G. Cohen et al., 2006; Skingley & Bungay, 2010, but also the well-being of the group as a whole (Silber, 2005; M. Cohen, 2009). The majority of a sample of choir singers (87%) indicated that singing in the choir had brought them social benefits (Clift & Hancox, 2001). In the qualitative studies by Bailey and Davidson (2002, 2005), both marginalized and middle-class singers reported social benefits of being engaged in the group but these were more significant for the marginalized individuals. For the homeless individuals, group participation had brought an increase in social interaction and improved communication. It also contributed for feelings of belonging and a sense of social contribution, normalcy, and social support (Bailey & Davidson, 2002, 2005). For the middle-class singers, social benefits of singing in a choir related mostly to feelings of camaraderie and environmental safety to experience voice (Bailey & Davidson, 2005).

Louhivuori et al. (2005) were interested in investigating how the social capital of individuals developed with participation in group musical activities. A survey conducted with 500 choir singers in South-Africa and Finland, found that choirs were more important communities to their members than other groups they belong to.

Silber (2005) examined the impact of choir singing on social harmony in a prison setting. The author set up a choir with inmates of a female prison. Sessions lasted 90 minutes and were held once a week for eight months. A qualitative examination of findings revealed several social effects of engagement in the group singing activity: there was an increase in trust amongst group members, reduction in aggressive behaviour, and increase

in social support. At the individual level, female inmates developed better communication skills, as the ability to listen and look the other in the eyes while communicating. At the group level, participation in the choir seemed to have promoted bonding and cooperation. M. Cohen (2009), also reported a significant increase in sociability amongst male inmates of a prison taking part in a public choral performance outside their prison. Quantitative findings in this quasi-experimental study, obtained with a standardized measure of well-being (Friedman Well-being Scale) answered before and after a public performance, suggest the social aspects of a public choir performance promoted the perceived well-being of male prison inmates, when compared to a group of inmates who were not in the choir. This is consistent with the findings of Bailey and Davidson (2002, 2005) of social interaction and reconnection of marginalized groups with society through public performances.

A different exploratory study with older adults also indicates long-term effects of group singing on social aspects (G. Cohen et al., 2006). Participants were allocated to either the choral group or a usual activity group (as a comparison group). Those in the choral group participated in weekly rehearsals for 30 weeks, and also some performances throughout that time. Those in the usual activity group simply completed the questionnaires and proceeded in their life as usual (passive control). Measures taken at baseline and 12 months after, revealed a decrease in loneliness in both groups with a greater decrease in the choral group. Unfortunately, the authors fail to report the statistical significance of these findings. It also appears that both groups differed significantly in levels of loneliness at baseline, which were lower in the choral group. These individuals also had lower levels of depression than the ones taking part in the comparison group. It is possible that individuals who were less depressed and isolated to start with, were more interested in joining the choir. The methodological and analytical limitations make it difficult to draw any valid conclusions from this study. However, a qualitative study where older adults were interviewed about their participation in “Silver Song Clubs” (singing groups for individuals over 60), also

indicates an increase in social interaction is an effect of taking part in the singing group (Skingley & Bungay, 2010).

Overall, these studies appear to indicate that group singing promotes opportunities for social interaction and socialization, and these may lead to bonding and cooperation, promote connectedness and increase feelings of social well-being. There is some empirical suggestion that these feelings may also arise from the opportunities to enjoy synchronized behaviours promoted by singing together. Dancing and singing involve a degree of synchrony that has been shown to increase group cohesion and enhance cooperation between group members (Wiltermuth & Heath, 2009). As mentioned above, synchronization results from entrainment and coordinated action often results in feelings of bonding possibly from perceptions of shared psychological states (Clayton, 2009). Synchrony is common in nature and seems to be highly valued in other species as well with bird species adopting synchronous dance movements to help them bond and cement their relationship (Goymer, 2009). It is, thus, possible that the way the socializing opportunities created by group singing are turned into bonding experiences is through the promotion of coordinated action or synchronous behaviours.

#### **2.4.4 The role of situational factors and individual differences**

The evidence in the previous section seems to suggest that effects of group singing on well-being are influenced by other factors beyond the activity itself. Variables such as the social context in which the singing occurs and individual or social background of the singers, seem to influence the effects group singing might have on the well-being correlates mentioned above. For instance, evidence of different psychological and physiological effects found under different circumstances (Beck et al., 2000) seems to suggest situational variables have a determining role. Furthermore, the findings reviewed in the previous section indicate that different individuals, with different backgrounds, benefit from group singing differently.

As an example, marginalized singers placed a greater importance on the social benefits of singing than middle-class singers (Bailey & Davidson, 2005). Different life circumstances lead to different opportunities to socialize. It is possible that marginalized individuals have less social connections and support and would, thus, benefit greatly from being engaged in an activity that allows them to build such connections. On the other hand, middle-class singers possibly already have social support provided elsewhere in their lives. The extra social benefits provided by group singing could be interpreted as part of normal life and not be given a great level of importance. This idea is consistent with other findings in the above-mentioned literature. It seems the individuals who benefit the most from this activity at the social level were those in more isolating social circumstances either through incarceration (Silber, 2005; Cohen, 2009), poverty (Bailey and Davidson 2002, 2005) or even as a result of ageing (Cohen et al., 2006; Skingley and Bungay, 2010).

Another set of individual differences that appears to have an impact on the experiences of group singing are gender differences. These differences emerge in the effects of group singing on mood, with female respondents reporting higher positive emotional states than male participants after a choral rehearsal, but both genders reporting similar levels of negative affect (Sandgren, 2009). Women also reported stronger well-being benefits associated with singing than did men, in the survey reported by Clift and Hancox (2001). These gender differences are consistent with the literature on emotions regarding expression of positive emotions. Brody and Hall (2008) reviewed the literature that indicates that women express positive emotions more than men. This could be simply a reporting bias since women have also been found to be more emotionally expressive. This raises the possibility that gender differences exist in expression but not on the experience of emotions (Brody & Hall, 2008). Similarly, there are indications gender differences in the expression of emotions are situation-specific with women reporting more positive affect states while at work than at home, and men reporting more positive affect states while at home than

at work (Larson, Richards, & Perry-Jenkins, 1994).

Gender differences have also been found in cortisol expression. In four studies with adolescents and adults, Kirschbaum, Wüst, and Hellhammer (1992) demonstrated consistent gender differences in the patterns of hormonal responses to stress, with cortisol levels higher in male than female participants. These differences have been related to gender differences in emotional responses to stressful psychosocial situations: male participants were found to have elevated cortisol levels in anticipation of a psychological stressor, without actually experiencing it (Kirschbaum et al., 1992). In the singing literature, Grape, Sandgren, Hansson, Ericson, and Theorell (2003) have found cortisol to increase in male participants but decrease in female participants during a singing lesson. Unfortunately, the studies reviewed above (i.e. Beck et al., 2000; Kreutz et al., 2004) did not provide an indication on whether cortisol levels differed between female and male singers.

Other variables such as personality, conducting styles, audience feedback, professional identification, attitudes towards singing, expectations, cognitive or physical challenge, experience and training, and synchrony could also play a role in the effects group singing has on psychological, bodily and social domains (e.g., Gick, 2011).

#### **2.4.5 Limitations in the current literature and ways forward: The working model in this thesis**

In sum, current empirical evidence on the effects of group singing on well-being is encouraging but inconclusive. Overall, the literature reviewed in this section indicates that group singing may indeed have social, hedonic and eudaimonic effects, that can generate feelings of well-being. These may depend on the social and emotional context of the experience, the socio-economic background and gender of the individual, and mechanisms such as coordinated action. However, it is clear that the literature raises more questions than provides answers. As Clift et al. (2008) point out, the current body of research lacks

a common conceptual framework on both the nature of singing and well-being. This, together with a lack of theoretical work that connects singing with well-being, has resulted in a lack of a coherent programme of systematic research. In turn, this has resulted in a body of research which raises the possibility that singing, particularly in a group, can contribute to an improvement of quality of life, well-being and health, but there is no solid empirical evidence that this is indeed the case.

The main goal of the empirical work presented in this thesis is to advance some understanding on the potential group singing has to promote and sustain well-being. Clift et al. (2008) suggest the way to do so is by developing empirical work which is based on clear conceptualizations of both singing and well-being, and a theoretical framework that allows hypotheses about this relationship to be generated and tested.

Following these suggestions, the empirical work on this thesis is, first and foremost, based on a conceptualization of well-being as a multifaceted concept that integrates hedonic, eudaimonic and social components, as proposed on chapter one. As similar conceptual work is lacking regarding group singing, the first empirical chapter in this thesis focus on work developed to clarify the nature of this music activity. In particular, to clarify whether the activity of group singing involves the type of psychological, bodily and social experiences that can promote well-being, as conceptualized in this work. Following this conceptual clarification of group singing, the remaining empirical chapters in this thesis attempt to clarify specific effects of group singing on well-being correlates, what kind of influence specific situations may have, and which effects, if any, are unique to group singing.

Given the lack of a theoretical framework that links well-being with singing, in particular group singing, I found myself in a position where I had to develop a very basic working model that could inform the empirical work I wished to conduct. For this, I integrated the information arising from the well-being literature (discussed on Chapter 1) with the

theoretical and empirical information on music, including how the flow theory explains the connection between music activities and well-being (discussed in this chapter). In this model, illustrated in figure 2.1, group singing is considered a multifaceted activity that operates on psychological, bodily and social levels. In the short-term, the activity of group singing engages the individual at all of those levels, impacting on each one of them. I propose that the processes of group singing at each one of those levels have effects that can be related to hedonic, eudaimonic and social well-being. As it stands, this model can be used to describe the effects of group singing on well-being, and explore the mechanisms underlying this relationship. The strength of this model lies in its ability to generate testable hypotheses. For instance, this model predicts that, in the short-term, group singing is associated with correlates of well-being. In this way, it is possible to test the hypotheses that group singing increases positive affect, and leads to feelings of personal growth and connection with others. These hypotheses are based on the argument that the relationship between group singing and well-being exists because group singing generates those feelings (e.g. group singing relates to hedonic well-being through increases in positive affect).

It was my belief that this model would be incomplete if it only explained the relationship between group singing and well-being. This is because it would be ignoring the evidence that there are factors that can influence effects of group singing. Therefore, the model also accounts for the variables that can moderate the relationship between group singing and well-being, such as situational factors and individual differences. Adding this information allows the investigation of the factors that might enhance or attenuate the effects of group singing on well-being. For example, it becomes possible to investigate whether short-term effects of group singing on affective states, such as an increase in positive affect, are influenced by the social context in which the singing occurs.



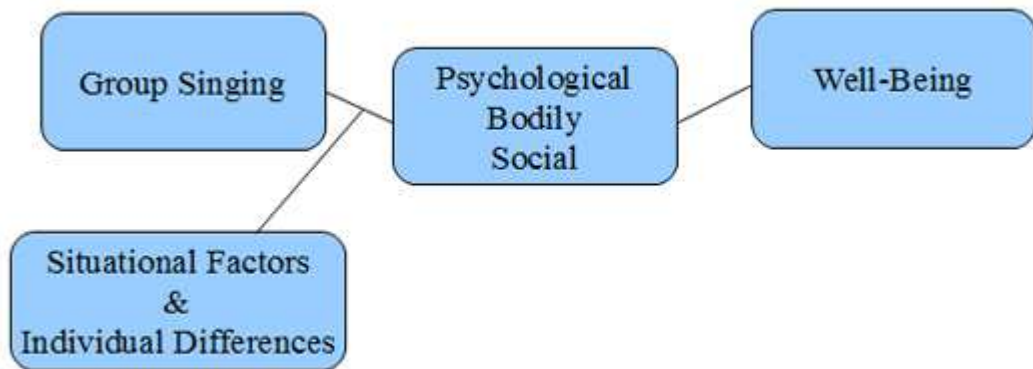


Figure 2.1: Illustration of the working model used to guide the empirical work in this thesis: The relationship between group singing and well-being is mediated by psychological, bodily and social effects; these are moderated by situational factors and individuals differences

## 2.5 The work in this thesis

In this chapter, I have reviewed theoretical and empirical literature that suggests that the activity of group singing has potential to promote well-being as conceptualized by integrated perspectives described on Chapter 1 - a multifaceted concept constituted of hedonic, eudaimonic and social domains. While the theoretical literature provides a convincing case on how a music activity such as group singing may promote and sustain well-being, the empirical literature still has a long way to go before we have a clear understanding on what effects group singing has and how these may contribute to feelings of well-being.

Following suggestions by Clift et al. (2008), and based on the working model described in the previous section, I developed several empirical studies that intended to be a contribution to the development of a systematic effort to investigate the relationship between group singing and well-being. In Chapter 4, I describe two studies intended to investigate and conceptualize the nature of group singing, as studied in this thesis. In Chapter 5, a large survey study is described, where I intended to explore connections between group singing and the diverse facets of well-being. In Chapter 6, I report two studies which in-

investigated the influence of context in the effects of group singing. Chapter 7 describes the first experimental study where the causal relationship between group singing and several well-being correlates was extensively investigated. Finally, considering the potential of group singing as a well-being promotion activity, of possible application in larger public health and community projects, it seemed important to investigate people's willingness to engage with such activity. In Chapter 8, I describe a survey investigating people's attitudes towards singing, and how these attitudes impact engagement with singing behaviours.

The work in this thesis focused on establishing clarity regarding the possible effects of group singing as a way to explore the potential of this activity to promote well-being. In the next chapter, I will outline the methodological approach with which this empirical work was executed.

## Chapter 3

# General Methodology

In the previous chapters, I have reviewed the literature which provides a background and a rationale for the proposed thesis. I stated that, in this work, well-being is conceptualized as a multifaceted concept which integrates hedonic, eudaimonic and social domains. Several activities can impact on these domains and benefit them but I propose that activities that require high levels of multidimensional involvement, such as group singing, operate on all these domains and, thus, can impact well-being wholly. I concluded the previous chapter by mentioning that the empirical research on a relationship between group singing and well-being is still in its early stages and the main goal of the work reported here is to contribute to the scientific development of this topic.

There are five empirical chapters in this thesis. In the first empirical chapter (Chapter 4), I attempt to conceptualize the activity of group singing discussed in this thesis. I will report findings from three studies that help characterize the experience of group singing as investigated in this work. In the second empirical chapter (Chapter 5), I investigate whether singing regularly has measurable effects on the several facets of well-being, and which ones stand out the most in the long run. The survey reported in that chapter was a study meant to explore connections between singing and well-being, as conceptualized in this study. In the third and fourth empirical chapters (Chapters 6 and 7), I move

on to test hypotheses related to effects of group singing on well-being correlates. On Chapter 6, I report two studies where I investigated whether the context in which the singing occurs impacts on how singing affects well-being. Chapter 7 describes a study where I investigated effects of group singing on several well-being correlates. Finally, the last empirical chapter in this thesis, Chapter 8, derives from a question that emerged all throughout the execution of this project: what are the barriers to joining a singing group? I felt it was necessary to investigate as it relates to the practical challenge of getting people to sing in the first place. Group singing may be an activity with potential to promote well-being as a whole but there may be psychological barriers preventing adult non-singers from adhering to it. If group singing is to be used as a well-being promoting activity in community-wide settings, it is essential to understand what these barriers are so that it is possible to develop strategies to overcome them.

The present chapter focus on providing a general overview of the methodologies used to approach the above-mentioned work. As the review of literature has highlighted, the topic of research in this thesis is multidisciplinary, and can be approached by researchers with different backgrounds and perspectives. This is also a new field of research and it is important for researchers in new and multidisciplinary fields to report not only findings but also be very clear about the methodologies used to obtain such findings.

For this purpose, I will start by describing the main characteristics of the samples, highlight issues surrounding recruitment, and describe the main design, focusing on how it fits in with the Medical Research Councils framework for development and evaluation of complex interventions in health care. I will then conclude by outlining the types of materials used and measures of interest.

Besides providing information about the methodological approach in this thesis, there are two main points that I wish to make in this chapter. First, that there are challenges surrounding participant recruitment that hinder investigation in this field. It is, thus,

essential for any researcher reporting findings in this field to include detailed information on how participants were approached and recruited. The second point I wish to make in this chapter is that such a multifaceted topic requires a multifaceted methodological approach. In this way, I will briefly outline the main advantages of complementing observational with experimental data and self-report psychological data with physiological data, when addressing this topic of research.

### **3.1 Sample characteristics**

The main goal of the work reported in this thesis was to understand the potential of group singing to promote well-being. In particular, I intended to investigate whether the activity of singing in a group has the potential to promote the well-being of a wide range of adult individuals. Following previous research (e.g., Clift & Hancox, 2001; Clift et al., 2007; Clift & Hancox, 2010), the majority of the empirical work developed for this thesis focused on a population of amateur community/university choir singers. These groups have broad, non-clinical, adult populations which provide a wide spectrum of individualities, experiences and backgrounds. Furthermore, amateur singers are more representative of the general population than professional singers, particularly regarding their experiences with singing training and ability (Bailey & Davidson, 2002). These singing groups are currently popular in England, making it easier to contact a large number of potential participants.

While asking people who sing regularly about their experiences might shed light on the main characteristics of that activity, it does not allow conclusions to be established on cause and effect. For instance, it is not possible to question whether any described experiences are a result of personality characteristics or the actual activity of singing in a group. Furthermore, singers may already be biased towards the activity they choose to perform regularly and end up describing what they think should be happening or what they think the researcher wants to hear. It was, thus, my aim to also develop research

with adults from the non-clinical, general population who had little or no experience with singing, particularly in a group, as defined in the previous chapter.

## 3.2 Recruitment

The recruitment of individuals from groups mentioned in the previous section, was challenging and time-consuming. It was also determinant of the successful completion of all the studies reported in this thesis. If there are strategies that work, the fact such information is never shared, leaves subsequent researchers of a topic in the dark about them. For this reason, in this section I wish to provide some clarification on what challenges I encountered with recruitment and what strategies were used to overcome them. I hope that, by sharing this information, future endeavours will be better prepared to overcome this significant barrier to the advancement of scientific knowledge on the topic discussed in this thesis.

I do not believe the challenges encountered were unique to my research experience reported in this thesis but, instead, are inherent to the type of recruitment required (i.e., outside academia) and this particular research topic (i.e., singing). Active research participation is not common outside academia and amongst the general public. On top of that, it appears that people who don't already sing are afraid of singing, which makes them reluctant to join a study where they are required to sing. Research with human participants, conducted with high ethical standards, is entirely dependent on the freedom and willingness of an individual to take part. The question is then, how to attract and secure the commitment of people in the face of the double challenge this research topic presents? In order to answer this question, we first need to understand what the issues are.

My entire experience with research has been within psychology and, thus, with human participants. However, recruiting undergraduate students for studies done within univer-

sity grounds is not quite the same as recruiting adults from the general, non-academic population for studies done in environments unfamiliar to the researcher. Put simply, within a psychology department, a researcher has more means and opportunities to attract and retain participants, than when working outside that academic environment. Outside academia, means and opportunities have to be created by the researcher before any recruitment can take place.

This fact raises considerable challenges that I did not expect and, thus, did not account for when planning for this research project. This lack of awareness of any recruitment issues might have arisen from my lack of experience with recruitment outside the academic world. Research is a big part of most psychology departments and, in those cases, the whole environment is built to promote and support research. Recruitment requires the researcher to attract the attention and secure the commitment of potential participants and with these issues addressed in academic environments, recruitment often becomes a non-issue. For instance, psychology departments have computerized systems specifically designed to easily connect the researcher with potential participants, i.e., undergraduate students. Researchers are encouraged to use these systems to advertise their studies, and participants (i.e., undergraduate students) are encouraged to check the system regularly, for studies to take part in. The access to potential participants is then often boosted by direct contact with undergraduate students during classes taught by the researcher. In these, the researcher has the opportunity to remind potential participants when recruitment is undergoing and the advantages of taking part (e.g., course credits). As a lecturer, the researcher also has the opportunity to do studies presented as course exercises. It is offered as a good way for students to get acquainted with the different aspects of research, while allowing the researcher to collect large amounts of data in a short period of time. Academia is, thus, an environment where researchers have close and easy access to large numbers of potential participants, who are constantly made aware of the need to participate in

research.

While a culture of research is found in most psychology departments, the same cannot be said of the world outside academia. The routine of research participation is only a reality for undergraduate students of research-active academic institutions. Beyond that, we can perhaps find one other group of people who understand the relevance of research work and are inclined to take part in research studies - individuals with serious medical conditions who might see in their participation a way to find a cure to their ailments. That said, studies that require the researcher to step out of the academic environment and recruit participants from the general public, have to account for a recruitment situation where attention and commitment will not be easy to procure. Extra work is required because the supporting infrastructures and systems that exist within academic, are absent from the “real-world” context.

As I moved from recruiting group singers to attempting to recruit individuals without singing experience, I realized that this particular research topic is faced with an extra recruitment challenge, on top of the already stated difficulties of recruiting outside academia: people who don't already sing, appear to have a certain fear of singing. Interestingly, I did not encounter many difficulties attracting the attention of adult non-singers to the research topic. A pattern of responses arose, throughout the past three years, whenever I discussed this research project: an initial excitement to learn about the project was followed by a nervous reluctance to the idea of joining the singing themselves. The main issue was, thus, securing the commitment of potential participants. The studies reported in the subsequent empirical chapters explored an array of recruiting strategies where I attempted to maximize success rate while complying with ethical guidelines. With each recruiting experience, it became more clear that, to achieve this, it was essential to shift from the traditional recruitment approach where the participant is seen as just someone who comes in to do the study for us. Even though psychology research has replaced the word “sub-



jects” for “participants” in recent years, in practice, this hasn’t changed much what can be colloquially referred to as the “participant as guinea-pig” approach. I found that, to successfully engage the community of singers and non-singers, it was necessary to consider strategies framed by an approach where the participant was considered a collaborator.

This was particularly relevant when attempting to recruit non-singers and secure their commitment for a two-day experiment (Chapter 7). Over the seven years of my research career, I have experienced in the industry, a lack of sensitivity to the fact that each participant has a life that precedes the experiment and continues beyond it, even though ethical standards and principles alert to these issues. Unlike what may seem, our studies do not happen in a vacuum. The participant will bring something to the experiment and will take something with her/him. Ignoring this fact may not raise any substantial issues in many studies inside academia, where undergraduates come and go, but it becomes the main barrier to engaging individuals from the general population. Most people are not willing to dedicate their personal time to a project for which they do not perceive the relevance and do not feel respected or part of it. The main way to achieve this is if the participant is considered a valuable stakeholder, someone we work with, and not a subject who is there to serve our purposes, to be used and discarded.

In practice, the field of community engagement sheds some light on specific methodologies to engage individuals from the general population (Gottlieb, 2007) and these can be framed by the ethical principles concerning participant recruitment. However, the particular context of this field of research, with the double-challenge described above, would benefit from future papers containing more detailed information on how participants were attracted and retained.

### 3.3 Design

It was my intention to work under a methodological approach that could be characterized as scientific, evidence-based and experimental, framed by psychology research paradigms - research with human participants randomly assigned into controlled and experimental conditions. This was the priority. However, I was quickly faced with the reality of this field of research: systematic work is still to be accumulated. The novelty of the field dictated, then, that the studies reported in this thesis also involved observational and quasi-experimental methods. While this thwarted my initial intentions, I soon realized that such work is missing but is essential and, thus, has to be done. As Field and Hole (2003) point out, for any phenomenon being researched, it is important to start with careful systematic and ecologically-valid observation. This helps understand the phenomenon as it happens in the real-world. Quasi-experimental studies, though limited in the range of conclusions that can be drawn, are a useful research step when it is difficult or impossible to control for some factors, such as previous experience or exposure to the phenomenon. Both these research methods help generate hypotheses to test in an experimental manner when little or no information is available. In this way, the experimental work reported in this thesis has benefited greatly from having being preceded by observational and quasi-experimental research.

This design approach is consistent with the framework for development and evaluation of complex interventions in health care, proposed by the Medical Research Council (MRC, 2000). This framework provides a guide for researchers faced with research topics that contain several dimensions of complexity, such as evaluations of public health interventions. It suggests that the best approach to researching complex health care interventions is to do so systematically, starting with developing the intervention through identification of existing evidence and appropriate theory. It is also suggested that, at this stage, producing an evidence-based model of how the intervention might alter behaviour or produce target

outcomes, can help identify weaknesses and better design evaluations. The developed intervention should then be tested using a phased approach where studies increase in design complexity, from pilot studies to exploratory and randomized controlled trials. MRCs framework also includes reporting as an important feature of the process, essential for replication and long-term follow up (Craig et al., 2008; MRC, 2008).

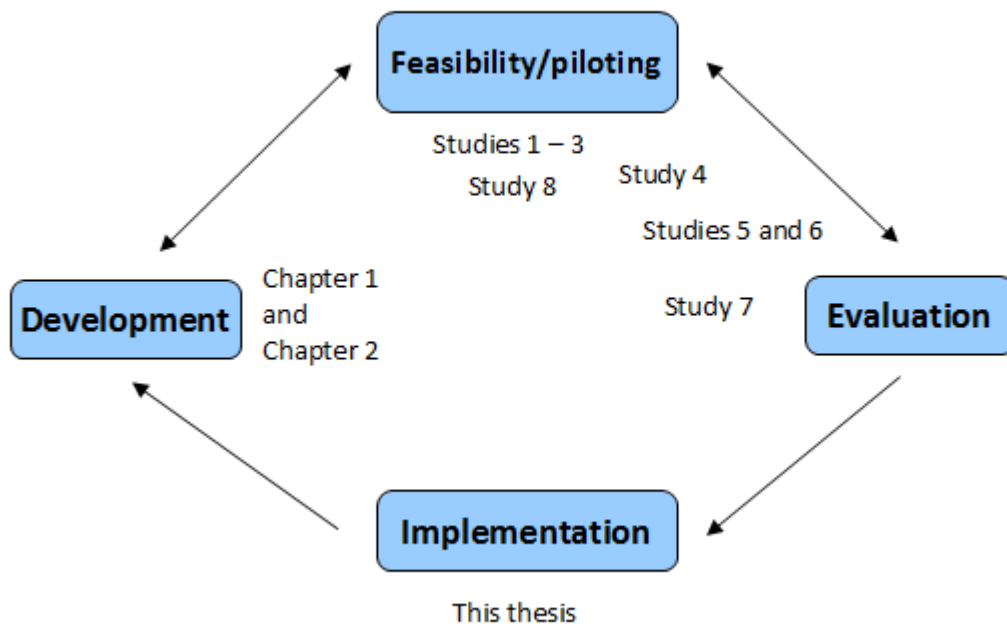


Figure 3.1: Adaptation of MRC’s illustration of the main stages of the process from development through to implementation of a complex intervention; the work in this thesis is plotted against each stage.

While the research in this thesis does not focus on developing and evaluating a particular health care intervention, MRCs framework can be particularly helpful to understand the relationship between the theoretical and modelling work and the different studies in this thesis. Chapters 1 and 2, where literature was reviewed and the developed model reported, fall easily within the first stage of MRCs proposed framework - Development. The studies’ designs can be seen to increase in complexity from studies 1 to 7, and can thus be distributed through the subsequent testing stages of MRC’s framework - Feasibility/Piloting and Evaluation. Figure 3.1 adopted from MRC (2008), illustrates this comparison. The

arrows are part of the original illustration and indicate the main interactions between the stages. MRC's framework acknowledges that development and evaluation stages don't necessarily follow a linear pattern. Double arrows indicate that information gathered in one stage can be used to refine understanding at a previous stage (MRC, 2008). Study 8 is an example of using evidence collected throughout the research process, information that hadn't been anticipated, to improve knowledge of issues that could undermine future testing, thus returning to a more exploratory stage of the research. This thesis in itself can be thought globally as pertaining to the implementation stage, where publication is a key element that allows dissemination.

### **3.4 Materials and Measures**

The materials used reflect an attempt to combine subjective psychological measures with objective physiological measures. This type of methodological approach allows subjective information to be complemented by more objective information, providing a more complete picture of the phenomena in focus.

The psychological materials used were questionnaire-based measures appropriate to explore the topic. They included mood (e.g., positive and negative affect), stress and anxiety measures; social connection measures through group connection scales; and questionnaire-based well-being measures related to life satisfaction (hedonic well-being), personal development (eudaimonic well-being) and social well-being.

Besides these methods of quantitative analyses framed by psychology paradigms, physiological methods (i.e., salivary assay), previously related to well-being and health, helped record data that can inform about variations of salivary hormonal (cortisol) concentrations (see Appendix A for a review of psychophysiological evidence on cortisol).

This psychophysiological approach allows the collection of data that exposes objective and measurable effects. Using questionnaire-based quantitative measures allows the

collection of quantitative data of easy access to the participants and under appropriate time frames. The physiological measures, though surrounded by some relatively more complex procedures, have already been shown to be a reliable scientific way of looking at psychological-related issues. These provide further quantitative and scientific evidence for the effects on variables believed to have a strong impact on well-being such as anxiety and stress.

### **3.5 Summary**

In this chapter I attempted to provide a clarification on the broad characteristics of the methodology used in the implementation of the empirical research of the proposed thesis. Besides this, I also hoped to raise awareness to the fact that there are challenges surrounding participant recruitment that hinder investigation in this field. I discussed what these challenges were and how they may be overcome, including increasing discussion on the different recruitment techniques amongst researchers. Finally, I outlined the main advantages of complementing experimental with observational data and self-report psychological data with physiological data, when addressing this topic of research.

In the next chapters, I will describe, analyse and discuss the empirical findings resulting from the investigation into the proposed thesis. I would like to note that ethical approval for all the reported studies was obtained and letters of ethical approval for each chapter can be found appended to this work.

## Chapter 4

# The Experience of Group Singing

Building on the rationale developed in the previous chapters, I sought to empirically clarify the nature of the experience of group singing. In particular, I wished to investigate whether group singing involved the types of experiences that could promote hedonic, eudaimonic and social well-being. Given the novelty of this field of research, it was important to start with such descriptive work (Rozin, 2009). Focusing on understanding the experiences brought about by the activity of group singing helps elucidate the processes involved in the activity. Ultimately, such knowledge can help understand whether such processes could generate feelings of well-being.

In this chapter, I report three exploratory studies which investigated the first step of the model I propose in this thesis, namely, that group singing involves psychological, bodily and social experiences. In study one, I report a qualitative study where I obtained information on the main experiences involved in group singing. In study two, I used this information to develop structured questionnaire, which was used to further investigate the experiences of group singing. In study three, I used an improved version of that structured questionnaire to overcome limitations in study two.

Whilst the research reported here is largely descriptive, it was based in the general hypothesis generated by the working model described on chapter 2, that group singing

engages psychological, bodily and social domains leading to experiences at each one of these levels.

## 4.1 Study 1

Study 1 was a qualitative survey study designed to collect information on the main experiences of group singing. This information was to serve as a source to develop a structured questionnaire adequate to explore the main experiences of group singing more systematically.

Previous studies (Clift & Hancox, 2001; Bailey & Davidson, 2002, 2005) had already collected important information on the experience of group singing and attempted to organize this information into coherent theoretical models. However, the information collected in these studies was restricted to the positive benefits of group singing, that is, participants were mostly asked about the benefits associated with their experience of singing in a group. In the survey studies reported by Clift and Hancox (2001), for example, respondents were asked about what they thought were the benefits of singing on their health and well-being. The structured questionnaire used on the second survey of that study, for instance, contained statements that reflected belief about the possible benefits of singing (e.g., *singing helps to increase my lung capacity; Singing helps my mood be more positive*). Such statements clarify which domains of human functioning singers believe benefit most from singing. However, they are also more susceptible to widespread notions and generalizations, which may or may not reflect actual processes and effects. It also provides an incomplete view of the experience of group singing, as answers are limited to the perceived benefits of singing. For the work in this thesis, it was my purpose to start by understanding the activity of group singing as a whole, and the main experiences it may facilitate. Focusing on the main experiences of group singing could help understand the core universal characteristics of this activity. In turn, this knowledge would be useful

to help devise hypotheses and experimentally investigate effects of group singing on well-being. For this purpose, I combined the information provided by previous studies into a broader model which then guided the questions used in this exploratory study.

In the survey study by Clift and Hancox (2001) already described on Chapter 2, a principal components analysis revealed six areas of benefits of singing: well-being and relaxation, breathing and posture, social benefits, spiritual benefits, emotional benefits and heart and immune system benefits.

The studies by Bailey and Davidson (2002; 2005) also previously described, stated that benefits and positive effects of choir singing and performance could be organized into four broad areas: clinical type benefits (emotional catharsis, energy and relaxation, introspection), group processes (social support, camaraderie), choir/audience reciprocity (sharing, contributing, empowerment, pride, opportunity to demonstrate skills), and cognitive stimulation (concentration, challenge and achievement). The authors further suggested that the broad areas of benefits to either middle-class singers or marginalized singers could represent different specific benefits. For instance, while middle-class singers reported benefiting from an opportunity to demonstrate skills, under the choir/audience reciprocity area, marginalized singers reported, for this same area, benefiting from a sense of sharing, contributions, empowerment and pride (Bailey & Davidson, 2005). This evidence suggested that the experience of group singing could involve universal processes, which may then lead to different specific effects. For instance, both types of singers reported benefits of group processes. However, the marginalized and middle-class singers had different notions of what constituted beneficial effects of group processes. As an example, marginalized singers referred to social support, while middle-class singers referred to safety of environment to experience voice.

The evidence by Bailey and Davidson (2005) also suggests that group singing involves universal processes that can lead to different degrees of the same effects, depending on



the social or individual circumstances. For instance, both middle-class and marginalized singers referred to camaraderie, as a beneficial effect of social processes, but middle-class singers only attributed a minimal importance to this effect, while the marginalized singers attributed a much greater importance (Bailey & Davidson, 2005).

The areas of benefits suggested by these two sets of studies, can, in my view, be organized into three broad categories. These, I suggest, represent the three main domains involved in the experience of singing in a group: psychological, bodily and social domains. I propose, therefore, that group singing involves psychological processes (emotional and cognitive, i.e., positive and negative emotions; mental stimulation, concentration, challenge, achievement), bodily processes (physical sensations and physiological changes, such as voice-related sensations, physical changes related to breathing and arousal), and social processes (social interaction and cooperation between singers, but also interactions between singers and conductor, and between singers and audiences). Using these three main areas as guidelines – psychological, bodily and social – a simple, open-ended questionnaire was devised, where group singers were asked to describe their typical singing experiences in two different contexts, namely rehearsals and performances. In Clift and Hancox’s (2001), participants also mentioned spiritual benefits and it is possible that group singing facilitates spiritual experiences in some circumstances and/or for some individuals. Therefore, singers were asked to refer to such experiences. Finally, because Bailey and Davidson (2002) highlighted the importance of the group leader (i.e., conductor or facilitator) for the overall experience, singers were also asked to reflect on this topic.

#### **4.1.1 Method**

##### **Participants**

Participants were 32 members of singing groups in England (26 females). Their ages ranged from 24 to 73 (1 unreported), with a mean of 50 years of age. Their experience

with group singing ranged from 4 months to 54 years.

### **Recruitment**

An email was sent to several choirs and community singing groups, inviting singers to participate by sharing their experiences online, on their own time. These choirs and singing groups were sourced from the website [www.choirs.org.uk](http://www.choirs.org.uk), and the Sidney De Haan Research Centre own network of singing groups. The email explained the purpose of the study, provided a link to the online site where to participate, and requested the contact person to pass on the information to the singers in their choir. It was made clear that the only request that was being made was that the information in the email was forwarded to the different individuals in the singing groups as, ultimately, the decision to complete the survey rested with each singer and no commitment was required from the group as a whole. This was essential to ensure minimal time and effort was required from the contact person regarding the study.

I found that this form of contact had several advantages over attempting to visit choirs and singing groups in person, and hand out hard copies of the questionnaire. Recruiting participants and collecting data through online technology facilitates the contact of a larger sample of people in a smaller amount of time. It also ensured I had immediate access to any replies. Furthermore, this strategy allowed me to contact individuals with whom I had no personal contact. This is an important factor when collecting subjective data as, together with anonymity, may reduce a positive bias (i.e., when respondents attempt to portray a phenomenon in a good light).

### **Procedure**

The questionnaire was placed online, in the [www.surveymonkey.com](http://www.surveymonkey.com) website. Participants were given a link to the online address where information about the study was provided.

Participants were informed of the main purposes of the study, its anonymous nature, and that they were free to discontinue their participation at any time. They were also informed their consent would be assumed once they clicked to the next pages.

## Materials

The survey consisted of three parts. In the first part, participants were asked to provide demographic information, such as gender and age, but also information about their group singing experience, i.e., whether their singing group was amateur or professional, the number of years they had been in the group, how many hours per week they had dedicated to singing in that group over the last month, how often they had performed in front of an audience over the last month, and whether they were also involved in other music-making activities (such as instrument playing).

The second and third parts consisted of a request for participants to describe their typical rehearsal (part two) and performance (part three) considering several areas of experience based on the hypothetical domains mentioned above. This request was made through the following questions:

*Please describe your typical singing rehearsal/performance in relation to what you feel from the beginning until the end of it, all that may be happening in your body and your mind.*

*The following topics might aid your reflection: Consider any physical sensations, emotional experiences and what might cause them. Consider any changes, issues or difficulties with your voice, breathing and posture.*

*Think of how challenging a typical singing rehearsal/performance is for you, how focused you have to be and the level of attention it requires from you.*

*Please reflect on what the positive and negative aspects of having others singing around you are.*

*Reflect on the importance of the conductor/facilitator.*

*Consider any moments that you could describe as a spiritual experience.*

*Please reflect upon these but we are sure they do not cover the whole singing experience so please mention any others you may think of.*

These statements guided the answers on several hypothetical domains of the experience but also left room for respondents to specify what the particulars of that experience were and add any other aspects they could consider important but were not covered by the proposed categories.

#### **4.1.2 Results**

For the analysis of the collected data, each individual answer was carefully screened for content. Several of the suggested areas of reflection were identified in this content and the main categories suggested at the beginning of this study were used to organize it. As a reminder, the categories used were: psychological experiences, bodily experiences, social experiences and spiritual experiences. Several themes were then identified within these main categories. In some instances, respondents referred to two types of experiences in the same sentence. For example, respondent twenty-one said

“I have to remember to breathe properly and sit straight when we start but soon this becomes automatic.”

,

in which case there is a reference to both breathing and posture aspects. In this case, such sentences were placed in both sub-categories it referred to. In the case of ambiguous statements, where a clear content was not possible to identify, or where it was not possible to discern whether the respondent was referring to an experience during

rehearsals or performances, such statements were not utilized. For instance, respondent seven produced the following statement:

“When we sing very emotional songs, I usually envisage a story in my mind, so that I can put emotion into my voice”

This is a reference to a technique used by this individual to aid the expression of emotion through singing, but it was not clear whether it was used in rehearsals or performances, or both, nor was there any indication other singers use this technique as well. In addition, discussion on singing techniques was outside the scope of this study. This sentence was, therefore, not placed under any specific category and not used in the content analysis. It also occurred that five out of the thirty-two respondents did not provide any comments on part three, and stated, instead, it was not clear how this was different from part two. In general, respondents described their experiences more fully on part two, often referring to performance experiences in that section as well.

In most cases, it was easy to identify whether respondents were discussing issues within the more broad domains, such as psychological, bodily and social experiences. This made it possible to identify common themes that arose within each of those broad domains. Table 4.1 reports the frequency of a specific theme that was possible to identify within each broad domain. Because several participants mentioned different aspects of the same theme more than once, these frequencies reflect the number of mentions and not the number of individuals who commented on it. This approach also ensured that it was possible to identify the most important experiences of singing in a group. For instance, emotional experiences can be important to singers and several mentions can be made of different positive emotions in one comment. The following comment illustrates this:

“The feeling of euphoria is fantastic when you know your singing well. We

gave our all and the sound was fantastic and I felt so proud afterwards, my head was buzzing.”

In this case, the same individual mentions feelings of euphoria but also pride, so it resulted in two mentions of positive emotions by the same individual. It also mentions a sensation of their head “buzzing” so this resulted in one mention of the bodily experiences “head buzz”.

While providing an idea of the frequency with which a certain experience was mentioned will give the reader an idea about the more common experiences, it will not provide a full, rich account of the content provided by the comments given. Particularly when considering comments where respondents share their belief of the possible mechanisms behind certain effects. For example:

“I sometimes have a stomach ache at the end of rehearsal because of the posture required to sing well”;

or

“I always feel physically less tired and more energetic, and up lifted emotionally by the end. I am sure it is to do with breathing; breathing with the diaphragm low into the body, I think one becomes much more present and focused on what is going on around them rather than worried about what sort of day they are having or what is going on in their lives.”

From the first statement, it is possible to discern that there is some sort of physical effort involved in maintaining an adequate posture. The second statement indicates that the experience of singing involves a process of arousal, which may lead to physical energizing and emotional uplifting. This singer is convinced the reason for this lies in the fact that singing involves deep breathing techniques, which increasing awareness and concentration on the task at hand. Whether this is indeed the mechanism through which

singing energizes and improves emotional states, or not, it reveals several facets of this singer's experience and belief regarding that experience. These would be ignored if only a quantitative account of experiences was taken into consideration.

The most common psychological experiences identified (Table 4.1) regarded positive emotional experiences (e.g., excitement, joy, happiness, pride), but some negative experiences (e.g., nervousness, anxiety, stress, frustration, embarrassment) were also identified. These were followed by psychological experiences related to focus of attention and concentration. Some psychological experiences related to personal growth and development were also identified.

Table 4.1: Frequency of psychological experiences by context (rehearsals/performances) and in total

	Rehearsals	Performances	Total
<b>Psychological Experiences</b>			
<b>Personal Growth</b> (accomplishment, achievement; work hard towards)	7	3	10
<b>Positive emotions</b> (excitement, happiness, euphoria, pride, joy, confidence)	18	20	38
<b>Stress reduction</b>	5	0	5
<b>Mood improvement</b> /Makes me feel better even when I arrive tired	7	2	9
<b>Negative emotions</b> (stress, anxiety, nervousness, embarrassment, frustration with oneself;)	10	14	24
<b>Concentration/Attention/Mental effort</b>	21	10	31
<b>Spiritual Experiences</b>	7	7	14

The most common bodily experiences (Table 4.2) related to feelings of arousal, physical "high", physical sensations regarding voice and breathing. Specific bodily sensations with voice referred mostly to feelings of hoarseness and physical effort to control voice. There were also mentions of muscle tension release, exhaustion, tiredness, experiences of tears, increased body temperature, physical pain, smiling, laughing and physical effort to control posture.

The most common positive experiences of singing with others related to feelings of connection and bonding, producing something together. Several other positive comments

Table 4.2: Frequency of bodily experiences by context (rehearsals/performances) and in total

	Rehearsals	Performances	Total
<b>Bodily Experiences</b>			
<b>Arousal</b> (arrive tired, leave energized, energetic, invigorated, uplifted; difficult to relax and fall asleep afterwards; butterflies in stomach before performance)	15	4	19
<b>Relaxation/Muscle tension release</b> (e.g., shoulder and neck)	6	0	6
<b>Chills/Tingle/Shivers down the spine/Hairs on end</b>	4	0	4
<b>Feeling “high”/elated/getting a “buzz”</b>	4	9	13
<b>Feeling “drained”/exhausted</b>	1	3	4
<b>Tears</b>	2	0	2
<b>Increase body temperature</b>	2	0	2
<b>Pain</b>	1	2	3
<b>Voice</b> (physical effort to control, hoarseness, vibration, tiredness)	11	7	18
<b>Breathing</b> (physical effort to control; shortness of breath, relaxation through breathing)	10	8	18
<b>Posture</b> (physical effort to control; stand straight;)	5	2	7
<b>Smile and Laugh</b>	3	0	3

related to feelings of safety and confidence to sing. Several negative experiences of singing with others also arose, mainly related to frustration about the singing others are producing (when perceived as out of tune, for instance) or the distraction/disruption caused by others chatting or making noise that prevents the individual from listening to other parts or the conductor (these were common in rehearsals), in sum, issues with lack of individual control over the group.

The relationship with the conductor appeared to be of central importance for the majority of respondents. The importance of the relationship with the audience was noted by six respondents.

Several respondents referred to spiritual experiences (Table 4.1) but the specifics of these experiences varied greatly between individuals. Respondents described it as “losing” themselves in a song, “entering into the music”, an “out-of-body” experience, or as connected to religious songs, sung in a religious context (e.g., Sunday mass, funeral).



Table 4.3: Frequency of social experiences by context (rehearsals/performances) and in total

	Rehearsals	Performances	Total
<b>Social Experiences</b>			
<b>Positive aspects of singing with others</b> (feelings of shared emotions, enjoyment of listening to sound of others; achieve something beautiful together; bonding/friendships; safety to sing/feeling supported; feeling helpful; feelings of belonging)	31	14	45
<b>Negative aspects of singing with others</b> (frustration with how others sound; disruptions; lack of personal control over the overall product; feelings voice is being judged)	14	4	18
<b>Relationship with audience</b> (sharing enjoyment; feedback)	0	6	6
<b>Relationship with group leader</b> (central; determines the overall experience)	15	8	23

In Tables 4.1, 4.2 and 4.3, experiences were organized by context (rehearsal vs. performance). This was meant to help distinguish between experiences that might occur when the singing is done in a particular context, from the experiences that may occur independent of the context in which group singing takes place. For instance, if it was found that singers mentioned an experience in one context, but not the other, then it was possible such experience was not a broad effect of group singing.

In this study, experiences related to stress reduction, feelings of relaxation or muscle tension release, chills or shivers down the spine, increase in body temperature, and smiling or laughing, were mentioned only in relation to rehearsals.

As it would be expected, experiences relating to a relationship with the audience were only mentioned in regards to performances.

### 4.1.3 Discussion

In this exploratory study, the aim was to acquire information on the broad experiences of singing in a group that could serve as the basis for a more systematic investigation of the main characteristics of this activity. Respondents were expected to refer to psychological, bodily and social processes and describe experiences related to these. The acquired information replicated findings from previous studies (e.g., Beck et al., 2000; Clift & Hancox, 2001, 2010), particularly in relation to emotional and physiological experiences of arousal (for example, the energizing effect experienced during rehearsals and singer's "high" experienced after a performance), cognitive processes such as concentration and focus of attention, and benefits of singing with others (such as feelings of support and belonging). It also added information on areas that hadn't previously been addressed or highlighted. It was not uncommon for respondents to note negative aspects of the experience of group singing, such as difficulties in relaxing, frustration with self and others, and physical pain (mainly related to posture and vocal efforts).

The findings reported in the previous section also suggest that the context in which the activity of group singing occurs, is an important aspect to consider. There is evidence in the literature consistent with this notion. Beck et al. (2000) reported how a public performance was related to more positive and negative emotions than two rehearsals. This evidence suggests that the context played a part in how singers reported feeling, affecting the strength of emotional responses to group singing. In the findings reported above, the content of the experiences was similar across contexts, in that they involved psychological, bodily, social and spiritual domains. But, in most instances, there were variances in the number of times specific experiences were mentioned in each context. As an example, *Feeling "high"/elated/getting a "buzz"* was mentioned four times in rehearsals and nine times in performances. This could suggest that such bodily experience is a universal characteristic of group singing, but it occurs more frequently in a public performance

context than in a rehearsal context.

The sample in this study was small and there was a female bias. On the other hand, it contained a wide age and experience range. The fact that, nonetheless, there was consistency in the experiences of the different individuals, suggests that the information collected has validity. For instance, the majority of respondents commented on how they arrive tired at a rehearsal but soon after starting to sing begin to feel more relaxed and, by the end of the rehearsal feel energized. In performances, most respondents commented on the feeling of nervousness or excitement before the performance, how it was not uncommon to end with a “high”, which was followed by a feeling of overall exhaustion or “low”, a few hours later.

It could also be argued that answers are biased because respondents were directed to focus on specific aspects of their experiences. A certain directionality and structure was needed to help respondents describe their experiences with group singing on the level intended to be investigated here. However, only very broad directions were given, and respondents were free to express their specific experiences with each domain. For instance, respondents were asked to *Consider any physical sensations* and to this there were a variety of answers from experiencing tearfulness, to increased body temperature and smiling or laughing.

Overall, the experiences documented in this study provided a source of information to develop a structured questionnaire that could be used to further investigate the main psychological, bodily and social characteristics of the experience of group singing. In the next study, I describe a second survey using such instrument.

## 4.2 Study 2

In Study 2, I aimed to use the qualitative information acquired in the previous study to investigate the main psychological, bodily and social experiences of group singing in a

quantitative way. Evidence from previous studies was also used to develop the statements used in this study (i.e., Beck et al., 2000; Clift & Hancox, 2001; Bailey & Davidson, 2002, 2005; Clift et al., 2007, 2008; Clift & Hancox, 2010).

Following the model in the previous study, several statements were developed for each of the four broad experiential domains previously identified: psychological (including spiritual experiences), bodily and social. Each statement reflected evidence collected in the previous study but was also informed by the existing literature. For instance, positive emotions (e.g., happiness and joy) were mentioned thirty-eight times in the previous study. In the data reported by Clift and Hancox (2001), thirty-six out of fifty-nine respondents reported that choir singing made them feel really positive/feel good/feel happier. This evidence suggests positive emotions such as those are a significant characteristic of this activity. As such, that information was used to create several statements which were expected to tap into this possible aspect of the experience of singing (e.g. *I felt happy*).

In previous studies, participants were asked to consider their general experience with group singing. The exception to this was the study by Beck et al. (2000), which also asked participants to rate how much they had experienced several emotions after the particular sessions studied (two rehearsals and one performance). That study only focused on a handful of emotional experiences (i.e., satisfaction, enjoyment, excitement stress, anxiety and frustration) but it allowed a better understanding of specific effects of the activity of group singing on those emotions. In order to understand how group singing might be related to well-being, it is essential to investigate the nature of the activity and the processes that occur during it. One way to do so is to start by asking individuals to consider their experiences while they were singing or how they felt shortly after a particular singing session. In the present study, this exercise was facilitated by suggesting respondents should consider their most recent singing session and should fill the questionnaire as soon after the session as possible. It was reasoned that this would allow the collection of more

accurate information on the main experiences group singing may facilitate the actual experiences that may occur while someone is participating in group singing and significant effects that linger on shortly after the singing has finished.

As mentioned before, the aim of this research was to identify the main experiences of group singing that could lead to a better understanding of how this activity could relate to well-being. As such, there was a focus on experiences that were reported in both rehearsals and performances. It was reasoned that such experiences reflected the core and universal aspects of group singing, regardless of context or individual differences. These would be the experiences that, together, could better reflect processes brought about by the activity of group singing itself and not other factors. It could then be argued that these would be the experiences that could better explain the potential of group singing to promote the well-being of the majority of individuals.

#### **4.2.1 Method**

##### **Participants**

Participants were 112 singers (86 females) from several amateur choral societies in the South West and South East of England. Ninety-eight respondents filled in the questionnaire after a rehearsal and fourteen respondents filled in the questionnaire after a performance. Their ages ranged from 18 to 80 (6 unreported), with a mean of 46 years of age. Their experience with group singing ranged from 1 month to 50 years.

##### **Recruitment**

The same recruitment strategy was used as in the previous study. A list of potential participants was compiled with the help of the choirs.org website and the Sidney De Haan Research Centre resources. An email was then sent to the several choirs and community singing groups on this list, inviting singers to participate. Singers from the Canterbury

Christ Church University Choral Society were contacted directly, and in person. In both cases, potential participants were given the option to reply online or request a paper version of the questionnaire. While making the questionnaire available online makes for an easier access to participation, it does not allow for answers to be provided right after a singing session. Beck et al. (2000) noted that participants described their overall experience with singing in a positive light but, when describing a specific experience with singing, the nuances of that experience were clearer, with both positive and negative feelings coming through. It was possible that a distance from the event could prevent respondents from sharing experiences that actually occurred, and replace them with their overall feeling about their experience with singing. Instead of sharing what they had just experienced, respondents could simply revert to reporting what they usually experience with singing. Nonetheless, in both cases (paper/online) respondents were asked to complete the questionnaire as soon after the singing experience as possible. In specific, they were asked to complete the questionnaire no later than two hours after a rehearsal or performance.

### **Procedure**

This was a questionnaire study where respondents were asked to complete a questionnaire after a group singing rehearsal or performance. The questionnaire was made available in three different ways: online, hard-copy through post and in person (in the case of the Canterbury Christ Church University Choral Society).

### **Materials**

The questionnaire had three main sections. In the first one, respondents were asked to provide demographic information and answer questions about their experience with group singing (e.g., how long they had been part of the choir, how often they performed, or whether they were filling the questionnaire after a rehearsal or a performance). The

second section of the questionnaire contained the majority of items and asked respondents to consider what they felt during singing and specify how strongly they agreed or disagreed with the statements on a scale of 1, *Strongly Disagree*, to 5, *Strongly Agree*. The third, and final, section of the questionnaire asked respondents to specify how they felt at that moment, using the same scale.

### Questionnaire items

The statements used can be found on Table 4.4. The items were developed considering the four broad proposed domains, the more specific experiences identified on study 1 and the evidence on the existing literature. However, as mentioned above, there was a focus on the more frequent and universal experiences identified. For instance, experiences of increased body temperature may occur during group singing but were only mentioned twice in the previous study and only in relation to rehearsals. Even though increased body temperatures may reflect increased physical exercise or other physical or physiological processes, the experience of increased body temperature itself may be more a result of individual or contextual differences than a universal characteristic of group singing.

It is also relevant to stress that although items are grouped on table 4.4 by main domain and specific area of experience, this grouping is merely descriptive and no psychometric testing was conducted to assert the validity of each grouping to measure the specific area of experience as its underlying construct.

Table 4.4: Items used by main domain and specific area of experience

<b>Psychological Experiences</b>	
Personal Growth	I feel a real sense of achievement after this singing session. I feel I have achieved something important after this singing session. I feel like I learned something new in this singing session.
Positive Emotions	I felt happy. I felt joy during this singing session. I felt confident about my singing voice.

(Continue)

(Continued)

	I feel relaxed. I feel proud of my performance during this singing session.
Negative Emotions	I was frustrated by my inability to reach the correct notes. I felt self-conscious during this singing session. I felt anxious during the singing session. I felt nervous while I was singing. This singing session has put me under stress. I found it hard to wind down during this singing session. I found it difficult to relax during this singing session.
Concentration/ Attention	I found it hard to concentrate during this singing session. My lifes worries were on my mind during this singing session. I felt that time passed quickly during this singing session. I felt lost or uncertain about my part during this singing session. I felt bored during this singing session.
Spiritual Experiences	I experienced a strong spiritual feeling. I did not experience any kind of spiritual feelings during this singing session.
<b>Bodily Experiences</b>	
Arousal	I felt energized during the singing session. I feel energized after this singing session. I feel energetic after this singing session. I felt an increase in my heart rate during this singing session. I could feel my heart beat.
Feeling "high"/elated/getting a "buzz"	I experienced a kind of high during this singing session.
Feeling tired	I felt tired during the singing session. I feel tired after this singing session.
Voice	I was aware of a dryness in my mouth and/or throat.
Breathing	I experienced breathing difficulties.
<b>Social Experiences</b>	
Positive social experiences	I felt close to people. I felt connected with the other singers. I felt the support of the singers around me. I felt the choir was bonding throughout this singing session. I felt I bonded with those standing close to me during this singing session. I felt all sections of the choir were working towards the same goal.

(Continue)



(Continued)

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Negative social	I felt frustrated by the behaviour of other members of the choir.
experiences	I felt frustrated by the performance of other members of the choir during this singing session.
	I felt annoyed by other people in the group during this singing session.
	I found myself feeling concerned about the quality of my singing compared to that of those around me.
	I felt exposed during this singing session.
	I felt self-conscious during this singing session.
	I do not feel a sense of togetherness with the other singers.
	I didn't feel I participated in the singing.
	I feel like an outsider.
	I do not feel related to the other singers.

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### 4.2.2 Results

Tables 4.5, 4.6 and 4.7 report the mean, standard deviations, sample size (which varies depending on missing values), and distribution of percentage frequencies of responses to each statement. These were ordered from the percentage of “strongly disagree” responses to the percentage of “strongly agree” responses.

The statement “I felt happy” produced the highest percentage of strong agreement (43%), followed by “I felt all sections of the choir were working towards the same goal” (37%). On the other hand, “I didn’t feel I participated in the singing” produced the highest percentage of strong disagreement (71%), followed by “I felt bored” (64%). Finally, the statement “I feel a real sense of achievement after this singing session” had the highest percentage of “undecided” responses (40%).

Consistent with the findings on study 1, experiences involving positive emotions, positive social experiences, feelings of arousal, and a feeling of “high”, had the highest ratings of agreement.

Feelings of concentration were also suggested by high percentages of disagreement with the sentences “I found it hard to concentrate during this singing session” (49%), “My lifes worries were on my mind during this singing session” (59%) and “I felt bored”. Agreement with feelings that time passed quickly (54%) also suggested that concentration was involved.

Out of the negative emotions, frustration with one’s voice had the highest rating of agreement (25%), followed by the statements “I found it hard to wind down” (17%) and “I felt anxious” (11%).

Regarding negative experiences of singing with others, the statements with highest percentages of agreement were “I do not feel a sense of togetherness with the other singers” (35%) and “I found myself feeling concerned about the quality of my singing compared to that of those around me” (20%).

Table 4.5: Mean, standard deviations, n and distribution of percentage frequencies of responses from 1 “strongly disagree” to 5 “strongly agree” (3 represented “undecided”)

Psychological Experiences		M	SD	n	1	2	3	4	5
Personal Growth	I feel a real sense of achievement after this singing session.	3.91	0.85	110	1.8	5.5	13.6	58.2	20.9
	I feel I have achieved something important after this singing session.	3.77	0.90	111	1.8	9.0	17.1	55.0	17.1
	I feel like I learned something new in this singing session.	3.96	0.89	111	4.5	3.6	3.6	67.6	20.7
Positive Emotions	I felt happy.	4.33	0.70	112	0.9	0.9	5.4	50.0	42.9
	I felt joy during this singing session.	4.06	0.76	112	1.8	0.9	12.5	58.9	25.9
	I felt confident about my singing voice.	3.60	0.97	111	1.8	12.6	25.2	44.1	16.2
	I feel relaxed.	4.03	0.71	111	0.9	2.7	9.9	65.8	20.7
	I feel proud of my performance during this singing session.	3.77	0.90	111	1.8	9.0	17.1	55.0	17.1
Negative Emotions	I was frustrated by my inability to reach the correct notes.	2.66	1.28	112	20.5	33.9	12.5	25.0	8.0
	I felt self-conscious during this singing session.	1.81	0.94	112	44.6	39.3	6.3	9.8	-
	I felt anxious during the singing session.	1.82	1.02	111	48.6	33.3	6.3	10.8	0.9
	I felt nervous while I was singing.	1.52	0.67	111	55.0	40.5	1.8	2.7	-
	This singing session has put me under stress.	1.51	0.75	111	59.5	33.3	4.5	1.8	0.9
	I found it hard to wind down during this singing session.	2.35	1.09	111	22.5	42.3	15.3	17.1	2.7
	I found it difficult to relax during this singing session.	1.88	0.85	112	35.7	43.7	11.6	4.5	0.9
	Concentration/Attention	I found it hard to concentrate during this singing session.	1.68	0.84	112	49.1	40.2	5.4	4.5
	My lifes worries were on my mind during this singing session.	1.55	0.77	111	58.6	31.5	6.3	3.6	-
	I felt that time passed quickly during this singing session.	3.88	0.94	112	3.6	4.5	15.2	53.6	23.2
	I felt lost or uncertain about my part during this singing session.	2.47	1.23	111	26.1	33.3	11.7	25.2	3.6
	I felt bored during this singing session.	1.50	0.80	111	64.0	26.1	5.4	4.5	-
Spiritual Experiences	I experienced a strong spiritual feeling.	3.21	1.11	111	7.2	18.9	32.4	28.8	12.6
	I did not experience any kind of spiritual feelings during this singing session.	2.70	1.18	111	18.0	27.9	26.1	21.6	6.2

Table 4.6: Mean, standard deviations, n and distribution of percentage frequencies of responses from 1 “strongly disagree” to 5 “strongly agree” (3 represented “undecided”)

Bodily Experiences		M	SD	n	1	2	3	4	5	
Arousal	I felt energized during the singing session.	4.14	0.73	112	0.9	2.7	7.1	59.8	29.5	
	I feel energized after this singing session.	3.99	0.89	111	2.7	5.4	7.2	59.5	25.2	
	I feel energetic after this singing session.	3.71	0.99	111	2.7	9.9	20.7	46.8	19.8	
	I felt an increase in my heart rate during this singing session.	2.78	1.14	110	14.5	30.0	21.8	30.0	3.6	
	I could feel my heart beat.	2.06	1.10	112	34.8	42.9	7.1	11.6	3.6	
Feeling “high”/ elated/ getting “buzz”	a	I experienced a kind of high during this singing session.	3.73	0.96	112	1.8	11.6	17.0	50.9	18.8
Feeling tired	I felt tired during the singing session.	2.32	1.18	112	27.7	39.3	9.8	19.6	3.6	
	I feel tired after this singing session.	2.75	1.21	110	16.4	34.5	10.9	33.6	4.5	

Although the number of respondents filling in the questionnaire after a rehearsal was larger than the number of respondents answering after a performance, it was considered relevant to explore the patterns of responses in each context. Tables 4.8, 4.9 and 4.10 contain means and standard deviations for each statement in rehearsals and performances. While the number of respondents who completed the questionnaire after a performance was constant, the variations previously seen in the sample size were due to missing values in the rehearsals’ sub-sample.

In general, performances were associated with stronger positive emotions, stronger feelings of achievement, stronger spiritual feelings, stronger feelings of arousal and singer’s ‘high’, and stronger positive social experiences. Performances were also associated with stronger feelings of anxiety.

Rehearsals were associated with more negative emotions, such as frustration, nervousness and feelings of self-consciousness. At the same time, feelings of relaxation were reported higher after rehearsals than performance. Feelings of boredom, finding it harder

Table 4.7: Mean, standard deviations, n and distribution of percentage frequencies of responses from 1 “strongly disagree” to 5 “strongly agree” (3 represented “undecided”)

	Social Experiences	M	SD	n	1	2	3	4	5
Positive social experiences	I felt close to people.	3.66	0.88	112	3.6	6.3	20.5	59.8	9.8
	I felt connected with the other singers.	3.89	0.91	112	3.6	3.6	15.2	55.4	22.3
	I felt the support of the singers around me.	3.99	.78	112	0.9	5.4	12.5	61.6	20.5
	I felt the choir was bonding throughout this singing session.	3.94	0.79	112	0.9	5.4	12.5	61.6	19.6
	I felt I bonded with those standing close to me during this singing session.	3.84	0.86	112	1.8	6.3	16.1	58.0	17.9
	I felt all sections of the choir were working towards the same goal.	4.25	0.69	112	0.9	-	8.9	53.6	36.6
Negative social experiences	I felt frustrated by the behaviour of other members of the choir.	1.96	0.89	112	36.6	42.0	10.7	9.8	0.9
	I felt frustrated by the performance of other members of the choir during this singing session.	2.07	0.96	111	27.0	52.3	9.0	9.9	1.8
	I felt annoyed by other people in the group during this singing session.	1.97	0.98	111	36.9	39.6	13.5	9.0	0.9
	I found myself feeling concerned about the quality of my singing compared to that of those around me.	2.53	1.12	111	16.2	43.2	16.2	19.8	4.5
	I felt exposed during this singing session.	1.76	0.96	112	48.2	37.5	7.1	4.5	2.7
	I felt self-conscious during this singing session.	1.81	0.94	112	44.6	39.3	6.3	9.8	-
	I do not feel a sense of togetherness with the other singers.	2.84	1.39	111	24.3	22.5	8.1	35.1	9.9
	I didn't feel I participated in the singing.	1.33	0.61	112	71.4	25.9	1.8	-	0.9
	I feel like an outsider.	1.50	0.74	111	60.4	33.3	3.6	1.8	0.9
	I do not feel related to the other singers.	1.90	0.99	111	38.7	45.0	6.3	7.2	2.7

Table 4.8: Mean and standard deviations for each statement in rehearsals (n=96-98) and performances (n=14)

		Total		Rehearsals		Performance	
Psychological Experiences		M	SD	M	SD	M	SD
Personal Growth	I feel a real sense of achievement after this singing session.	3.91	0.85	3.80	0.84	4.64	0.50
	I feel I have achieved something important after this singing session.	3.77	0.90	3.71	0.88	4.14	1.03
	I feel like I learned something new in this singing session.	3.96	0.89	3.96	0.87	4.14	1.03
Positive Emotions	I felt happy.	4.33	0.70	4.29	0.72	4.64	0.50
	I felt joy during this singing session.	4.06	0.76	3.99	0.75	4.57	0.65
	I felt confident about my singing voice.	3.60	0.97	3.53	0.95	4.14	0.95
	I feel relaxed.	4.03	0.71	4.05	0.70	3.86	0.77
	I feel proud of my performance during this singing session.	3.77	0.90	3.71	0.88	4.14	1.03
Negative Emotions	I was frustrated by my inability to reach the correct notes.	2.66	1.28	2.72	1.27	2.21	1.31
	I felt self-conscious during this singing session.	1.81	0.94	1.85	0.93	1.57	0.94
	I felt anxious during the singing session.	1.82	1.02	1.74	0.98	2.36	1.15
	I felt nervous while I was singing.	1.52	0.67	1.54	0.69	1.43	0.51
	This singing session has put me under stress.	1.51	0.75	1.52	0.78	1.50	0.52
	I found it hard to wind down during this singing session.	2.35	1.09	2.30	1.06	2.71	1.27
	I found it difficult to relax during this singing session.	1.88	0.85	1.88	0.84	1.86	0.95
Concentration/Attention	I found it hard to concentrate during this singing session.	1.68	0.84	1.73	0.87	1.29	0.47
	My lifes worries were on my mind during this singing session.	1.55	0.77	1.63	0.80	1.00	0.00
	I felt that time passed quickly during this singing session.	3.88	0.94	3.82	0.97	4.63	0.50
	I felt lost or uncertain about my part during this singing session.	2.47	1.23	2.55	1.23	1.93	1.07
	I felt bored during this singing session.	1.50	0.80	1.56	0.83	1.14	0.36
Spiritual Experiences	I experienced a strong spiritual feeling.	3.21	1.11	3.08	1.09	4.07	0.92
	I did not experience any kind of spiritual feelings during this singing session.	2.70	1.18	2.86	1.16	1.64	0.75

Table 4.9: Mean and standard deviations for each statement in rehearsals (n=96-98) and performances (n=14)

		Total		Rehearsals		Performance	
Bodily Experiences		M	SD	M	SD	M	SD
Arousal	I felt energized during the singing session.	4.14	0.73	4.08	0.73	4.57	0.65
	I feel energized after this singing session.	3.99	0.89	3.94	0.92	4.36	0.50
	I feel energetic after this singing session.	3.71	0.99	3.68	1.02	3.93	0.73
	I felt an increase in my heart rate during this singing session.	2.78	1.14	2.67	1.11	3.57	1.02
	I could feel my heart beat.	2.06	1.10	2.01	1.04	2.43	1.45
Feeling “high”/ elated/ getting a “buzz”	I experienced a kind of high during this singing session.	3.73	0.96	3.65	0.91	4.29	1.14
Feeling tired	I felt tired during the singing session.	2.32	1.18	2.43	1.18	1.57	0.85
	I feel tired after this singing session.	2.75	1.21	2.76	1.22	2.71	1.20

to concentrate or feeling lost about their part, were also higher in rehearsals than performance. Feelings of tiredness and most negative social experiences were also rated higher by those respondents referring to rehearsals. The exception to this trend were the items “I do not feel a sense of togetherness with the other singers” and “I didn’t feel I participated in the singing”, which received higher ratings by the participants referring to performances.

The statement “My life’s worries were on my mind during this singing session” was the only to have been strongly disagreed by every respondent answering after a performance.

Statistical tests results would not allow a generalization of findings, given the great disparity between sample sizes, but they might be useful to understand if, in this sample, the differences reported above were sufficiently large to reject the null hypothesis. Independent t-tests were conducted for all statements. In the interest of accuracy, all reported tests upheld the assumption of equality of variances (i.e., Levene’s test was not significant,  $p < .05$ ).

Respondents answering after a performance provided a higher rate of agreement with

Table 4.10: Mean and standard deviations for each statement in rehearsals (n=96-98) and performances (n=14)

		Total		Rehearsals		Performance	
Social Experiences		M	SD	M	SD	M	SD
Positive social ex- periences	I felt close to people.	3.66	0.88	3.62	0.91	3.93	0.48
	I felt connected with the other singers.	3.89	0.91	3.82	0.93	4.43	0.51
	I felt the support of the singers around me.	3.99	.78	3.96	0.80	4.21	0.58
	I felt the choir was bonding throughout this singing session.	3.94	0.79	3.90	0.81	4.21	0.58
	I felt I bonded with those standing close to me during this singing session.	3.84	0.86	3.79	0.87	4.21	0.70
	I felt all sections of the choir were working towards the same goal.	4.25	0.69	4.20	0.70	4.57	0.51
Negative social experiences	I felt frustrated by the behaviour of other members of the choir.	1.96	0.89	1.98	0.97	1.86	1.03
	I felt frustrated by the performance of other members of the choir during this singing session.	2.07	0.96	2.08	0.99	2.00	0.78
	I felt annoyed by other people in the group during this singing session.	1.97	0.98	2.01	0.98	1.71	0.91
	I found myself feeling concerned about the quality of my singing compared to that of those around me.	2.53	1.12	2.55	1.07	2.43	1.45
	I felt exposed during this singing session.	1.76	0.96	1.78	0.99	1.64	0.75
	I felt self-conscious during this singing session.	1.81	0.94	1.85	0.93	1.57	0.94
	I do not feel a sense of togetherness with the other singers.	2.84	1.39	2.73	1.40	3.57	1.09
	I didn't feel I participated in the singing.	1.33	0.61	1.32	0.51	1.43	1.09
	I feel like an outsider.	1.50	0.74	1.52	0.77	1.36	0.50
	I do not feel related to the other singers.	1.90	0.99	1.95	1.02	1.57	0.65



the statement “I feel a real sense of achievement after this singing session”, and this was significantly higher than the ratings provided by respondents answering after a rehearsal,  $t(108) = -3.64, p < .001$ .

The statements “I felt joy during this singing session” and “I felt confident about my singing voice” were also rated significantly higher by respondents answering after a performance,  $t(110) = -2.75, p < .01$  and  $t(109) = -2.28, p < .05$ , respectively.

Of the negative emotions, only the differences in the ratings of the statement “I felt anxious during the singing session” were significant,  $t(109) = -2.14, p < .05$ .

Differences in the rehearsal and performance ratings were also significant in the statement “I felt that time passed quickly during this singing session.”,  $t(110) = -2.05, p < .05$ .

The statement “I experienced a strong spiritual feeling” was rated higher by those responding after a performance than those responding after a rehearsal and this difference was significant,  $t(109) = -3.24, p < .01$ . The statement meant to refer to the opposite, “I did not experience any kind of spiritual feelings during this singing session”, was rated higher by those responding after a rehearsal than those after a performance, and this difference was also significant,  $t(109) = 3.81, p < .001$ .

Respondents who completed the questionnaire after a performance reported feeling energized more so than respondents who completed the questionnaire after a rehearsal, and this difference was significant,  $t(110) = -2.39, p < .02$ . Similarly, performance was associated with higher ratings of feeling an increase in heart rate, and this too was significantly different from the ratings provided by respondents after a rehearsal,  $t(108) = -2.87, p < .01$ .

Experiencing feelings of ‘high’ was more common after performances than after rehearsals and the difference in ratings between different contexts was significant,  $t(110) = -2.36, p < .05$ .

Regarding differences in positive social experiences, only the statement “I felt connected with the other singers” was rated significantly higher by those after a performance than by those after a rehearsal,  $t(110) = -2.39, p < .02$ .

Finally, regarding differences in negative social experiences, there were no significant differences between the ratings after a rehearsal and the ratings after a performance.

### 4.2.3 Discussion

In this study, the structured questionnaire informed by the findings on study 1 and available literature, was completed by group singers after rehearsals and performances. The qualitative evidence on Study 1 suggested that there were a number of common experiences to both rehearsals and performances. The structured questionnaire on Study 2 was meant to reflect that commonality in an attempt to focus on broad and universal experiences of group singing.

Consistent with the evidence on study 1 and previous studies (e.g., Bailey & Davidson, 2005), statements referring to positive emotions, positive social experiences, positive feelings of arousal (mainly feeling energized), and a feeling of “high”, had the highest ratings of agreement. In particular, the statement “I felt happy” produced the highest percentage of strong agreement, followed by “I felt all sections of the choir were working towards the same goal”. There was also evidence that group singing involved concentration, as suggested by high percentages of disagreement with the sentences “I found it hard to concentrate during this singing session” and “I felt bored”. High percentages of agreement with feelings that time passed quickly also supported the argument that concentration was involved.

This evidence suggests that the activity of group singing involves psychological, bodily and social processes which result in positive experiences at these diverse levels of functioning. It is possible such effects result from an interaction of those domains. For instance, group singing requires individuals to work together to reach a common goal, and such might require strong focus of attention and intense concentration in the task at hand. Succeeding at reaching goals together might then be a source of positive feelings, such as happiness.

However, the evidence described in the previous section also suggests that there may be some negative aspects of singing with others, particularly regarding insecurities with

one's own voice. Out of the negative emotions, feelings of frustration with one's voice had the highest rating of agreement. Regarding negative experiences of singing with others, the statement "I found myself feeling concerned about the quality of my singing compared to that of those around me" had the second highest percentage of agreement. Bailey and Davidson (2005) had previously suggested that middle-class amateur choir singers did not fully enjoy the experience of group singing, particularly in public, due to concerns related to the quality of their singing. Shared and widespread notions of what a "good voice" should sound like could lead to feelings of inadequacy or increased concern over expressing one's singing voice in front of others. While singing in a group could provide a safe environment to experiment with one's voice (Bailey & Davidson, 2005), it is also possible that it would increase feelings that others are listening to and judging our voices. The singers who completed the structured questionnaire in the present study, were all from groups that follow the English choral tradition. Being an amateur singer does not seem take the pressure off performing within the expected standards, as Bailey and Davidson (2005) had suggested.

Finally, the trend of responses discusses in the previous paragraphs was similar across both rehearsal and performance contexts. That is, both contexts involved similar psychological, bodily and social experiences. This supports the argument that the statements used in this questionnaire captured core and universal aspects of psychological, bodily and social experiences of group singing, regardless of other factors, such as context. However, as had been the case in study 1, there seemed to be a difference in the degree of some particular experiences.

Within the topic of personal growth, for instance, the statement "I feel I have achieved something important after this singing session", was rated higher by respondents answering after a performance than those answering after a rehearsal, and this difference was significant. Regarding positive emotions, there were two statements which were also rated

significantly higher by respondents answering after a performance: “I felt joy during this singing session” and “I felt confident about my singing voice”. The majority of statements referring to negative emotions was rated similarly in both contexts. The only exception was the statement “I felt anxious during the singing session”, which had significantly higher ratings in performances. The same was the case for statements referring to concentration, where only the statement “I felt that time passed quickly during this singing session” was rated significantly higher in performances. Regarding bodily experiences, feeling energized, feeling an increase in heart rate and experiencing singer’s ‘high’, were also significantly more common in performances than rehearsals. Finally, regarding social experiences, only the statement “I felt connected with the other singers” was rated significantly higher by those after a performance than by those after a rehearsal.

These findings suggest that, while the activity of group singing might involve psychological, bodily and social processes that are common to any experience of group singing (e.g., group singing requires individuals to interact with one another and work together to achieve a common goal), the strength of some effects of those processes might be influenced by other factors. The context in which performances occur, for instance, appears to involve factors external to the activity of group singing itself that seem to enhance some particular effects of the experience of group singing.

The findings above are encouraging and certainly appear to show that the structured questionnaire contained statements that reflected universal experiences of group singing. However, there were some areas that were under-explored, and therefore it was not possible to draw conclusions about them. For instance, the statements used to refer to voice and breathing appear to be limited and not entirely reflect the range of bodily experiences at those levels. Another type of experiences that could have been limited by the statements used was that referring to concentration and attention. Experiences regarding this area were mostly referred to with statements reflecting the absence of attention or

concentration, and no actual statement referred to the presence of concentration.

In order to overcome these limitations, a second version of the questionnaire was developed to include improvements in those areas. This improved version was then used to further explore main psychological, bodily and social experiences of group singing. It was believed that the next logical step was to do so with a quasi-experimental design. This would allow a closer understanding of possible causal links between the activity and its effects. In Study 3, this was done by asking members of one choral ensemble to complete the structured questionnaire after a rehearsal and after a performance. Investigating responses by the same individuals in two different contexts provided an opportunity to further understand the processes involved in the main psychological, bodily and social experiences of group singing and how their effects might be enhanced.

## **4.3 Study 3**

### **4.3.1 Method**

#### **Participants**

Participants were 16 members of a choral ensemble, constituted mostly of students and alumni from the music department at Canterbury Christ Church University. Their ages ranged from 18 to 49, with a mean of 22 years of age. Their time in the ensemble ranged from 1 to 5 years.

#### **Recruitment**

The procedure was similar to the one for the members of the Choral Society. Members of the choral ensemble “Cantata Choir” were contacted directly after a rehearsal. The conductor of the choir, Prof. Grenville Hancox, allowed me to come over and ask singers to complete the questionnaire after a rehearsal and a performance. In this instance, the

option offered was paper version as it would have more success of being completed on the spot.

### **Procedure**

The procedure was similar to that of Study 2 except the only type of questionnaire made available was in paper. Also, respondents in this study filled in the questionnaire both after a rehearsal and after a performance. After each session, singers were informed (or reminded, in the case of the performance) about the aims and procedure of the study, its voluntary nature and strict confidentiality of their responses. Questionnaires were distributed to those who were willing to participate, and filled on the spot.

### **Materials**

The questionnaire used in this study was similarly structured to that used on Study 2. The main differences were on the items added and removed and the scale used. While on Study 2 the scale was from 1, *Strongly Disagree*, to 5, *Strongly Agree*; in this study, it was a scale from 1, *Strongly Disagree*, to 7, *Strongly Agree*. It was reasoned that a wider range of options could better capture nuances in individual responses.

### **Questionnaire items**

The improved version of the structured questionnaire used in this study, can be found on table 4.11. This version reflected a refinement of the original version. This was done by adding statements (in bold on table 4.11) that reflected the target experiences better. For instance, in the first version of this structured questionnaire, there was one statement referring to physical experiences with voice. After the analysis of the data on Study 2, however, it was noted that it would be useful to add statements reflecting the wider range of physical vocal experiences. These would also be more closely related to the experiences

described by singers on study 1. Other statements added referred to spiritual experiences, experiences with breathing and posture, and statements referring to mental stimulation.

As with study 2, it is important to note that the groupings on table 4.11 are merely descriptive and no psychometric testing was conducted to assert the validity of each grouping to measure the specific area of experience as its underlying construct.

Table 4.11: Items used organized by main domain and specific area of experience

	Psychological Experiences
Personal Growth	I feel a real sense of achievement after this singing session. I feel I have achieved something important after this singing session. I feel like I learned something new in this singing session.
Positive Emotions	I felt happy. I felt joy during this singing session. I felt confident about my singing voice. I feel relaxed. I feel proud of my performance during this singing session.
Negative Emotions	I was frustrated by my inability to reach the correct notes. I felt self-conscious during this singing session. I felt anxious during the singing session. I felt nervous while I was singing. This singing session has put me under stress. I found it hard to wind down during this singing session. I found it difficult to relax during this singing session.
Concentration/Attention	<b>I felt completely focused during this singing session.</b> My lifes worries were on my mind during this singing session. I felt that time passed quickly during this singing session. I felt lost or uncertain about my part during this singing session. I felt bored during this singing session.
Mental stimulation	<b>The musical piece challenged me to do better.</b> <b>I felt mentally stimulated.</b>
Spiritual Experiences	I experienced a strong spiritual feeling. I did not experience any kind of spiritual feelings during this singing session. <b>It felt as though the music was coming from external sources rather than inside me.</b>

(Continue)



(Continued)

**I felt a deep emotional feeling that I could describe as spiritual.**

Bodily Experiences	
Arousal	<p>I felt energized during the singing session.            I feel energized after this singing session.            I feel energetic after this singing session.            I felt an increase in my heart rate during this singing session.            I could feel my heart beat.  <b>I felt butterflies in my stomach.</b></p>
Feeling “high”/elated/getting a “buzz”	<p>I experienced a kind of high during this singing session.  <b>I feel a rush of adrenaline.</b>  <b>I feel a kind of a high.</b></p>
Feeling tired	<p>I felt tired during the singing session.            I feel tired after this singing session.</p>
Voice	<p><b>I felt a strain in my voice.</b>  <b>My throat feels scratched.</b>  <b>My voice felt hoarse.</b>  <b>My throat muscles felt tense.</b>  <b>My throat muscles felt relaxed.</b>  <b>My voice feels hoarse.</b></p>
Breathing	<p><b>I had a good control over my breathing.</b>  <b>I found it hard to control my breathing.</b>  <b>I was out of breath easily.</b>  <b>I was able to hold my breath for as long as I needed to.</b>  <b>I made a conscious effort to breath properly.</b></p>
Posture	<p><b>I was conscious of maintaining a good posture.</b>  <b>My posture automatically changed and became straight.</b>  <b>I had to remember to sit straight.</b>  <b>I experienced back pain.</b></p>
Social Experiences	
Positive social experiences	<p>I felt close to people.            I felt connected with the other singers.            I felt the support of the singers around me.            I felt the choir was bonding throughout this singing session.            I felt I bonded with those standing close to me during this singing session.            I felt all sections of the choir were working towards the same goal.  <b>I felt everyone was participating in a common effort that benefited all.</b></p>
Negative social experiences	<p>I felt frustrated by the behaviour of other members of the choir.            I felt some of the sections of the choir were not working towards the main goal.</p>

(Continue)

(Continued)

I found myself feeling concerned about the quality of my singing compared to that of those around me.

I felt exposed during this singing session.

I felt self-conscious during this singing session.

I do not feel a sense of togetherness with the other singers.

I didn't feel I participated in the singing.

I feel like an outsider.

I do not feel related to the other singers.

---

### 4.3.2 Results

In this analysis, high ratings of agreement were considered to be those generating an overall mean  $> 4$ . Consistent with the findings on Studies 1 and 2, respondents provided higher ratings of agreement, across both conditions, with the statements referring to feelings of achievement, positive emotions, feelings of concentration, feelings of increased energy, singer's 'high', and the majority of statements referring to positive social experiences. In this version of the questionnaire it also emerged that respondents provided high ratings in the statements referring to mental stimulation and breathing (control and awareness). The statements "My throat muscles felt relaxed" and "My posture automatically changed and became straight" also received high ratings of agreement.

There were several other statements that also had high ratings of agreement (mean  $> 4$ ) but only after one of the conditions. The statements "I felt bored during this singing session", "I felt frustrated by the behaviour of other members of the choir" and "I felt some of the sections of the choir were not working towards the main goal" received high ratings of agreement after the rehearsal. The statements "I felt an increase in my heart rate during this singing session", "I was conscious of maintaining a good posture", "I felt the choir was bonding throughout this singing session", and "I felt all sections of the choir were working towards the same goal", received high ratings of agreement after the performance. The statement "I feel a rush of adrenaline" also received high ratings

of agreement after the performance, but the mean ratings after the rehearsal were only slightly under 4.

Respondents answered each statement twice - once after a rehearsal and once after a performance. For this reason, repeated-measures *t*-tests were conducted on each pair of responses for each statement, to investigate whether any differences were significant.

Table 4.12: Mean and standard deviations for each statement in rehearsals and performances (n=16)

		Rehearsal		Performance	
Psychological Experiences		Mean	SD	Mean	SD
Personal Growth	I feel a real sense of achievement after this singing session.	4.13	1.54	5.13	1.54
	I feel I have achieved something important after this singing session.	4.56	1.41	5.19	1.56
	I feel like I learned something new in this singing session.	2.73	1.91	3.13	1.69
Positive Emotions	I felt happy.	5.20	1.42	6.00	1.13
	I felt joy during this singing session.	5.00	1.25	5.33	1.29
	I felt confident about my singing voice.	5.73	0.96	5.67	1.11
	I feel relaxed.	5.00	1.46	4.81	1.60
	I feel proud of my performance during this singing session.	4.56	1.42	5.19	1.56
Negative Emotions	I was frustrated by my inability to reach the correct notes.	1.80	1.57	1.93	1.58
	I felt self-conscious during this singing session.	1.73	1.28	1.73	1.28
	I felt anxious during the singing session.	1.00	0.00	2.20	1.57
	I felt nervous while I was singing.	1.06	0.25	2.00	1.59
	This singing session has put me under stress.	1.40	1.06	2.00	1.46
	I found it hard to wind down during this singing session.	2.87	1.73	3.47	1.73
	I found it difficult to relax during this singing session.	2.00	1.16	1.94	1.00
	I felt completely focused during this singing session.	4.00	1.51	5.13	1.46

(Continue)

(Continued)

		My lifes worries were on my mind during this singing session.	2.13	1.19	2.07	1.67
		I felt that time passed quickly during this singing session.	4.40	1.30	5.07	1.53
		I felt lost or uncertain about my part during this singing session.	1.87	1.41	1.73	1.44
		I felt bored during this singing session.	4.13	1.54	3.50	1.59
Mental stimulation		The musical piece challenged me to do better.	4.87	1.55	5.07	1.49
		I felt mentally stimulated.	5.20	1.27	5.13	1.36
Spiritual Experiences		I experienced a strong spiritual feeling.	3.60	1.45	3.80	1.66
		I did not experience any kind of spiritual feelings during this singing session.	3.00	1.77	2.87	1.64
		It felt as though the music was coming from external sources rather than inside me.	2.07	0.92	2.64	1.28
		I felt a deep emotional feeling that I could describe as spiritual.	3.33	1.59	3.53	1.92
Bodily Experiences						
Arousal		I felt energized during the singing session.	5.07	1.00	5.36	1.15
		I feel energized after this singing session.	4.94	1.48	5.69	1.40
		I feel energetic after this singing session.	4.38	1.59	4.94	1.57
		I felt an increase in my heart rate during this singing session.	2.19	1.28	3.06	2.54
		I could feel my heart beat.	3.47	1.64	4.67	1.59
		I felt butterflies in my stomach.	2.53	1.25	3.33	1.45
Feeling "high"/ elated/ "buzz"	getting a	I experienced a kind of high during this singing session.	3.94	1.44	4.81	1.60
		I feel a rush of adrenaline.	4.67	1.23	4.93	1.44
		I feel a kind of a high.	4.56	1.50	5.13	1.75
Feeling tired		I felt tired during the singing session.	3.60	2.03	3.00	2.07
		I feel tired after this singing session.	4.00	2.14	3.93	1.83
Voice		I felt a strain in my voice.	2.47	1.60	2.73	1.49
		My throat feels scratched.	1.69	0.95	2.06	1.24
		My voice felt hoarse.	2.36	1.65	2.57	1.51

(Continue)

(Continued)

	My throat muscles felt tense.	2.13	1.50	3.06	1.65
	My throat muscles felt relaxed.	4.94	1.65	4.06	1.65
	My voice feels hoarse.	2.06	1.39	3.06	1.77
Breathing	I had a good control over my breathing.	5.07	0.96	5.00	1.36
	I found it hard to control my breathing.	1.87	0.74	1.80	0.94
	I was out of breath easily.	2.81	1.76	2.44	1.79
	I was able to hold my breath for as long as I needed to.	5.00	1.03	4.44	1.59
	I made a conscious effort to breath properly.	5.67	1.68	5.13	1.89
Posture	I was conscious of maintaining a good posture.	3.73	1.79	4.13	1.41
	My posture automatically changed and became straight.	4.38	1.54	4.50	1.71
	I had to remember to sit straight.	1.88	1.26	3.94	1.84
	I experienced back pain.	3.15	1.91	3.23	2.20
Social Experiences					
Positive social experiences	I felt close to people.	4.93	1.59	5.07	1.49
	I felt connected with the other singers.	4.56	1.15	5.00	1.41
	I felt the support of the singers around me.	4.44	1.03	4.69	1.45
	I felt the choir was bonding throughout this singing session.	3.64	1.28	4.93	1.39
	I felt I bonded with those standing close to me during this singing session.	4.47	1.64	4.87	1.30
	I felt all sections of the choir were working towards the same goal.	3.60	1.50	4.27	1.71
	I felt everyone was participating in a common effort that benefited all.	4.00	1.79	4.69	1.82
Negative social experiences	I felt frustrated by the behaviour of other members of the choir.	4.33	1.88	2.93	1.91
	I felt some of the sections of the choir were not working towards the main goal.	4.06	1.73	3.13	1.93
	I found myself feeling concerned about the quality of my singing compared to that of those around me.	3.00	2.36	2.20	1.66

(Continue)

(Continued)

I felt exposed during this singing session.	2.71	1.64	2.64	1.60
I felt self-conscious during this singing session.	1.73	1.28	1.73	1.28
I do not feel a sense of togetherness with the other singers.	2.56	1.86	1.75	1.29
I didn't feel I participated in the singing.	1.06	0.25	1.19	0.75
I feel like an outsider.	1.38	0.72	1.38	0.72
I do not feel related to the other singers.	2.44	1.59	1.63	0.86

The statement "I felt happy" had higher ratings of agreement after the performance than after the rehearsal, and this difference was significant,  $t(15) = -2.25$ ,  $p < .05$ .

Of the negative emotions, only the differences between the ratings of the statements "I felt anxious during the singing session" and "I felt nervous while I was singing" were significant,  $t(15) = -2.97$ ,  $p < .02$  and  $t(15) = -2.39$ ,  $p < .05$ , respectively. In both cases, respondents rated those statements higher after the performance.

Differences in the rehearsal and performance ratings were also significant in the statement "I felt completely focused during this singing session.",  $t(15) = -2.67$ ,  $p < .02$ . As can be seen on table 4.12, this statement was also rated higher after the performance.

From all the statements meant to refer to spiritual experiences, only the statement "It felt as though the music was coming from external sources rather than inside me" had significantly different ratings after the rehearsal and performance,  $t(15) = -2.28$ ,  $p < .05$  (higher ratings after the performance).

The statement "I felt energized after this singing session" received high ratings in both conditions but the ratings after the performance were significantly higher than the ratings after the rehearsal,  $t(15) = -3.22$ ,  $p < .01$ .

As mentioned above, the performance was associated with higher ratings of feeling an increase in heart rate, and this was significantly different from the ratings after the rehearsal,  $t(15) = -2.26$ ,  $p < .05$ . Similarly, the differences mentioned above in ratings of

the statement “I feel a rush of adrenaline” were also significant,  $t(15) = -3.05, p < .01$ .

The statement “My throat muscles felt tense” was rated higher after the performance than after the rehearsal, and this difference was significant,  $t(15) = -2.91, p < .02$ . On the other hand, the statement “My throat muscles felt relaxed” was rated higher after the rehearsal than the performance, and this difference was also significant,  $t(15) = 2.57, p < .05$ .

Out of the statements referring to posture, only the statement “I had to remember to sit straight” had significantly higher ratings after performance than after rehearsal,  $t(15) = -4.39, p < .02$ .

Regarding differences in positive social experiences, only the statement mentioned above “I felt the choir was bonding throughout this singing session” was rated significantly higher after the performance than after the rehearsal,  $t(15) = -4.84, p < .001$ .

Finally, as mentioned above, the statements “I felt frustrated by the behaviour of other members of the choir” and “I felt some of the sections of the choir were not working towards the main goal” received higher ratings after the rehearsal than after the performance, and these differences were significant,  $t(15) = 2.54, p < .05$  and  $t(15) = 2.27, p < .05$ , respectively.

### 4.3.3 Discussion

In this study, an improved version of the structured questionnaire intended to address main psychological, bodily and social experiences of group singing, was completed by members of a choral ensemble on two occasions after a rehearsal and after a performance. It was reasoned that following a quasi-experimental design was the logical next step in the attempt to systematically investigate the psychological, bodily and social processes involved in the activity of group singing. This step would remain tentative in nature, while allowing a closer look at possible causal links between the activity of group singing

and the experiences investigated here.

The findings reported above replicated both the findings in the qualitative study and the findings on Study 2. Group singing, here investigated in the form of choral singing, be it in a rehearsal or performance, involved feelings of achievement, positive emotions, feelings of concentration, feelings of increased energy, singer's 'high', and feelings of connecting and bonding with others. In this study, there was also evidence that group singing involves mental stimulation.

Regarding the physical experiences added in this second version those related to voice, breathing and posture there was evidence that the singers were aware of having a good control of breathing, relaxed throat muscles, and their posture automatically changing and becoming straight during the singing sessions. Singing techniques involve learning how to use the upper respiratory system which includes these three domains to produce musical sound. It is possible that these singers, who were in a high performance choral ensemble, had training in such techniques of singing and were aware of their importance to carry on the activity.

Consistent with findings throughout this chapter and also in the existing literature (i.e., Beck et al., 2000), there was evidence that some experiences could be universal effects of the activity of group singing, but be enhanced under one context or another. In this case, the statements "I felt happy", "I felt completely focused during this singing session", and "I felt energized after this singing session" had high ratings of agreement both after the performance and after the rehearsal, but these were higher after the performance and this difference was significant. Similarly, the statement "My throat muscles felt relaxed" had high ratings of agreement both after the performance and after the rehearsal, but, in this case, these were significantly higher after the rehearsal than the performance. This evidence suggests these particular experiences might be part of the core and universal effects of group singing, but the context in which the singing occurs enhances such effects.



On the other hand, some particular experiences appeared to be more likely a result of singing in a particular context than universal effects of the activity of group singing. This was because they received high ratings but only in one of the conditions. Evidence that a particular experience is likely to occur in one situation but not the other, would indicate that other factors are contributing to these experiences, not just the activity of singing itself.

Frustration with the behaviour of others and feelings that not everyone was working towards the same goal, for instance, had high rates of agreement in the rehearsal session but not in the performance session, and these differences were significant. Evidence that such experiences are common in rehearsals but not performances was also present in the testimonials of Study 1. In that study, singers mentioned feeling frustrated with distraction or disruption caused by others chatting or making noise that prevented them from listening to other parts or the conductor. Rehearsals can provide opportunities for individuals to interact in ways that are not common in a performance. When singers arrive they are able to talk to each other before the rehearsal starts, but it is possible that some individuals take the opportunity to exchange thoughts during the rehearsal as well. Unlike performances, rehearsals do not involve an uninterrupted sequence of singing. In rehearsals, the practice is interrupted by the conductor to provide more directions for improvement. It is in these moments, when the group is not singing, that some verbal exchanges might occur between individuals. Such exchanges can be disruptive to other singers attempting to listen to the conductor, and this could cause such feelings of frustration to emerge. At the same time, in big choral ensembles, it is common for the different sections of the group (sopranos, altos, tenors and bases) to rehearse together their different sections of the materials. Often it may occur that one section of the group is having more difficulties with a section, and this too may give the feeling that not all sections are doing their best. On a performance, however, there are no opportunities for the singers to engage in conversation with each

other, and usually, every singer and every section is giving their best. Ideally, the materials have been mastered and the feelings that not everyone was focused or doing their best, would be less likely to emerge. This evidence suggests that those feelings are not brought about by the activity of singing together with others, but other circumstances that arise during the activity (e.g., disruptive behaviours).

Similarly, feelings of an increase in heart rate and feeling the choir was bonding throughout the singing session, had high rates of agreement in the performance but not rehearsal, and these differences were significant. These too, might be experiences brought about by singing with others in the particular context of a performance, and not feelings that would be universal to the experience of group singing. The natural anxiety that arises from performing in public (Beck et al., 2000) might be responsible for feelings of increased heart rate. At the same time, it is also possible that the conditions of singing in a performance, particularly the absence of interruptions in the flow of the singing and the likelihood that the group is working together at its best, can contribute to those feelings that the entire group is bonding. In big groups, such conditions may be necessary for individuals to feel the entire group is working together and bonding.

Finally, there were some experiences which did not receive high rates of agreement but, nonetheless, were rated significantly higher after performance. This was the case of the statements “I felt anxious during the singing session”, “I felt nervous while I was singing”, “It felt as though the music was coming from external sources rather than inside me”, “My throat muscles felt tense” and “I had to remember to sit straight”. Such evidence might suggest that these particular experiences are not common to the activity of group singing but, nonetheless might occur when other factors (contextual and individual) are at play. Of these, only increased feelings of anxiety reported in the performance condition replicated findings in Study 2. These results were also consistent with the findings by Beck et al. (2000) regarding performance anxiety. While singing with others does not appear

to be an anxious activity in itself, the situation of exposing the voice of the group to the judgement of an audience could increase feelings of anxiety.

Overall, these findings were consistent with the evidence discussed on Study 1 and Study 2 that suggested group singing is an activity involving positive experiences at psychological, bodily and social levels. Furthermore, the evidence discussed above also supported the argument that, while remaining universal characteristics of group singing, some of these experiences can be enhanced by particular contexts. In this study, there was also evidence that some particular psychological, bodily and social experiences could occur, but more as a result of the context in which the singing took place, than as a result of universal effects of group singing.

This was a small, mostly exploratory study where the evidence discussed above could be seen as reflecting the experience of this one choir. Furthermore, the design used here was limited in that it was not possible to include a control condition to exclude the possibility that the observed effects were due to unidentified factors beyond the activity of group singing. Nevertheless, the replication of previous findings indicates that it is likely that these experiences reflected general processes of group singing and not processes limited to this sample and these contexts. Furthermore, even though the sample was small and there was a lack of randomisation and control condition, each respondent completed both questionnaires which controls for some sources of variation, such as individual differences.

Such consistency across studies offered a valid source from which to draw hypotheses regarding the processes involved in the activity of group singing, its effects and how it may relate to well-being. For instance, the consistent evidence that group singing involves positive emotions that can be enhanced in a performance context, justify testing the hypothesis that positive affect increases in a performance condition more so than a rehearsal condition.

## 4.4 General Discussion

This chapter focused on understanding the main characteristics of the experience of group singing. Previous studies focused on asking singers to describe what they thought were the benefits of singing in a group. While these studies have provided vital information on the possible benefits of group singing, they did not inform on wider psychological, bodily and social characteristics of the experience. It was reasoned that understanding the psychological, bodily and social nature and processes of the activity of group singing was necessary to understand the effects it might have and how it may be related to well-being.

The studies described in this chapter have provided evidence consistent with the notion that group singing is a multifaceted activity involving positive psychological, bodily and social experiences. In particular, group singing was seen to involve positive emotions, mental challenge, concentration, physiological arousal, effects on breathing, posture and the vocal apparatus, and positive social experiences such as bonding and connecting with others. It also emerged that some of those experiences could be enhanced, possibly by an interaction between the processes promoted by the activity of group singing and environmental factors, such as the context in which the activity occurs. For instance, it appeared that the processes involved in group singing promoted physiological arousal but this could be enhanced under a performance context.

The model proposed on Chapter 2, suggested that the main characteristics of the activity of group singing are psychological, bodily and social in nature. The particular processes at those levels result in positive effects which then generate feelings of well-being. The evidence gathered in this chapter represented a significant empirical step, as the first set of studies to explore and quantify the main characteristics of the activity of group singing at those levels. Before moving on to further investigate effects of those experiences on Chapter 6, I will first empirically explore, on Chapter 5, whether the activity of group

singing relates to any of the diverse facets of well-being.

## Chapter 5

# Investigating connections between group singing and the main well-being dimensions

The work described in the previous chapter, aimed to establish the main psychological, bodily and social characteristics of the nature of group singing. The evidence collected suggests the activity of group singing is a multifaceted activity that operates on psychological, bodily and social domains that can be related to hedonic, eudaimonic and social well-being. In this chapter, I describe a survey study where connections between group singing and the diverse facets of well-being were explored.

In the working model proposed on Chapter 2, I suggest that group singing relates to hedonic, eudaimonic and social well-being. However, no previous empirical work has explored connections between singing, or particularly, group singing, and well-being as conceptualized in this thesis. It was, thus, essential to explore these connections and relationships before advancing on to more complex research designs. Study 4 was an attempt at doing so.

## 5.1 Study 4

The main aim of this exploratory study was to investigate potential relationships between group singing and well-being correlates. In order to do so, diverse singers and non-singers were asked to complete an online survey about their current general well-being. Aspects such as singing participation, amateur versus professional status, or how much someone liked singing, were also taken into account.

Since the aim was to consider the relationship of group singing with well-being as conceptualized in this thesis, the measures used in this study covered the three main domains of well-being: hedonic, eudaimonic and social. This approach was meant to provide a broader insight into potential effects of group singing on well-being.

In line with the literature reviewed on Chapter 1, measurements focused on variables related to life satisfaction (hedonic well-being), personal development (eudaimonic well-being) and social well-being. Subjective happiness (Lyubomirsky & Lepper, 1999) and satisfaction with life (Diener, Emmons, Larsen, & Griffin, 1985; Pavot, Diener, Colvin, & Sandvik, 1991) were the measures chosen to cover life satisfaction; meaning in life (Steger, Frazier, Oishi, & Kaler, 2006), purpose in life and personal growth (Ryff & Keys, 1995), covered personal development; and social well-being was measured with the scales suggested by Keyes (1998) social integration, contribution, coherence, actualization and acceptance. The scales used to measure these variables were all selected from the well-being literature for their established psychometric qualities and relevance.

There were two sets of questions that guided this exploratory study. The first related to how enjoyment of singing might relate to well-being. In particular, would people who enjoyed singing more, have enhanced well-being? If so, in which domains of well-being would that be more evident?

The second set of questions related to the relationship between consistent and structured engagement with singing (i.e., group singing) and well-being. Specifically, would

more years of participation in a group singing activity relate to more well-being? If so, would there be some domains of well-being where this relationship would be more significant than others?

## 5.2 Method

### Participants

This correlational survey study was completed by three hundred and three participants (mean age = 52, SD = 13.38, range = 17-80; 243 females).

English was the first language of 275 participants; 277 participants had 16 years or more formal education; 159 were married, 57 were single, 63 were in a relationship, 12 were widowed, and 12 were divorced or separated.

A majority of respondents reported being amateur group singers (210), while the rest of the sample was distributed amongst professional group singers (16), amateur solo singers (11), professional solo singers (15), non-specified singers (19), conductor/leader/facilitator (12), choir and solo profession (3), choir and solo amateur (1), and non-singers (16).

### Recruitment

Participants were invited to participate through social media platforms, including twitter and facebook, participant mailing lists collected throughout the development of this project (i.e., in the end of each study, participants were asked whether they would like to be contacted in the future to participate in studies on singing and well-being), research mailing lists, such as the Music and Science mailing list, and the Advancing Interdisciplinary Research in Singing (AIRS) network. AIRS also advertised the study on their main website. Information about the study and a link to the online survey site was also placed on the research section of my semi-professional blog <sup>6</sup>.

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<sup>6</sup>[www.muzikoenmiakapo.wordpress.com](http://www.muzikoenmiakapo.wordpress.com)



In this invitation, the main purpose of the study was provided, along with information about anonymity, how long the survey could take, and freedom to discontinue at any time.

## **Procedure**

The questionnaire was placed online in the Bristol Online Surveys website. Unlike Survey Monkey used on study 1, the access to this website was free and provided through the Canterbury Christ Church University.

Participants were given a link to the online address where information about the study was provided. Here they were, once again, informed of the main purposes of the study, its anonymous nature, and how they were free to discontinue their participation at any time. They were also informed their consent would be assumed once they clicked to the next pages.

## **Materials**

The survey was constituted of three main parts. In the first part, respondents were asked to provide the usual demographic information (gender, age, nationality and main language), but also other demographic characteristics that could be important predictors of well-being, as discussed on Chapter 1: marital status and level of formal education.

The second part contained questions about the respondents' broad singing habits, i.e., whether they considered themselves a singer and if so, what type of singer (solo; choir/group; amateur or professional), and for how many years; how often they found themselves singing on a regular day; and how much they enjoyed singing.

The third, and final, part of this survey contained several measures developed to assess hedonic, eudaimonic and social facets of well-being.

### **Measuring Subjective Happiness**

The Subjective Happiness Scale (SHS) developed by Lyubomirsky and Lepper (1999), was used to measure subjective happiness. This scale contains four items and is measured on a scale of 1 to 7. Respondents are asked to choose the point in the scale that they feel are more appropriate to describe them. In this study, internal consistency for this scale was high, as measured by Cronbach's alpha coefficient (Cronbach's  $\alpha = .86$ ).

### **Measuring Satisfaction with Life**

This facet of hedonic well-being was measured with the Satisfaction with Life Scale (SLS) developed by Diener et al. (1985). This scale contains five items and asks respondents to rate their agreement or disagreement with each one of them, in a scale of 1 (*strongly disagree*) to 7 (*strongly agree*). In this study, internal consistency for this scale was high (Cronbach's  $\alpha = .84$ ).

### **Measuring Meaning in Life**

This facet of eudaimonic well-being was measured with the Meaning in Life Questionnaire (MiLQ), developed by Steger et al. (2006). Respondents are asked to take a moment to think about what makes their life and existence feel important and significant to them. The scale contains ten statements which respondents are asked to rate in a scale of 1 (*absolutely untrue*) to 7 (*absolutely true*). Five of these statements belong to a sub-scale that measures *presence* of life meaning, and the other five statements constitute the sub-scale that measures *search* for life meaning. In this study, internal consistency was high for both the *presence* sub-scale (Cronbach's  $\alpha = .88$ ), and the *search* sub-scale (Cronbach's  $\alpha = .90$ ).

### Measuring Purpose in Life and Personal Growth

These two facets of eudaimonic well-being were measured with the corresponding sub-scales developed by Ryff and Keys (1995), as part of the Psychological Well-being Questionnaire. The original sub-scales contain fourteen items each but, in this study, the nine-item version was used instead, given the length of the survey.

Respondents are asked to rate each item in a six point Likert scale where 1 corresponds to *strongly disagree* and 6 corresponds to *strongly agree*. In the present survey, internal consistency was high for both the Purpose in Life scale (Cronbach's  $\alpha = .81$ ) and Personal Growth scale (Cronbach's  $\alpha = .81$ ).

### Measuring Social Well-being

As discussed on Chapter 1, Keyes (1998) has suggested that social well-being contains five dimensions - social integration, social contribution, social coherence, social actualization, and social acceptance. Each one of those dimensions was measured with the corresponding scale developed by Keyes (1998). In this study, a short version was used, and each sub-scale contained three items. Respondents were asked to specify how strongly they agreed with each statement, in a scale of 1 *strongly disagree* to 7 *strongly agree*, where 4 represented *don't know*.

Besides each sub-scale, an overall measure of social well-being was also computed by adding the scores on all the items. Internal consistency was acceptable for social integration scale (Cronbach's  $\alpha = .74$ ); social contribution (Cronbach's  $\alpha = .63$ ); social coherence (Cronbach's  $\alpha = .51$ ); social actualization (Cronbach's  $\alpha = .63$ ); low for social acceptance (Cronbach's  $\alpha = .38$ ); and acceptable for the overall measure of social well-being (Cronbach's  $\alpha = .79$ ).

## 5.3 Results

While the original goal was to compare group singers to other types of singers and non-singers, the sample sizes were not large enough to grant accurate comparisons. For this reason, the results reported here focused on the sample of 210 respondents (173 females) who identified themselves as group singers. The first part of the analysis focused on exploring gender differences on this sample of 210 respondents. For the second part of the analysis, however, only 205 of those respondents provided answers on all variables and, therefore, the remaining 5 were excluded from the analysis. For the third part of the analysis, 206 respondents completed all the items and the analysis was done on this sample.

### 5.3.1 Gender differences

Similarly to previous studies in this field, there were more female than male respondents in this survey. Nevertheless, independent measures t-tests were performed to compare differences between these two groups.

Findings on table 5.1 indicate that female respondents had higher ratings of social contribution, personal growth, purpose in life, presence of meaning in life, satisfaction with life and subjective happiness. Of these, only personal growth and purpose in life were significantly different from the ratings by male respondents.

Male respondents had higher ratings of overall social well-being, particularly, feelings of social integration, social coherence and social actualization; and higher ratings of search for meaning in life. Of these, only social coherence was significantly different from the ratings by female participants.

The Levene's tests of equality of variances indicated that this assumption was not violated in any comparisons and, therefore, these findings can be considered statistically robust.

Table 5.1: Gender means, standard deviations and test statistics

Scale	Female (n=173)		Male (n=37)		T-Test of Equality of Means		Levene's Test of Equality of Variances
	Mean	SD	Mean	SD	<i>t</i>	<i>df</i>	<i>F</i>
Social Well-being	4.93	0.70	5.10	0.58	-1.36	208	1.84
Social Integration	5.44	1.10	5.68	0.81	-1.28	208	3.09
Social Contribution	5.66	0.94	5.57	0.81	0.58	208	1.38
Social Coherence	4.20	1.06	4.72	0.97	-2.74**	208	0.41
Social Actualization	4.35	1.08	4.53	1.13	-0.91	208	0.16
Social Acceptance	5.01	0.83	5.01	0.80	0.02	208	0.13
Personal Growth	5.22	0.65	4.88	0.66	2.80**	208	0.08
Purpose in Life	4.82	0.75	4.56	0.73	1.96*	208	0.00
Meaning in Life (Search)	3.95	1.41	4.14	1.53	-0.75	208	1.00
Meaning in Life (Presence)	5.15	1.08	5.07	1.16	0.42	208	0.06
Satisfaction with Life	4.82	1.17	4.63	1.16	0.87	208	0.10
Subjective Happiness	5.35	1.17	5.22	0.95	0.60	208	2.96

\* $p < .05$  (two-tailed); \*\*  $p < .01$  (two-tailed)

### **5.3.2 Were there significant relationships between group singing and the diverse facets of well-being?**

In order to answer this question, the variable that provided information on group singing was the number of years someone had been engaging with this activity.

The findings on table 5.2 suggest that the number of years of participation in group singing had a significant association with a number of social and eudaimonic well-being measures, but not with hedonic well-being measures. In particular, participation had a significant positive association with social integration and social contribution. Furthermore, participation also had a significant positive association with the measure of purpose in life and presence of meaning in life. Finally, the association between participation and search for meaning in life was significantly negative.

Well-being measures correlated significantly with one another, except search for meaning in life which had non-significant correlations with social actualization, social acceptance and personal growth.

While this information on the degree of association between the variables was encouraging, it did not provide information on the actual relationship between variables. In order to investigate whether there was an actual relationship between years of engagement with a group singing activity and the different well-being measures, several simple regressions were conducted.

Table 5.2: Amateur Group Singers (n=205) means, standard deviations and inter-correlations among variables

Variable	M	SD	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	54.10	12.22	.13	-.02	-.05	-.12	.09	-.01	.02	-.13	.04	-.18*	.12	.04	.05
2. Years of Singing Participation	15.33	15.66		.20**	.26**	.19**	.07	.10	.09	.05	.21**	-.17*	.27**	.09	.12
3. Social Well-being	4.97	0.69			.64**	.72**	.72**	.70**	.70**	.45**	.50**	-.25**	.53**	.37**	.43**
4. Social Integration	5.51	1.04				.47**	.27**	.17*	.31**	.25**	.23**	-.19**	.37**	.43**	
5. Social Contribution	5.65	0.92					.43**	.29**	.36**	.48**	.51**	-.18*	.54**	.30**	.38**
6. Social Coherence	4.30	1.07						.41**	.35**	.29**	.42**	-.28**	.40**	.22**	.26**
7. Social Actualization	4.38	1.09							.51**	.31**	.34**	-.11	.29**	.24**	.25**
8. Social Acceptance	5.01	0.83								.23**	.25**	-.09	.26**	.22**	.28**
9. Personal Growth	5.17	0.66									.51**	-.14	.39**	.26**	.31**
10. Purpose in Life	4.78	0.75										-.33**	.62**	.41**	.47**
11. Meaning in Life (Search)	3.98	1.43											-.38**	-.35**	-.38**
12. Meaning in Life (Presence)	5.16	1.08												.52**	.54**
13. Satisfaction with Life	4.81	1.15													.66**
14. Subjective Happiness	5.35	1.12													

\* $p < .02$ ; \*\*  $p < .001$

Table 5.3: Regression coefficients predicting well-being from years of participation in group singing (n=205)

Well-Being Measure	$R^2$	Standardized Coefficients (Beta)	$t$
Social Well-being (Global)	.04**	.20**	2.92
Social Integration	.07***	.26***	3.84
Social Contribution	.03**	.17**	2.69
Social Coherence	.01	.07	1.01
Social Actualization	.01	.10	1.37
Social Acceptance	.01	.09	1.23
Personal Growth	.00	.05	0.72
Purpose in Life	.04**	.21**	2.99
Meaning in Life (Search)	.03*	-.17*	-2.38
Meaning in Life (Presence)	.07***	.27***	3.95
Satisfaction with Life	.01	.09	1.28
Subjective Happiness	.02†	.12†	1.75

\* $p < .02$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ; † $p = .08$

The standardized regression coefficients on table 5.3., suggest that there was a positive and significant relationship between years of participation and social well-being, in particular, feelings of social integration and social contribution; purpose in life; and presence of meaning in life. The standardized regression coefficients also indicate that there was a negative and significant relationship between years of participation and search for meaning in life, suggesting that it was possible that the longer someone had been engaging with singing the less they felt there was a need to search for meaning in their lives.

Participation in group singing also explained a significant portion of the variation of social well-being ( $R^2 = .04$ ,  $F(1, 203) = 8.54$ ,  $p < .01$ ), particularly in feelings of social integration ( $R^2 = .07$ ,  $F(1, 203) = 14.76$ ,  $p < .000$ ) and social contribution ( $R^2 = .03$ ,  $F(1, 203) = 7.24$ ,  $p < .01$ ); purpose in life ( $R^2 = .04$ ,  $F(1, 203) = 8.92$ ,  $p < .01$ ); and in the variation of feelings of search ( $R^2 = .03$ ,  $F(1, 203) = 5.68$ ,  $p < .02$ ) and presence of meaning in life ( $R^2 = .07$ ,  $F(1, 203) = 15.63$ ,  $p < .000$ )

It can be argued that the  $R^2$  values above indicate that participation in group singing explained a small portion of the variation in those well-being domains. However, it is important to note that it was likely that there were a wide variety of individual experiences with group singing that contributed to answers on these measures. The fact that,



nonetheless, there were measurable and significant effects emerging, provides important evidence that engaging in group singing activities might promote and sustain feelings of social and eudaimonic well-being.

While encouraging, it was possible that these findings were more a result of the normal development that might occur with age, than the result of engaging consistently with a singing activity. In order to investigate this possibility, several multiple regressions were conducted where the relationship between the well-being outcomes highlighted in the previous paragraph and the number of years someone had been a group singer, was investigated while controlling for age.

The standardized regression coefficients (*Beta*/ $\beta$ ) between years of participation in group singing and the different social and eudaimonic well-being measures, are reported on Table 5.4. The values reported are the ones obtained while controlling for age. Those values indicate that the number of years someone had been involved in group singing had a positive relationship with feelings of social integration; a positive relationship with feelings of purpose in life; and a positive relationship with feelings of presence of meaning in life. This relationship was present and significant even when controlling for age. At the same time, age was not significantly related to these measures of well-being either on its own or when accounting for years of participation (standardized coefficients between -.11 and .08). These findings suggest that the longer a respondent had been involved in group singing, the stronger were their feelings of social integration, purpose in life and presence of meaning in life, and this did not relate to how old they were.

The analysis on the relationship between participation and the measure of search for meaning in life provided a different picture. This measure of eudaimonic well-being had a significantly negative relationship with participation. This relationship was significant on its own,  $\beta = -.17$ ,  $t = -2.38$ ,  $p < .02$ , and when age was controlled for,  $\beta = -.14$ ,  $t = -2.08$   $p < .05$ . It turned out that age was also significantly related to this measure of

Table 5.4: Regression coefficients predicting facets of well-being from years of participation in group singing, controlling for age

Well-Being Measure	Years of Participation		<i>t</i>
	$R^2$ (Age)	Standardized Coefficients (Beta)	
Social Well-being (Global)	.04	.21**	2.98
Social Integration	.07	.27**	3.97
Social Contribution	.06*	.21**	2.98
Purpose in Life	.04	.20*	2.93
Meaning in Life (Search)	.05*	-.14*	-2.08
Meaning in Life (Presence)	.08	.26**	3.76

\* $p < .05$  (two-tailed); \*\* $p < .001$  (two-tailed)

well-being, both on its own,  $\beta = -.18$ ,  $t = -2.58$ ,  $p < .01$ , and when controlling for years of participation,  $\beta = -.16$ ,  $t = -2.30$ ,  $p < .01$ . These findings suggest that a decrease in search for meaning in life was significantly related to both an increase in age and years of participation in group singing. In fact, age and years of participation contributed, together, to a significant portion of the variation in feelings of search for meaning in life,  $R^2 = .05$ ,  $F(1, 203) = 4.33$ ,  $p < .05$ ).

Finally, social contribution also had a different pattern of relationship with age and participation. This measure of social well-being had a significant positive relationship with participation. While this relationship was significant on its own,  $\beta = .19$ ,  $t = 2.69$ ,  $p < .01$ , once age was controlled for, it became stronger,  $\beta = .21$ ,  $t = 2.98$ ,  $p < .01$ . At the same time, age only had a marginally significant negative relationship with this measure of well-being on its own,  $\beta = -.12$ ,  $t = -1.74$ ,  $p = .08$ , but, when controlling for years of participation, the relationship became significantly negative  $\beta = -.15$ ,  $t = -2.16$ ,  $p < .05$ . In line with these findings, age and years of participation together explained a significant portion of the variation in feelings of social contribution,  $R^2 = .06$ ,  $F(1, 203) = 8.86$ ,  $p < .01$ ). These findings suggest that feelings of social contribution might increase with lengthier experiences of group singing, but they also appear to decrease with age.

### **5.3.3 What was the importance of enjoying the activity of singing?**

The inter-correlation values on Table 5.5 suggest that enjoyment of singing had a positive and significant association with personal growth, purpose in life, presence of meaning in life and subjective happiness. The relationship between enjoying singing and feelings of social acceptance is also noteworthy as it was marginally significant. However, as mentioned before, correlations do not provide much more information on the relationship between variables than to inform on the degree of association. In order to answer the question above, several regressions were conducted to investigate the relationship between enjoyment of singing and the several well-being measures.

Table 5.5: Amateur Group Singers (n=206) means, standard deviations and inter-correlations among variables

Variable	M	SD	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Years of Singing Participation	15.27	15.65	.06	.20**	.26**	.18**	.08	.10	.09	.05	.21**	-.17*	.27**	.10	.13†
2.How much do you enjoy singing?	3.93	0.95		.11	.10	.11	.03	.04	.13†	.17*	.22**	-.05	.15*	.08	.20**
3. Social Well-being	4.97	0.69			.64***	.71***	.72***	.70***	.71***	.45***	.50***	-.25***	.53***	.37***	.43***
4.Social Integration	5.51	1.03				.47***	.27***	.17*	.30***	.25***	.23**	-.19**	.37***	.29***	.33***
5.Social Contribution	5.66	0.92					.42***	.28***	.35***	.48***	.50***	-.17*	.53***	.29***	.36***
6.Social Coherence	4.30	1.07						.41***	.36***	.29***	.42***	-.29***	.40***	.23***	.27***
7.Social Actualization	4.38	1.09							.52***	.30***	.34***	-.12	.29***	.24***	.26***
8.Social Acceptance	5.01	0.83								.23**	.26***	-.10	.26***	.23**	.28***
9.Personal Growth	5.17	0.66									.52***	-.13‡	.39***	.26***	.31***
10.Purpose in Life	4.77	0.75										-.33***	.62***	.41***	.47***
11.Meaning in Life (Search)	3.99	1.44											-.37***	-.36***	-.39***
12.Meaning in Life (Presence)	5.16	1.08												.52***	.53***
13.Satisfaction with Life	4.80	1.15													.67***
14.Subjective Happiness	5.34	1.13													

\* $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ ; †  $p = .07$ ; ‡  $p = .06$

Table 5.6: Regression coefficients predicting well-being from enjoyment of singing

Well-Being Measure	$R^2$	Standardized Coefficients (Beta)	$t$
Social Well-being (Global)	.01	.09	1.27
Social Integration	.01	.07	1.06
Social Contribution	.01	.10	1.48
Social Coherence	.00	.02	0.26
Social Actualization	.00	.02	0.27
Social Acceptance	.02†	.13†	1.58
Personal Growth	.03**	.17**	2.55
Purpose in Life	.05***	.21***	3.13
Meaning in Life (Search)	.00	-.02	-0.35
Meaning in Life (Presence)	.02*	.15*	1.85
Satisfaction with Life	.01	.09	1.24
Subjective Happiness	.04***	.20***	2.92

\* $p < .05$  (two-tailed); \*\* $p < .02$  (two-tailed); \*\*\* $p < .01$  (two-tailed); † $p = .07$  (two-tailed)

The standardized regression coefficients on Table 5.6. suggest that enjoyment of singing had a positive relationship with most well-being measures used in this study, except search for meaning in life, with which it had a negative correlation. However, consistent with the correlation analysis, these relationships were only significant between enjoyment of singing and personal growth, purpose in life, presence of meaning in life and subjective happiness. The relationship with social acceptance was marginally significant.

These findings indicate that the more a respondent enjoyed singing, the stronger were their feelings of personal growth, purpose in life, presence of meaning in life and subjective happiness. It is also possible to argue that this was the case regarding feelings of social acceptance.

It was possible that the people who enjoyed singing the most were also the ones engaging with singing for longer, so how would that relationship between enjoyment and those measures of well-being stand up if the number of years someone had been engaging with group singing was taken into account? Several multiple regressions were conducted where the relationship between enjoyment of singing and personal growth, purpose in life, presence of meaning in life and subjective happiness, was analysed while controlling for the number of years someone had been a group singer.

Regarding personal growth, this measure of eudaimonic well-being had a positive relationship with enjoyment with singing, as had been seen above. Has seen before, this relationship was significant on its own,  $\beta = .17$ ,  $t = 2.42$ ,  $p < .02$ , but also when years of participation was controlled for,  $\beta = .17$ ,  $t = 2.38$   $p < .02$ . Years of participation, on the other hand, were not significantly related to this measure of well-being, neither on their own,  $\beta = .05$ ,  $t = 0.70$ ,  $p = .49$ , nor when controlling for enjoyment of singing,  $\beta = .04$ ,  $t = 0.57$ ,  $p = .57$ . These findings suggest that increases in feelings of personal growth were significantly related to more enjoyment of singing, and this was not related to the number of years someone had been a group singer. Consistent with these results, enjoyment of singing contributed, on its own, to a significant portion of the variation of feelings of personal growth,  $R^2 = .03$ ,  $F(1, 204) = 5.85$ ,  $p < .02$ .

Purpose in life was also positively related to enjoyment of singing, as had been seen above. This relationship remained significant when years of participation were controlled for,  $\beta = .21$ ,  $t = 3.15$   $p < .01$ . At the same time, years of participation also had a positive relationship with feelings of purpose in life, and this relationship was significant, both on its own,  $\beta = .21$ ,  $t = 3.04$   $p < .01$ , and when accounting for enjoyment of singing,  $\beta = .20$ ,  $t = 2.92$   $p < .01$ . Consistent with this, enjoyment of singing and years of singing participation accounted for a significant portion of the variation in feelings of purpose in life,  $R^2 = .09$ ,  $F(1, 203) = 8.51$ ,  $p < .01$ . These findings suggest that increases in feelings of purpose in life were significantly related to both how much someone enjoyed group singing and how long they had been doing that for.

Presence of meaning in life was also positively related to enjoyment of singing, as had been seen above. This relationship remained significant when years of participation were controlled for,  $\beta = .15$ ,  $t = 1.97$   $p < .05$ . At the same time, years of participation also had a positive relationship with feelings of presence of meaning in life, and this relationship was significant, both on its own,  $\beta = .27$ ,  $t = 3.97$   $p < .000$ , and when accounting for enjoyment

of singing,  $\beta = .26$ ,  $t = 3.88$   $p < .000$ . Consistent with this, enjoyment of singing and years of singing participation accounted for a significant portion of the variation in feelings of presence of meaning in life,  $R^2 = .09$ ,  $F(1, 203) = 15.01$ ,  $p < .000$ . These findings suggest that increases in feelings of presence of meaning in life were significantly related to both how much someone enjoyed group singing and how long they had been doing that for.

The positive relationship between enjoyment of singing and subjective happiness remained significant while controlling for years of participation,  $\beta = .20$ ,  $t = 2.89$   $p < .01$ . Years of participation in group singing were also positively related to subjective happiness, but this relationship was only marginally significant on its own,  $\beta = .13$ ,  $t = 1.84$   $p = .07$ , and when accounting for enjoyment of singing,  $\beta = .12$ ,  $t = 1.71$   $p = .09$ . Nevertheless, together, enjoyment of singing and years of participation accounted for a significant portion of the variation in subjective happiness,  $R^2 = .06$ ,  $F(1, 203) = 8.37$ ,  $p < .01$ . These findings indicate that enjoyment of singing was more strongly related to subjective happiness than the number of years someone had been engaging with group singing, but these should also be considered.

Finally, regarding feelings of social acceptance, this measure of social well-being had a positive relationship with enjoyment with singing, as had been seen above. Has seen before, this relationship was marginally significant on its own,  $\beta = .13$ ,  $t = 1.84$ ,  $p = .07$ , and remained marginally significant when years of participation were controlled for,  $\beta = .12$ ,  $t = 1.77$   $p = .08$ . Years of participation, on the other hand, were not significantly related to this measure of well-being, neither on their own,  $\beta = .09$ ,  $t = 1.27$ ,  $p = .21$ , nor when controlling for enjoyment of singing,  $\beta = .08$ ,  $t = 1.18$ ,  $p = .24$ . These findings suggest that it was possible that increases in feelings of social acceptance were related to more enjoyment of singing, and this was not related to the number of years someone had been a group singer.

In summary, there was evidence that participation in group singing was related to several facets of social and eudaimonic well-being. In particular, the longer someone had been involved in group singing, the stronger were their feelings of social integration, purpose in life and presence of meaning in life, and this did not relate to how old they were. A decrease in search for meaning in life was also significantly related to both an increase in age and years of participation in group singing. Finally, an increase in feelings of social contribution was related to lengthier experiences of group singing, but they also appeared to decrease with age.

There was also evidence that enjoyment of group singing also related to eudaimonic well-being, but hedonic well-being as well. The possibility for enjoyment of singing to relate to social well-being also emerged. Stronger feelings of personal growth were related to stronger enjoyment of singing, and this was not related to the number of years someone had been a group singer. Stronger feelings of presence of meaning in life and purpose in life, on the other hand, were related to both stronger enjoyment of group singing and more years engaging in this activity. Subjective happiness was also strongly related to enjoyment of group singing. However, the evidence above suggests the relationship between subjective happiness and the number of years someone had been engaging with group singing, should also be taken into account. Finally, stronger feelings of social acceptance were marginally related to enjoyment of singing but not the number of years someone had been taking part in group singing.

## 5.4 Discussion

This correlation study focused on exploring the relationship between group singing and well-being as conceptualized in this thesis. In this way, the main goal was to investigate whether group singing related to social, eudaimonic and hedonic well-being.



The main question focused on exploring relationships between the number of years someone had been engaging with the activity of group singing and the diverse facets of well-being. While it was not possible to compare group singers with other singers or non-singers, which would have been ideal, it was possible to compare different degrees of participation in group singing and see whether being involved in group singing for longer had any measurable effects on well-being.

The evidence collected in this study suggested that the longer someone had been engaging with group singing, the stronger were their feelings of social integration, social contribution, purpose in life, and presence of meaning in life. At the same time, the evidence suggested that the longer a respondent has been engaging with group singing the lower were their ratings in the measure of search for meaning in life.

It was possible this was the case because people who had been engaging with singing for longer were also older and, therefore, these relationships were more a result of the development that might come with age than their regular participation in group singing. In the case of presence of meaning in life, for instance, there was evidence of a positive and significant correlation with age (Steger et al., 2006). Investigation into this point revealed that, in this study, age was not involved in the positive relationship between years of participation in group singing and feelings of social integration, purpose in life and presence of meaning in life. However, a decrease in search for meaning in life was significantly related to both an increase in age and years of participation in group singing. Finally, stronger feelings of social contribution were related to lengthier participation in group singing, but they also appeared to decreased with age.

First, the findings on the relationship between years of participation in group singing activity and feelings social integration, purpose in life and presence of meaning in life, were encouraging. It could be argued that group singing only contributed to a small portion of the variations in those social and eudaimonic well-being facets. However, these contribu-

tions were measurable and significant, despite the wide variety of individual experiences with group singing that contributed to answers on these measures. It is not unlikely that regular and consistent participation in an activity which offers wide opportunities to draw and reach goals, aims or objectives, would also allow individuals to experience feelings of purpose in life and presence of meaning in their lives. These involve a perception of having goals and sense of direction, and a subjective sense that one's life, past and present, is meaningful (Ryff & Keys, 1995; Steger et al., 2006). Furthermore, it is not unlikely that regular participation with group singing would allow the individual to experience feelings of being part of their communities or society. In fact, this would be consistent with the current literature, where individuals indicated that feelings of belonging were one of the main benefits of engaging with group singing (e.g., Clift & Hancox, 2001; Bailey & Davidson, 2002, 2005; Skingley & Bungay, 2010; Clark & Harding, 2012).

Secondly, search for meaning in life was a measure that meant to reflect a drive and orientation to find meaning in one's life (Steger et al., 2006). With age, it is possible that individuals become either more secure about their life's meaning or stop trying to search for it. In this study, search for meaning in life also decreased with participation in group singing. It could be argued that this was the case because group singing provided the experiences mentioned in the previous paragraph that allowed individuals to have a sense of meaning and purpose. Therefore, they didn't feel they needed to search for something they feel that they already have.

Finally, social contribution refers to evaluations of one's social value, of being a vital member of society. With age, there's a decrease in work and family life activity, with reaching the age of retirement and after children have grown up. A perceived sudden loss of family and work activity, together with other factors, such as the loss of friends or spouses and poor health, could place ageing individuals at an increased risk of social

isolation <sup>7</sup>. As a result of decreased social interaction, individuals could experience a decrease in feelings of contribution as they grow older. The finding that age was related to a decrease in feelings of social contribution is, thus, consistent with this argument. However, simultaneously to age having a negative relationship with social contribution, participation in group singing had a positive relationship. This finding suggests that the activity of group singing might be important to balance out the negative effects of age on feelings of social contribution. This would occur because group singing, through regular rehearsals and performances, would provide individuals with opportunities to interact with others, their communities and society. This argument is consistent with the evidence collected by Bailey and Davidson (2002, 2005). In these studies, marginalized choir singers, who had experienced alienation and social isolation, noted how the choir had allowed them to experience feelings of contribution. Bailey and Davidson (2005) argued that the reciprocity between the choir and the audience allowed the marginalized singers to connect with the society they had been alienated from. Such opportunities helped them experience feelings of contribution, among others (Bailey & Davidson, 2005).

The evidence discussed above supports the argument that participation in group singing is related to eudaimonic and social well-being, but the findings in this study also suggested that enjoying singing was also important. In fact, enjoyment of group singing was not only related to eudaimonic well-being, but hedonic well-being as well. There was also evidence that enjoyment of singing could relate to social well-being.

Personal growth, purpose in life, presence of meaning in life, subjective happiness and social acceptance were all positively related to enjoyment of singing. In the case of personal growth and social acceptance, the relationship was not related to the number of years someone had been a group singer. For purpose in life and presence of meaning in life, both enjoyment of singing and lengthier involvement with the activity were important factors.

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<sup>7</sup>[http://www.health.gov.bc.ca/library/publications/year/2004/Social\\_Isolation.Among\\_Seniors.pdf](http://www.health.gov.bc.ca/library/publications/year/2004/Social_Isolation.Among_Seniors.pdf)

In the case of subjective happiness, enjoyment of singing had a stronger relationship but the number of years someone had been involved in group singing should also be taken into account. These findings suggest that enjoyment is an important aspect of the relationship between group singing and well-being. This would be consistent with the flow theory.

Personal growth referred to feelings of continued development, seeing the self as growing and expanding, being opened to new experiences, having a sense of realizing his or her potential, and seeing improvement in self and behaviour over time (Ryff & Keys, 1995). The finding that stronger feelings of personal growth were related to stronger enjoyment of group singing are consistent with the argument that group singing can be a flow activity. As mentioned on Chapters 1 and 2, flow activities promote and sustain well-being through the feelings of enjoyment that they involve. These feelings are not synonyms of pleasure but, instead, enjoyment emerges from the feeling of having achieved a goal, having gone beyond previous limits and accomplished something new (Csikszentmihályi, 1990, 1997, 2000). While the evidence here does not allow conclusions on causality to be drawn, it is possible that those individuals experienced feelings of more personal growth because they were also deriving more enjoyment from their group singing experiences. Having been involved in an activity for many years, on the other hand, would not guarantee that these experiences would allow one to experience feelings of personal growth, as activities that can lead to flow, don't always do so.

Also as predicted by the flow theory, feelings of overcoming a challenge are rewarding. In this way, enjoyable activities promote eudaimonic well-being. Feelings of purpose in life and presence of meaning in life involve having goals and reaching them. It is possible that those who enjoyed singing more and were involved in group singing for longer would have had more opportunities to develop and reach goals, and enjoy those experiences. This could have then increased their feelings of purpose and presence of meaning in life.

The evidence above also indicated that the more someone enjoyed group singing and the

longer they had been doing it for, the stronger were their feelings of subjective happiness. Again, these findings are also consistent with what would be expected by the flow theory. First, there is evidence that group singing is an activity that involves positive emotions (e.g., Clift & Hancox, 2001, 2010; Kreutz et al., 2004). It is, therefore, possible that group singing involves feelings of pleasure when it is occurring. As a flow activity, group singing would also allow for positive emotions to be experienced out of the enjoyment of feeling that goals were achieved and going beyond previous limits. Those who would have been involved in group singing for longer and enjoyed it more would have had more opportunities to experience positive emotions, and, thus promote and sustain their hedonic well-being.

The findings regarding social acceptance are more intriguing. Social acceptance refers to feelings of accepting society with its good and bad facets (Keyes, 1998). The measure of social acceptance, in this study, contained the items “people who do a favour expect nothing in return”; “people do not care about other people’s problems” and “I believe that people are kind”. Group singing would involve working together with others and interact with a wide range of people, be it those in the group or audiences. In group singing, achieving a goal is not only an individual experience, but some goals can only be achieved as a group. Enjoyment of singing in a group would, therefore, necessarily involve positive experiences with the others around. It is, then, possible that those who enjoyed group singing more also had more positive experiences with those around them, leading them to express stronger agreement with the items above.

Overall, the findings in this study provide evidence that group singing is related to the hedonic, eudaimonic and social facets of well-being. However, because this was an exploratory correlation study, the only information that could be drawn regarded the degree of association between variables and the nature and strength of their relationship. No information could actually be drawn on whether group singing, impacted on well-being. It is possible that individuals who have more well-being are also more likely to

actively seek to take part in different activities such as participating in group singing. What seems more likely, however, is that there is some kind of interactive and additive relationship, where individuals make the effort to go to the late weekday rehearsals and weekend concerts because they feel well, but those experiences provide them with positive outcomes that sustain their feelings of well-being. As the flow theory suggests, enjoyable experiences motivate us to engage with them over and over again, allowing well-being to be sustained over time (Csíkszentmihályi, 1990, 1997, 2000).

Another limitation of this study was the impossibility to compare amateur group singers with other singers and non-singers. This has prevented exploring whether amateur group singing is more beneficial than other singing activities or not participating in singing activities at all. Nevertheless, the type of group singing studied in this thesis related more closely to amateur group singing. In that way, the findings collected in this study would provide a more accurate picture of the type of group singing that is the focus of research here.

Finally, the sample in this study was mostly constituted of highly educated individuals and it was not possible to investigate the contribution of different demographic factors in the relationship between group singing and well-being.

Despite these limitations, the findings in this study have provided support to the argument that group singing relates to different facets of well-being. With this possibility in mind, in the next chapter I attempt to clarify the main psychological, physiological and social effects of group singing. As proposed on Chapter 2, these could relate to hedonic, eudaimonic and social well-being and be, thus, at the source of the relationship between well-being and group singing.

## Chapter 6

# Impact of context on effects of group singing on mood, cortisol and social connection

In this chapter I report two studies, which reflect an attempt to advance clarification on psychological, physiological and social effects of group singing. The main goal of this chapter is to investigate which effects might be associated to the activity of group singing and whether other factors are at play. In the two studies reported here, I focused on investigating the context in which the singing occurred, as a possible factor influencing effects reported in group singing.

The theoretical model discussed on chapter 2 predicts that group singing can have effects on psychological, physiological and social domains that result in feelings of well-being. In that model, I also noted that it is possible that these effects are influenced by other factors such as situational factors, such as the social context in which the singing occurs. The findings discussed in Chapter 4 seem to support this notion, by suggesting that group singing is an activity that does involve experiences at those levels, and that some of

these experiences might occur in some circumstances more so than others. Is this indeed the case? In order to maximize any potential an activity might have to promote well-being, it is important to understand which effects it promotes and under what circumstances it does so.

On Chapter 2, I discussed how previous research aimed at understanding connections between group singing and well-being correlates, has looked at effects of choral singing on affective states, immune system and cortisol (i.e., Beck et al., 2000; Kreutz et al., 2004). As already explored in that chapter, this research offered consistent findings regarding effects on affective states and immune function but had different findings regarding the impact on cortisol. Beck et al. (2000) reported that cortisol increased during performance but decreased during rehearsal but Kreutz et al. (2004) found that cortisol did not change significantly during a singing condition. The literature on cortisol suggests that these divergent findings are due to differences in the contexts in which the singing occurred. Cortisol is known to have a daily rhythm that, under normal circumstances, displays higher values in the morning, which gradually decrease throughout the day. However, cortisol is also known to be sensitive to external stimulation and can be very quickly secreted under arousing circumstances (Clow, 2004). Beck et al. (2000) conducted a quasi-experimental study under naturalistic conditions which meant the group singing in the study occurred under the same circumstances as it would if the study wasn't being conducted. This meant that data was collected on two real rehearsals and one real public performance, over which the researchers had no control. While this has limitations regarding generalization of findings, it does provide ecologically pertinent data, particularly in what pertains to the perceived emotional context of a situation. To corroborate this argument, participants reported feeling more relaxed in the rehearsals but more anxious in the performance, an emotion associated with arousal. This was also consistent with objective measures of physiological arousal, i.e. levels of cortisol (Beck et al., 2000). Kreutz et al. (2004), on



the other hand, conducted a quasi-experimental study where the singing occurred during a rehearsal. Although this study did not report subjective data regarding specific feelings of relaxation or anxiety, it is likely that the singing condition in this study involved a less arousing situation.

In Beck et al. (2000), the impact of context is suggested not only from the findings on cortisol but also on emotional states. In that study, a public performance was associated with both more positive and negative emotions which suggests that the context played a part in how singers reported feeling, affecting the strength of emotional responses to group singing.

It is important to note, however, that Beck et al. (2000) collected information on short-term emotions only after each condition, and no information was collected at baseline. A baseline measure would be necessary to understand whether a real change occurred during the activity. Although their findings are suggestive, it is, therefore, not possible to draw conclusions on how different contexts might influence effects of group singing on affective states.

There is one other limitation regarding that study that I feel it is important to bring to light and consider when taking the findings by Beck et al. (2000) on cortisol into account. It pertains to the statistical analysis conducted. This study had a multivariate mixed-measures design, where the repeated-measures independent variables were Time (before and after) and Condition (with three levels: performance, rehearsal 1, rehearsal 2). In this situation, a repeated-measures ANOVA should have been used to analyse the data but, instead, *t*-tests were used. Conducting several statistical tests on the same experimental data generates a family-wise or experiment-wise error rate. This error rate across tests increases the probability of making a Type I error accepting the effect as significant when, in reality, it wasn't. If we assume a significance level of .05, the probability of no Type I error is 95%. If *t*-tests are conducted on data with more than two experimental

conditions, this probability is multiplied by the number of tests conducted. In the case of Beck et al. (2000), this means that an overall probability of no Type I errors was  $(.95^3) = .95 \times .95 \times .95 = .857$  (as there were three tests). This has decreased the probability of no Type I errors from 95% to 85.7%. At the same time, the probability of making at least one Type I error increased from 5% to 14.3%, a value above the accepted significance level of .05 (Field, 2009). Looking at the significance levels reported for the dependent t-tests the authors conducted on cortisol levels, they are smaller than .05 ( $p < .01$  in first rehearsal;  $p < .007$  in second rehearsal; and  $p < .028$  on performance) so it is possible that no such error occurred. Besides, the findings have a reasonable explanation consistent with the literature on cortisol. Nevertheless, this statistical limitation raises the possibility that it is at the source of the differences in cortisol effects reported in the literature above.

The work reported in this chapter was an attempt to clarify these uncertainties and test the general hypothesis that short-term effects of group singing on affective states and cortisol are influenced by the context in which the singing occurs. Congruent with the overall purpose of this thesis, and following the evidence discussed in the previous chapter, besides looking at the effects on psychological and physiological variables, the work that follows also investigated effects on social connection. The literature on group affect suggests emotions play an important role in how individuals within a group connect and the strength of that connection (Lawler, 2001; Barsade, 2002; Spoor & Kelly, 2004). For instance, Lawler (2001) proposed a theoretical approach which recognizes that social exchange produces emotions, and these strengthen or weaken the ties within social units (e.g., groups, networks), depending on the positive or negative dimension in which those feelings are situated. Consistent with this theory, Barsade (2002) found that members of a group where positive emotions were involved, experienced improved cooperation and decreased conflict. Spoor and Kelly (2004) offered an evolutionary perspective of the functions of affect in groups which suggests that shared affect in groups fosters group

bonds. If group singing, and particularly group singing in a public performance, involves stronger emotions (Beck et al., 2000), particularly positive, it is possible that these will contribute to stronger feelings of connection between the individuals.

In sum, I expected context to moderate effects of group singing on psychological, physiological and social variables. That is, I expected context to affect the direction and strength of the effects of group singing on those domains. In order to test this general hypothesis, I conducted two quasi-experimental studies. In study 5, questionnaire and saliva samples were collected before and after a group singing rehearsal, a non-singing day and a public performance. In study 6, I attempted to conduct a replication following a rehearsal and a first public performance of a complex piece.

In both studies I attempted to establish some common ground with previous literature and used the positive and negative affect schedule (PANAS), as Kreutz et al., (2004), before and after each condition. Saliva samples were also collected before and after each condition in order to analyse cortisol levels. Unlike previous literature, feelings of social connection were gathered, but these only after each condition. Finally, while investigating gender differences was not the main purpose of this chapter, the model used to guide the empirical research in this thesis also suggests that individual differences in gender might play a role. This is consistent with the review of literature on this topic in Chapter 2 which suggests women and men might respond differently to singing (e.g. Sandgren, 2009). Following this, both studies included analysis on how female and male participants responded.

## **6.1 Study 5**

This study focused on exploring effects of group singing during a choral rehearsal and a public performance. These conditions were also compared to a control day. In light of the arguments developed above and in previous chapters, I tested the following hypotheses:

1. **Effects on affective states:**

- (a) Positive affect will increase and negative affect will decrease significantly during the singing conditions;
- (b) Positive affect will be significantly higher and negative affect will be significantly lower after the singing conditions compared to control. These two hypotheses arise from the argument that group singing involves both relaxing and positive effects (Beck et al., 2000) that would not be present in the control condition.
- (c) Performance will be related with both more positive and more negative affect compared to rehearsal. This, I argue, is due to the possibility that the rehearsal is a more positive and less negative situation to start with, with little room for big emotional changes in the course of the session. On the other hand, Beck et al. (2000) suggested that a performance is associated with more negative feelings and less positive feelings to start with due to a natural increase in anxiety prior to performance - but is an experience with the potential to produce stronger emotions in the course of singing. These can then contribute for greater mood changes during the session.

2. **Effects on salivary cortisol:** All three assessments were made in the late afternoon. Because cortisol has a daily rhythm which, under normal circumstances, gradually decreases throughout the day, a decrease in cortisol levels between pre and post assessments was to be expected. However, cortisol is sensitive to external circumstances and can be very quickly secreted under arousing circumstances, such as a public performance. I, thus, predicted that:

- (a) Salivary cortisol levels would decrease in rehearsal and control conditions, but significantly so in rehearsal. Again, this would be due to both the relaxing and positive effects of choir singing which are not present on the control condition.

- (b) Because performance anxiety is a natural arousing reaction to public performance (Beck et al., 2000), I tested the hypothesis that salivary cortisol levels would be significantly higher before performance, and increase significantly, than in rehearsal and control.
3. **Effects on feelings of connection to others:** As argued above, stronger emotions can contribute to stronger feelings of connection between the individuals (Lawler, 2001; Barsade, 2002; Spoor and Kelly, 2004). Performance is expected to involve stronger emotions (Beck et al., 2000), particularly positive. Therefore, the hypothesis that social connection will be rated higher in performance than rehearsal, will also be tested.
4. **Gender differences:** The existing literature suggests gender differences are to be expected in reports of emotional states (Sandgren, 2009) and on salivary cortisol levels (Kirschbaum et al., 1992; Grape, et al., 2003). Based on this, I tested the following hypotheses:
- (a) Female participants will rate positive affect significantly higher after each condition than male participants.
- (b) Negative affect will not differ significantly between female and male participants.
- (c) Male participants will have significantly higher cortisol levels in public performance than female participants.
5. **Subjective feelings of anxiety and relaxation:** Participants will report feeling significantly more relaxed in the rehearsal than performance, and significantly more anxious in the performance than rehearsal.

### **6.1.1 Method**

#### **Participants**

Participants were 28 members of a choral ensemble, the Cantata Choir. This is a choir constituted mostly of students and alumni from the music department at Canterbury Christ Church University, and was conducted by Grenville Hancox. The choir had weekly rehearsals and performed frequently (participants reported an average of 20 performances in the past year). Their ages ranged from 18 to 49, with a mean of 22 years of age. Out of these, 12 completed all stages of the study (8 females). Their ages ranged from 19 to 49, with a mean of 23 years of age. Their time in the ensemble ranged from 1 to 5 years.

#### **Design**

This was a quasi-experimental study employing a multivariate mixed measures design. The repeated measures independent variables were 1) Activity, with three levels singing rehearsal, singing performance and control (non-singing); and 2) Time, with two levels - before and after the activity. The between-participants experimental variable was sex, with two levels - Male, Female. The dependent variables were ratings of positive and negative affect; ratings of social connection and salivary cortisol levels. This was a questionnaire and salivary concentration measures study.

#### **Procedure**

Data was collected in three different moments: before and after a rehearsal, before and after a performance, and before and after a passive control on a different day of the week but at the same time as the usual singing activity.

On a pre-experiment visit, the members of the Cantata Choir were informed about the aims and procedure of the study, its voluntary nature and strict confidentiality of their responses. The procedure on saliva collection was demonstrated, and information on the

nil by mouth procedure and exclusion criteria was provided. Potential participants were informed about the study dates. Any questions potential participants had, were answered and any doubts about the study or procedure clarified. An information pack was then provided. This contained a study information sheet, and instructions for saliva collection. This visit took no longer than 20 minutes.

### **Rehearsal**

Members of the choir were asked again whether they wanted to participate. Those who volunteered were asked if they followed the nil by mouth procedure for 30 minutes prior to sampling (except water). Only participants that fulfilled the criteria were to provide salivary samples. Those who had not fulfilled the criteria, were not to be excluded from the study but wouldn't provide saliva samples. All the individuals who agreed to take part confirmed they had followed the nil by mouth procedure.

Participants were reminded of the aims and procedure of the study, the confidentiality of their responses, and the voluntary nature of their participation.

A test pack containing the questionnaire measures and the saliva collecting materials (Salivette tubes) was provided to each participant. Two copies of the consent form were included and those who agreed to take part in the study, were asked to sign both of them. Participants were then advised that they were free to discontinue their participation at any time.

Participants were then asked to pick out the saliva collection tube and were guided through the saliva donation procedure. Once this was completed by everyone, participants were instructed to complete the questionnaires and record sheet. Once this step was completed, the conductor proceeded with the rehearsal as usual.

After the rehearsal, which lasted for 1 hour and 30 minutes, participants were instructed to repeat the data collection procedure, with saliva donation first and questionnaire

completion just after that.

Each of the data collection procedures took no longer than 30 minutes.

### **Control**

The control condition was a passive control where participants were to provide saliva samples and complete the questionnaires on a day of the week when they did not have a singing rehearsal. Participants did this at home, in their own time. In order to do so, a study pack containing all the materials needed was provided at the end of the rehearsal. This included the questionnaires, the saliva collection tubes, and instructions.

Most participants had weekly singing activities, with the choir rehearsals being on Mondays. The control date was set for the Wednesday of the week after the rehearsal collection session. Participants completed the questionnaires and donated saliva samples at the same time of the day that matched the rehearsal pre and post data collection. An email was sent out the day before with a reminder, and, on the day, participants received a text message one hour before they were to complete the procedure. This ensured that participants had enough time to prepare for the study and adhere to the nil by mouth procedure.

Participants were advised they were to keep their saliva samples in their home freezer, and bring it, together with the questionnaires, on the next meeting session. This happened on the performance day, the following Saturday.

### **Performance**

The data collection procedure was similar to that in the rehearsal condition, in that participants provided saliva samples and completed questionnaires before and after their performance. However, there were some key differences that were outside my control. The performance took place in a different town to the one where the choir usually rehearses



so a meeting-point was organized. This was also in a location different to that where the choir rehearses. The pre-performance data collection was done in the meeting-point location and three hours before the post-performance data collection. This was due to the time that had to be allowed for the choir to drive to the performance location, and the length of the performance. The post-performance data collection was completed in the performance location.

### **Materials**

The materials for this study can be organized into three categories: study information materials, questionnaire materials and saliva collection materials. Two consent forms for each participant were also prepared. One copy was to be kept by the participant and another by the researcher.

The study information materials consisted of a participant information sheet containing all the details about the study's background and aims, what was necessary to do so that saliva samples could be donated (the nil-by-mouth checklist and schedule), procedures, exclusion criteria, confidentiality, researcher contact and ethical approval. Questionnaire materials consisted of all the self-report measures used in this study and a record sheet, where demographic information could be provided as well as information regarding the adherence to the nil-by-mouth procedure. Saliva collection materials consisted not only of the actual collection tubes, but also an information sheet specifying instructions for saliva donation, the nil by mouth procedure and exclusion criteria.

Confidentiality was maintained by asking participants to provide a code. This also helped connect each participant to each data set without violating privacy. Each questionnaire contained a page where participants were asked to provide the first letter of their first name, the first letter of their mothers first name, the first letter of their fathers first name, the day and the month of their birth.

### Measuring affective states

Affective states were measured with the positive and negative affect schedule (PANAS) which was developed by Watson, Clark, and Tellegen (1988) to assess mood in non-clinical populations. In its usual format the scale includes 10 negative items and 10 positive items. However, in order to decrease study demands, I decided to use the short version developed by Thompson (2007). This version contains two 5-item scales and participants were asked to rate, on a 5-point Likert scale (1=*very slightly or not at all*; and 5=*extremely*), to what extent they felt in a particular way on that moment.

In the present study, the positive affect scale had Cronbach's alpha coefficients of .80 before the rehearsal condition, .64 after the rehearsal condition, .87 before control, .79 after control, .93 before the performance condition and .86 after the performance condition. The negative affect scale had Cronbach's alpha coefficients of .80 before the rehearsal condition, .04 after the rehearsal condition, .58 before control, .72 after control, .49 before the performance condition and .53 after the performance condition.

Whilst a low alpha is often indicative of a problematic scale, or a poor specified scale, in this case it is more likely that this low alpha occurred due to floor effect. That is, it is more likely that this is a result of a lack of variability in these singers' responses, particularly after the rehearsal, such that the vast majority gave a response of 1. This assertion is supported by the finding that the scale has a healthy alpha in some of the other contexts in this study.

### Measuring Social Connection

Thirteen statements were developed in order to assess levels of connection between participants under each condition. These were informed by the work on social connectedness and adapted from the revised Social Connectedness scale, SCS-revised (Lee & Robbins, 1995; Lee, Draper, & Lee, 2001; Lee, Dean, & Jung, 2008). The SCS-revised is a 20-

item psychometric instrument that measures a psychological sense of belonging, or how individuals cognitively construe interpersonal closeness with others in their social world (Lee et al., 2008). It does not measure feelings of belongingness or connection with others on a given moment, but instead an individual's sense of connectedness. However, in this study, participants were asked to think about how they felt on that moment and rate their agreement or disagreement with positively and negatively worded statements referring to feelings of closeness, connection, togetherness and cooperation, on a 1 (*strongly disagree*) to 7 (*strongly agree*) rating scale.

Reliability and validity of this created scale was measured with Cronbach's alpha coefficient. Internal consistency was acceptable for both the rehearsal condition (Cronbach's  $\alpha = .76$ ) and the performance condition (Cronbach's  $\alpha = .73$ ).

### **Measuring anxiety and relaxation**

Feelings of anxiety and relaxation were measured after singing, with two items included in the questionnaire developed in the previous chapter. In this study, participants were asked to rate their agreement, in a scale of 1 (*strongly disagree*) to 7 (*strongly agree*), with the following statements: "I felt anxious" and "I feel relaxed".

#### **6.1.2 Results**

Overall means and standard deviations for social connection, negative affect, positive affect and cortisol are presented in table 6.1. Means and standard deviations by gender are presented in table 6.3. Means and standard deviations for anxiety and relaxation ratings are reported in the section referring to hypothesis 5. SPSS (version 17) was used to conduct all tests, with the exception of effect size and post-hoc tests, which were calculated using the indicated formulas.

Assumptions of normality were violated <sup>8</sup> in the distributions of negative affect before rehearsal,  $W(12) = 0.60$ , after rehearsal,  $W(12) = 0.66$ , before control,  $W(12) = 0.80$ , after control,  $W(12) = 0.70$ , and after performance,  $W(12) = 0.48$ , but not before performance,  $W(12) = 0.88$ , ns.

The  $F$ -test in ANOVA is known to be accurate even when its assumptions are violated (Glass, Peckham, & Sanders, 1972). The  $F$ -test in ANOVA is, therefore, quite robust, and known to perform well in skewed distributions (Games & Lucas, 1966). Nevertheless, several options were explored to attempt to stabilize the variances between groups and normalize the distribution.

The first of those options was transforming the data. A log transformation, a square root transformation and a reciprocal transformation of the data were attempted to correct for the violations of the assumption of normality, but did not normalize the distributions.

The second option was to explore the existence and impact of outliers, as these could be the source of the violations of normality. Three outliers were identified, with the help of SPSS, in the ratings of negative affect. Before removing extreme values, it is acceptable practice to investigate the effect of replacing the score (Field, 2009). This is often preferable in studies with small samples where removing scores is an undesirable outcome. The score can be changed to the next highest score plus one unit, converting back from a z-score or replace the extreme value with the mean plus two standard deviations. This last option was simple and straight-forward, however, changing the scores on those outliers did not normalize the distributions.

Finally, before deciding to use non-parametric tests with the analysis of negative affect, tests were conducted on the data from which outliers were removed. Removing the outliers did not normalize the distributions of negative affect. It was, then, decided to use non-parametric tests on this variable.

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<sup>8</sup>All values significant to  $p < .05$

Two 3\*2 (Condition\*Time) repeated-measures ANOVA were performed on positive affect and salivary cortisol. One repeated-measures t-test was performed on social connection, and two repeated-measures *t*-tests were conducted on rating of anxiety and relaxation. One Friedman test was performed on negative affect. Three 3\*2\*2 (Condition\*Time\*Gender) mixed ANOVA were carried out for negative affect, positive affect and salivary cortisol.

All effects are reported as significant at  $p < .05$  (two-tailed) and marginally significant to  $p < .10$  (two-tailed) , unless otherwise stated. Sphericity assumed unless otherwise stated.

Table 6.1: Means and standard deviations for social connection, negative affect, positive affect and cortisol

	Social Connection n=16		Negative Affect n=12				Positive Affect n=12				Cortisol n=12			
	M	SD	Before		After		Before		After		Before		After	
			M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Rehearsal	4.65	0.52	1.25	0.45	1.10	0.16	2.80	0.80	2.95	0.55	0.14	0.08	0.07	0.04
Control	n/a	n/a	1.42	0.51	1.35	0.51	2.42	0.71	2.33	0.63	0.16	0.09	0.10	0.06
Performance	4.94	0.68	1.40	0.41	1.05	0.12	2.42	0.85	3.13	1.04	0.17	0.07	0.09	0.05

**Hypotheses 1:**

- 1a)** Positive affect will increase and negative affect will decrease significantly during choral singing;
- 1b)** Positive affect will be significantly higher and negative affect will be significantly lower after choral singing compared to control;
- 1c)** Performance will be related with both more positive and more negative affect compared to rehearsal;

Overall, positive affect was rated higher in the singing sessions than control. Positive affect was higher after performance ( $M = 3.13$ ,  $SD = 1.04$ ) than before performance ( $M = 2.42$ ,  $SD = 0.85$ ), higher after rehearsal ( $M = 2.95$ ,  $SD = 0.55$ ) than before rehearsal ( $M = 2.80$ ,  $SD = 0.80$ ), and lower after control ( $M = 2.33$ ,  $SD = 0.63$ ) than before ( $M = 2.42$ ,  $SD = 0.71$ ).

A 3\*2 (Condition\*Time) repeated-measures ANOVA revealed a non-significant main effect of Activity,  $F(1, 22) = 3.00$ , *ns*, a significant main effect of Time,  $F(1, 11) = 10.08$ ,  $p < .05$  and a significant interaction Condition\*Time,  $F(1, 22) = 4.92$ ,  $p < .05$   $r = 0.43^9$ . Given that this interaction was significant and had a medium effect size, it was relevant to further investigate it.

A post hoc Tukey's HSD<sup>10</sup> test was performed,  $HSD = 0.64$  ( $\alpha .05$ ), and compared to the nine possible mean differences (based on estimated marginal means). The significant

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<sup>9</sup>Effect size calculated with the formula

$$r = \sqrt{\frac{F(1, dfr)}{F(1, dfr) + dfr}}$$

(Field, 2009, p.501); Partial Eta Squares is the default measure of effect size provided by SPSS for a mixed ANOVA. However, the partial eta square tends to overestimate the size of the effect.

<sup>10</sup>Tukey's HSD can be calculated with the formula

$$HSD = q_k \times \sqrt{\frac{MS_w}{n}}$$

where  $q_k$  is the critical value found in the studentized range, corresponding to the  $\alpha$ ,  $df_{wn}$  is degrees of freedom within subjects and  $k$  is the number of comparisons

Table 6.2: Mean differences within conditions (diagonal values), between conditions on time 1 (values on left of diagonal); and between conditions on time 2 (values on the right of the diagonal)

	Rehearsal	Performance	Control
Rehearsal	-0.15	0.18(a)	0.62(a)
Performance	0.38(b)	-0.71*	.80*(a)
Control	0.38(b)	0.00 (b)	0.09

b - before; a - after; \*Significant to  $p < .05$

differences are those that are bigger than the *HSD* value (ignoring any signs), and all possible values can be found on table 6.2. Values in diagonal represent the differences within conditions. Values to the right of the diagonal correspond to the differences between conditions on time 2 (a - after). Values to the left of the diagonal represent the differences between conditions on time 1 (b - before).

These results indicate that positive affect was significantly higher after performance than after control, and increased significantly in the performance condition. It is also possible to consider that the difference between positive affect in the rehearsal and control is marginally significant.

Negative affect had lower ratings in the singing sessions than control. Negative affect was lower after performance ( $M = 1.05$ ,  $SD = 0.12$ ) than before performance ( $M = 1.40$ ,  $SD = 0.41$ ), lower after rehearsal ( $M = 1.10$ ,  $SD = 0.16$ ) than before rehearsal ( $M = 1.25$ ,  $SD = 0.45$ ), and lower after control ( $M = 1.35$ ,  $SD = 0.51$ ) than before ( $M = 1.42$ ,  $SD = 0.51$ ).

A Friedman's ANOVA<sup>11</sup> indicated that there were significant differences in negative affect,  $\chi^2(5) = 13.07$ . Wilcoxon tests were used to further investigate this finding but a Bonferroni correction<sup>12</sup> for the number of tests was applied. Therefore, all effects are reported at a .005 level of significance. The Wilcoxon tests revealed that negative affect

<sup>11</sup>Non-parametric alternative to a repeated-measures ANOVA (Field, 2009).

<sup>12</sup>Bonferroni correction (critical value of .05 divided by the number of tests conducted) prevents type I errors from accumulating when several tests are performed (Field, 2009)



only changed significantly in the performance condition,  $t = 0.00$ ,  $r^{13} = -0.52$ .

Taken together, these findings partially corroborate hypothesis 1a, as positive affect increased and negative affect decreased significantly in performance, but not in rehearsal. Hypothesis 1b is also partially corroborated, as positive affect was significantly higher after performance than after control. It should be noted that positive affect was higher after rehearsal than control and this difference was marginally significant. Finally, hypothesis 1c is not corroborated by these findings: although performance was related to more positive and more negative affect than rehearsal, the differences were not statistically significant.

### **Hypothesis 2:**

- 2a)** Salivary cortisol levels will decrease in rehearsal and control conditions, but significantly so in rehearsal.
- 2b)** Salivary cortisol levels will be significantly higher before performance than rehearsal and control.

Levels of salivary cortisol were lower after performance ( $M = 0.09$ ,  $SD = 0.05$ ) than before performance ( $M = 0.17$ ,  $SD = 0.07$ ), lower after rehearsal ( $M = 0.07$ ,  $SD = 0.04$ ) than before rehearsal ( $M = 0.14$ ,  $SD = 0.08$ ), and lower after control ( $M = 0.10$ ,  $SD = 0.06$ ) than before ( $M = 0.16$ ,  $SD = 0.09$ ).

A 3\*2 (Condition\*Time) repeated-measures ANOVA revealed a non-significant main effect of Activity,  $F(1, 22) = 1.54$ , *ns*, a significant main effect of Time,  $F(1, 11) = 30.75$ ,  $p < .05$ ,  $r = 0.86$ , and a non-significant interaction Condition\*Time,  $F(1, 22) = 0.37$ , *ns*.

A post hoc Tukey's HSD test was performed,  $HSD = 0.06$  ( $\alpha .05$ ), to further investigate

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<sup>13</sup>Effect size calculated converting z-score into the effect size estimate,

$$r = \frac{Z}{\sqrt{N}}$$

where  $N$  corresponds to the number of observations (Field, 2009).

the main effect of time. The difference between mean cortisol levels before and after rehearsal was 0.07; the difference between mean cortisol levels before and after performance was 0.09; and the difference between mean cortisol levels before and after control was 0.06. These results indicate that salivary cortisol decreased significantly in the rehearsal and performance, while the decrease in the control condition can only be considered marginally significant.

These findings corroborate hypothesis 2a, but do not corroborate hypothesis 2b.

### **Hypothesis 3:**

Social connection will be rated higher in performance than rehearsal.

Ratings of social connection were higher in performance ( $M = 4.94$ ,  $SD = 0.68$ ) than rehearsal ( $M = 4.65$ ,  $SD = 0.52$ ) but this difference was not statistically significant,  $t(15) = -1.82$ ,  $r^{14} = -0.23$ .

These findings indicate that there was a trend in the hypothesized direction, but this trend failed to reach statistical significance.

### **Hypotheses 4:**

**4a)** Female participants will rate positive affect significantly higher in each condition than male participants.

**4b)** Negative affect will not differ significantly between female and male participants.

**4c)** Male participants will have significantly higher cortisol levels in public performance

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<sup>14</sup>Effect size calculated with formula appropriate for  $t$ -tests, using the original standard deviations to prevent overestimation of ES (Dunlap, Cortina, Vaslow, & Burke, 1996);

$$r = \frac{d}{\sqrt{d^2 + 4}}$$

where  $d$  (Cohen's  $d$ ) =  $\frac{M1-M2}{sd}$  (when variances are homogeneous) or  $sd_{pooled}$  (when the deviations are heterogeneous) where

$$sd_{pooled} = \sqrt{\frac{sd_1^2 + sd_2^2}{2}}$$

This formula will also be used in subsequent  $t$ -tests.

than female participants.

The main assumptions to consider in a mixed ANOVA are normality of distributions and equality of variances. The assumptions of normality were violated in the distributions of negative affect before rehearsal,  $W(8) = 0.53$ , and after rehearsal,  $W(8) = 0.60$ , after control,  $W(8) = 0.69$ , and after performance,  $W(8) = 0.42$ , for female participants. For male participants, assumptions of normality were violated in the distribution of negative affect after performance,  $W(4) = 0.63$ .

The variances of negative affect were only significantly different in the two groups after performance,  $F(1, 10) = 6.06$ . Variances of negative affect were not significantly different in any other groups.

The violated assumptions could compromise the accuracy of the  $F$ -test for gender on this variable. Since the  $F$ -test in ANOVA is considered accurate even when its assumptions are violated, the only source of statistical concern was negative affect after performance. This was so because there were violations of both assumptions. A log transformation, a square root transformation and a reciprocal transformation of the data were attempted to correct for the violations of the assumption of homogeneity of variance and/or normality. A reciprocal transformation stabilized the variances,  $F(1,10) = 4.60$ , *ns*, but did not normalize the distribution of negative affect after performance for either female,  $W(8) = 0.42$ , or male,  $W(4) = 0.63$ , participants.

A 3\*2\*2 (Condition\*Time\*Gender) mixed ANOVA was conducted with the transformed negative affect and compared to a 3\*2\*2 (Condition\*Time\*Gender) mixed ANOVA on the untransformed data. Findings were similar which suggested the violations of assumptions were not a source of concern. The analysis of negative affect reported here is, thus, based on the original data.

The assumptions of normality were violated in the distributions of cortisol after rehearsal for female,  $W(8) = 0.81$ , and male,  $W(4) = 0.74$ , participants. The assumption

of equality of variances was upheld in all cortisol distributions. The analysis was, thus, conducted on the original data.

No assumptions were violated in the distributions of positive affect.

Table 6.3: Means and standard deviations of negative affect, positive affect and cortisol by female and male participants

		Negative Affect n=8(F); 4(M)				Positive Affect n=8(F); 4(M)				Cortisol n=8(F); 4(M)			
		Before		After		Before		After		Before		After	
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Rehearsal	Female	1.25	0.55	1.08	0.15	2.83	0.54	3.05	0.54	0.15	0.10	0.08	0.04
	Male	1.25	0.19	1.5	0.19	2.75	1.29	2.75	0.57	0.10	0.04	0.05	0.02
Control	Female	1.45	0.55	1.38	0.55	2.48	0.84	2.28	0.62	0.17	0.09	0.10	0.07
	Male	1.35	0.47	1.30	0.48	2.30	0.42	2.45	0.72	0.14	0.09	0.10	0.04
Performance	Female	1.40	0.40	1.03	0.07	2.48	0.63	3.25	0.87	0.17	0.06	0.10	0.06
	Male	1.40	0.49	1.10	0.20	2.30	1.29	2.90	1.44	0.16	0.09	0.08	0.04

### Positive Affect

The values on Table 6.3 indicate that female participants rated positive affect higher before and after rehearsal and performance, and before control but male participants rated positive affect higher after control.

A 3\*2\*2 (Condition\*Time\*Gender) mixed ANOVA revealed a non-significant main effect of Condition,  $F(2,20) = 2.11$ , *ns*, a non-significant interaction between Condition\*Gender,  $F(2,20) = 0.16$ , *ns*, a significant main effect of Time,  $F(1,10) = 7.98$ ,  $p < .05$ , a non-significant interaction between Time\*Gender,  $F(1,10) = 0.01$ , *ns*, a non-significant interaction between Condition\*Time,  $F(2,20) = 3.57$ , *ns*, a non-significant Condition\*Time\*Gender interaction,  $F(2,20) = 0.63$ , *ns*, and a non-significant main effect of Gender,  $F(1,10) = 0.17$ , *ns*.

These findings do not corroborate hypothesis 4a. Female participants rated positive affect higher in the singing conditions and before the control condition, but these ratings were not significantly different from the ratings by male participants.

### Negative Affect

The values on Table 6.3 indicate that female and male participants rated negative affect similarly before rehearsal and before performance, but female participants rated negative affect lower than male participants after rehearsal and after performance. Female participants rated negative affect higher before and after control, compared to male participants.

A 3\*2\*2 (Condition\*Time\*Gender) mixed ANOVA revealed a non-significant main effect of Condition,  $F(2,20) = 0.82$ , *ns*, a non-significant interaction between Condition\*Gender,  $F(2,20) = 0.11$ , *ns*, a significant main effect of Time,  $F(1,10) = 9.21$ ,  $p < .05$ , a non-significant interaction between Time\*Gender,  $F(1,10) = 0.24$ , *ns*, a non-significant interaction between Condition\*Time,  $F(2,20) = 0.99$ , *ns*, a non-significant

Condition\*Time\*Gender interaction,  $F(2,20) = 0.01$ , *ns*, and a non-significant main effect of Gender,  $(1,10) = 0.00$ , *ns*.

These findings indicate that, as predicted, there were no significant gender differences in the ratings of negative affect.

### Salivary Cortisol

Female participants had higher cortisol levels than male participants before and after rehearsal, performance, and before control. Female and male participants had similar levels of salivary cortisol after control. The data on table 6.3 is already an indication that salivary cortisol levels were not higher for male participants than female participants, as predicted.

Similarly to the findings on negative and positive affect, a 3\*2\*2 (Condition\*Time\*Gender) mixed ANOVA revealed a non-significant main effect of Condition,  $F(2,20) = 1.57$ , *ns*, a non-significant interaction between Condition\*Gender,  $F(2,20) = 0.15$ , *ns*, a significant main effect of Time,  $F(1,10) = 23.74$ ,  $p < .05$ , a non-significant interaction between Time\*Gender,  $F(1,10) = 0.46$ , *ns*, a non-significant interaction between Condition\*Time,  $F(2,20) = 0.53$ , *ns*, a non-significant Condition\*Time\*Gender interaction,  $F(2,20) = 0.34$ , *ns*, and a non-significant main effect of Gender,  $(1,10) = 0.77$ , *ns*.

These findings confirm that, as indicated by the means on table 6.3, hypothesis 4c is not corroborated: male participants did not have higher levels of salivary cortisol in public performance than female participants. In fact, female participants had higher levels of salivary cortisol than male participants, though no differences were statistically significant.

**Hypothesis 5:**

Participants will report feeling significantly more relaxed in the rehearsal than performance, and significantly more anxious in the performance than rehearsal.

Ratings of relaxation ( $n=16$ ) were higher in rehearsal ( $M = 5.00$ ,  $SD = 1.46$ ) than performance ( $M = 4.81$ ,  $SD = 1.60$ ) but this difference was not significant,  $t(15) = 0.38$ ,  $ns$ ,  $r = 0.06$ . Ratings of anxiety ( $n=15$ ) were higher in performance ( $M = 2.20$ ,  $SD = 1.56$ ) than rehearsal ( $M = 1.00$ ,  $SD = 0.00$ ) and this difference was significant,  $t(14) = -2.96$ ,  $r = -0.48$ . Hypothesis 5 is, thus, only partially corroborated.

**6.1.3 Discussion**

While previous studies have investigated psychological and physiological effects of group singing (e.g. Beck et al., 2000; Kreutz et al., 2004), this study was a first attempt at investigating psychological, physiological and social effects of group singing, and how context might influence these.

The first set of hypotheses referred to effects on affective states. Following previous literature, I expected positive affect to increase and negative affect to decrease significantly during the singing conditions. I also expected positive affect to be significantly higher and negative affect to be significantly lower after singing compared to control. Finally, I expected performance to be related to more positive and more negative affect compared to rehearsal.

The findings in this study partially corroborate the first two hypotheses but do not corroborate this last one. Positive affect increased and negative affect decreased significantly in performance; and positive affect was significantly higher after performance than after control. While the increase in positive affect in rehearsal was not significant, it was higher than in control and this difference was marginally significant. Negative affect was also lower in the singing conditions compared to control but this was not statistically



significant. Finally, although performance was related to higher ratings of positive and negative affect than rehearsal, the differences were not statistically significant.

With these hypotheses, I wanted to investigate whether group singing benefits mood and whether mood changes in group singing can be affected by the context in which the singing occurs. The findings reported above are consistent with previous research (Beck et al., 2000; Unwin et al., 2002; Kreutz et al., 2004) in that group singing was related to mood improvement, as reflected in increases in positive affect and decreases in negative affect. Although this was only significant in one of the singing conditions, it still provides support for the argument that an increase in positive affect and decrease in negative affect are associated with group singing. This association, however, seems to be influenced by different circumstances. These findings indicate that the type of singing session had an impact on how group singing affected emotional states. However, it seemed to do so differently as if the rehearsal was a more positive and less negative situation to start with, with little room for big mood changes, while the performance was associated with more negative feelings and less positive feelings to start with but was a positive experience that contribute for greater changes in positive and negative affect.

While these findings are somewhat consistent with the existing literature (e.g., Beck et al., 2000), there is one important issue to be taken into account when considering them. The negative affect scale had a low validity in some instances, which raises the possibility that the items used addressed levels of negative affect that were not part of the experience. A wider range of negative feelings could, in the future, provide a clearer picture.

The second set of hypotheses investigated effects on salivary cortisol levels. I expected the time of the day when the study took place would lead to a decrease of cortisol in rehearsal and control. However, due to both the relaxing and positive effects of choir singing (which would be absent from the control condition), I expected this decrease to be significant in rehearsal. Because I expected performance to be associated with significantly

higher levels of anxiety, I also predicted salivary cortisol levels to be significantly higher before performance, and increase significantly in this condition.

The findings corroborated the first hypothesis but do not corroborate the second one. Salivary cortisol levels decreased in all three conditions. This decrease was significant in rehearsal and performance. Consequently, these findings only partially replicate those by Beck et al. (2000). At baseline, salivary cortisol levels were highest in the performance condition and lowest in the rehearsal condition. Salivary cortisol levels were lowest after rehearsal, followed by performance and control. However, these differences between conditions were not statistically significant.

While decreases in cortisol levels can be attributed to the time of the day when the data was collected, cortisol levels were lowest after the singing conditions, and significantly so. Normative data (Salimetrics, 2011) places normal diurnal salivary cortisol below 0.1  $\mu\text{g}/\text{dL}$  after 4.30 pm. The study took place between 6 and 9 pm and cortisol levels are only slightly above that level before each condition, but below that level after each condition. It is possible that this was due to relaxing and positive effects of group singing and not only the time of the day.

From this evidence it is also evident that performance was not as arousing of a situation as expected. One reason for the unexpected findings in this condition may be the fact that the singers who donated a sample for this study had experience performing in similar contexts, in average, 20 times over the past year, and, unlike for participants in Beck et al. (2000), it was not their first time performing those musical contents. In that study, the musical piece was difficult and novel for many of the singers and it was their first time performing it. The level of familiarity with the singing materials would have been smaller and a greater performance anxiety could be associated to that. In the present study, there was a greater level of familiarity with the materials. Therefore, it is not unlikely participants had already developed significant habituation to such performance contexts,

felt comfortable and confident about the musical materials being performed, and/or had developed successful mechanisms to cope with the naturally arising performance anxiety. Indeed, other findings in this study provide support for this last argument. Ratings of anxiety were significantly higher in performance than rehearsal, possibly reflecting that naturally arising performance anxiety. However, not only was the level of anxiety still very low, but the performance was also associated with similar levels of relaxation as the rehearsal and a significant increase in positive affect.

With the third hypothesis, I intended to investigate effects on feelings of connection amongst singers. The literature suggests stronger emotions, particularly positive, contribute to stronger feelings of connection between individuals (Lawler, 2001; Barsade, 2002; Spoor & Kelly, 2004). Following the expectation that performance would involve stronger emotions, I expected feelings of connection to be rated higher in this condition than rehearsal. Ratings of social connection were indeed higher in performance than rehearsal, but this difference was not statistically significant.

The results in subjective and objective measures in this study offer the first explanation for these findings. Emotions involve both psychological and physiological components. Affective states and endocrine reactions are only two of the many elements that constitute the generic emotional experience (Scherer, 2005). According to a definition of emotion outlined by Scherer (2005), this phenomenon involves five components: cognitive appraisal, bodily responses (neuroendocrine, autonomic and somatic nervous system expressions of arousal), action tendencies (motivation); physical expression (facial, vocal and other bodily expressions); and the subjective experience that reflects all these components (i.e., feelings). The findings reported above indicate that performance was associated with more positive and more negative affect than rehearsal but the differences were not statistically significant. At the same time, salivary cortisol levels (an expression of arousal) decreased significantly in performance and rehearsal. As mentioned above, this indicates

the performance was more a relaxing than arousing experience. Emotions are not just reflected in subjective reports of affect, but seem to also depend on objective physiological changes. In order for any differences in social connection to emerge, it appears stronger affective states in performance would have to be associated with physiological arousal.

Another possible explanation for these findings lies in the characteristics of the group which were impossible to control for. The participants in this study had been members of the choir between 1 to 5 years. It is possible that positive feelings of connection between singers would already be present at the time of the study. Any short-term effects on such feelings would only reinforce already existing ones.

One of the main limitations in previous studies is a lack of data on gender differences. There was a female bias in recruitment in this study but it seemed important to investigate and report whether female and male participants responded differently. The fourth set of hypotheses concerned the existence of gender differences in affective states and cortisol. Regarding affective states, and following Sandgren (2009), female participants were expected to rate positive affect significantly higher after each condition than male participants, but no differences were expected to emerge in negative affect. Regarding salivary cortisol levels, male participants were expected to have significantly higher cortisol levels in public performance than female participants. This hypothesis arose from the evidence that men and women respond differently to stressful psychosocial situations. As already mentioned on Chapter 2, Kirschbaum et al. (1992) found male participants to have higher cortisol levels than women, in anticipation of a psychological stressor (in this public performance), without actually experiencing it.

Female participants did rate positive affect higher in the singing conditions and before the control condition, but this difference was not significant. There were also no significant gender differences in the ratings of negative affect, and salivary cortisol levels were also similar in female and male participants in the different conditions.

In light of what has already been discussed above, the salivary cortisol findings are not surprising. If the performance was more of a relaxing than stressful situation, then it is less likely it would have been perceived as a psychological stressor . It is plausible that this would also be reflected in males' salivary cortisol levels in this condition. The findings did not corroborate the stated hypothesis but are consistent with the findings discussed so far.

Another explanation might relate to factors extraneous to the study that influence salivary cortisol levels (see supplement A for a review of variables that influence cortisol levels). While a record sheet was provided and participants were asked to provide information on several factors known to increase salivary cortisol (one of particular interest in females is estrogen-based medication), the majority of respondents who completed the study did not complete this section on each day or failed to return it. This was probably a result of the fact that only one sheet was provided and participants were to keep it, record the information on each day, and return it in the end of the study. Instead, separate record sheets should have been provided for each day. It is, thus, not possible to demonstrate that levels of salivary cortisol in female participants were not influenced by these other factors.

Regarding affective states, the proposed hypothesis was also not corroborated. One possible explanation as to why there were no significant gender differences in the expression of positive affect might be related to the evidence that men can be as emotionally expressive as women. While there is evidence in the literature that women are often more emotionally expressive, it is not certain that this is the case in the experience of emotions (Brody & Hall, 2008). Consistent with this notion, there is evidence that gender differences in expression of emotion can be situation-specific (Larson et al., 1994) which suggest men can be as emotionally expressive as women. In their study, Larson et al. (1994) found that, when at home, men reported more positive affect states than women. On the other

hand, when at work, men reported less positive affect than women. It is possible that one of the factors that determines the expression of emotions is the way the individual, male or female, relates to the task or activity he/she has experienced. In this study, all participants were engaging in an activity of their choice. It is possible both female and male participants were already quite happy about what they were doing and had no inhibitions in expressing so.

Some of the main limitations in this study have already been discussed in previous paragraphs, but it is important to highlight that the findings above should be considered within the context of this study. The small sample size makes it difficult to generalize the findings and carry-over effects were not controlled for. A measure of anxiety was only taken after the singing, which left no possibility to control for baseline levels. Nevertheless, it can be argued that the naturalistic characteristics of the study provided it with ecological validity. The tests used were statistically strong, with high reliability in most measures and upheld normality in most distributions. Furthermore, there was some replication of previous findings and consistencies between the subjective and objective measures.

In sum, it is possible to argue that the findings discussed above indicated that a rehearsal and a performance of choir singing could be associated with an objective change in the endocrine system. In this study, this was reflected in a reduction of cortisol levels. Furthermore, the findings above also suggested that a choir singing performance could be associated with mood improvement, with an increase in positive affect and decrease in negative affect. The performance studied here also turned out to be a complex situation involving both feelings of anxiety and relaxation, as Beck et al. (2000) had suggested.

The findings discussed above also suggest that an influence of context emerged in affective measures but not on cortisol. This is likely to be because although performance was a stronger experience affectively, it was a relaxing one, like rehearsal. Cortisol is an objective measure of physiological arousal and, therefore, would not increase in a relaxing

experience. These findings suggest that psychological and physiological effects of group singing were moderated not only by the social context in which the singing occurred, but other factors such as previous experience performing in public and familiarity with singing materials. It is possible that a public performance with a more arousing component (i.e., first time performing complex musical materials in public) would highlight situational influences of effects of group singing. The next study was meant to clarify these assumptions.

## 6.2 Study 6

This study aimed to further investigate effects of group singing on psychological, physiological and social domains, and the impact of context on these. One of the main limitations in the previous study was that there was little distinction, in terms of the emotional content of the experience, between the circumstances in which the singing occurred. While rehearsal was expected to be a more relaxing experience, performance was expected to be related to more anxiety. Rehearsals tend to occur in familiar places, in more relaxed circumstances. There is space to repeat sections that need more work, to practice notes that are more challenging, to clarify any questions the group might have. Public performances, on the other hand, are a one off challenge. Whatever is done at first is what remains. There is no opportunity to just stop, go back and do it again. But, in the previous study, performance was not related to feelings and experiences of arousal. It was reasoned that this was possibly due to the degree of familiarity that singers had with the materials and performance context. Unlike Beck et al. (2000), the singers in the previous study performed pieces with which they were very familiar with, and had performed in public many times before.

In this study, data was collected in circumstances where the group was dealing with the singing materials together for the first time. This was expected to highlight contextual

differences between rehearsal and performance as it was more likely for anxiety to be present in a novel situation (i.e., performing in public for the first time). In an attempt to overcome other limitations in the previous study, measures of negative affect were expanded, data was collected on factors that could impact on cortisol secretion, and a more adequate measure of state anxiety was used before and after each condition. While a control condition would have been desirable, it was not possible to conduct one extra condition in this study due to lack of availability in the participants' schedule. Since the main purpose was to further investigate differences between contexts, it was hoped that comparing rehearsal with performance would suffice.

Even though a large part of this study was exploratory, it was possible to advance some specific predictions to be tested. Following the conditions above and previous arguments, I attempted to test the following hypotheses:

1. **Effects on affective states:** It was reasoned that the performance would be an exciting, yet anxious occasion, as it was the first time the choir was performing those materials in public. Singers would be happy to be doing this, but nervous about how it would go. The rehearsal occurred after this performance and was expected to be a less arousing experience. However, in this rehearsal, participants were also dealing with novel materials for a subsequent performance so it was possible that they would be less confident and both less positive and more negative feelings would be present to start with. A mood improvement would then occur throughout the rehearsal and be reflected in increased ratings of positive affect and decreased ratings of negative affect afterwards. The following specific hypotheses were tested:
  - (a) Positive and negative affect will be significantly higher in the performance than rehearsal;
  - (b) Positive affect will increase and negative affect will decrease significantly in the



rehearsal condition.

2. **Effects on salivary cortisol:** The rehearsal was expected to be a more relaxing situation, while the performance was expected to be an arousing situation, not only for the excitement of being able to perform in public but for the naturally arising public anxiety that would accompany such situation. In this way, cortisol was expected to respond to these two contexts differently as predicted above.

(a) Salivary cortisol levels will decrease significantly in rehearsal;

(b) Salivary cortisol levels will be significantly higher in performance than in rehearsal, and increase significantly in the performance condition.

3. **Effects on feelings of connection to others:** Social connection will be rated higher in performance than rehearsal but this difference will not be significant as the members of the choir will have developed feelings of connection throughout the weekly rehearsals in the months prior to the study.

4. **Effects on state anxiety:** Ratings of state anxiety will be significantly higher before the performance condition than before rehearsal.

5. **Gender differences:** Again, I attempted to replicate previous findings that there were gender differences in the psychological and physiological effects of group singing.

The following hypotheses were, once again, tested:

(a) Female participants will rate positive affect significantly higher after each condition than male participants.

(b) Negative affect will not differ significantly between female and male participants.

(c) Male participants will have significantly higher cortisol levels in performance than female participants.

- (d) Male participants will have higher ratings of state anxiety than female participants in performance.

### **6.2.1 Method**

#### **Participants**

Participants were 24 members of the Canterbury Christ Church University (CCCU) Choral Society (19 females). Their ages ranged from 19 to 65, with a mean of 41 years of age. Out of these, 11 participants completed all stages of the study (7 females). Their ages ranged from 19 to 65, with a mean of 43 years of age. Some participants had been part of previous versions of the choral society over the past 20 years, while others were members for the past 17 months.

#### **Recruitment**

At the time of the study, the CCCU Choral Society had over 100 singers and was preparing novel materials to perform together for the first time. Since the two main goals of replicating the previous study was to increase sample size and collect data in circumstances where singers were dealing with novel materials, it seemed like a good opportunity to work with the members of the CCCU Choral Society.

The recruitment goal was to attract and retain 25 male and 25 female singers in a total sample of 50 participants. The numbers above fall short of this recruitment goal. While I can try to explore several explanations, a real understanding of this disappointing result still escapes me.

At the time of this study in early 2012, the members of the choral society were well informed about the ongoing research project discussed in this thesis. In particular, they were well informed that a study would be conducted on a rehearsal and performance of the novel materials being prepared. The choir conductor was a constant champion of the

research work, and allowed me to speak to the choir in several occasions to pass on all the necessary information, advertise the study and encourage participation.

As I mention in chapter 3, one way for research with human participants to overcome the challenges of attracting and retaining participants, particularly outside academic settings, is to move away from the participant as guinea-pig approach, and closer to the participant as collaborator approach. One of the ways to do this is by being very clear, with potential participants, about the amount of effort (e.g., financial, intellectual, scientific) involved in completing a research study. In fact, this is, in my view, one of the main information gaps between researchers and potential participants, particularly those outside academia. Researchers might forget that individuals from the general population may not have experienced research work and, therefore, will not have a grasp of what is involved in organizing and managing a study. It is my belief that a better understanding of the work and efforts involved will bring the participant closer to the researcher. Sharing important details involved in the organization of the study also might allow the potential participant to feel involved in the process, feel more respected and, thus, more like the individual human being they are and not just a number on a ledger.

With this in mind, in the opportunities I had to talk to the choral society, I highlighted the relevance of the study within the general context of the research topic and within the particular context of this thesis, I stressed the essential role of anyone who decided to take part, and provided information about the intellectual and financial effort involved.

Members of the choral society were encouraged to sign up for the study beforehand and several did. However, the majority of participants was recruited on the performance day. After arrival at the performance location, the conductor reminded all the singers that the study was taking place and allowed me to, once again, talk to the singers. Unfortunately, before I addressed the singers, they were informed that, those who would not take part had several pub options in the area of the venue, where they could take a break before

they had to be back for the performance. After this, I reminded the group of the aims and procedures of the study, the essential quality of their participation and the fact we needed 25 female and male participants. I attempted to stress that data would be collected in no longer than 15 minutes and participants would still have time to go out before the performance. However, the nature of the study also determined that those who would have alcoholic drinks could be compromising the quality of the saliva samples and, thus, having anything besides water was not advisable for those wanting to take part.

Initially, 23 people accepted to take part. After the performance, 17 people completed the study. On the rehearsal day, 16 people provided data for both pre and the post rehearsal.

After analysing carefully the recruitment strategies used in this study, it is my belief that the main limitation was to treat recruitment as one isolated event, instead of treating it as four time points. The main reason for this was assuming that accepting to take part at time 1 (before performance) meant to the participant the same it meant to me: accepting to take part on all four time points. However, it is not unlikely that, after almost two hours of performing, participating in the study would still be in the forefront of someone's mind. While in the rehearsal hall it was possible for participants to be reminded of the study, due to the fact that it was impossible for them to leave without walking past the study corner, in the performance hall the study corner had to be set up in a back room, away from the main exit. In the future, in such naturalistic circumstances, I suggest recruitment is planned for each time point of a study, as it is unrealistic to expect participants to recall the study on top of their own life.

It is also clear that, in the future, the researcher should work more closely with any group leaders, in order to avoid concurrent or clashing options being provided to potential participants at the moment of recruitment. Particularly options that are potentially more desirable than completing questionnaires and providing saliva samples, while having to

avoid food, or drinking anything but water.

## **Design**

This was a quasi-experimental study employing a multivariate mixed measures design. The repeated measures independent variables were 1) Condition, with two levels singing rehearsal, and singing performance; and 2) Time, with two levels - before and after the activity. The between-participants experimental variable was Sex, with two levels - Male, Female. The dependent variables were positive and negative affect scores, social connection scores, state anxiety scores and salivary cortisol levels. This was a questionnaire and salivary concentration measures study.

## **Procedure**

This study had a very similar procedure to that described for study 5. The main difference was there was no control day in the present study. Although this would have provided valuable information, the workload of the members of the choral society meant that fewer people would be available to dedicate personal time to a control day. At the time of planning, I hoped that a larger sample would make up for a lack of a third collection moment.

## **Materials**

### **Measuring affective states**

As mentioned before, the Positive and Negative Affect Schedule (PANAS) was developed with non-clinical populations to measure mood (Watson et al., 1988). This instrument contains two, 10-item mood scales, one measuring positive affect and another measuring negative affect. Work on mood revealed that a dimension based on valence of the mood descriptors (positive/negative) was accompanied by another dimension based on content,

referring to specific qualities of individual affects. To allow mood to be measured at these two different levels, (Watson & Clark, 1994) created and extended version of the PANAS (PANAS-X). The PANAS-X contains 60 items and measures the initial positive/negative affect, but also 11 other specific affects: fear, sadness, guilt, hostility, shyness, fatigue, surprise, joviality, self-assurance, attentiveness and serenity. The different scales can be administered together or on different combinations depending on the relevance of each scale to a particular study. Respondents are asked to rate every item on a 5-point Likert scale (1 = *very slightly or not at all*; 5 = *extremely*), indicating to what extent they felt this way in the indicated time frame.

In this study, I attempted to overcome the limitations encountered with the PANAS, particularly the negative affect scale, in the previous study. For that effect, participants were asked to rate to what extent they felt in a particular way on that moment. Both positive and negative affect scales (10 items each) were used, and four extra items were added (two on each scale): *lonely*, *anxious*, *energetic* and *relaxed*. Out of these, only *anxious* was not an original item in the PANAS-X. It was included to add an extra measure of self-reported anxiety before and after each activity. Lonely and relaxed were also used to obtain reports on those two specific emotional states.

The authors of the PANAS-X scales reported Cronbach's alpha coefficients that reveal high internal consistency for both the positive and negative affect scales. For the selected time frame (on that moment), the positive affect scale has Cronbach's alpha coefficients that range from .83 (sample of 56 psychiatric inpatients) to .88 (sample of 2213 undergraduates). The negative affect scale has Cronbach's alpha coefficients that range from .85 (sample of 2213 undergraduates) to .88 (sample of 56 psychiatric inpatients) (Watson & Clark, 1994).

In the present study, the negative affect scale had Cronbach's alpha coefficients of .75 before the performance condition, .57 after the performance condition, .56 before the

rehearsal condition and .77 after the rehearsal condition. The positive affect scale had Cronbach's alpha coefficients of .88 before the performance condition, .92 after the performance condition, .93 before the rehearsal condition and .86 after the rehearsal condition.

### **Measuring levels of anxiety**

In the previous study a measure of anxiety was only acquired after the conditions, so there was no information on baseline levels of anxiety and no possibility to explore any possible effects of the activity on these. To overcome this limitation, participants were asked to rate 20 items, on a scale from 1 (*Not at all*) to 4 (*Very much so*), according to how they felt at that moment, before and after each session. These items were adapted from Spielberger's State Anxiety Inventory, which consists of 20 items that ask how a person feels now, and assesses the intensity with which anxiety manifests itself in a given moment (Barnes, Harp, & Jung, 2002).

In the present study, the state anxiety scale had Cronbach's alpha coefficients of .72 before the performance condition, .61 after the performance condition, .77 before the rehearsal condition and .67 after the rehearsal condition.

### **Measuring Social Connection**

The measure used to assess feelings of connection between participants was the same as in the previous study: thirteen statements adapted from the revised Social Connectedness scale. Again, participants were asked to think about how they felt on that moment and rate their agreement or disagreement with positively and negatively worded statements referring to feelings of closeness, connection, togetherness and cooperation, on a 1 (*strongly disagree*) to 7 (*strongly agree*) rating scale.

Reliability and validity of this created scale was measured with Cronbach's alpha coefficient. Internal consistency was excellent for both the rehearsal condition (Cronbach's

$\alpha = .91$ ) and the performance condition (Cronbach's  $\alpha = .93$ ).

### 6.2.2 Results

Overall means and standard deviations for negative and positive affect, state anxiety, cortisol and social connection are presented in table 6.4 Means and standard deviations by gender are presented in table 6.5.

SPSS (version 17) was used to conduct all tests, with the exception of effect size and post-hoc tests, which were calculated using the indicated formulas.

Assumptions of normality were violated in the distributions of levels of salivary cortisol before,  $W(11) = 0.75$ , and after performance  $W(11) = 0.69$ , and distributions of negative affect before performance,  $W(11) = 0.76$ , before rehearsal,  $W(11) = 0.78$ , and after rehearsal,  $W(11) = 0.69$ .

As mentioned before, the  $F$ -test is robust in ANOVA, often withstanding violations of normality assumptions. However, the analysis of the data could be biased by outliers.

One outlier was identified in the levels of salivary cortisol before and after performance. Removing this outlier led to assumptions of normality being upheld for all cortisol distributions. On the other hand, removing this outlier did not change the tests results, which indicated that the outlier was not biasing the analysis of the data. The analysis was done with the complete data.

Two outliers were also identified in the scores of negative affect before performance, before rehearsal and after rehearsal. Removing these outliers also normalized the distributions of negative affect. It also led to different test results which indicated that those outliers were biasing the analysis of the data. As a result, the main analysis of negative affect reported here is provided without those outliers.

Four 2\*2 (Condition\*Time) repeated-measures ANOVA were performed on negative affect, positive affect, state anxiety and salivary cortisol. One repeated-measures  $t$ -test



was performed on social connection. Analysis on effects of gender will be described in a separate section.

All effects are reported as significant at  $p < .05$  (two-tailed) unless otherwise stated.

Marginally significant results were those significant at a  $p < .10$  (two-tailed).

Table 6.4: Means and standard deviations of negative and positive affect, state anxiety, cortisol and social connection before and after performance and rehearsal

	Negative Affect n=9				Positive Affect n=11				State Anxiety n=10				Cortisol n=11				Social Connection n=11	
	Before		After		Before		After		Before		After		Before		After		M	SD
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Performance	1.32	0.23	1.27	0.27	3.74	0.73	4.10	0.73	2.38	0.23	2.37	0.33	0.15	0.11	0.24	0.18	4.81	1.04
Rehearsal	1.16	0.13	1.14	0.09	3.09	0.94	3.59	0.68	2.08	0.40	2.21	0.26	0.12	0.05	0.08	0.04	4.53	1.04

**Hypotheses 1:**

- 1a)** Positive and negative affect will be significantly higher in the performance than rehearsal;
- 1b)** Positive affect will increase and negative affect will decrease significantly in the rehearsal condition.

Overall, **positive affect** was rated higher in the performance than the rehearsal. Positive affect was higher after performance ( $M = 4.10$ ,  $SD = 0.73$ ) than before performance ( $M = 3.74$ ,  $SD = 0.73$ ), and higher after rehearsal ( $M = 3.59$ ,  $SD = 0.68$ ) than before rehearsal ( $M = 3.09$ ,  $SD = 0.94$ ).

A 2\*2 (Condition\*Time) repeated-measures ANOVA revealed a significant main effect of Condition,  $F(1, 10) = 5.65$ ,  $p < .05$ , a marginally significant main effect of Time,  $F(1, 10) = 4.89$ ,  $p < .10$  and a non-significant interaction Condition\*Time,  $F(1, 10) = 0.41$ ,  $r = .20$ .

In order to test part of hypotheses 1a and 1b, a post-hoc Tukey's HSD<sup>14</sup> test was performed on the interaction,  $HSD = 0.47$  ( $\alpha .05$ ), and compared to the four possible mean differences (based on estimated marginal means). The difference between mean positive affect before and after performance was -0.36; the difference between mean positive affect before and after rehearsal was 0.50; the difference between mean positive affect before performance and before rehearsal was 0.65; and finally, the difference between mean positive affect after performance and after rehearsal was 0.51.

These results indicate that positive affect was significantly higher in the performance than the rehearsal. Furthermore, they also indicate that positive affect increased significantly in rehearsal but the increase in performance was not statistically significant.

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<sup>14</sup>Tukey's HSD calculated with the formula mentioned previously; this post-hoc test controls well for type I error but is fairly conservative (lacks statistical power) which may lead to type II error (reject an effect that is indeed there); Nevertheless, it's an adequate test for multiple comparisons when test assumptions are upheld (or even under small deviations from normality) (Field, 2009).

**Negative affect** was higher before performance ( $M = 1.32$ ,  $SD = 0.23$ ) than before rehearsal ( $M = 1.16$ ,  $SD = 0.13$ ), and lower after rehearsal ( $M = 1.14$ ,  $SD = 0.09$ ) than after performance ( $M = 1.26$ ,  $SD = 0.27$ ).

A 2\*2 (Condition\*Time) repeated-measures ANOVA revealed a marginally significant main effect of Condition,  $F(1, 8) = 4.46$ ,  $p < .10$  a non-significant main effect of Time,  $F(1, 8) = 0.27$ , and a non-significant interaction Condition\*Time,  $F(1, 8) = 0.24$ ,  $r = .17$ .

To test the remaining of hypotheses 1 a and 1b, a post-hoc Tukey's HSD test was performed,  $HSD = 0.17$  ( $\alpha .05$ ). The difference between mean negative affect before performance and before rehearsal was 0.16; the difference between mean negative affect after performance and after rehearsal was 0.13; the difference of mean negative affect before and after performance was 0.05; and the difference of mean negative affect before and after rehearsal was 0.02. These results are consistent with those of the ANOVA.

These results indicate that negative affect was marginally significantly higher before performance than before rehearsal, but did not decrease significantly in either condition.

In conclusion, these findings only partially corroborate the above-mentioned hypotheses. Positive affect was significantly higher in performance than rehearsal, but negative affect was only marginally significantly higher before performance than before rehearsal. Positive affected increased significantly in rehearsal but negative affect did not decrease significantly in either condition.

### **Hypotheses 2:**

**2a)** Salivary cortisol levels will decrease significantly in rehearsal;

**2b)** Salivary cortisol levels will increase significantly in the performance condition, and be significantly higher in this condition than in rehearsal.

Salivary cortisol was higher after performance, ( $M = 0.24$ ,  $SD = 0.18$ ), than before, ( $M = 0.15$ ,  $SD = 0.11$ ); and lower after rehearsal, ( $M = 0.08$ ,  $SD = 0.04$ ), than before, ( $M = 0.12$ ,  $SD = 0.05$ ). Levels of salivary cortisol were higher in the performance than the rehearsal.

A 2\*2 (Condition\*Time) repeated-measures ANOVA revealed a significant main effect of Condition,  $F(1, 10) = 6.04$ ,  $p < .05$ , a non-significant main effect of Time,  $F(1, 10) = 1.80$ ,  $ns$ , and a significant interaction Condition\*Time,  $F(1, 10) = 14.91$ ,  $p < .05$ ,  $r = .77$ . This is a very large effect size which indicates this is a powerful effect.

To further investigate these findings and test the hypotheses 2a and 2b, a post-hoc Tukey's HSD test was performed on the interaction,  $HSD = 0.07$  ( $\alpha .05$ ), and compared to the four possible mean differences (based on estimated marginal means). The difference between mean cortisol levels before and after performance was -0.09; the difference between mean cortisol levels before and after rehearsal was 0.04; the difference between mean cortisol levels before performance and before rehearsal was 0.03; and finally, the difference between mean cortisol levels after performance and after rehearsal was 0.16.

These results indicate that levels of salivary cortisol increased significantly in the performance, and were significantly higher after performance than after rehearsal. Hypothesis 2b is upheld but not hypothesis 2a.

**Hypothesis 3: Social connection will be rated higher in performance than rehearsal but this difference will not be significant as the members of the choir will have developed feelings of connection throughout the weekly rehearsals in the months prior to the study.**

Ratings of social connection were higher after performance, ( $M = 4.81$ ,  $SD = 1.04$ ), than after rehearsal, ( $M = 4.53$ ,  $SD = 1.04$ ), but this difference was not significant,  $t(10) =$

1.58, *ns*,  $r = .27$ <sup>15</sup>. These results are consistent with what was expected.

**Hypothesis 4: Ratings of state anxiety will be significantly higher before the performance condition than before rehearsal.**

State anxiety was higher before performance, ( $M = 2.38$ ,  $SD = 0.23$ ), than after, ( $M = 2.37$ ,  $SD = 0.33$ ); and higher after rehearsal, ( $M = 2.21$ ,  $SD = 0.26$ ), than before, ( $M = 2.08$ ,  $SD = 0.40$ ). State anxiety levels were higher in the performance than rehearsal.

A 2\*2 (Condition\*Time) repeated-measures ANOVA revealed a significant main effect of Condition,  $F(1, 9) = 6.50$ ,  $p < .05$ , a non-significant main effect of Time,  $F(1, 9) = 1.83$ , *ns*, and a non-significant interaction Condition\*Time,  $F(1, 9) = 1.50$ ,  $r = .38$ .

Like before, a post hoc Tukey's HSD test was performed,  $HSD = 0.25$  ( $\alpha .05$ ), and compared to the four possible mean differences (based on estimated marginal means). The difference between mean state anxiety levels before and after performance was 0.01; the difference between mean state anxiety before and after rehearsal was 0.13; the difference between mean state anxiety before performance and before rehearsal was 0.30; and finally, the difference between mean state anxiety levels after performance and after rehearsal was 0.16.

These results indicate that state anxiety levels were significantly higher before performance than before rehearsal, but no other differences were significant. The hypothesis was corroborated.

## Correlations

In the interest of investigating relationships between objective and subjective measures of anxiety, bivariate Pearson correlations were calculated between levels of salivary cortisol and ratings of state anxiety for each condition. Out of all sixteen coefficients, three

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<sup>15</sup>Effect size calculated with same formula as the one used for the dependent *t*-test in the previous study; J. Cohen (1988), suggested small ES correspond to  $d = .20$ ; medium ES to  $d = .50$ ; and large ES to  $d = .80$ .

were significant. Cortisol levels before performance correlated significantly with ratings of anxiety before performance,  $r = 0.81$ ,  $p < 0.01$ , and with ratings of anxiety after performance,  $r = 0.73$ ,  $p < 0.02$ . Levels of salivary cortisol after performance correlated significantly with ratings of anxiety before performance,  $r = 0.64$ ,  $p < 0.05$ .

**Hypotheses 5:**

- 5a) Female participants will rate positive affect significantly higher before and after each condition than male participants.
- 5b) Negative affect will not differ significantly between female and male participants.
- 5c) Male participants will have significantly higher cortisol levels before performance than female participants.
- 5d) Male participants will have higher ratings of state anxiety than female participants in performance.

As mentioned before, the main assumptions to consider in a mixed ANOVA are normality of distributions and equality of variances. The assumptions of normality were violated in the distributions of salivary cortisol before performance,  $W(7) = 0.62$ , and after performance,  $W(7) = 0.72$ , for female participants. Also for female participants, negative affect did not follow a normal distribution before performance  $W(7) = 0.69$ , before rehearsal  $W(7) = 0.66$ , and after rehearsal  $W(7) = 0.72$ . For male participants, assumptions of normality were violated in the distribution of state anxiety before rehearsal,  $W(4) = 0.71$ . No violations occurred in the assumption of equality of variances. For this reason, the analyses were done with parametric tests on all the data.

Four 2\*2\*2 (Condition\*Time\*Gender) mixed ANOVA were carried out for negative affect, positive affect, state anxiety and salivary cortisol.

All effects are reported as significant at  $p < .05$  unless otherwise stated.

Table 6.5: Mean and standard deviations for negative and positive affect, state anxiety and cortisol before and after rehearsal and performance by gender

		Negative Affect n = 7(F); 4(M)				Positive Affect n = 7(F); 4(M)				State Anxiety n = 6(F); 4(M)				Cortisol n = 7(F); 4(M)			
		Before		After		Before		After		Before		After		Before		After	
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Rehearsal	Female	1.27	0.29	1.38	0.42	3.15	0.94	3.61	0.83	2.14	0.39	2.26	0.31	0.11	0.05	0.06	0.03
	Male	1.17	0.20	1.10	0.13	2.98	1.09	3.54	0.42	2.00	0.46	2.14	0.17	0.15	0.03	0.11	0.03
Performance	Female	1.43	0.56	1.21	0.17	3.86	0.86	4.23	0.58	2.35	0.29	2.33	0.30	0.14	0.13	0.25	0.23
	Male	1.48	0.21	1.31	0.38	3.54	0.48	3.88	1.00	2.42	0.13	2.42	0.40	0.17	0.06	0.22	0.03



### Positive Affect

The values on Table 6.5 indicate that female participants rated positive affect higher than male participants before and after rehearsal and performance.

A 2\*2\*2 (Condition\*Time\*Gender) mixed ANOVA revealed a non-significant main effect of Condition,  $F(1, 9) = 4.32, ns$ , a non-significant interaction between Condition\*Gender,  $F(1, 9) = 0.16, ns$ , a non-significant main effect of Time,  $F(1, 9) = 4.17, ns$ , a non-significant interaction between Time\*Gender,  $F(1, 9) = 0.01, ns$ , a non-significant interaction between Condition\*Time,  $F(1, 9) = 0.44, ns$ , a non-significant Condition\*Time\*Gender interaction,  $F(1, 9) = 0.09, ns$ , and a non-significant main effect of Gender,  $F(1, 9) = 0.40, ns$ .

These findings do not corroborate hypothesis 5a statistically. Female participants rated positive affect higher before and after each condition, but these ratings were not significantly different from the male participants.

### Negative affect

The values on Table 6.5 indicate that female participants rated negative affect higher than male participants in rehearsal but lower than male participants in performance. Negative affect decreased for both female and male participants in performance, but in rehearsal it increased for female participants while decreased for male participants.

A 2\*2\*2 (Condition\*Time\*Gender) mixed ANOVA revealed a non-significant main effect of Condition,  $FF(1, 9) = 2.66, ns$ , a non-significant interaction between Condition\*Gender,  $F(1, 9) = 2.91, ns$ , a non-significant main effect of Time,  $F(1, 9) = 0.49, ns$ , a non-significant interaction between Time\*Gender,  $F(1, 9) = 0.06, ns$ , a non-significant interaction between Condition\*Time,  $F(1, 9) = 1.74, ns$ , a non-significant Condition\*Time\*Gender interaction,  $F(1, 9) = 0.45, ns$ , and a non-significant main effect of Gender,  $(1, 9) = 0.17, ns$ .

These findings indicate that, as predicted, female and male participants rated negative affect similarly in this study.

### Salivary Cortisol

Male participants had higher cortisol levels than female participants before rehearsal, after rehearsal and before performance. Female participants had higher cortisol levels than male participants after performance.

A 2\*2\*2 (Condition\*Time\*Gender) mixed ANOVA revealed a marginally significant main effect of Condition,  $F(1, 9) = 4.50$ <sup>16</sup>, a non-significant interaction between Condition\*Gender,  $F(1, 9) = 0.38$ , *ns*, a non-significant main effect of Time,  $F(1, 9) = 1.18$ , a non-significant interaction between Time\*Gender,  $F(1, 9) = 0.37$ , *ns*, a significant interaction between Condition\*Time,  $F(1, 9) = 11.76$ <sup>17</sup>, a non-significant Condition\*Time\*Gender interaction,  $F(1, 9) = 0.69$ , *ns*, and a non-significant main effect of Gender,  $F(1, 9) = 0.22$ , *ns*.

These findings indicate that hypothesis 5c is not corroborated statistically.

### State Anxiety

Male participants had higher ratings of state anxiety than female participants before and after performance, but female participants had higher ratings of state anxiety than male participants before and after rehearsal. Ratings of anxiety increase for both female and male participants in the rehearsal condition, decreased for female participants in performance, and remained the same for male participants in performance.

A 2\*2\*2 (Condition\*Time\*Gender) mixed ANOVA revealed, as before, a significant main effect of Condition,  $F(1, 8) = 7.75$ ,  $p < .05$ , a non-significant interaction between Condition\*Gender,  $F(1, 8) = 1.37$ , *ns*, a non-significant main effect of Time,  $F(1,$

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<sup>16</sup> $p = .06$

<sup>17</sup> $p < .01$

8) = 1.68, a non-significant interaction between Time\*Gender,  $F(1, 8) = 0.05$ , *ns*, a non-significant interaction between Condition\*Time,  $F(1, 8) = 1.30$ , a non-significant Condition\*Time\*Gender interaction,  $F(1, 8) = 0.01$ , *ns*, and a non-significant main effect of Gender,  $F(1, 8) = 0.02$ , *ns*.

These findings are in the direction predicted in hypothesis 5c but this is not statistically corroborated.

### 6.2.3 Discussion

The main purpose of this study was to further investigate whether context had an impact on short-term psychological, physiological and social effects of group singing. The findings in this study suggest the social and emotional circumstances surrounding the singing activity impact on strength and direction of affective states and endocrine function, but not as strongly on feelings of social connection.

Regarding affective states, positive and negative affect were expected to be significantly higher in the performance than rehearsal. At the same time, positive affect was expected to increase and negative affect to decrease significantly in the rehearsal condition. Group singing had been found to decrease negative affect and increase positive affect in previous literature (Unwin et al., 2002; Kreutz et al., 2004), and in the previous study. Effects of group singing on mood were expected to occur here too. The main question was whether these effects would be different in rehearsal and performance. The findings in the previous study and those by Beck et al. (2000) suggested such moderation by context would be possible. In this study, performance was expected to be an exciting, yet anxious occasion, as it was the first time the choir was performing those materials in public. Singers would be happy to be doing this, but nervous about how it would go. The rehearsal occurred after the performance and was expected to be a less arousing experience. However, because participants would be dealing with novel materials for a subsequent performance in this

rehearsal, it was possible that less positive and more negative feelings would be present to start with. A mood improvement would then occur throughout the rehearsal and be reflected in increased ratings of positive affect and decreased ratings of negative affect afterwards.

The findings only partially corroborated the predicted hypotheses. Overall, positive and negative affect were rated higher in performance. While positive affect was significantly higher in performance than rehearsal, the differences in negative affect were only marginally significant before each condition. There were also increases in ratings of positive affect and decreases in ratings of negative affect in both conditions. However, these changes were only significant for positive affect in the rehearsal condition.

The public performance was the first the group took part with those particular materials. This was also a group of amateur singers for whom an opportunity to perform in public may have been unique or at least not something to be taken for granted (the choir only had two scheduled performances that year and there was no certainty that the group would proceed the following year as the conductor was leaving the University). It is not unlikely that these circumstances led to a complex combination of positive and negative affect. On one hand, positive affect did not increase significantly possibly because it was already quite high to start with. The fact that positive affect was significantly higher after performance than after rehearsal suggests that, even though not significant, the increase was possibly an effect of the activity and not a random factor. On the other hand, negative affect showed a decreasing tendency but the uncertainties surrounding the continuity of the group could have brought about a realization that this would be one of the last performances of the group. Indeed, there was one particular moment that, I would point out, could have been upsetting and distressing in this way. Halfway through the performance, just before the choir finished *Lacrimosa*, the conductor stopped for longer than was supposed to, visibly overwhelmed with emotion. Most choir members were not

left untouched by what could have been classified as a moment involving a certain sadness. So, although the performance would have been a positive experience, evidenced by the high ratings of positive affect, it was also surrounded by more sad circumstances that would have prevented a stronger decrease in negative affect.

The rehearsal had the expected effects on positive affect, possibly due to the beneficial effects of group singing. On the other hand, negative affect did not decrease significantly in this condition either. This was possibly due to the fact that the group was rehearsing another novel and complex piece to perform, in what could have been considered a more important concert, three days later. This piece had been rehearsed less often and, in informal conversation with the singers after the rehearsal, many manifested discontent with their level of preparedness to perform it in public. This realization throughout the rehearsal could have then contributed to negative feelings.

Overall, these findings suggest that, as predicted by the theoretical model in Chapter 2, there are factors, other than social context, surrounding the activity of group singing that seem to influence how this activity impacts on mood. In particular, the emotional circumstances of the context in which the singing occurred, appeared to have impacted on the strength of effects of this activity on affective states. While it is possible that the findings reported here are case-specific and would not be generalizable due to the small sample size, particularly in what concerns negative affect, the robustness of the tests used suggests the results are accurate indications of real effects of a group singing rehearsal and public performance on mood.

The second pair of hypotheses tested predictions relating to effects on salivary cortisol. Rehearsal was expected to be a more relaxing and less arousing experience and, therefore, salivary cortisol levels were expected to decrease significantly in this condition. On the other hand, performance was expected to be more arousing, particularly due to the naturally arising performance anxiety, but also for the excitement surrounding the opportunity

to perform in public. In this way, salivary cortisol levels were, not only expected to be significantly higher in performance than in rehearsal, but also increase significantly in the performance condition.

The findings in this study supported this last hypothesis, but not the first one. Salivary cortisol levels increased significantly in the performance condition, and were higher in performance than rehearsal. However, although results showed a trend in the expected direction, salivary cortisol levels did not decrease significantly in the rehearsal condition. In effect, these results replicate both the findings by Beck et al. (2000) and Kreutz et al. (2004).

As mentioned, the performance was expected to be an arousing experience. This would result from the emotionally complex experience of public performance, where positive feelings seem to be accompanied by less positive feelings, such as nervousness and anxiety, particularly before the performance. It is, thus, not surprising that such a circumstance would impact on cortisol levels, which are sensitive to emotional arousal (in its combination of psychological and physiological responses). This argument is supported by both the objective measures in this study, and the subjective measures of positive affect and anxiety. As seen above, the performance was surrounded by high levels of positive affect. At the same time, ratings of anxiety were also higher in the performance condition, particularly when comparing the levels before performance and before rehearsal. Furthermore, anxiety states were highly correlated with salivary cortisol levels both before and after the performance, and did not decrease in this condition. The combination of these findings suggests that, as expected, the public performance brought about very positive feelings but also involved feelings of nervousness and anxiety. Higher levels of cortisol were stimulated probably due to this combination of both the pleasure and excitement of the singing experience, and a naturally anxious response to performing in public.

On the other hand, the rehearsal was expected to have more relaxing effects that

would result in a significant decrease in cortisol. This did not occur. While positive affect increased significantly in this condition, indicating that the singing experience was pleasurable, feelings of anxiety also showed an increasing trend. At the same time, negative affect did not decrease significantly, as would have been expected. One possible reason for this may have been the fact mentioned above that the rehearsal revolved around another set of novel materials which was to be performed three days after, in the Canterbury Cathedral and for the celebration of the University's Golden Jubilee. It is possible that this concert would have been considered very important and the realization that the materials were not yet well mastered by the group as a whole, could have arisen concerns amongst the singers. These reactions would have prevented a more relaxing experience from occurring during the rehearsal.

Like the findings on affective states, these findings suggest that it is not only the social context of the experience that can influence effects of group singing, but also the wider emotional content of the circumstances in which the singing occurs.

Regarding feelings of connection between singers, as expected, there were no significant differences between conditions. This was possibly due to the fact that participants had been singing together for several months. Any effects of singing in the performance or rehearsal on feelings of connection would be off-set by previously existing ones. A limitation however, was that no information on feelings of connection was collected before the conditions and this could have highlighted particular effects during the singing experience.

Finally, responses by female and male participants were also investigated even though the sample was small and, as in the previous study, there was a female bias in the sample. Nonetheless, it felt that this study would be incomplete without such information.

Following previous literature (Sandgren, 2009; Kirschbaum et al., 1992; Grape, et al., 2003), female participants were expected to rate positive affect significantly higher after each condition than male participants; negative affect was not expected to differ signific-

antly; and male participants were expected to have significantly higher cortisol levels in performance than female participants. Finally, male participants were also expected to rate state anxiety higher than female participants in the performance condition.

Findings for positive affect and anxiety states showed a trend in the expected direction, but any differences between female and male participants were not significant. Negative affect was, as expected, not rated significantly different by female and male participants. Salivary cortisol levels, however, were higher for male participants before performance, but female participants had higher levels after performance. Since levels also increased for male participants, these differences between female and male cortisol levels were also not significant.

On one hand, it is possible that the singers who participated in this study had similar experiences in both conditions, leading them to provide similar answers. As argued in the previous chapter, it is possible for men to be as emotionally expressive as women (Larson et al., 1994). On the other hand, it is also possible the less positive circumstances surrounding both performance and rehearsal could have impacted in female participants in a way that curbed their expression of positive emotions.

In sum, the results discussed above seem to suggest that both the social and emotional context in which the singing occurred contributed to different psychological and physiological responses. This difference was both in strength and direction. What this seems to signal is that effects of group singing on these domains are influenced by the wider circumstances in which the singing occurs. In a group already established, contextual characteristics did not seem to impact as strongly on feelings of social connection amongst singers. Gender also did not seem to lead to different experiences.

There were several limitations in this study that require the findings discussed above to be considered carefully. The most obvious one was the failure to secure a larger sample size. Nevertheless, the robustness of the statistical tests and consistency with previous



findings suggest it is unlikely the effects discussed here were due to random factors, and not the activities individuals were engaged in.

Secondly, this was a quasi-experimental study where it was not possible to add a control condition. Such a condition would have been desirable, particularly to control for natural diurnal variations of cortisol in this particular group of individuals. However, since the main goal was to investigate the impact of social context on short-term effects of group singing, it could be argued that comparing rehearsal with performance and collecting data at baseline and after the activity, provided a certain degree of control. Regarding the cortisol results particularly, diurnal rhythms of cortisol are also well known, with low points occurring in early evening. The fact that cortisol levels increased significantly in one condition but had a decreasing trend in another, suggest these variations resulted from the activities and not something particular to the daily cortisol rhythms of the individuals who took part in this study.

Finally, this was a repeated-measures study where it was not possible to control for carry-over effects. Contrary to the previous study, data was collected first in performance and after in rehearsal. It can be argued that the rehearsal was on different singing materials and for a different performance, and therefore, would be less likely that the performance would have carry-over effects particularly at the psychophysiological level. On the other hand, the evidence seems to indicate that group singing could have long-term effects that possibly carry on from one experience to the other, particularly in what concerns social processes. Counterbalancing measures or investigating different groups would certainly be preferable to further investigate these possibilities.

Despite these limitations, the fact that these were genuine group singing activities with a genuine group of singers, provided ecological validity to the findings reported here. While we should be cautious to generalize them, we can, nonetheless, draw valuable information on possible effects of group singing and the impact of the singing context on

these. Furthermore, it is worth noting that the diverse types of data collected converged into a coherent picture of such effects and possible moderating factors.

### 6.3 Conclusions and Implications

The two studies reported and discussed in this chapter aimed to provide clarification on whether short-term effects of group singing on well-being correlates could be influenced by the social context in which the singing occurred.

The literature and the evidence discussed in previous chapters not only suggested that group singing had measurable effects on psychological, physiological and social domains, but the strength and direction of such effects could be influenced by other factors such as the gender of the singer or the social circumstances in which the singing occurred. In the studies discussed above, I focused on further investigating these possibilities, particularly the role of social context.

Social context was expected to moderate effects of group singing on psychological, physiological and social variables. That is, I expected social context to affect the direction and strength of the effects of group singing on those domains. In order to investigate these arguments, I collected both subjective psychological and objective physiological data before and after choral rehearsals and performances. While it could be argued that the findings in this chapter are restricted to choral singing and not generalizable to the wider experience of group singing, it is also the case that choral singing is a common form of group singing in western societies, and therefore is a valid representative of the type of frequent and organized group singing experience that is the focus of study in this thesis.

The findings collected in both studies provide consistent evidence in support of the argument that, in the short-term, group singing has psychological and physiological effects which are moderated by the social context in which the singing occurs. However, a stronger moderating effect appeared to emerge from other situational characteristics of the context,

such as the wider emotional content of such contexts. Effects of group singing on social connection, however, did not seem to be affected as strongly by such situational factors.

Overall, group singing was associated with mood and endocrine changes. Both studies showed that different social circumstances such as private rehearsals or public performances could impact on the strength and direction of such changes. What became more clear was that the emotional content of such social circumstances also played a role in moderating those effects. This role was more evident in what regarded endocrine changes, and negative affect. It appeared that positive affect was more robustly associated with the activity of group singing, while negative affect and cortisol seemed to be more influenced by situational factors. This would explain the diverging findings in the literature regarding endocrine changes, and evidence that group singing is an overall positive experience.

One could argue that the implications of such findings are substantial. If this activity has the potential to provide positive feelings under such a variety of affective and physiological experiences, it would be invaluable in the context of individual and social well-being. This would explain the pervasiveness of group singing, particularly when coping with negative situations: while the circumstances can lead to more negative emotions (involving both negative affect and physiological changes), the activity of singing appears to have benefits that help cope with those affective states and interpret feelings of arousal not as anxiety but as a positive “high”.

Questions still arise on whether group singing could benefit well-being as a whole, particularly because it was not possible to gauge effects on social processes. In the next chapter, I will address the design limitations and questions still to be answered, namely, what effects exactly group singing has on psychological, physiological and social correlates of well-being, and whether this activity can, indeed, benefit individual well-being as a whole.

## Chapter 7

# Effects of group singing on mood, cortisol, social connection, dimensions of flow and personal growth

The studies discussed in the literature and the previous empirical chapters of this thesis, provided convincing indications that group singing has psychological, physiological and social effects that relate to well-being. What remained unclear from those studies is whether the effects measured were indeed caused by group singing. Furthermore, it is also not possible to conclude from the evidence discussed so far that group singing has enhanced effects compared to other musical or non-musical activities. The reason for this is that those studies lacked experimental designs, participant randomization and an active control. In order to actually determine effects of a phenomenon, experimental designs have to be followed (Field & Hole, 2003).

In this chapter, I report and discuss a study where I hoped to overcome the limitations

of previous research and experimentally compare short-term effects of group singing with those of an equivalent social activity involving no music perception or production. To the best of my knowledge, this is the first study to do so.

## 7.1 Study 7

This study compared effects of two group activities – singing and a non-musical activity on mood, cortisol levels, social connection and flow states. These variables were chosen given their potential relationship with well-being. Ultimately, the goal of this study was to investigate the main effects of group singing on well-being correlates.

Two groups of participants took part in both a group singing session and a non-musical group activity session. The effects investigated were those on mood (as measured by positive and negative affective states), salivary cortisol, feelings of connection with those around them, states of flow and personal growth. Mood and salivary cortisol levels were measured before and after each session; social connection, flow states and personal growth were measured after each session.

Although this was an experimental study, the lack of previous similar research meant that most predictions were largely tentative. Nevertheless, the following hypotheses were tested:

### 1. **Effects on affective states:**

- (a) Ratings of positive affect will increase and negative affect will decrease significantly in the singing condition. This hypothesis followed previous research (Unwin et al., 2002; Kreutz et al., 2004) and the findings reported in Chapter 6, which indicated group singing has effects on mood.
- (b) There was no experimental evidence to suggest that group singing would have stronger effects on emotional states, than the non-musical group activity. If

anything, the existing evidence suggested that group singing would not differ significantly from an equivalent, though non-musical, activity (Valentine and Evans, 2001). Nonetheless, the hypothesis that group singing leads to higher positive and lower negative affect than a non-musical group activity, was tested.

2. **Effects on salivary cortisol:** Consistent with the studies in the previous chapter, cortisol was the physiological variable chosen. This option would also allow comparisons with previous research (Beck et al., 2000; Kreutz et al., 2004), and help clarify effects of group singing on this hormone. This study was designed so that the only difference between group activities would be the music-making aspect. Both activities were expected to have similar levels of social interaction, challenge and fun, and a similar relaxed environment. For this reason, salivary cortisol levels were expected to decrease significantly in both activities. However, salivary cortisol levels in the singing condition were expected to decrease less than the levels in the non-musical condition. The reason for this is related to the way cortisol increases in the presence of psychological challenges (Soares et al., 2010) and how group singing may be seen as a more challenging activity. Singing seems to be connected to certain elitist attitudes in our society that might make individuals perceive it as a special activity that requires a high level of musicianship. Blacking (1973) and, more recently, Bailey and Davidson (2002; 2005) highlighted how elitist notions of music production have a strong inhibiting effect in western societies, limiting the majority of us to listeners and only a small elite to makers of music. In the study by Bailey and Davidson (2005), middle-class singers reported the benefits of participating in group singing were related to the opportunity to experience their voice in the safety of a group. The participants in the current study were recruited from the general population and previous singing experience was not required. It was possible that they would expect singing to be a more intimidating and challenging experience than the non-musical

activity. Since our expectations of an event might influence our perception of that event (Kirsch, 1985), those expectations would make the group singing experience more stressful and physiologically arousing than the alternative non-musical activity. These expectations would conflict with the relaxing effects of the activity itself and, thus, prevent a higher decrease of cortisol.

### 3. Effects on feelings of connection to others:

- (a) Connection was the variable chosen to investigate effects of each activity on social processes. Much of the exploratory literature described on Chapter 2 refers to qualitative reports on how group singing leads to feelings of connection and belonging, through frequent social interaction, cooperation and shared goals. Only Louhivuori et al. (2005) report evidence that suggests that group singing activities lead to stronger feelings of togetherness than non-singing activities. In this study, both activities involved social interaction and the need to work together towards a common goal. It is likely that both would lead to similar levels of connection. The evidence on Chapter 4, particularly that of studies 2 and 3, also supports the argument that group singing generated feelings of connection between singers. However, as mentioned on Chapter 6, emotions play an important role in how individuals within a group connect and the strength of that connection (Lawler, 2001; Barsade, 2002; Spoor & Kelly, 2004). If group singing can have strong positive effects on mood and increase physiological and psychological levels of arousal, it is possible that these will contribute to stronger feelings of connection between the individuals. In this way, ratings of social connection after singing were expected to be significantly higher than levels of social connection after the non-musical activity.
- (b) Given the repeated measures nature of this study, participants were randomly

allocated to one of two groups: group A participated in group singing first and took part in the non-musical activity secondly; and group B the other way around. This counterbalance technique allowed any carry-over effects to be detected. Following the reasoning above, it could be expected that a stronger connection in the first experience of group A would be carried on to their interaction on the second experience and, thus, their feelings of connection in both conditions would be similarly high. Group B, on the other hand, would participate in the control condition first and, thus, not have any influence of previous strong interactions in this condition. In line with this, I predicted that group B would have significantly higher ratings of social connection after group singing than after the control condition. Furthermore, group A would have significantly higher ratings of social connection in the control condition than group B in that same condition.

#### 4. Effects of Flow states:

- (a) In Chapter 2 I have analysed the theoretical arguments that suggest group singing is a flow activity and, thus can lead to optimal experiences that boost well-being as a whole. In this study, flow states were measured in order to investigate whether group singing does indeed lead to states of flow. There is no evidence group singing would lead to states of flow more than the alternative group activity. Nonetheless, the hypothesis that group singing leads to higher ratings of flow states was tested.
- (b) What is more likely, however, it that both activities would lead to different experiences of the different dimensions of flow. Just as a reminder of what was mentioned in Chapter 2, Csíkszentmihályi (1990, 1997) suggests flow is comprised of nine dimensions: challenge-skill balance (the balance between the



demands of the situation and personal skill), action-awareness (the feeling of automaticity in ones actions), clear goals (a certainty about what is going to be done), unambiguous feedback (a clear and immediate feedback that confirms things are as happening as they are supposed to), concentration on task at hand (a feeling of being truly focused), sense of control (which happens without a conscious effort), loss of self-consciousness (the individual becomes one with the activity and a concern with the self disappears), transformation of time (time passes more quickly or more slowly or there is a complete lack of awareness of the passage of time), and autoletic experience (an intrinsically rewarding experience done for its own sake, with no expectation of future reward or benefit). There is evidence that these dimensions contribute to the experience of flow to different degrees (Tenenbaum, Fogarty, & Jackson, 1999). Data obtained with athletes suggested that the nine dimension of flow can be placed in a continuum, from the most easily and readily experienced states autoletic experience - to the ones only encountered at the height of a deep flow experience transformation of time and loss of self-consciousness. The remaining dimensions were found in this continuum, between those extremes, as follows, from the more easily experienced to the more difficult to experience clear goals, challenge-skills balance, concentration in the task at hands, sense of control, unambiguous feedback, and action-awareness (Tenenbaum et al., 1999)). Participants in the present study were not singers, either professional or amateur. It was possible that most would feel they were better prepared to face the non-musical activity than the group singing. It was, thus, expected that the challenge-skill balance, clear goals, and sense of control would be higher in the alternative group activity. Loss of self-consciousness could also be expected to be experienced more in the non-musical activity, since singing

could be considered more intimidating and self-exposing. A constant focus of attention is necessary to achieve the goal of singing together. On the other hand, the non-musical group activity required participants to work together towards the same goal but constant focus of attention on their actions and that of those around them was not as necessary. Concentration on the task at hand and action-awareness were, therefore, expected to have higher ratings after the group singing activity. Unambiguous feedback is another dimension where a music activity could be expected to act faster than a non-musical activity. The product of music is in the form of sound, and this can be more rapidly processed than the product of other activities, even if only slightly faster. As for transformation of time, the literature suggests this is one main characteristic of group singing. It could, thus, be expected that this dimension would be rated higher in the group singing activity. As for the autoletic experience, the evidence that it is very easy to capture the feelings of enjoyment suggests this dimension would have the highest ratings from all nine dimensions after both activities but significantly higher after group singing for it was expected this activity would lead to more positive affect.

5. **Effects on feelings of achievement:** Participants will experience feelings of achievement, more so in the group singing condition than control. Feelings of achievement were chosen given their relationship with eudaimonic well-being and, in particular, personal growth. Personal growth results from the acquisition of new skills and knowledge. Expanding the self involves effort and going beyond one's limits. This could involve feelings of achievement, of having overcome a challenge and reached new levels. Group singing was expected to be a more challenging and stimulating experience, and thus if feelings of having achieved something and learned something new were to emerge in this condition, they would be greater than those arising from

the control condition.

#### 6. Gender differences:

- (a) In the studies discussed on Chapter 6, the small samples did not have an equal number of female and male participants. Nonetheless, the findings were in the expected direction in what concerned positive affect. This was consistent with what was found by Sandgren (2009). In line with this, I tested the hypothesis that female participants would rate positive affect significantly higher after singing than male participants.
- (b) Since singing was expected to be perceived as a more arousing and stressful situation than the control condition, I tested the hypothesis that male participants would have significantly higher salivary cortisol levels before the singing activity than female participants.

## 7.2 Method

### Participants

Twenty-one participants (11 females), were recruited from a convenience sample of the general population and no previous experience with singing was required. The participants had never sung together before. Eighteen participants (9 females; mean age = 28 years,  $SD = 4.70$ , range = 23-41 years) completed two conditions: group singing (experimental) and a non-musical group activity (control).

### Recruitment

Potential participants were contacted through Facebook, about the possibility of taking part in a research study that would involve group singing and Lego® playing in a group. In the initial contact message, individuals were informed that twenty volunteers were needed,

as well as a commitment to be available on the two afternoons of the weekend of the study. The message also contained a request to forward the message to any other individuals in their contacts that they thought could be interested. An alternative contact email was provided and any individual wishing to reply was urged to do so through that email. This would allow individuals to avoid any multiple group messages. The facts that no singing experience was required, no one would have to sing on their own, and the singing groups would be conducted by a person with experience in conducting groups of people who have no previous experience with singing, were strongly stressed by stating them clearly at both the beginning and end of the message. No financial compensation was offered.

Facebook was the medium chosen, because it was a quick, easy and inexpensive way to reach a large number of individuals with a diverse background.

Once volunteers had made their intentions clear, a mailing list was created and further details about the study's aims and procedures, its schedule and dates were sent through email.

Some volunteers were acquaintances of the researcher, but no volunteer had met the conductor of the singing groups.

## **Design**

This was an experimental study employing a multivariate mixed measures design. The repeated measures independent variables were 1) Activity, with 2 levels non-singing group activity (control), and group singing (experimental); and 2) Time, with two levels - before and after the activity. The between-participants experimental variable was Sex, with two levels - Male, Female. The dependent variables were positive and negative affect scores, salivary cortisol levels, social connection scores and flow state scores. This was a questionnaire and salivary concentration measures study.

### **Repeated Measures and Counterbalancing**

All participants provided data for every condition of the experiment. This appeared to be the best option given the fact that the budget for this study limited the maximum number of participants. Having a repeated-measures design ensured more data was gathered from the small sample. Another advantage of this design is the increase in sensitivity of the data as random variation is reduced.

However, a possible problem with repeated measures design is the possibility of carry-over effects from one condition to the other. In order to deal with possible order effects in this within-subjects design, all participants were randomly distributed between two groups: group A experienced group singing followed by the non-singing group activity and group B experienced the non-singing group activity followed by group singing.

### **Procedure**

The study took place on a Saturday and Sunday from 3pm-5pm. On both days, participants were asked to arrive by 2.55pm for a 3pm start.

Since both sessions were happening at the same time, it was important to book two rooms distant enough from each other, so that the music would not be heard in the non-musical session. Two rooms were booked in the same building but on two different floors.

Participants were informed that meeting place for both days was the room where the non-musical session was going to take place. After arrival, participants were invited to take a seat. Once everyone had arrived, the researcher introduced herself and the person who was going to conduct the singing groups. Participants were reminded about the purpose and procedures of the study, the volunteer nature of their participation, and on how they were free to discontinue their participation at any time and leave without any explanation being necessary. The opportunity was given for questions to be asked and any issues clarified.

After this introduction and clarification of what was going to happen, consent forms were distributed and signed. Once everyone had signed the consent forms, randomization took place. An equal number of folded papers containing the letters A and B were put in a bag and passed around the table. Each participant took one paper. Those with the letter A were told they would be taking part in the singing session on that day, Saturday, and Lego® on Sunday. Those with the letter B were told they would be taking part in the Lego® session on that day, Saturday, and the singing session the following day, Sunday.

Once the randomization process was complete, envelopes containing the questionnaires to be completed before each session, a record sheet, and the saliva collection tubes, were distributed, and participants were asked to place one copy of the consent form inside. This was the only way to trace each individual to their questionnaires and saliva samples. Participants were asked to complete the questionnaires and not to comment the items with one another.

After everyone had finished completing the questionnaires, the saliva sampling took place. Participants were asked to retrieve the test tube and the first author demonstrated the saliva donation procedure. After this demonstration, participants were asked to remove the tube's cap, drop the sponge in their mouths and move it around gently. This was done for one minute. After confirmation that their sponges were soaked, participants were, again, showed how to drop it back in the tube without touching it with their fingers, and asked to place the cap back on. Tubes were placed inside the envelopes which were sealed and returned to the researcher.

Before the singing group moved to the room where the singing session was to take place, all participants were requested not to discuss any of their experiences on that day with one another after the sessions. This request was repeated after the sessions took place.

Researchers started each session simultaneously, and each session lasted for 60 minutes

on both days.

After each session, a similar procedure took place but this time saliva samples were donated immediately after the end of the session, followed by the questionnaires. This was to allow levels of cortisol expressed during the sessions to be captured, but also to allow participants to drink water and eat something as soon as possible. In contrast to what happened before each session, the two groups filled in the questionnaires separately. This was to avoid any loss of time: the time it would take for the singing group to travel back to the non-musical room, and also the time it would take to rearrange the non-musical room to its original state to accommodate everyone.

On the second day of the study, Sunday, the procedure before and after each session was similar with the exception of the introduction, randomization and participant information stages.

Refreshments and biscuits were provided after the end of the sessions. The particular procedures followed during experimental and control sessions are described next.

### **The experimental session - group singing**

The session started with some physical warm-ups: rubbing the face and back of the neck to loosen the muscles, stretching the tongue in different directions and then the action rhyme "Hi My name is Joe". This rhyme requires the person to speak in rhythm whilst moving arms, legs, hips and head all independently of each other. As a result it stretches all the muscles that need to be elastic and dynamic during singing.

Once the participants were physically more relaxed and had laughed a lot (in itself good preparation for singing) whilst trying to complete the activity, the facilitator got them to do lip and tongue trills up and down scales. In order to keep the lips or the tongue vibrating (Brrr or Rrrr) the abdominal muscles have to support the air flow and good air flow is required for comfortable singing.

The activity of group singing followed these physical and vocal preparations. The group singing started with some very simple songs, some but not all of the participants already knew them from childhood. The vocal range of the songs was deliberately restricted to around an octave and the songs were short (See the attached sheet in Appendix B).

The songs were taught by orally copying a phrase at a time. Once the participants had learned each song they then sang it as a round. First, with the facilitator as the second part and then the group itself divided into 2, 3 and eventually 4 parts. Once the participants had gained confidence in their own abilities through the singing of these simple songs the facilitator moved to the more complex rounds “Janie Mama” and “The Rhythm of Life”. With this last song, the groups also did a variety of speeds to keep the concentration levels up.

In order to maintain focus and individual participant integrity in the condition, the group facilitator kept the pace of the session very fast. She did not allow time for discussion between the participants. There was however a lot of laughter and non-verbal communication between participants and they were very actively listening to each other in order to carry out the tasks.

### **The control session – Lego® building**

After the participants taking part in the singing session left the room, the non-musical group participants were asked to gather around and the Lego® materials were brought into the table. Water was distributed and tables were re-arranged to accommodate the smaller group. This gave enough time for the singing group to get to their room and start their session.

The non-musical group session started with instructions about the task. The group was informed they were to work together to build the different Lego® constructions. They were informed they had one hour to do so. The Lego® instructions sheets were put on



the table as well as the bags containing all the pieces. These materials had been organized in three different sets, corresponding to the three main constructions.

To maintain a certain level of guidance from the researcher/facilitator that would mimic the one received during the singing session, the group was instructed to start with deciding how they wanted to approach the task. All throughout the session, the researcher/facilitator was involved in the activity by sometimes seating with participants and helping find pieces, helping find solutions or making small suggestions.

## **Materials**

The materials for this study can be organized into four categories: study information materials, questionnaire materials, saliva collection materials and control materials. Two consent forms for each participant were also prepared. One copy was to be kept by the participant and another by the researcher.

The study information materials consisted of a participant information sheet containing all the details about the study's background and aims, what was necessary to do so that saliva samples could be donated (the nil-by-mouth checklist and schedule), procedures, exclusion criteria, confidentiality, researcher contact and ethical approval. Questionnaire materials consisted of all the self-report measures used in this study and a record sheet, where demographic information could be provided as well as information regarding the adherence to the nil-by-mouth procedure. Saliva collection materials consisted not only of the actual collection tubes, but also an information sheet specifying instructions for saliva donation, the nil by mouth procedure and exclusion criteria. Since the nil-by-mouth procedure involves specific requests to avoid flossing or brushing teeth, smoking, eating or drinking anything but water for at least 30 minutes before providing a saliva sample, it is not excessive to include that reminder on more than one place. Finally, control materials included all the materials necessary to conduct the control condition.

The participant information sheet, together with the saliva donation information sheet were sent to participants through email after each individual had showed interest in taking part in the study. The remaining materials were used during the study.

Four study packs were prepared for this study. Two contained the questionnaires and saliva collection tubes to be used before each session, and two contained the questionnaires and saliva test tubes to be used after each session. Each questionnaire and saliva test tube was placed inside an envelope for each individual on each moment. A pen was also placed inside each envelope. To facilitate later organization of materials, collection tubes used before each session had a blue sticker and those used after each session had a green sticker.

In order to maintain confidentiality, each questionnaire set contained a page where a code was asked. These codes were used to relate the data provided on different moments: participants were asked to provide the first letter of their first name, the first letter of their mothers first name, the first letter of their fathers first name, the day and the month of their birth.

Bottles of water were also provided to each participant before each session.

### **Participant record Sheet**

This sheet recorded all the demographic information (gender and age), as well as information on aspects that can affect cortisol levels: being a smoker, taking estrogen or steroid-based medication, having smoked the hour before the saliva donation, or having drunk coffee or alcohol in the twelve hours before donation.

### **Measuring affective states**

In the sequence of study 6, the PANAS-X was used to measure affective states. Participants were asked to rate to what extent they felt in a particular way on that moment on a 5-point Likert scale (1 = *very slightly or not at all*; 5 = *extremely*). Both positive

and negative affect scales (10 items each) were used, and four extra items were added: *lonely*, *anxious*, *energetic* and *relaxed*. Out of these, only *anxious* was not an original item in the PANAS-X. As with study 6, it was included to assess self-reported anxiety before and after each activity. Lonely and relaxed were also used to obtain reports on those two specific emotional states.

The authors of the PANAS scales reported Cronbach's alpha coefficients that reveal high internal consistency for both the positive and negative affect scales. For the selected time frame (on that moment), the positive affect scale has Cronbach's alpha coefficients that range from .83 (sample of 56 psychiatric inpatients) to .88 (sample of 2213 undergraduates). The negative affect scale has Cronbach's alpha coefficients that range from .85 (sample of 2213 undergraduates) to .88 (sample of 56 psychiatric inpatients) (Watson & Clark, 1994).

In the present study, the positive affect scale had Cronbach's alpha coefficients of .86 before the singing conditions, .81 after the singing condition, .86 before the control condition, and .89 after the control condition. The negative affect scale had Cronbach's alpha coefficients of .66 before the singing condition, .39 after the singing condition, .87 before the control condition and .71 after the control condition. It is possible that the low alpha after the singing condition indicates that what the scale used was measuring was not part of what the participants experienced.

### **Measuring social connection**

This was the same scale used in previous studies. Reliability and validity of this created scale was measured with Cronbach's alpha coefficient. Internal consistency was high for both the singing condition (Cronbach's  $\alpha = .83$ ) and the non-singing condition (Cronbach's  $\alpha = .84$ ).

### Measuring states of Flow

Flow, or optimal experience, was measured with a set of items adapted from the Flow State Scale (Jackson & Marsh, 1996). This scale was developed to measure flow states in sport and physical activity settings but seemed equally appropriate to measure states of flow in this study's contexts.

The Flow State Scale is a 36-item instrument assessing the nine dimensions of flow proposed by (Csíkszentmihályi, 1990). Respondents provide ratings on a Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Each of the nine scales has four items and internal consistency for the scale is high (Mean Cronbach's  $\alpha = .83$ , from a sample of 394 athletes) (Jackson & Marsh, 1996). In the current study, internal consistency was high for both the singing condition (Cronbach's  $\alpha = .88$ ) and the non-singing condition (Cronbach's  $\alpha = .96$ ).

### Measuring feelings of achievement

All items were measured on a Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Feelings of achievement are likely to result from overcome challenges and be related to new knowledge acquisition. In this study, a composite measure considering these factors was created by asking participants how strongly they agreed or disagreed with the following statements (adapted from the questionnaire described on Chapter 4): "I felt mentally stimulated", "I felt challenged to do better", "I feel a real sense of achievement", "I feel I have achieved something important" and "I feel like I learned something new",  $\alpha = .88$  (in the group singing condition) and  $\alpha = .87$  (in the control condition).

### **Cortisol sampling and assessment**

Cortisol levels were obtained from saliva samples collected with Salivette test tubes and sponges. These materials were provided by Salimetrics Europe, where the samples were analysed.

### **The control condition: building three dimensional structures with Lego®**

One of the challenges in an experimental study of effects of group singing is to find an appropriate control activity. It should involve similar levels of social interaction, engagement, challenge, goal orientation and cooperation, while avoiding any kind of musical experiences. If the group singing experience is developed to be a fun activity, so does the control activity should be thought in that way. In the same way, if participants are being recruited from the general population and experience with group singing is not required, equal levels of novelty should be attempted. Finally, if the group singing session is designed to mimic a real-world group singing session, the control activity should also allow individuals experience an activity in a similar “real-world” environment.

In order to create an alternative group experience that would be similar to the group singing, though non-musical, several options were considered. One was group reading. This option lacked certainty that it would be enjoying, have a clear common goal to work towards and be challenging. Following this idea to use reading as an alternative activity, but trying to overcome these limitations, reading of a theatrical play was also considered. Even if a play does not have as many characters as the number of participants in each group, there is the option of alternating the readings or attributing one character to more than one person and have each group of characters read their passages simultaneously. This options still seems like a viable alternative activity but, when the present study took place, it was not possible to choose this option.

Building puzzles together is a known activity used in team building settings. I had

previous experience with such contexts and therefore it seemed appropriate that both activities would be facilitated by individuals with similar degrees of experience in that activity. Legos are an activity many adults can relate to, even if they only experienced it in their childhood. Much like singing, there seems to be certain attitudes towards playing with Legos that determine they are supposed to be a children toy, preventing many adults from engaging with it. There is a clear set of goals (to build the object), several sets can be quite complex and challenging, and according to that degree of complexity, many allow for more than one individual to work together. The chosen Lego® was a Star Wars “Battle of Endor” set, composed of 890 pieces that allow six different main objects to be built separately.

## 7.3 Results

### 7.3.1 Was the control activity an adequate control?

To assess the adequacy of the Lego® activity as an alternative non-musical activity for this study, participants were asked provide answers to several statements, before and after each activity, regarding their expectations and experiences. The aim was to investigate if participants were biased towards singing, in a way that they would have had more experience with group singing and expect a more positive experience.

Out of the eighteen participants who completed both conditions, ten had experienced singing in a group before (8 females) and fourteen had experienced playing with Legos® before (8 females). From those who had experienced singing before, nine replied “Yes” to the question “*Did you like it?*”, and one did not answer. All fourteen participants who said they had played Lego® before, also confirmed they liked it.

Table 7.1 contains the questions asked before each activity, the means and standard deviations for each activity. A repeated-measures *t*-test was performed on each pair and

statistically significant differences are noted. Each statement was rated on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*), with the exception of the first statement which was rated on a scale from 1 (*not at all*) to 5 (*very much*).

Table 7.1: Item means and standard deviations for experimental condition (Singing) and control (Lego®)

Question	Singing		Lego®	
	M	SD	M	SD
How much do you think you will enjoy the activity you are about to experience?	3.35	0.61	3.71	0.77
***I do not like the activity I am about to experience.	2.29	0.85	1.47	0.51
*I believe I will enjoy the activity.	3.76	0.56	4.12	0.60
**Knowing that I would have to take part in this activity made me think twice about participating in this study.	2.12	1.17	1.29	0.59
I think I will have a lot of fun.	3.65	0.86	3.76	0.66
I was looking forward to take part in this study because of this activity.	3.06	1.09	3.24	0.75
**Knowing that I would have to do this gave me second thoughts about volunteering to this study.	2.00	1.23	1.24	0.75

\* $p < .10$  (two-tailed); \*\*  $p < .05$  (two-tailed); \*\*\*  $p < .01$  (two-tailed)

After each session, participants were also asked to answer how much they enjoyed the session and how much fun they had on a Likert scale from 1 (*not at all*) to 5 (*very much*). Results can be found on Table 7.2. A repeated-measures  $t$ -test was performed for each pair but no statistically significant differences were found.

Table 7.2: Item means and standard deviations for experimental condition (Singing) and control (Lego®)

Question	Singing		Lego®	
	M	SD	M	SD
How much did you enjoy this session?	4.39	0.78	4.06	1.06
How much fun did you have during this session?	4.33	0.77	4.06	0.94

These results suggest participants had different expectations regarding both activities but found them similarly fun and enjoyable. In that regard, the control activity appears to have served as an appropriate control.

### 7.3.2 Were there any carry-over effects from one activity to the other?

Counterbalancing allows carry-over effects to be detected in repeated-measures designs. To investigate this, a 2\*2\*2 (Activity\*Time\*Order) mixed ANOVA was carried out for negative affect, positive affect and salivary cortisol. A 2\*2 (Activity\*Order) mixed ANOVA was carried out for social connection and flow states.

All effects are reported as significant at  $p < .05$  (two-tailed) unless otherwise specified.

#### ANOVA Assumptions

Negative affect before Lego® had significantly different variances in the two groups,  $F(1,16) = 7.43$ . This could compromise the accuracy of the  $F$ -test for order on this variable. The assumption of normality was also violated for this level of the variable, on both order A,  $W(10) = 0.79$ , and order B,  $W(8) = 0.77$ . In this situation, several options were explored to attempt to stabilize the variances between groups and normalize the distribution. The first of those options was transforming the data. A log transformation, a square root transformation and a reciprocal transformation of the data were attempted to correct for the violations of the assumption of homogeneity of variance and normality. A reciprocal transformation stabilized the variances,  $F(1,16) = 0.86$ , *ns*, but did not normalize the distribution for either order A,  $W(10) = 0.79$ , or order B,  $W(8) = 0.77$ . It was possible that the violations were being created by outliers. This study had a very small sample, and removing outliers was an undesirable outcome, reducing the sample even further. Before removing extreme values, it is acceptable practice to investigate the effect of replacing the score (Field, 2009). The score can be changed to the next highest score plus one unit, converting back from a z-score or replace the extreme value with the mean plus two standard deviations. This last option was simple and straight-forward, and stabilized variances between groups. Four outliers (scores above  $3*SD$ ) were identified in the scores of negative affect before Lego®, and changed. This alteration did not correct



the violations of the assumption of homogeneity,  $F(1,16) = 4.70$ , nor normalized the distributions for either order A,  $W(10) = 0.65$ , or order B,  $W(8) = 0.71$ . These findings suggested outliers could indeed bias the analysis. To further investigate the extent of that bias, tests were conducted on the data from which outliers were removed. Removing the four outliers stabilized the variance,  $F(1,12) = 1.50$ , *ns*, and normalize the distribution for order A,  $W(9) = 0.89$ , *ns*, and order B,  $W(5) = 0.78$ , *ns*. The analysis reported in this section was done without these outliers.

The variances of cortisol levels were equal for order A and order B after singing,  $F(1, 16) = 0.09$ , *ns*, before Lego®,  $F(1, 16) = 0.04$ , *ns*, and after Lego®,  $F(1, 16) = 0.35$ , *ns*, but not before singing where the variances of cortisol levels were significantly different between groups,  $F(1, 16) = 5.07$ . This compromised the accuracy of the  $F$ -test for order on this variable. However, the distribution of cortisol levels before singing was not significantly different from a normal distribution, on both the order A,  $W(10) = 0.96$ , *ns*, and B,  $W(10) = 0.89$ , *ns*. An analysis of the data identified one outlier in the levels of salivary cortisol before singing. Removing this outlier did not stabilize the variances  $F(1, 15) = 12.70$ . As mentioned before, the ANOVA  $F$ -test is robust and its findings can still be considered accurate even when its assumptions are violated. Given that the assumption of normality was not violated for this level of the variable, interpretations of order effects on cortisol levels were done based on the tests performed on all the original scores.

There were no violations of assumptions of normality or equality of variances in the distributions of group A and group B in social connection, flow states and positive affect.

### **Negative Affect**

Means and standard deviations can be found on Table 7.3. Negative affect was higher before than after singing in both orders of participation, and higher before than after

Table 7.3: Negative affect means and standard deviations in the different conditions and orders of participation (n = 14)

	PANAS Negative Singing		PANAS Negative Lego®	
	Before	After	Before	After
Order A (sing/Lego®) n = 9	1.34 (M) 0.26 (SD)	1.14 (M) 0.10 (SD)	1.18 (M) 0.16 (SD)	1.21 (M) 0.23 (SD)
Order B (Lego®/sing) n = 5	1.15 (M) 0.17 (SD)	1.07 (M) 0.11 (SD)	1.33 (M) 0.10 (SD)	1.25 (M) 0.37 (SD)

Lego® in order B. However, negative affect was rated higher after than before Lego® in order A. Negative affect was also rated higher in the singing condition by participants in order A, and higher in the Lego® condition by participants in order B.

A 2\*2\*2 (Activity\*Time\*Order) mixed ANOVA revealed a significant main effect of Time,  $F(1,12) = 4.90$ ,  $p < .05$ ; a non-significant interaction between Time\*Order,  $F(1,12) = 0.00$ ,  $ns$ ; a non-significant main effect of Activity,  $F(1,12) = 1.67$ ,  $ns$ ; a non-significant interaction between Activity\*Time,  $F(1,12) = 1.24$ ,  $ns$ ; a significant interaction between Activity\*Order,  $F(1,12) = 4.68$ ,  $p < .05$ ; non-significant Activity\*Time\*Order interaction,  $F(1,12) = 1.24$ ,  $ns$ ; and a non-significant main effect of order,  $F(1,12) = 0.05$ ,  $ns$ .

These findings suggest there were non-significant order effects on negative affect. Negative affect was generally the same across both orders.

### Positive Affect

Means and standard deviations can be found on Table 7.4. Positive affect was rated higher after than before both conditions in both orders of participation. This variable was also rated higher after singing than after Lego® for both orders of participation.

A 2\*2\*2 (Activity\*Time\*Order) mixed ANOVA revealed a non-significant main effect of activity,  $F(1, 16) = 0.39$ ,  $ns$ ; a non-significant interaction Activity\*Order,  $F(1, 16) = 0.33$ ,  $ns$ ; a significant main effect of time,  $F(1, 16) = 47.65$ ,  $p < .001$ ; a non-significant

Table 7.4: Positive affect means and standard deviations in the different conditions and orders of participation (n = 18)

	PANAS Positive Singing		PANAS Positive Lego®	
	Before	After	Before	After
Order A (sing/Lego®) n = 10	2.72 (M) 0.44 (SD)	3.43 (M) 0.11 (SD)	2.72 (M) 0.56 (SD)	3.09 (M) 0.60 (SD)
Order B (Lego®/sing) n = 8	2.43 (M) 0.58 (SD)	3.43 (M) 0.32 (SD)	2.58 (M) 0.54 (SD)	3.26 (M) 0.74 (SD)

interaction Time\*Order,  $F(1, 16) = 2.16$ , *ns*; a non-significant interaction Activity\*Time,  $F(1, 16) = 2.71$ , *ns*; a non-significant interaction Activity\*Time\*Order,  $F(1, 16) = 0.001$ , *ns*; and finally, a non-significant main effect of order,  $F(1,16) < 1$ ,  $r = .09$ .

These findings suggests positive affect was generally the same across both orders.

### Salivary Cortisol

Means and standard deviations on Table 7.5 show that levels of salivary cortisol were higher before than after both conditions in both orders of participation, except for order A in the singing condition where it was slightly higher after the session. Salivary cortisol levels were also higher for order B *before* the singing condition; and higher for order A *before* the Lego® condition.

Table 7.5: Salivary cortisol means and standard deviations in the different conditions and orders of participation (n = 18)

	Cortisol $\mu/dL$ Singing		Cortisol $\mu/dL$ Lego®	
	Before	After	Before	After
Order A (sing/Lego®) n = 10	0.14 (M) 0.04 (SD)	0.15(M) 0.17 (SD)	0.17 (M) 0.06 (SD)	0.12 (M) 0.05 (SD)
Order B (Lego®/sing) n = 8	0.20 (M) 0.12 (SD)	0.15 (M) 0.12 (SD)	0.16 (M) 0.08 (SD)	0.09 (M) 0.04 (SD)

A 2\*2\*2 (Activity\*Time\*Order) mixed ANOVA revealed a non-significant main effect of activity on cortisol levels,  $F(1, 16) = 1.43$ , *ns*; a non-significant interaction Activ-

ity\*Order,  $F(1, 16) = 1.74$ , *ns*; a significant main effect of time,  $F(1, 16) = 4.53$ ,  $p < .05$ ; a non-significant interaction Time\*Order,  $F(1, 16) = 0.70$ , *ns*; a non-significant interaction Activity\*Time,  $F(1, 16) = 2.09$ , *ns*; a non-significant interaction Activity\*Time\*Order,  $F(1, 16) = 0.97$ , *ns*; and a non-significant main effect of order,  $F(1, 16) < 1$ ,  $r = .07$ . These findings suggest levels of cortisol were generally the same across both groups.

### Social Connection

This was the only variable where there was a specific hypothesis about order effects. Hypothesis 3b predicted that group B would have significantly higher ratings of social connection after group singing than after the control condition; and group A would have significantly higher ratings of social connection in the control condition than group B in that same condition.

Means and standard deviations on Table 7.6 show that social connection was rated higher in the singing condition for both orders of participation. Furthermore, social connection had higher ratings in order A.

Table 7.6: Social connection means and standard deviations in the different conditions and orders of participation (n = 18)

	Social Connection Singing	Social Connection Lego®
Order A (sing/Lego®) n = 10	4.91 (M) 0.50 (SD)	4.85(M) 0.39 (SD)
Order B (Lego®/sing) n = 8	4.90 (M) 0.56 (SD)	4.41 (M) 0.67 (SD)

A 2\*2 (Activity\*Order) mixed ANOVA revealed a non-significant main effect of activity  $F(1, 16) = 3.06$ , *ns*; a non-significant interaction Activity\*Order,  $F(1, 16) = 1.85$ ,  $r = 0.32$ , *ns*; and a non-significant main effect of order,  $F(1, 16) = 1.24$ , *ns*. To further investigate the hypothesis, and considering that the effect size of that interaction was medium, a post-

Table 7.7: Mean differences between both order of participation in both conditions

Interaction Activity*Order Social Connection n =18			
	Singing	lego®	Mean Difference
Order A	4.91	4.85	0.06
Order B	4.90	4.41	0.49*
Mean Difference	0.01	0.44*	

\*Difference Significant when Mean difference > HSD

hoc Tukey's HSD test with harmonic mean<sup>18</sup> was performed,  $HSD = 0.45$ , and compared to the four possible mean differences (Table 7.7).

These findings suggest participants who took part in the study in order B (control/experimental), had significantly higher ratings of feelings of social connection in the singing condition than the control condition. At the same time, participants who took part in the study in order A (experimental/control) rated social connection higher in the control condition (i.e., Lego®) than participants in order B, and this difference was marginally significant.

These findings corroborate hypothesis 3b. Statistically, it is unlikely the marginal significance was due to random factors instead of an effect of the experimental manipulation. Participants in both groups rated social connection similarly in the singing condition, but not in the Lego® condition. It seems plausible that feelings of connection developed in the singing condition were carried-over to the group interaction the following day.

### Flow states

Mean values of ratings of flow states can be found on Table 7.8. These show that there were higher ratings of flow states in the Lego® condition for order of participation A, and higher ratings of flow states in the singing condition for order of participation B.

<sup>18</sup>Harmonic mean is more accurate than the arithmetic mean when group sizes differ. Calculated with formula

$$nk = \frac{k}{\sum \frac{1}{ni}}$$

; HSD calculated with the formula previously stated, using nk instead of n.

Table 7.8: Flow states means and standard deviations in the different conditions and orders of participation (n = 18)

	Flow Singing	Flow Lego®
Order A (sing/Lego®) n = 10	3.51 (M) 0.27 (SD)	3.63(M) 0.49 (SD)
Order B (Lego®/sing) n = 8	3.53 (M) 0.52 (SD)	3.47 (M) 0.87 (SD)

A 2\*2 (Activity\*Order) mixed ANOVA revealed a non-significant main effect of activity,  $F(1, 16) = 0.02$ , *ns*; a non-significant interaction Activity\*Order,  $F(1, 16) = 0.33$ , *ns*,  $r = 0.14$ ; and a a non-significant main effect of order,  $F(1, 16) < 1$ , *ns*.

These findings suggest flow states were generally the same across both groups.

### Summary

With the exception of the findings on social connection, there were no significant effects of order on the dependent variables in this study. This indicates that there were no significant carry-over effects from one activity to the other, and tests could be conducted on the data from both groups.

### 7.3.3 In general, what were the main effects of this experiment?

In order to test the hypotheses from 1 to 4, three 2\*2 (Activity\*Time) repeated-measures ANOVA were performed on negative affect, positive affect and salivary cortisol. Two repeated-measures *t*-tests were performed on flow states and social connection.

Means and standard deviations can be found on Table 7.9.

Assumptions of normality were violated in the distributions of levels of salivary cortisol before,  $W(18) = 0.83$ , and after singing  $W(18) = 0.64$ , and distributions of negative affect before Lego®,  $W(18) = 0.76$ , and after singing,  $W(18) = 0.82$ . As mentioned before, the *F*-test is robust in ANOVA, often withstanding violations of normality assumptions.

However, the existence of outliers could bias the analysis of the data. One outlier was identified in the scores of salivary cortisol and four outliers were identified in the ratings of negative affect. Removing the outliers led to different results in the ANOVA which indicated those outliers were biasing the data. Tests reported here were, thus, conducted on the data from which these outliers were removed.

All effects are reported as significant at  $p < .05$  (two-tailed) unless otherwise stated. Marginally significant results were those significant at a  $p < .10$  (two-tailed).

Table 7.9: Means and standard deviations of ratings of flow states, social connection, positive and negative affect and cortisol in the singing and control conditions

	Flow States n = 18		Social Connection n = 18		Negative Affect n = 14				Positive Affect n = 18				Cortisol n = 17			
					before		after		before		after		before		after	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Singing	3.52	0.39	4.91	0.51	1.27	0.25	1.11	0.11	2.59	0.51	3.43	0.47	0.17	0.09	0.12	0.09
Lego®	3.56	0.67	4.65	0.57	1.23	0.16	1.23	0.27	2.66	0.54	3.17	0.65	0.17	0.07	0.10	0.04



**Hypothesis 1:**

- 1a)** Ratings of positive affect will increase and negative affect will decrease significantly in the singing condition;
- 1b)** Group singing leads to higher positive and lower negative affect than a non-musical group activity.

Values on Table 7.9 show that **positive affect** was higher after singing ( $M = 3.43$ ,  $SD = 0.47$ ) than before singing ( $M = 2.59$ ,  $SD = 0.51$ ), but also higher after Lego® ( $M = 3.17$ ,  $SD = 0.65$ ) than before Lego® ( $M = 2.66$ ,  $SD = 0.54$ ). Positive affect was lower before singing ( $M = 2.59$ ,  $SD = 0.51$ ) than before Lego® ( $M = 2.66$ ,  $SD = 0.54$ ), and higher after singing ( $M = 3.43$ ,  $SD = 0.47$ ) than after Lego® ( $M = 3.17$ ,  $SD = 0.65$ ).

A 2\*2 (Activity\*Time) repeated-measures ANOVA revealed a non-significant main effect of Activity,  $F(1, 17) = 0.51$ , *ns*, a significant main effect of Time,  $F(1, 17) = 43.04$ ,  $p < .05$   $r = .85$ , and a non-significant interaction Activity\*Time,  $F(1, 17) = 2.92$ ,  $r = .38$ .

In order to test part of **hypotheses 1a and 1b**, post-hoc tests using the Bonferroni<sup>19</sup> 2 correction and considering estimated marginal means, were performed with the ANOVA analysis. These revealed that the difference between mean positive affect after singing and after Lego® (0.27) was not significant; but the difference between mean positive affect before and after singing (-0.85) was significant. These tests also revealed that the difference between mean positive affect before and after Lego® (-0.51) was significant.

These findings suggest positive affect increased significantly in the singing condition but ratings of positive affect were not significantly higher in this condition compared to control.

**Negative affect** was higher before singing ( $M = 1.27$ ,  $SD = 0.25$ ) than before Lego®

<sup>19</sup>Bonferroni is reported here instead of Tukey's HSD; this is because Bonferroni has more power when the number of comparisons is small (Field, 2009, p.374).

( $M = 1.23$ ,  $SD = 0.16$ ), and lower after singing ( $M = 1.11$ ,  $SD = 0.11$ ) than after Lego® ( $M = 1.23$ ,  $SD = 0.27$ ). A 2\*2 (Activity\*Time) repeated-measures ANOVA revealed a non-significant main effect of Activity,  $F(1, 13) = 0.39$ ,  $ns$ , a significant main effect of Time,  $F(1, 13) = 5.78$ ,  $p < .05$ ,  $r = .55$ , and a non-significant interaction Activity\*Time,  $F(1, 13) = 2.20$ ,  $r = .38$ .

In order to test the remaining section of **hypotheses 1a and 1b**, post-hoc tests using the Bonferroni correction were performed with the ANOVA analysis. These revealed that the difference between mean negative affect after singing and after Lego® (-0.12) was not significant; but the difference between mean negative affect before and after singing (0.16) was significant. These findings are congruent with the ANOVA results and suggest negative affect decreased significantly in the singing condition, but ratings of negative affect were not significantly lower after singing than after Lego®.

In conclusion, **hypothesis 1a** is corroborated by these findings: positive affect increase and negative affect decreased significantly in the singing condition. On the other hand, **hypothesis 1b** was not corroborated statistically. Although group singing led to higher ratings of positive affect and lower ratings of negative affect, compared to control, the differences were not significant between both conditions. Nonetheless, in relation to negative affect, group singing did lead to significant decreases in negative affect while the control condition did not result in any changes on that variable. It is possible to conclude that group singing benefited mood more so than the control condition.

**Hypothesis 2: Salivary cortisol levels were expected to decrease significantly in both activities. However, salivary cortisol levels in the singing condition were expected to decrease less than the levels in the non-musical condition.**

Salivary cortisol was at the same levels before singing ( $M = 0.17$ ,  $SD = 0.09$ ) and before Lego® ( $M = 0.17$ ,  $SD = 0.07$ ), but was lower after Lego® ( $M = 0.10$ ,  $SD = 0.04$ ) than

after singing ( $M = 0.12$ ,  $SD = 0.09$ ).

A 2\*2 (Activity\*Time) repeated-measures ANOVA revealed a non-significant main effect of Activity,  $F(1, 16) = 0.30$ , *ns*, a significant main effect of Time,  $F(1, 16) = 28.01$ ,  $p < .05$ ,  $r = .80$ , and a non-significant interaction Activity\*Time,  $F(1, 16) = 1.36$ .

These results suggest levels of salivary cortisol decreased significantly on both activities, and more so on the Lego® activity. However, this difference was not significant. Hypothesis 2 was partially corroborated.

**Hypothesis 3: Ratings of social connection after singing will be significantly higher than ratings of social connection after control.**

Ratings of social connection were higher after singing ( $M = 4.91$ ,  $SD = 0.51$ ) than after Lego® ( $M = 4.65$ ,  $SD = 0.57$ ) but this difference was not significant,  $t(17) = 1.57$ , *ns*,  $r^{20} = .23$ . Hypothesis 3a is not upheld statistically. This was possibly due to carry-over effects from the singing condition to the Lego® condition in group A.

**Hypothesis 4:**

**4a)** Group singing leads to higher ratings of flow states than the non-music group activity.

**4b)** Ratings of challenge-skill balance, clear goals, sense of control and loss of self-consciousness will be higher in the alternative group activity; concentration on the task at hand, action-awareness, unambiguous feedback, transformation of time and autoleptic experience will have higher ratings after the group singing activity.

Ratings of flow states were higher after Lego® ( $M = 3.56$ ,  $SD = 0.67$ ) than after singing ( $M = 3.52$ ,  $SD = 0.39$ ) but this difference was not significant,  $t(17) = -.22$ , *ns*,  $r = .04$ . Hypothesis 4a was, thus, not corroborated.

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<sup>20</sup>Effect size calculated with the original standard deviations to prevent overestimation of ES (Dunlap et al., 1996)

Table 7.10: Mean and standard deviation in each Flow states sub-scale in each condition

n = 18	Singing		Lego®	
	Mean	SD	Mean	SD
Challenge-Skill balance	3.58	0.38	3.68	0.74
Action-Awareness	3.43	0.75	3.13	1.06
Clear goals	3.69	0.60	4.04	0.78
Unambiguous feedback	3.31	0.69	3.68	0.61
Concentration on task at hands	3.93	0.77	3.49	1.07
Sense of Control	3.46	0.80	3.61	0.74
*Loss of self-consciousness	3.21	0.88	3.85	0.97
Transformation of time	3.03	0.81	2.92	0.78
Autoletic experience	4.08	0.71	3.63	1.00

\*Difference significant to  $p < .05$

Looking at each dimension of flow in Table 7.10, ratings were higher in the Lego® activity on challenge-skill balance, clear goals, unambiguous feedback, sense of control, and loss of self-consciousness (in this case indicating that participants felt less self-conscious in the control condition). A dependent  $t$ -test revealed that, in this last dimension, the difference was significant,  $t(17) = -2.46$ ,  $p < .05$ ,  $r = -.33$ . The group singing activity had higher ratings in the action-awareness dimension, concentration on the task at hands, transformation of time and autoletic experience. Dependent  $t$ -tests were performed but no significant differences were found in these dimensions.

These findings only partially corroborate hypothesis 4b. Results were in the expected direction but there was only one significant difference.

**Hypothesis 5: It was predicted that participants would experience feelings of achievement, more so in the group singing condition than control.**

Ratings of the combined scores of mental stimulation, achievement and knowledge acquisition ( $n=18$ ), were higher after group singing ( $M = 5.02$ ,  $SD = 1.26$ ) than after control ( $M = 4.28$ ,  $SD = 1.16$ ) and this difference was significant,  $t(17) = 3.20$ ,  $p < .05$ ,  $r = .29$ . Hypothesis 5 was, thus, corroborated.

### 7.3.4 How did female and male participants respond to the experiment?

#### Hypotheses 6:

- 6a)** Female participants will rate positive affect significantly higher after singing than male participants;
- 6b)** Male participants will have significantly higher salivary cortisol levels before the singing activity than female participants.

To test these hypotheses and investigate any further differences between female and male participants, three 2\*2\*2 (Activity\*Time\*Gender) mixed ANOVA were carried out for negative affect, positive affect and salivary cortisol. Two 2\*2 (Activity\*Gender) mixed ANOVA were carried out for social connection and flow states.

All effects are reported as significant at  $p < .05$  (two-tailed) unless otherwise specified.

#### ANOVA Assumptions

Negative affect had significantly different variances in the two groups before,  $F(1, 16) = 16.75$ , and after Lego®,  $F(1, 16) = 6.45$ . The assumptions of normality were not violated in the distributions of negative affect before Lego® for female,  $W(9) = 0.85$ , *ns*, and male participants,  $W(9) = 0.91$ , *ns*. Equally, the distribution of negative affect after Lego® for female,  $W(9) = 0.93$ , *ns*, and male participants,  $W(9) = 0.84$ , *ns*, were not significantly different from a normal distribution. Given that the assumption of normality was not violated for these levels of the variable, interpretations of gender effects on negative affect were done based on the tests performed on all the original scores.

The variances of cortisol levels were equal for female and male levels before singing,  $F(1, 16) = 0.58$ , *ns*, before Lego®,  $F(1, 16) = 0.11$ , *ns*, and after Lego®,  $F(1, 16) = 0.00$ , *ns*, but not after singing where the variances of cortisol levels were significantly different between groups,  $F(1, 16) = 6.26$ ,  $p < .05$ . This compromises the accuracy of the

$F$ -test for gender on this variable. Further exploration of homogeneity of variances and normality assumptions revealed that the distribution of cortisol levels after singing, for male participants, was significantly different from a normal distribution,  $W(10) = 0.72$ ,  $p < .01$ . Given that the assumption of normality was also violated for this level of the variable, it seemed important to investigate possible outliers that could be causing both assumptions to be violated. One outlier, from a male participant, was detected in the levels of cortisol after singing. Transforming the data (log transformation, square root and reciprocal transformation) and changing the score did not normalize the distribution or stabilized the variances. This outlier was removed and this stabilized the variances. The analysis reported here reflects this removal.

Assumptions of normality and equality of variances were upheld on all levels of the distributions of positive affect, social connection and flow states.

### Negative affect

Means and standard deviations on Table 7.11 indicate that the highest ratings of negative affect were given by female participants *before* the Lego® condition. Both female and male participants rated negative affect higher *before* singing. While female participants also rated negative affect higher *before* the Lego® condition, male participants rated negative affect marginally higher *after* this condition.

Table 7.11: Negative affect means and standard deviations by female and male participants in each condition (n=18)

	PANAS Negative Singing		PANAS Negative Lego®	
	Before	After	Before	After
Female n =9	1.38 (M) 0.23 (SD)	1.10(M) 0.16 (SD)	1.71 (M) 0.70 (SD)	1.19 (M) 0.17 (SD)
Male n = 9	1.23 (M) 0.23(SD)	1.14 (M) 0.12 (SD)	1.25 (M) 0.17 (SD)	1.28(M) 0.32 (SD)

A 2\*2\*2 (Activity\*Time\*Gender) mixed ANOVA revealed, as before, a significant

Table 7.12: Mean differences within and between genders at baseline and after the activities

Interaction Time*Gender			
Negative Affect			
n=18			
	Female	Male	Mean Difference
Baseline	1.54	1.25	0.29*
After Activities	1.14	1.21	0.07
Mean Difference	0.40*	0.04	

*\*Difference Significant when Mean difference > HSD*

main effect of activity  $F(1, 16) = 4.50, p < .05, r = .47$ ; a non-significant interaction Activity\*Gender,  $F(1, 16) = 0.84, ns$ ; a main effect of time,  $F(1, 16) = 12.63, p < .01$ ; a significant interaction Time\*Gender,  $F(1, 16) = 8.71, p < .01, r = .59$ ; a non-significant interaction Activity\*Time,  $F(1, 16) = 0.27, ns$ ; a non-significant main effect of gender,  $F(1, 16) = 1.56, ns$ ; and finally, a non-significant interaction Activity\*Time\*Gender,  $F(1, 16) = 1.75, ns$ .

A post-hoc Tukey's HSD test on the Time\*Gender interaction,  $HSD = .25$ , revealed that the mean difference between ratings of negative affect before the activities by female and male participants was significant, as can be seen on table 7.12. This test also indicated that ratings of negative affect, when considering both conditions simultaneously, decreased significantly for female participants.

These findings suggest that there was no significant interaction activity\*time\*gender. However, if ratings of negative affect on both activities are considered simultaneously, the findings indicate that female participants rated negative affect significantly higher than male participants before both conditions and those higher ratings decreased significantly after both conditions.

### Positive Affect

Means and standard deviations on Table 7.13 indicate that positive affect was rated higher after both conditions by both male and female participants. Furthermore, the highest ratings were given by female participants *after* singing.

Table 7.13: Positive affect means and standard deviations by female and male participants in each condition (n=18)

	PANAS Positive Singing		PANAS Positive Lego®	
	Before	After	Before	After
Female n =9	2.51 (M) 0.41 (SD)	3.57(M) 0.43 (SD)	2.48 (M) 0.54 (SD)	3.06 (M) 0.65 (SD)
Male n = 9	2.67 (M) 0.62(SD)	3.30 (M) 0.50 (SD)	2.83 (M) 0.51 (SD)	3.27(M) 0.67 (SD)

A 2\*2\*2 (Activity\*Time\*Gender) mixed ANOVA revealed a non-significant main effect of activity on positive affect,  $F(1, 16) = 0.53$ , *ns*; a non-significant interaction Activity\*Gender,  $F(1, 16) = 1.53$ , *ns*; a significant main effect of time,  $F(1, 16) = 45.82$ ,  $p < .001$ ; a non-significant interaction Time\*Gender,  $F(1, 16) = 2.10$ , *ns*; a non-significant interaction Activity\*Time,  $F(1, 16) = 2.84$ , *ns*; a non-significant interaction Activity\*Time\*Gender,  $F(1, 16) = 0.50$ , *ns*,  $r = 0.17$ ; and finally, a non-significant main effect of gender,  $F(1, 16) < 1$ ,  $r = .16$ .

There were no gender effects on positive affect. Even though female participants rated positive affect higher after singing, this was not significantly different from the ratings of male participants.

### Salivary cortisol

Means and standard deviations on Table 7.14 indicate that salivary cortisol decreased in both conditions in both female and male participants. They also indicate that male participants had higher salivary cortisol levels than female participants before both conditions.

According to a 2\*2\*2 (Activity\*Time\*Gender) mixed ANOVA, there was a non-significant



Table 7.14: Salivary cortisol means and standard deviations by female and male participants in each condition (n=17)

	Cortisol $\mu/dL$ Singing		Cortisol $\mu/dL$ Lego®	
	Before	After	Before	After
Female n =9	0.13 (M) 0.06 (SD)	0.11(M) 0.05 (SD)	0.16 (M) 0.07 (SD)	0.12 (M) 0.04 (SD)
Male n = 8	0.21 (M) 0.10(SD)	0.14 (M) 0.13 (SD)	0.18 (M) 0.08 (SD)	0.08(M) 0.02 (SD)

main effect of activity on cortisol levels,  $F(1, 15) = 1.47$ , *ns*; a marginally significant interaction Activity\*Gender,  $F(1, 15) = 3.28$ ,  $p < .10$ ,  $r = .42$ ; a significant main effect of time,  $F(1, 15) = 42.42$ ,  $p < .001$ ,  $r = .86$ ; a significant Time\*Gender interaction,  $F(1, 15) = 8.08$ ,  $p < .05$ ,  $r = .59$ ; a non-significant Activity\*Time interaction,  $F(1, 15) = 1.32$  *ns*; a non-significant Activity\*Time\*Gender interaction  $F(1, 15) = 0.09$ , *ns*,  $r = .08$ ; and a non-significant main effect of gender,  $F(1,15) < 1$ ,  $r = .21$ .

In order to test hypothesis 6a, a post-hoc Tukey's HSD test, with harmonic mean, was performed on the Activity\*Time\*Gender interaction,  $HSD = 0.05$ , and compared to the difference between mean salivary cortisol levels before singing for female and male participants, 0.08. This finding suggests this difference was significant.

The interaction Activity\*Gender was investigated further as the effect yielded close to large effect size<sup>21</sup>. Figure 7.1 indicates that male participants had higher cortisol levels than female participants in the singing activity, and female participants had slightly higher cortisol levels than male participants in the Lego® activity.

A post-hoc Tukey's HSD test, with harmonic mean, on the Activity\*Gender interaction,  $HSD = 0.07$ , revealed that the difference that was marginally significant was that between female and male participants in the singing condition (see Table 7.15). This is consistent with the finding that male participants had significantly higher salivary cortisol levels than female participants before the singing condition.

<sup>21</sup>As noted before, a large effect size corresponds to an  $r > .50$ .

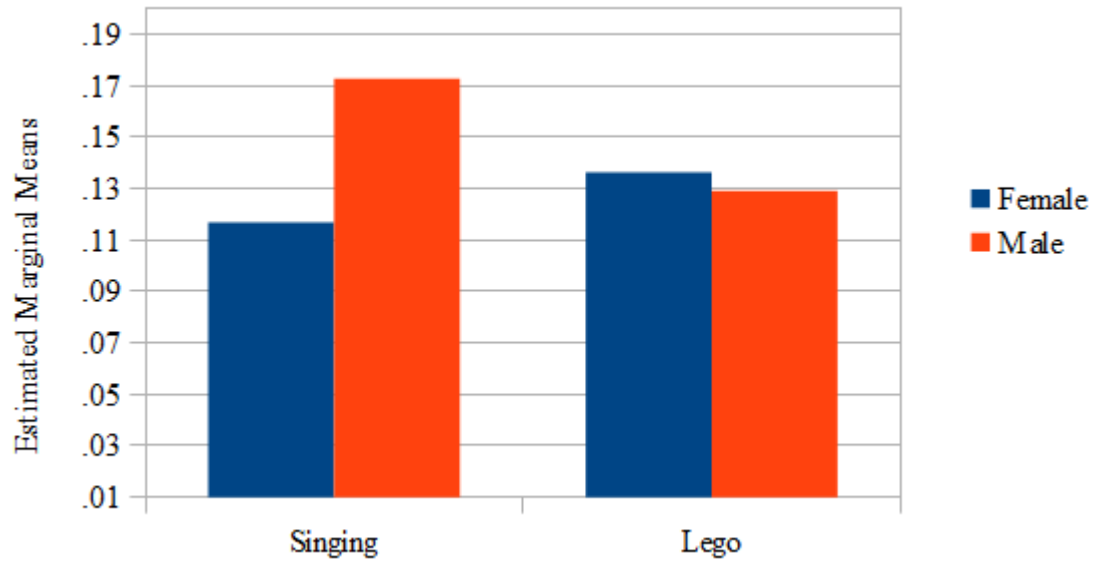


Figure 7.1: Salivary Cortisol Levels  $\mu/dL$  in the Singing and Lego Activities (n = 17)

Table 7.15: Mean differences within and between genders in each activity

Interaction Activity*Gender Salivary Cortisol n=17			
	Female n=9	Male n=8	Mean Difference
Singing	0.12	0.17	0.06*
Lego®	0.14	0.13	0.01
Mean Difference	0.02	0.04	

*\*Difference Significant when Mean difference > HSD*

The interaction Time\*Gender was also further investigated, as it had a large effect size. The interaction in Figure 7.2 suggests that cortisol levels not only decreased for both female and male participants, but were also at similar levels after the activities. However, male participants had higher cortisol levels before the activities than the female participants. This was probably due to the levels before the singing condition.

A post-hoc Tukey's HSD test, with harmonic mean, on the Time\*Gender interaction (figure 7.2),  $HSD = 0.03$ , revealed that the difference before the activities was significant. The values on Table 7.16 also indicate that salivary cortisol decreased significantly for male participants but only marginally significantly for female participants.

In sum, there were no main effects of gender on levels of salivary cortisol. Despite this,

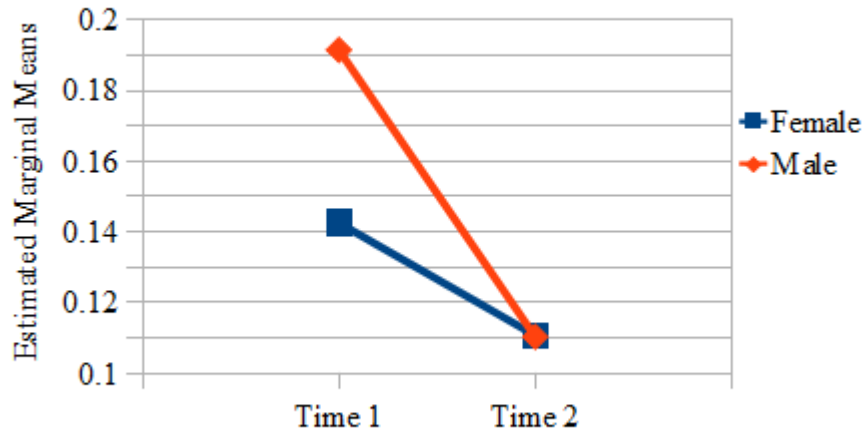


Figure 7.2: Interaction Time\*Gender for Cortisol Levels  $\mu/dL$  (n = 17)

Table 7.16: Mean differences within and between genders at baseline and after the activities

	Interaction Time*Gender		Mean Difference
	Female n=9	Male n=8	
Baseline	0.14	0.19	0.05*
After activities	0.11	0.11	0.00
Mean Difference	0.03	0.08*	

\*Difference Significant when Mean difference > HSD

further analysis revealed that male participants had significantly higher levels of cortisol before singing than female participants. Cortisol levels before both activities also differed significantly, with male participants exhibiting significantly higher levels of cortisol before the activities.

### Social Connection

Means in Table 7.17 indicate that both female and male participants rated social connection higher in the singing condition.

A 2\*2 (Activity\*Gender) mixed ANOVA pointed to a non-significant main effect of activity on ratings of social connection,  $F(1, 16) = 2.32$ , *ns*; a non-significant interaction

Table 7.17: Social connection means and standard deviations by female and male participants in each condition (n = 18)

	Social Connection Singing	Social Connection Lego®
Female n = 9	4.92 (M) 0.66(SD)	4.68(M) 0.43 (SD)
Male n = 9	4.98 (M) 0.36 (SD)	4.63 (M) 0.70 (SD)

Activity\*Gender,  $F(1,16) = 0.00$ , *ns*; and a non-significant main effect of gender,  $F(1,16) = 0.04$ , *ns*.

These findings indicate that ratings of social connection were generally the same across female and male participants.

### Flow states

Table 7.18: Flow states means and standard deviations by female and male participants in each condition (n = 18)

	Flow Singing	Flow Lego®
Female n = 9	3.60 (M) 0.44(SD)	3.78(M) 0.44 (SD)
Male n = 9	3.45 (M) 0.33 (SD)	3.34 (M) 0.80 (SD)

A 2\*2 (Activity\*Gender) mixed ANOVA indicated that there was a non-significant main effect of activity on flow states,  $F(1, 16) = 0.05$ , *ns*; a non-significant interaction Activity\*Gender,  $F(1, 16) = 0.91$ , *ns*; and a non-significant main effect of gender,  $F(1, 16) = 2.19$ , *ns*.

Even though values on Table 7.18 show that female participants had higher scores of flow on both activities, these differences were not significant. Flow states were generally the same across both female and male participants.

### Summary

These findings do not statistically corroborate hypothesis 6a. Female participants rated positive affect higher after singing than male participants but this difference was not

significant. On the other hand, the findings above corroborate hypothesis 6b: male participants had significantly higher levels of cortisol before singing than female participants. Further investigation also revealed that there was a significant interaction between Time and Gender on the ratings of negative affect, where female participants rated negative affect higher before the activities and lower after the activities than male participants.

## 7.4 Discussion

To the best of my knowledge, this was the first study to experimentally demonstrate that group singing has positive effects on variables related to well-being, namely affective states and salivary cortisol, and promotes social connection, states of flow and personal growth. It is also the first study to provide experimental evidence that a group singing activity might benefit well-being in the short-term more so than an equivalent, though non-musical, group activity.

In relation to effects on mood, due to the beneficial effects of group singing suggested by the literature, ratings of positive affect were expected to be significantly higher after singing than before, and levels of negative affect were expected to be significantly lower after singing than before. Although there was no experimental evidence to suggest that group singing would have stronger effects on emotional states, than the non-musical group activity, the hypothesis that group singing would lead to higher positive and lower negative affect than a non-musical group activity, was also tested.

The results showed that positive affect increased significantly and negative affect decreased significantly in the group singing condition. On the other hand, although group singing led to higher ratings of positive affect and lower ratings of negative affect, compared to control, the differences were not significant between both conditions.

The increase in positive affect and decrease in negative affect in the group singing corroborates the hypothesis and replicates previous research (Unwin et al., 2002; Kreutz

et al., 2004). This evidence supports the notion that group singing has benefits on mood, with an ability to increase positive affect and decrease negative affect significantly.

Regarding a comparison with a non-musical group activity, these findings, though not significant, are the first empirical evidence to suggest that group singing might have unique effects on mood, over and above those of a similar, though non-musical, group activity.

In relation to negative affect, at baseline, group singing had slightly higher ratings of negative affect than the control activity, but these were not significantly different. Group singing then led to a significant decrease in negative affect, while the control activity had no significant effect on this variable. Even though the difference between ratings of negative affect after group singing and control was not statistically significant, group singing had the power to decrease negative affect significantly, while such effect was not seen in the non-musical group activity. Furthermore, effects of the interaction between activity (group singing/Lego®) and time (before/after) on negative affect had a medium size. This suggests that while the differences between conditions may not have been statistically significant, the findings are still a result of the experiment, at least in part. In this case, about 9% (according to J. Cohen, 1988) of the variation in the data was an effect of the experiment.

The effects of both activities on positive affect were, in this aspect, more similar, since positive affect increased significantly on both activities. However, group singing had lower ratings of positive affect to start with and ended with higher ratings of positive affect than the control activity. The increase of positive affect in group singing was, thus, higher. In fact, these findings are consistent with the results in the items used to control the expectations and attitudes participants had towards both activities. Even though group singing and Lego® were rated as being similarly fun and enjoyable after the activities (with higher ratings on group singing, though not significantly higher), participants' expectations tended to be more positive regarding the Lego® activity. Furthermore, participant's views

on both activities were significantly different, with group singing rated as less desirable to participate in. In this context, the findings appear to indicate that group singing had a stronger effect on positive affect than the non-musical group activity. Even though the difference between the ratings of positive affect after group singing and Lego® was not significant, there is a clear possibility that group singing benefited positive affect more so than the alternative group activity. In fact, the effect size of the activity\*time interaction on positive affect was also medium, and, thus, at least 9% of the variance was an effect of the experiment.

Taken together, these findings appear to suggest that group singing had effects of mood over and above those of a similarly enjoyable, though non-musical, group activity. Although there is a lack of previous investigation on this topic, these results appear suggestive enough to encourage subsequent experimental investigation in order to clarify these effects.

In relation to effects on salivary cortisol levels, a decrease was expected on both activities due to their relaxing, enjoyable and fun characteristics. However, this decrease was expected to be smaller in the group singing due to elitist perceptions of group singing and cortisol responses to psychological stress. Participants were expected to perceive group singing as a more intimidating activity than playing with Lego®. These expectations and attitudes towards singing could then lead to group singing being perceived as a more challenging or stressful situation, and cortisol is known to increase in the presence of such psychological reactions. The findings in this study indicate that, as hypothesized, salivary cortisol decreased significantly on both activities. Furthermore, this decrease was higher on the Lego® than the group singing activity, though not significantly higher. Mean levels of salivary cortisol were higher than the norm for the corresponding time of the day (Salimetrics, 2011) suggesting the decrease was an effect of the experiment and not the diurnal rhythm. The size of the effect of time on salivary cortisol also supports this notion.

This was a very large effect, suggesting a large portion of the variation of the data was due to the experiment, and not other factors.

Both activities were designed to have similar levels of social interaction, challenge and fun, and a similar relaxed environment. Positive affect increased significantly after each activity, as noted above. Asked to rate their enjoyment and fun after each activity, participants reported finding both activities similarly enjoyable and fun. However, when asked how much they liked each activity before engaging in it, participants reported disliking group singing significantly more than Lego®. Likewise, knowing that they would have to engage in group singing gave participants second thoughts about taking part in the study significantly more so than knowing that they would have to play Lego®. Furthermore, participants believed they would enjoy Lego® more than group singing. These results suggest that, even though participants ended up finding both activities similarly pleasant, they had different attitudes towards both activities to start with, with more negative expectations and attitudes towards group singing. These would have contrasted with what participants actually experienced while singing in a group, namely positive effects such as relaxation and enjoyment. Group singing led to a significant decrease in cortisol indicating that any psychological stress or arousal that could have arisen from perceiving this activity as challenging, was replaced with the positive benefits of group singing. Because there is no indication that similar psychological stress could have arisen in relation to playing Lego®, this activity did not have expectations conflicting with the actual experiences, thus leading to a greater decrease in cortisol.

Another explanation can be related to how female and male participants in this study had different experiences with group singing and how men tend to respond to anticipated psychological stress with an increased production of cortisol (Kirschbaum et al., 1992). All but one of the female participants reported previous experience and enjoyment of group singing. On the other hand, all but one male participant reported not having experienced



group singing before (compared to six who reported having experienced playing with Lego® before). It is possible that the novelty and uncertainty about the activity they were about to experience, caused a certain degree of psychological stress in male participants which, in turn led to higher levels of cortisol in the group singing than the Lego® activity. This explanation is consistent with the finding that male participants had higher levels of salivary cortisol than female participants before the group singing activity, and this difference was significant. Male participants also had higher salivary cortisol levels than female participants in group singing condition overall, and this difference was marginally significant. These findings suggest that it was the contributions of male participants' elevated salivary cortisol levels, in the group singing activity, that led to a slightly lower decrease in salivary cortisol compared to the decrease experienced in the Lego® activity.

It appears that the experience of singing, in itself, can be an enjoyable experience but the thought of singing is more complex reflecting individual expectations and attitudes. This disparity between our thoughts and feelings leads to the complexities surrounding singing previously noted by Beck et al. (2000) and also discussed in Chapter 6. The findings by Beck et al. (2000) and the ones reported in Chapter 6, suggested that singing in a context which could be considered more challenging, namely a public performance, led to both stress and anxiety but also relaxation and enjoyment. These reactions can be thought as opposites but reflect the complexity of the activity of singing, which can have emotional and physiological benefits, but, as proposed by the theoretical model suggested in Chapter 2, also depends on other factors such as the context in which the singing is done and previous expectations and experiences of singing.

The findings in this study suggest that group singing can lead to a decrease in cortisol but psychological and situational factors should be taken into account. Future experimental studies investigating effects of group singing should consider comparing individuals with different singing experiences. Manipulations of expectations and contexts would be

helpful in clarifying the findings reported above.

Regarding the ways in which group processes, such as bonding and connection, were influenced by each activity, it was expected that group singing would lead to stronger feelings of connection between individuals (hypothesis 3a). It was reasoned that feelings of connection would arise not only as a result of social interaction and common goals, but would also be influenced by the emotions and physiological arousal in each activity. Since these were expected to be stronger in the group singing activity, so was social connection. Furthermore, it was also predicted that the participants who took part in the control condition first would rate social connection significantly higher in the group singing condition than the control condition; and participants who took part in the group singing condition first, would then report stronger feelings of connection in the control condition than the participants who took part in this activity first (hypothesis 3b). This was because those who took part in the group singing on day 1 would develop stronger feelings of connection that would then be carried-over to the control condition on day 2. Those who took part in the control condition first would not have any influence of previous strong interactions in this condition, as stronger feelings of connection would only arise after the group singing activity on day 2.

Hypothesis 3a was not statistically corroborated by the findings in this study but hypothesis 3b was. Group singing led to higher ratings of social connection but these were not significantly higher than the ratings in the control condition. On one hand, this is not surprising if we consider the fact that positive affect increased significantly and cortisol decreased significantly on both activities. There is indication that positive affect and physiological arousal were higher after singing but these were not significantly higher than after control. This study was designed so both activities would have similar levels of social interaction and involved a similar need to work together towards a common goal. Possibly there was no unique characteristic of group singing that had effects on social

processes over and above the non-musical group activity.

On the other hand, when the different orders of participation were controlled for, significant differences emerged. As predicted, participants who played with Lego on day 1 and sang on day 2, rated social connection significantly higher in the singing condition than the control condition. No significant difference emerged for the participants who sang on day 1 and played with Lego on day 2. This was probably due to carry-over effects from the singing condition to the control condition in this group. Participants who took part in group singing first had higher levels of social connection in the control condition than the participants who took part in this activity first. This difference was marginally significant and this fact, together with a medium effect size, indicate that it is more likely the difference was due to a real effect of the experimental manipulation than random unidentified factors. It seems plausible that feelings of connection developed in the singing condition were carried-over to the group interaction the following day and this is why no differences emerged between both conditions when considering global effects.

This finding is the first experimental evidence that group singing may have stronger short-term effects on social processes than an equivalent non-musical group activity. It is also consistent with reports from choir singers suggesting choirs were more important communities for their members than other groups (Louhivuori et al., 2005). However, one main limitation in this study is that there was no information about how participants felt at baseline. Although they had never worked together before in either condition, future research should attempt to replicate these findings by collecting data on group feelings not only after, but also before each condition.

Regarding effects of group singing on states of flow, the goal was to investigate whether group singing would lead to higher ratings of flow states and how group singing influenced each dimension of this optimal experience. Since participants in this study were not singers, and had never sung together before, it was reasoned that they would feel better

prepared to face the non-musical activity than the group singing, and for this it was expected that the experiences of challenge-skill balance, clear goals, and sense of control would be higher in the control activity. Since singing was considered more intimidating and self-exposing, loss of self-consciousness was also expected to be experienced more in the control activity. Due to the attention and awareness demands of group singing, concentration on the task at hand and action-awareness were expected to have higher ratings in the group singing condition. Because the product of singing was thought to be more readily available to be processed than the product of a non-musical activity, unambiguous feedback was another dimension where the music activity was expected to act faster than a non-musical activity. Transformation of time was also expected to receive higher ratings in the group singing condition. Finally, autoleptic experience was expected to have the highest ratings of all dimensions, since there is indication it is the most readily experienced dimension of flow. Nevertheless, because higher ratings of positive affect were also expected in group singing, autoleptic experience was expected to be significantly higher in this condition. The findings in this study did not support the hypothesis that group singing leads to higher ratings of flow states than a non-musical group activity. The results indicate that, for the global experience of flow, ratings were higher in the group singing condition but these were not significantly higher than the ratings in the control condition.

Looking at each dimension of flow, findings suggest that, even though both group singing and Lego® playing led to similar ratings of flow states, each activity did so through different effects on each of the dimensions that are thought to constitute the optimal experience. As expected, higher ratings in challenge-skill balance, clear goals, sense of control and loss of self-consciousness, were found in the control condition. Only the ratings in this last dimension were significantly higher in the control than the group singing condition. This provides further evidence that singing, though in a group, can be perceived as more intimidating and exposing than a non-musical activity.

Also as expected, the ratings in action-awareness, concentration on the task at hands, transformation of time and autoletic experience were rated higher in the group singing condition than the control condition, but this did not reach statistical significance. Contrary to what was expected, unambiguous feedback had higher ratings in the control condition than the group singing condition, though this was also not statistically significant. The dimension that obtained the highest ratings was autoletic experience in the group singing activity, but in the control activity it was the dimension “clear goals”, though differences were not significant.

Flow states are thought to be brought into place by different activities (e.g., ?, ?)csi97). It was expected both activities would only differ in the musical aspect and it is evident that both activities involved experiences that contributed to similar effects on flow. The only significant difference being loss of self-consciousness which speaks to the strength of the perception that singing exposes the self. Even though this experience involved *group* singing, the fact participants hadn't sung together before and some had no experience with group singing, indicates individuals in this study could have felt they would be exposed through singing. It seems group singing can lead to flow states but it remains unlikely it would do so more than an equivalent eudaimonic activity. What seems to be clear is that it relates to the different dimensions of flow differently from another group activity and, perhaps, it is at this level that further investigation should be conducted.

In an attempt to gather more evidence related to eudaimonic well-being, several items from the questionnaire developed and discussed on Chapter 4, were adapted and used in this study. These were related to feelings of achievement and asked participants whether they felt mentally stimulated, felt they had achieved something or learned something new. Feelings of achievement were chosen given their relationship with eudaimonic well-being (e.g., Ryff & Keys, 1995) and, in particular, personal growth. Personal growth occurs when new knowledge and skills are acquired. Because such developmental experiences

involve effort and going beyond one's limits, I reasoned it could involve feelings of achievement, of having overcome a challenge and reached new levels of personal growth. Since group singing was expected to be a more challenging and stimulating experience, any feelings that would emerge, would be greater in this condition. The findings in this study corroborated this hypothesis and suggest that a group singing activity can promote feelings of achievement and the acquisition of new knowledge, which would be conducive of personal growth. In future studies, perhaps, it would be relevant to develop items that would investigate personal growth more directly and also other dimensions of eudaimonic well-being, such as life meaning.

Finally, gender differences were expected in reports of positive affect, following evidence from previous research that suggested female participants rated positive affect significantly higher after singing than male participants (Sandgren, 2009). Further gender differences were expected in salivary cortisol levels in the group singing activity, with male participants expected to have higher levels of salivary cortisol before this activity. As mentioned before, it was argued that group singing was expected to be perceived as a more arousing and stressful situation and evidence suggested cortisol levels increase in men in anticipation of a psychological stressor, without the need to actually experience it (Kirschbaum et al., 1992).

As indicated in a previous paragraph, the results corroborated this last hypothesis but did not corroborate the first one. Female participants rated positive affect higher than male participants after group singing but this difference was not significant. Consistent with the cortisol literature, male participants had higher salivary cortisol levels than female participant before the group singing activity and this difference was significant. Both female and male participants were expected to rate negative affect similarly but the results show that negative affect decreased significantly only for female participants.

As discussed on Chapter 6, although the literature on emotions suggests women tend

to express positive emotions more than men (see Brody & Hall, 2008, for a review), there is also evidence in the literature that gender differences in the expression of emotions can be situation-specific (Larson et al., 1994). The evidence that there are situations where men can report high positive affect, even higher than women (Larson et al., 1994), suggests men can express positive affect as well as women when the occasion arises. In the context of the current study, male participants appeared to have positive expectations of group singing. Compared to female participants, male participants reported being more excited, energetic and less hesitant about experiencing group singing. It is not unlikely that this positive outlook, combined with a positive experience of group singing in this study, were reflected in their reports of positive affect. These positive feelings male participants had to start with could also explain the differences in negative affect ratings between female and male participants. It does not appear that female participants had particularly high ratings of negative affect before the activities, *per se*, but in comparison to male participants' ratings before the activities, they were significantly higher. In the case of group singing, it is possible that positive expectations by male participants were not just reflected in high ratings of positive affect but also lower ratings of negative affect before the activity. Group singing still had the power to decrease negative affect in both genders but perhaps because ratings were already low for male participants before the activity, this difference was just significant for female participants. It is noteworthy that ratings of negative affect after group singing were similar for both male and female participants. This suggests that despite any initial differences (which could be due to situational factors or individual differences other than gender), group singing generated similarly low feelings of negative affect in both female and male participants.

The finding that male participants had higher levels of salivary cortisol before the group singing activity than female participants is consistent with previous research already mentioned, where men had higher levels of cortisol as a response to an anticipated stressor.

Although male participants were more positive about group singing than female participants, they reported not having experienced the activity before and, therefore, it was possible the uncertainty and novelty of the experience could have elicited a certain level of psychological stress in anticipation to the activity. In turn, this was reflected in higher levels of salivary cortisol. More important for the work of this thesis, perhaps, is the finding that both male and female participants had similar levels of cortisol *after* the activities. Considering group singing in particular, this indicates that despite the possibility that both genders react differently to anticipated stress, group singing can have similar effects on endocrine function for both female and male singers. Nevertheless, future research should attempt to bring together a sample of female and male singers with similar experiences and expectations in order to clarify influences of gender on effects of group singing on psychological and physiological mechanisms.

In summary, this study provided experimental evidence that group singing can benefit well-being as a whole by having psychological, physiological and social effects which relate to hedonic, eudaimonic and social domains of well-being. In the short-term, it improved mood by increasing positive affect and reducing negative affect; had objective effects on the endocrine system, which in the circumstances studied here, were reflected in a reduction in cortisol levels, often associated with relaxation; promoted social connection and bonding, as well as feelings of achievement and personal growth; and appeared to be an activity with potential to promote optimal experiences. While the control activity used in this study promoted some of these effects (i.e., increased positive affect, reduced cortisol levels, and involved several dimensions that promote optimal experiences), group singing can be thought to have had effects over and above the those of the control activity, as was able to have stronger psychological, physiological and social effects and, in some instances, have effects where the control activity did not (e.g. decrease negative affect). Finally, in this study, there was also evidence to suggest that gender differences may not have a



strong moderating influence on effects of group singing. Instead, it seemed more likely that other factors, such as previous experience with or expectations of the activity, had more influence on psychological and physiological effects.

## 7.5 Main limitations and future research

The aim of this study was two-fold: to design an experimentally sound study that would investigate effects of group singing *and* provide a blueprint for future experimental studies in this field. In this way, this study was also successful in demonstrating that it is possible to develop an experimental study in this field of research, while maintaining a degree of authenticity and ecological validity. Throughout this discussion I have referred to some limitations when considering each finding, have suggested possible explanations and future alternatives. However, there are several main points that I would like to highlight when considering the findings discussed above and intentions to replicate them.

First and foremost, the sample size was small. Throughout the revision of the literature, and after my own experience with the studies in Chapter 6, it became clear that this is a common feature of studies in this area. In my view, this is a result of challenges associated with recruitment, particularly of non-singers. In an attempt to anticipate such issues, I designed this study keeping in mind an intentionally small sample. I tried to compensate this by developing a strong experimental design participant randomization, repeated measures and counterbalancing techniques. I believe these successfully tackled the issues that could arise from attempting to analyze data from a small sample. In most situations, assumptions of normality were upheld and the effects reported here can be considered accurate and valid. The simple fact that effects did arise, even after using tests designed to control for type I error, indicates that effects of group singing were strong and consistent enough to emerge in a small group, in a short period of time. Nevertheless, in future studies, it would be advisable to attempt to recruit a larger number of participants

or collect data on more time points, i.e., design a long-term study were two groups of participants, group singing and control, take part in those activities over a longer period of time and provide data in each session. Such design would have the advantage of allowing for any long-term effects of group singing to be further investigated.

Secondly, the small size of the study made it more evident that, although there was entire confidentiality, anonymity was not complete. I attempted to dilute this issue by asking participants to provide codes with which it would be possible to attribute different questionnaires to one same participants. However, for ethical reasons, I had to be able to keep record of all consents and match each consent with each response. Therefore, I had to keep an extra file where each participants' personal code was associated to their name. Nevertheless, the file containing the data was built without such information. It would, however, be desirable that the person analyzing the data would not have access to the participants' personal information (as it occurred with the cortisol data where Salimetrics did not receive any personal participant information).

Related with the above issue, and an important limitation that should be kept in mind, was the fact that I was not only involved in collecting and analyzing the data, but was also involved in facilitating the control condition. What makes this a potential source of bias, was the fact the participants were aware of my full involvement in managing the entirety of the study. This could lead them to feel less comfortable in expressing their views or attempting to tell me what they thought I wanted to hear. This was also an anticipated issue and I attempted to diminish any possible positive bias by using an array of measures, while combining objective data with subjective accounts. Future studies however, should attempt to use strong measures and involve different researchers at the different levels of the study or at least make sure the facilitators are equally unacquainted with the participants. In this case, it will be important that participants are fully aware that the people they have direct contact with, are not the people who analyze the data.

Considering both experimental and control condition closely, it can be argued that group singing was more realistic than playing with Lego. While it is common for adults to join singing groups, I am not aware puzzle building groups are a common group activity in adulthood. I have referred to this issue in the method section but would like to state once again that, although it seems the control and experimental activities were similar in several important points to control for (e.g. fun, enjoyment, working towards common goal), perhaps a closer match would be an equally realistic, cultural activity, such as a theatrical play. Taking into account that I wished to investigate a realistic group singing situation, perhaps it would be fitting to compare it to other activities that are commonly engaged in.

Finally, researching group singing and well-being requires a degree of sensitivity to people's previous experiences and expectations of the activity. This research involved investigating the potential of an *existing* and widely known activity to promote several facets of well-being in one session, instead of creating a well-being promoting activity from scratch. The pervasiveness of music, in its many forms, in society, makes it virtually impossible for any individual to have not had experiences with it. It is important to be aware that what study might ask participants to do, will contribute to those individuals' personal experience with singing. This is particularly crucial when working with children, or adults who see themselves as non-singers.

While it is impossible to manipulate previous experiences, it is within our power as researchers or group singing leaders/conductors/facilitators, to promote positive experiences. But before that can be done, individuals must be willing to come in and take part in the activity. In this study, it became apparent throughout the process of recruitment that most adult non-singers had had some kind of experience with singing, often negative, which made them reluctant to participate in such an activity. The practical implications of such attitudes are important: if adult non-singers are afraid of engaging with the activity,

it will be difficult to use it to promote their well-being. It will also be difficult to further research the potential of the activity in doing so. Such attitudes might thus be the biggest obstacle between group singing and well-being – in research and in practice.

I felt the empirical work in this thesis would be incomplete without insight into such big challenge. Both researchers and individuals intending to use singing to promote well-being will face inhibiting attitudes towards singing when attempting to involve nonsingers in group singing. The next chapter describes a survey study where I attempted to better understand attitudes towards singing and how they might affect a person's willingness to take part in such an activity. In doing so, I hoped to identify the main issues, so solutions can be sought. As I have not tired of mentioning throughout this thesis, the success of any research or practice on individual well-being depends greatly on the willingness of individuals to be involved. It is, after all, their well-being.

## Chapter 8

# Exploring how non-singers feel towards singing: implications for well-being promotion practice and research

From the time I was a toddler until my early twenties, I suffered frequently from tonsillitis and other upper respiratory tract infections. I also grew up in an extended family where there were many who could and would sing. One day, I must have been six or seven, during one of our frequent family singing sessions, I didn't resist joining in despite my sore throat and obviously coarse voice. As a child you don't really think about such impediments. While my most gifted aunt praised my younger sister's voice, I was told something like "Oh dear, you shouldn't really sing". While my aunt could have meant that I shouldn't really be singing because of my sore throat, what I grew up with was the idea that I had a terrible singing voice and shouldn't torture others with it. Up until I started this project, I was saddened by the idea that I couldn't sing and there was nothing I could do about it.

Even today, although I now know better, I still cringe when faced with a moment when I know I will be singing with and in front of others.

Throughout the implementation of the empirical work described in the previous chapter, particularly when it came to recruiting individuals from the general population, I was surprised to realize that my experience was not unique. It became evident that singing both attracted and repelled most of the people who didn't consider themselves to be singers. Most often, non-singers would recount how they did like singing but didn't think they could do it, quickly referring to the time when, as child, they were told they couldn't sing and, therefore, they wouldn't. At least not in front of others!

The main purpose of this thesis was to investigate whether an activity such as group singing, could promote the well-being of adult individuals. In the previous chapters, I have described and discussed evidence suggesting group singing can indeed impact positively on hedonic, eudaimonic and social facets of individual well-being. While this evidence is part of the recent growth of research on singing and well-being (which began in the late 1990s) and there is a need for further investigation and replication, the implications of these findings are already quite substantial. Overall, they suggest that an individual engaging in an organized form of group singing, can, in a relatively short period of time, be pro-actively promoting her/his own well-being on all its key levels.

If we consider the attitudes towards singing described above, it becomes clear that, as noted in the previous chapter, it may be difficult to engage adult non-singers in group singing activities, be it to promote their well-being or further research on the potential of the activity in doing so. I felt it would be beneficial to start by understanding attitudes towards singing and how they might affect a person's willingness to take part in singing activity. It is my belief that doing so was the only way to identify the problem, promote discussion into this topic and identify solutions for it. If group singing can promote well-being to the extent suggested in the empirical work described in this thesis, it would be

beneficial to identify ways to help non-singers overcome the psychological barriers that are preventing them from enjoying such positive experiences in their lives.

## 8.1 Study 8

This study aimed to explore the relationship between attitudes towards singing and engagement with this musical activity. In particular, this study focused on understanding how elitist attitudes towards singing, that are thought to have developed in Western societies (Bailey & Davidson, 2002), might inhibit our engagement with singing.

Blacking (1973) first noted in his ethnographic work with the Venda people in South Africa, that it was likely that there were strong social inhibitions in Western societies that prevent musical behaviours from being exhibited as freely as in non-westernized societies. Bailey and Davidson (2002), suggested this was possibly the result of an *elitist* view of music-making that is predominant in the Western world. According to this view, musical ability is limited to a talented minority with a genetic predisposition to such musical talent (Sloboda, Davidson, & Howe, 1994). Such a view would then restrict the majority of the population to being consumer rather than producer of music (Blacking, 1973; Bailey & Davidson, 2002).

Could indeed it be that such musical elitism would prevent a large number of adult individuals in Western societies from enjoying an activity that has the potential to promote their well-being?

In this exploratory study, individuals were asked to complete an online survey containing questions related to their views on singing and singing behaviours. It was expected that an elitist attitude towards singing would impact negatively on the individual's willingness to engage with singing, particularly when there was more potential to be judged by others.

In particular, the following hypotheses were investigated:

1. Respondents are more likely to engage with singing in situations where they are less likely to be judged by others. If the avoidance behaviour is socially generated, it would be less present in situations where there is no social judgement, such as singing alone, in private and informal situations.
2. Elitist attitudes towards singing impact negatively on people's likelihood to engage with singing; the only situation in which this is not significant is when they are on their own, in informal and private settings.
3. Why would this be the case? The third hypothesis proposes that the relationship between elitist attitudes and singing behaviours can be explained by people's negative views on their own singing voices. Elitist attitudes towards singing in Western societies have overexposed individuals to the best voices, which has made them biased towards particular judgements of what a singing voice should sound like. In this way, elitist attitudes will make individuals more judgemental of their own singing voices and lead them to underestimate their singing potential. Because we think our voices are not good for singing, we don't want to expose them to the judgement of others.

## 8.2 Method

### Participants

This study was completed by one hundred and fifty-five participants (mean age = 35,  $SD = 12.33$ , range = 21–79, 112 females, 53 singers) from twelve European nationalities, two north American nationalities, two south American nationalities, one African nationality, one southeast Asian nationality, and three Oceania nationalities. Indian nationality was also present.



## **Recruitment**

Participants were invited to participate through social media platforms, including twitter and facebook, participant mailing lists collected throughout the development of this project (i.e., in the end of each study, participants were asked whether they would like to be contacted in the future to participate in studies on singing and well-being), research mailing lists, such as the Music and Science mailing list, and the Advancing Interdisciplinary Research in Singing (AIRS) network. Information about the study and a link to the online survey site was also placed on the research section of my semi-professional blog<sup>22</sup>.

In this invitation, the main purpose of the study was provided, along with information about anonymity, how long the survey could take, and freedom to discontinue at any time.

## **Procedure**

The questionnaire was placed online in the Bristol Online Surveys website, like study 3. Participants were given a link to the online address where information about the study was provided. Here they were, once again, informed of the main purposes of the study, its anonymous nature, and how they were free to discontinue their participation at any time. They were also informed their consent would be assumed once they clicked to the next pages.

## **Materials**

The survey was constituted of three parts. In the first part, participants were asked to provide demographic information, such as gender, age, nationality and main language. This section also included questions asking participants about their broad singing experience, i.e., whether they had ever sung in a formal or informal setting and examples of such settings if that was the case; whether they considered themselves a singer, and if so,

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<sup>22</sup>[www.muzikoenmiakapo.wordpress.com](http://www.muzikoenmiakapo.wordpress.com)

what type of singer (group, solo, professional, amateur), what musical genre and for how many years; and, finally, a question on whether they played any instruments and, if so, what instruments.

The second part contained items designed to gather the respondent's general views on singing, their views on their own voice and whether they had elitist attitudes towards singing.

The third, and final section contained items designed to gather information about the likelihood of the respondent engaging with different singing behaviours in different contexts.

### **Assessing elitist attitudes**

Elitist attitudes towards singing were conceptualized as those where singing is seen as a skill that only a small percentage of individuals are born with, and are, thus, able to excel at. A measure was created by asking respondents to specify, in a scale of 1 (*strongly disagree*) to 7 (*strongly agree*), how strongly they agreed or disagreed with the following twenty-three statements:

- Everyone can sing.
- Public singing is just for a few people who are born with a good voice.
- Singing is not for everyone.
- Anyone can sing in the shower but it takes a special voice to sing in public.
- Singing is something anyone can do.
- A singer is someone who is born with incredible musical talent and vocal power.
- We are all singers.
- Any person can learn how to sing.

- Singing well is something we all can achieve.
- Only a few people are able to entertain others with singing.
- Singing is not like any other activity where you can become good at if you work hard enough: you either can sing or you can't.
- Its unacceptable for someone to sing in public unless they have a very good voice.
- Most people are not very supportive of people learning to sing who dont already have a good voice.
- A good singing voice is something only a few people are born with.
- Unless a person cannot speak for some damage to the vocal chords, they can sing well.
- Any speaking voice can become a good singing voice.
- If you can speak, you have the potential to sing.
- Singing is an activity that requires high vocal standards that only a small percentage of people can achieve.
- Not everyone has a singing voice.
- If someone is born with working vocal chords then they will be able to sing.
- Almost everyone can learn to be a good singer if they practice.
- Singing is a skill that only a select group of people can possess.
- Only a small percentage of people in society are able to sing well.

Several items that referred to a positive view of singing or singing voice (e.g., *Any speaking voice can become a good singing voice*) were subject to reverse coding since the

scale was looking at elitist attitudes towards singing. The internal consistency of the scale built with these items, was very high (Cronbach's  $\alpha = .94$ ).

### **Assessing views on own singing voice**

In order to gather information on how people viewed their own singing voice, respondents were asked to rate their agreement (in a scale of 1 – *strongly disagree* – to 7 – *strongly agree*) with the following six statements:

- My voice is good enough for singing.
- I don't have a good singing voice.
- My voice is not good enough for singing.
- I have a beautiful singing voice.
- I don't think I could ever develop a good singing voice.
- I have a good singing voice.

These items were inter-spaced with the items from the elitist scale, as they could have been considered very similar. Again, because this scale was to focus on negative views, items one, four and six were reverse coded. Reliability and validity of this scale was also measured with Cronbach's alpha coefficient. Internal consistency was very high (Cronbach's  $\alpha = .95$ ).

### **Assessing engagement with singing**

Singing behaviours can be thought to occur in many forms. In order to delineate exactly the types of singing behaviours this study focused on, three main dichotomies were considered. Singing can be done in public or private, formally or informally and on our own

or in a group. Eight scales were then created out of the combination of these categories. Table 8.1 contains information on which items constituted each scale and internal consistency of these measures.

Based on anecdotal evidence, these dichotomies could be thought to refer to singing behaviours that involve more or less potential for social judgement. If we consider group singing and solo singing, for instance, the first type of singing is considered to allow the individual to become less self-conscious and feel comfortable to expose their singing voice. In the same way, formal singing could be thought to involve more potential for judgement than informal singing as there is a necessary element of evaluation associated with formal singing. Finally, singing in public could be considered more prone to social judgement than singing in private. When we combine these three dichotomies, there will be singing behaviours that can be subject to social judgement more than others, with singing on your own, in a formal, public event, providing the most marked opportunity for such judgements.

Respondents were asked to rate how likely they were to engage with the different singing activities referred to in each statement (on a scale of 1 – *extremely unlikely* – to 7 – *extremely likely*). It was noted that the answer should be based on whether the respondent would be interested in being involved in the activity if they had the opportunity to do so, even if some were more likely to occur in their daily life than others.

Table 8.1: Scales, items and internal consistency of each scale

Scale	Items	Internal Consistency (Cronbach's $\alpha$ )
Group/Private/Informal	Sing with others in an informal, private, setting. Sing "Happy Birthday" with family and/or friends at a birthday party. Sing karaoke with a group of friends in a private room.	0.77

(Continue)

Scale	Items	Internal Consistency
	Sing with my flatmates/partner/children.	
Group/Private/Formal	Sing with a group of others in a private, formal setting. Sing at a group singing workshop. Choose to take part in a group singing workshop. Rehearse singing a choral piece with a choir.	0.93
Group/Public/Informal	Sing with a group of others in an informal, public, setting. Sing with a group of other people (friends, etc.) at a concert. Sing with a group of others at a sports event (football match, etc.). Sing with a group of friends at a karaoke bar. Sing with my friends to a song on a pub or bar sound-system.	0.81
Group/Public/Formal	Sing with a group of others in a formal, public setting. Perform with a choir in a public event. Sing with a group of others in a musical theatrical production. Sing with a group of others in a public performance. Sing in a group in front of a crowd.	0.96
Solo/Private/Informal	Sing on my own when I am in an informal, private setting (e.g., at home.) Sing on my own in the shower or around the house. Sing while I'm driving or riding a bicycle. Sing to the music I am listening to on my computer/ipod/mp3 player, when no one else can hear.	0.79
Solo/Private/Formal	Sing on my own when I am in a formal, private setting. Practice singing a musical piece on your own when no one else is around. Take private singing lessons with a vocal coach. Enroll in course online to find your singing voice.	0.84
Solo/Public/Formal	Sing on my own when I am in a public, formal setting. Entertain others with singing at a formal, public event. Be the lead singer in a band. Perform as a singer at a funeral, corporate event, fund-raising event or wedding. Perform as a singer in the subway or busy shopping street. Sing on your own in front of a crowd. Sing at a friend's wedding.	0.96
Solo/Public/Informal	Sing on my own when I am in a public, informal setting.	

(Continue)

Scale	Items	Internal Consistency
	Sing when youre walking on your own down the street. Sing on your own in a public place, like the supermarket. Sing along to the songs on a shop's sound system. Entertain your friends or family at a party with singing. Sing alone to my friends, flatmates, partner, children.	0.88

### Controlling for other attitudes towards singing

The following items helped record whether respondents liked singing or not. In the same scale as the previous ones, respondents were asked to rate how strongly they agreed or disagreed with the following five items:

- I enjoy singing.
- I do not like singing.
- I do not enjoy singing.
- I enjoy singing with others.
- I enjoy singing alone

## 8.3 Results

### 8.3.1 Enjoyment of singing

Table 8.2 provides information on frequencies of agreement and disagreement with statements included to control for whether respondents liked singing or not.

These data suggests the majority of respondents enjoyed singing, either on their own or with others.

Table 8.2: Sum agreement and disagreement frequencies for singing enjoyment control items

Item n=155	Agree Somewhat	Strongly Disagree	Mean	SD
	Strongly Agree	Disagree Somewhat		
I enjoy singing.	86.7%	6.3%	5.88	1.33
I do not like singing.	5.7%	88%	1.95	1.34
I do not enjoy singing.	38%	52.5%	1.99	1.23
I enjoy singing with others.	77.2%	8.2	5.45	1.53
I enjoy singing alone.	82.3%	7.0%	5.45	1.29

### 8.3.2 Differences between singers and non-singers

Singers had lower ratings of elitist attitudes towards singing ( $M = 3.37$ ;  $SD = 1.05$ ) than individuals who characterized themselves as non-singers ( $M = 4.01$ ;  $SD = 0.92$ ). An independent t-test conducted, suggested these differences were significant,  $t(153) = -3.88$ ,  $p < .000$ .

Table 8.3 contains information on the main differences between singers and non-singers, in terms of their singing engagement behaviours. This evidence suggests singers and non-singers differed in their likelihood to engage with singing behaviours, in that singers were more likely to engage with the diverse singing behaviours. The only behaviours in which differences were not significant were those involving solo, private and informal singing.

Table 8.3: Means, standard deviations and statistical analysis of behavioural differences between singers and non-singers

Singing Behaviour	Singers	Non-Singers	<i>T</i> -test		
	n = 53	n=102	Mean	SD	<i>t</i> (153)
Group/Private/Informal (GprI)	6.12	1.18	5.60	1.14	2.64*
Group/Private/Formal (GprF)	5.85	1.32	3.49	1.76	8.60*
Group/Public/Informal (GpuI)	5.55	1.32	4.87	1.44	2.86*
Group/Public/Formal (GpuF)	5.66	1.41	2.98	1.70	9.86*
Solo/Private/Informal (SprI)	6.21	1.17	6.06	1.06	0.81†
Solo/Private/Formal (SprF)	5.01	1.44	3.07	1.51	7.68*
Solo/Public/Formal (SpuF)	3.81	1.84	1.67	1.06	9.19*
Solo/Public/Informal (SpuI)	4.38	1.58	2.87	1.39	6.12*

\*Significant  $p < .01$ ; † non-significant



### 8.3.3 Testing hypothesis

Means, standard deviations and inter-correlations among variables can be found on Table 8.4.

Table 8.4: Means, standard deviations and inter-correlations among variables

Scale	Mean	SD	2	3	4	5	6	7	8	9	10
1. Elitist scale	3.79	1.01	.46*	-.26*	-.42*	-.36*	-.42*	-.12	-.41*	-.24*	-.28*
2. Voice scale (negative views)	3.73	1.68		-.43*	-.75*	-.49*	-.77*	-.29*	-.73*	-.63*	-.56
3. Group/Private/Informal (GprI)	5.78	1.18			.50*	.80*	.46*	.52*	.48*	.29*	.52*
4. Group/Private/Formal (GprF)	4.30	1.97				.56*	.89*	.27*	.77*	.56*	.49*
5. Group/Public/Informal (GpuI)	5.10	1.43					.59*	.44*	.53*	.43*	.53*
6. Group/Public/Formal (GpuF)	3.90	2.04						.27*	.80*	.68*	.52*
7. Solo/Private/Informal (SprI)	6.11	1.09							.31*	.11	.38*
8. Solo/Private/Formal (SprF)	3.73	1.75								.73*	.58*
9. Solo/Public/Formal (SpuF)	2.40	1.71									.61*
10. Solo/Public/Informal (SpuI)	3.39	1.62									

\*significant  $p < .01$  (two-tailed)

**Hypothesis 1: Respondents are more likely to engage with singing in situations where they are less likely to be judged by others.**

Overall, the mean likelihood displayed on Figure 8.1, from the less likely to the more likely, shows that respondents were less likely to engage in solo, public, formal singing, followed by solo, public and informal singing; solo, private and formal singing; group, public and formal singing; group private formal singing; group, public and informal singing; group, private and informal singing; and, finally, more likely to engage in solo, private and informal singing.

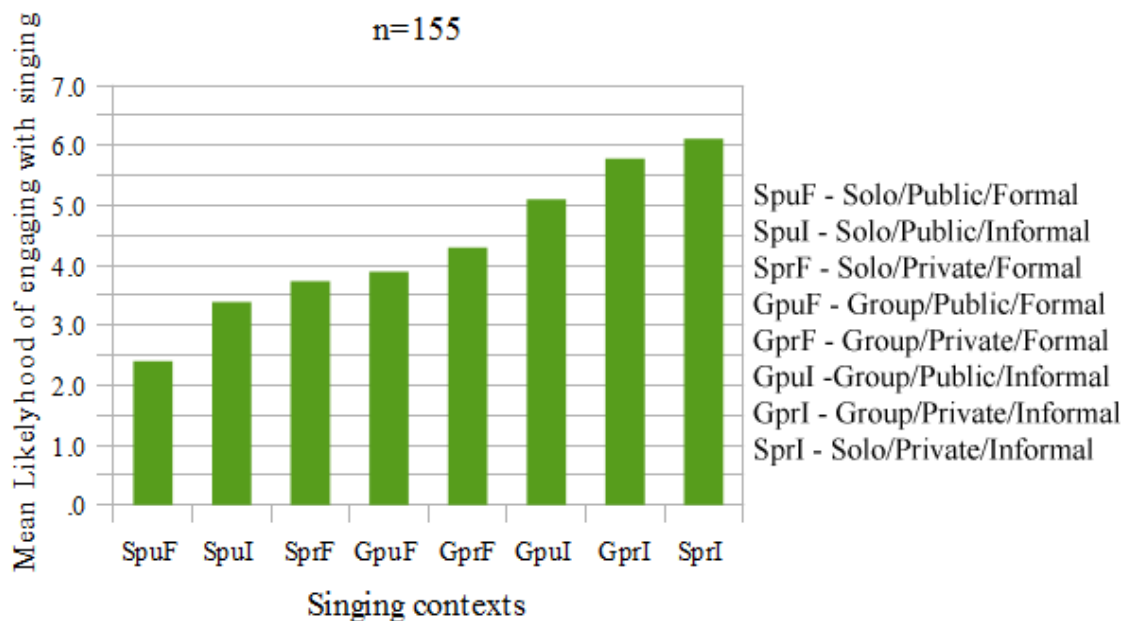


Figure 8.1: Mean likelihood of engaging with singing by context

Respondents were less likely to engage in singing activities in public and formal contexts where they would have to sing on their own, and were more likely to engage with singing in a private, informal context where they would sing alone. These two categories correspond, respectively, to the one where there was the most amount of self-exposure and potential to be judged by others, and the one where there was the least amount of self-exposure with no opportunity for others-generated judgement. A dependent measures *t*-tests revealed that the differences between these two categories was significant,  $t(154) = -8.40, p <$

.001,  $r = .79$ .

These results were consistent with the hypothesis.

**Hypothesis 2: Elitist attitudes towards singing impact negatively on people’s likelihood of engaging with singing; the only situation in which this is not significant is when they are on their own, in informal and private settings.**

In order to test this hypothesis, several regressions were conducted in which the different singing behaviours were predicted by elitist attitudes towards singing. The results of these regressions can be found on table 8.5.

The standardized regression coefficients between elitist attitudes towards singing and the different singing behaviours indicate that there was a negative relationship between these variables. This shows that, as expected, elitist views had a significant negative impact on the likelihood of engaging in singing behaviours. The only behaviours where this impact was not significant was solo, private and informal singing.

It is interesting to note that the singing behaviours with the strongest negative relationship with elitist attitudes towards singing were the ones that would be more relevant for the work in this thesis, namely, engaging with singing behaviours in formal and structured settings.

Table 8.5: Regression coefficients predicting engagement with singing behaviours from elitist attitudes

Elitist Attitudes Towards Singing				
	Singing contexts	$R^2$	Standardized Coefficients (Beta)	$t$
Solo	Public/Formal	.06	-.24*	-3.09
	Public/Informal	.08	-.28**	-3.64
	Private/Formal	.17	-.41**	-5.62
	Private/Informal	.01	-.12	-1.45
Group	Public/Formal	.17	-.42**	-5.67
	Public/Informal	.13	-.36**	-4.80
	Private/Formal	.17	-.42**	-5.69
	Private/Informal	.07	-.26*	-3.32

\*significant  $p < .01$  (two-tailed); \*\*significant  $p < .001$  (two-tailed)

**Hypothesis 3: The relationship between elitist attitudes and singing behaviours is explained by people's negative views on their own singing voices.**

In order to test this hypothesis, a mediation analysis was conducted where the relationship between elitist attitudes towards singing and the singing behaviours more strongly related to these views solo/private/formal; group/private/formal; group/public/formal - was investigated while controlling for people's negative views on their own singing voices. These three types of behaviours were chosen for analysis because they had the strongest relationship with elitist attitudes towards singing and were more relevant for the work discussed in this thesis.

The mediation analysis consisted of a series of regression analyses conducted to examine the relationship between the independent variable (elitist attitudes towards singing), the mediator (negative views on one's singing voice), and the dependent variable (singing behaviour). In order for a mediation to be present, the relationship between independent and dependent variables must be substantially reduced when the mediator is controlled for. The independent variable must also predict both the mediator and the dependent variable. Finally, the mediator must also predict the dependent variable. These are the three conditions for mediation.

The relationship between elitist attitudes towards singing and those singing behaviours was mediated by people's negative views on their own singing voice. As Figures 2a, 2b and 2c illustrate, the standardized regression coefficients between elitist attitudes towards singing and the likelihood of singing in solo/private/formal, group/private/formal and group/public/formal settings, decreased substantially when controlling for negative views on one's singing voice. The other conditions of mediation were also met: elitist attitudes towards singing were a significant predictor of both engaging with those singing behaviours, and negative views on one's singing voice; and this mediating variable was also a significant

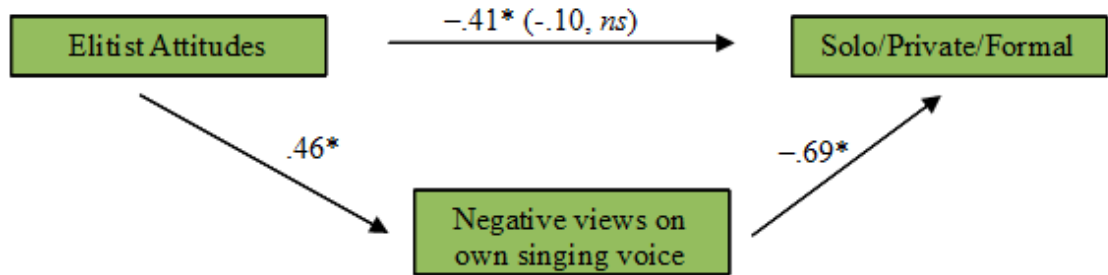
predictor of the singing behaviours<sup>23</sup>. In order to further test these mediating effects, three Sobel<sup>24</sup> tests were conducted<sup>25</sup>. These tests were significant, indicating that the mediation was present in the solo/private/formal analysis,  $t = -5.51$ ,  $p < .000$ ; group/private/formal analysis,  $t = -5.56$ ,  $p < .000$ ; and group/public/formal analysis,  $t = -5.68$ ,  $p < .000$ .

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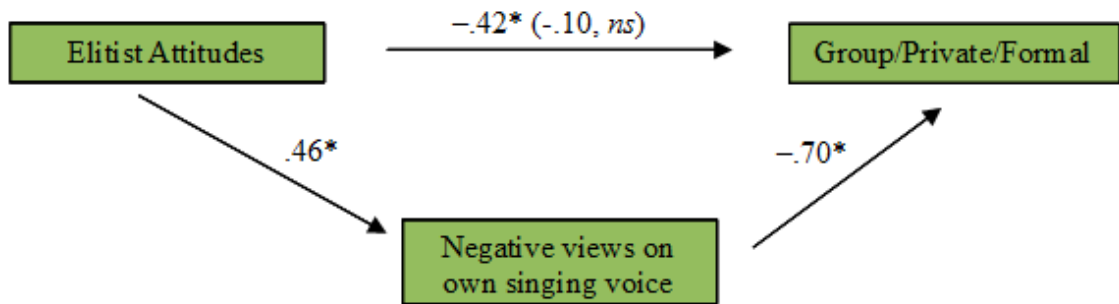
<sup>23</sup>Significant to  $p < .001$ \*

<sup>24</sup>The Sobel test is a way of testing the significance of a mediation effect; This specialized t-test provides a method to determine whether the reduction in the effect of the independent variable, after including the mediator in the model, is a significant reduction.

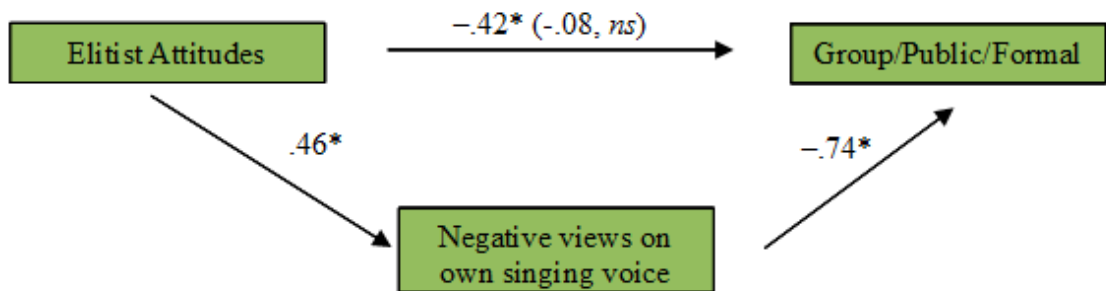
<sup>25</sup>Tests conducted using the online application at <http://quantpsy.org/sobel/sobel.htm>



(a) The relationship between elitist attitudes and solo/private/formal singing behaviours is mediated by people's negative views of their own voices; the standardized regression coefficient between elitist attitudes and the singing behaviours, when controlling for the negative views of one's own singing voice, are in brackets.



(b) The relationship between elitist attitudes and group/private/formal singing behaviours is mediated by people's negative views of their own voices; the standardized regression coefficient between elitist attitudes and the singing behaviours, when controlling for the negative views of one's own singing voice, are in brackets.



(c) The relationship between elitist attitudes and group/public/formal singing behaviours is mediated by people's negative views of their own voices; the standardized regression coefficient between elitist attitudes and the singing behaviours, when controlling for the negative views of one's own singing voice, are in brackets.

Figure 8.2: Explaining the relationship between elitist attitudes towards singing and their engagement with singing behaviours.

## 8.4 Discussion

This study aimed to further our understanding on elitist attitudes towards singing and their impact on engagement with singing.

With the first hypothesis I expected to explore the idea that an avoidance behaviour towards singing is socially generated. In this way, respondents would be more likely to engage with singing in situations where they are less likely to be judged by others. If the avoidance behaviour is socially generated, it would be less present in situations where there is less social judgement, such as singing alone, in private and informal situations.

The findings indicated that this was the case. Respondents were more likely to engage with singing behaviours that involved less potential to be judged by others, such as in informal social situations or when they were singing informally on their own. This type of response is consistent with Blacking (1973) argument that individuals in Western societies have become inhibited from engaging with singing in situations where others are present. However, the data in this study shows that this avoidance behaviour is diminished in informal and private social settings. I would argue that this is a result of individuals potentially feeling more safe in familiar, informal environments where they are with other individuals they know and feel safe with.

At the same time, while it was reasoned that public, solo and formal behaviours would be more prone to social judgement, one informal singing behaviour also had low likelihood of being engaged with singing on their own, in an informal, public setting. This is a very interesting finding: singing on our own, in public, appears to only be acceptable if we have an excuse for it. In informal conversations with singers and non-singers, it emerged that such behaviour can be thought of inconsiderate, rude or even a symptom of mental illness depending on how intimidating the singing person appears to be. While this could be thought to speak to the entrenched elitism towards singing in our society, it is also possible that there is a deeper, anthropological reason for this. As discussed in



Chapter 2, singing has been used by human societies to promote group cohesion, share and synchronize emotions and promote social well-being amongst individuals in one group or groups of individuals (e.g., Silber, 2005; M. Cohen, 2009; Wiltermuth & Heath, 2009). It is not unlikely that solo singing in public was considered to be a particularly special form of singing, one only individuals with special status in their groups would be allowed to perform. In Maori culture, for instance, where singing is still a pervasive part of daily life, everyone is expected to participate in the singing. However, everyday songs have to be led by a woman with the highest status in the group, while the haka, the war song, has to be led by a man with the highest status in the group. It is evident that, in Western societies, singing alone in front of others is still considered a special type of singing. It is certainly allowed to those who are considered “leaders” in singing, but it appears that only in formalized contexts. In this light, it is possible that those who engage in singing behaviours on their own, in public, informal settings could be interpreted to be engaging in anti-social behaviour, to a lesser or greater extent .

The second hypothesis was formulated to explore the possibility that one reason why people would be less likely to engage with different singing behaviours was a generalized elitist attitude towards singing. It was expected that elitist attitudes towards singing would have a negative impact on people’s likelihood to engage with singing. Because elitist attitudes towards singing were considered a socially generated perspective and not a result of people disliking the activity of singing for instance, this relationship was not expected to be significant when referring to singing alone, in informal and private settings.

In this study, there was indeed a negative relationship between elitist attitudes towards singing and the different singing behaviours. Also as expected, the only behaviour where this relationship was not significant was solo, private and informal singing.

This evidence provides support to the argument that elitist attitudes towards singing restrict our engagement with singing behaviours (e.g., Blacking, 1973; Bailey & Davidson,

2002). The data suggested that this relationship was stronger when it involved formal behaviours such as taking private singing lessons, perform with a choir or take part in a group singing workshop. It is possible that this happens because elitist attitudes towards singing make individuals more reluctant to engage with singing in environments or circumstances where they believe there are more chances they will be judged by others.

The third and final hypothesis proposed that this negative relationship between elitist attitudes towards singing and engagement with singing behaviours, was explained by people's negative views on their own singing. This hypothesis was tested with those behaviours that were more strongly related to elitist attitudes towards singing but also, and coincidentally, more relevant for the work in this thesis: singing in formal, organized settings (in group and solo). It was found that the relationship between elitist attitudes towards singing and those singing behaviours was mediated by negative views of one's own voice. These findings suggest that elitist attitudes towards singing inhibit engagement with singing, particularly in organized, formal settings, because they lead to more negative views of our own voice.

Elitist attitudes towards singing involve thinking that only a few talented people, who were born with the gift of a good singing voice, are entitled to sing. The rest of us should limit ourselves to listen to them singing (Bailey & Davidson, 2002). Such a widespread attitude could have overexposed individuals in Western societies to the elite voices, which would then shape and/or bias their perceptions of what a singing voice should sound like. Such an evaluative attitude could predispose individuals to strong judgements of their own singing voices which, in constant comparison to the elite voices, would never seem good enough to be exposed to the judgement of others. In reality, it is like saying that we can't run simply because we have been comparing ourselves to Hussein Bolt. Of course that, for the majority of human beings, if they compare their running skills in terms of speed, to those of elite athletes such as Bolt, their perceptions of their own running speed will

be very negative.

In sum, in this study, there was evidence that people are less likely to engage with singing behaviours when there are others around. This avoidance behaviour was predicted by elitist attitudes towards singing, particularly when it referred to singing in formal settings. Furthermore, there was evidence that this relationship was explained by negative views on people's own singing voice. That is, elitist attitudes towards singing increased a person's negative views on their own singing voice, and this then decreased the likelihood of them engaging with a singing behaviour, such as singing with others in a choir or taking singing lessons.

While these findings will benefit from replication with a larger sample of singers and non-singers, they are consistent with the literature on elitist attitudes towards singing and provide the first empirical evidence that such attitudes impact negatively on engagement with singing behaviours. Furthermore, the findings suggest elitist attitudes do this because they increase negative views of one's own singing voices. While the sports analogy used above was useful to explain how individuals could become so negatively biased, I believe there is one important difference between and singing. When it comes to sports abilities, there seems to be an attitude that most of individuals can work towards improving their own physical abilities. In fact, the attitude seems to be that a person can only improve their physical abilities if they train for it. The elite athletes may be seen as people with special physical abilities, but there is an awareness that without training they would not be able to achieve their potential. On the other hand, elitist attitudes towards singing carry with them the misconception that a good singing voice is a gift only a few are born with. Such misconception would necessarily hold a sense of hopelessness regarding the potential to ever develop a singing voice if individuals think that singing is a gift, an ability that only a few people are born with, they would be less likely to seek to explore their own singing voice, as they simply may not think that was possible.

The implications of such findings for both practice and research are considerable, particularly if we take into account another significant finding in this study, namely that non-singers were more likely to hold elitist attitudes towards singing. This explains the difficulties encountered in the recruitment of participants for the study in the previous chapter. However, it is also a warning sign for health programs that focus on singing as a main vehicle for health and well-being promotion. While non-singers also enjoy singing (as evidenced by their willingness to do so on their own in private), and would certainly benefit from singing with others (according to the evidence in the previous chapter), they are more inhibited from doing so than people who already sing. Approaches to research and promotion of singing for well-being should start taking such differences into account. Otherwise, there is a risk of either ending up with a biased pool of participants or not reaching individuals who would also benefit from singing.

It is my belief that an effort to deconstruct elitist attitudes towards singing amongst adult non-singers should be initiated. While it is important to start by avoiding traumatizing a young child with the, apparently common, “you can’t sing”, there are currently many adults out there who still hold elitist views of singing. These individuals often sing for themselves, or very close family members, but still believe they can’t sing. They also are also under the impression there is nothing they can do about it. As a result, they are reluctant to engage with singing activities. It is unlikely they would actively seek to participate in a singing group or invest time searching for their singing voice. Education is, in my view, the only way to remove the veil of mystery that surrounds singing. While we may not all be opera singers, there is certainly potential in most of us to learn how to sing. For instance, the existing literature investigating innate talent suggests that having an “innate gift” alone does not determine high achievement. Instead, excellence is more likely to be determined by the types of experiences, opportunities, habits, training, practice and preferences that an individual is exposed to in early childhood (Howe, Davidson,

& Sloboda, 1998). This type of evidence is at odds with elitist views of singing ability and a greater effort should be put in highlighting such evidence.

Future studies should seek to investigate the impact of providing clear and accurate information about the processes and techniques of singing to individuals who hold elitist views of this activity. It is my belief that understanding that there are techniques associated with the activity of singing, and such techniques can be taught and learned, would have a positive impact on willingness to engage with more formalized singing behaviours.

## 8.5 Conclusions

In this chapter, I hoped to explore the main reasons behind the bipolar response to opportunities to engage with singing that emerged amongst non-singers throughout the implementation of the empirical work reported and discussed in this thesis: *I like it but I can't sing*.

The evidence discussed above was the first empirical evidence to provide some clarification on the reasons behind such attitudes and how they impact on different singing behaviours. While I attempted to provide suggestions on ways forward, I am conscious that replication and experimentation are of key importance. Nevertheless, this work has provided understanding on what the main issues might be and will hopefully serve to promote further discussion on how to help non-singers overcome the psychological barriers that prevent them from engaging with singing activities to promote their own well-being.

As a non-singer myself, I started this doctoral project with elitist views of singing, very negative views of my own voice, a reluctance to engage with singing in front of others and yet, at the same time, a strong will to do so. This last aspect was a result both of a real fondness for the activity and an old scientific spirit pushing me to run experiments on myself.

Through my research work, and by mere luck (e.g., having a choral conductor in my

PhD panel), I had the opportunity to engage with singing in different social circumstances and learn about this activity. This knowledge has allowed me to understand that I simply did not know how to sing. The joy I felt when I was first aware that I was really singing is almost indescribable. As a non-singer who couldn't recall how to read a score two years ago, to an alto performing Mozart's Requiem in the Canterbury Cathedral in March 2012, I have experienced the importance of knowledge and education, first hand.

While it is important to provide such education from a young age, there is no reason to keep it from adult individuals. After all, the evidence collected in the empirical chapters of this thesis, suggests that singing, particularly with others, promotes the well-being of adult individuals. In the next chapter, I will revisit such evidence and explore the implications of the main findings for the proposed thesis.

## Chapter 9

# Conclusions and implications for understanding the potential of group singing to promote well-being

### Chapter 9

The work in this thesis was motivated, primarily, by a wish to consider mental health from a positive perspective and seek proactive ways to promote and sustain it. In particular, I was interested in understanding the potential of music-related activities, particularly those requiring high levels of involvement, to promote well-being in a holistic way. In this chapter I discuss in what ways the work in the previous four chapters does, or does not, speak to these motivations. I will also refer to the wider issues related to singing and well-being research and possible directions for future work.

## 9.1 Thesis and working model

The literature reviewed in Chapter 1 suggests that well-being is a multifaceted concept that can be better understood, promoted and sustained from multidimensional approaches. However, as I discussed in that chapter, intervention work to this date has been focused on unidimensional characteristics of different interventions. But why focus on one dimension of well-being at a time? The main message from positive psychology is that we can be proactive in promoting and sustaining our mental health. Would it be possible to do so by engaging in intentional activities that allow us to continuously promote well-being as a whole, instead of waiting to remedy one area or the other? In Chapter 1 I point out that the theoretical work on Flow suggests that it is possible for some human activities (e.g. sports, games, music, religious rituals) to fulfil this goal, at least in what concerns hedonic and eudaimonic well-being. According to the flow theory, this is because such activities have the potential to engage the individual at many levels, and, thus, can impact on more than one dimension of well-being in one single experience. Following on from this theoretical framework, I concluded that chapter by proposing that music activities, particularly those that require high levels of multidimensional involvement, such as group singing, operate on levels that have effects on hedonic, eudaimonic and social dimensions of individual well-being and, thus, can impact well-being in a holistic way.

In Chapter 2 I reviewed the theoretical and empirical literature containing evidence in support of the proposed thesis. I started that chapter by taking a closer look at the nature of music. I reasoned that if music activities were to have potential to promote well-being as a whole, then there would have to be evidence that such activities have a multifunctional character. I argued that such would suggest music activities are structured to impact on many levels, thus increasing their potential to have effects on the main dimensions of well-being. At the same time, I explored the evidence that music has a universal character. This characteristic would be essential to any well-being intervention that would appeal



to a wide range of individuals and communities. The evidence reviewed supported both these views by suggesting that music is a widespread phenomenon in our species that serves many useful purposes in our individual and societal functioning.

After establishing that music activities were multifaceted and biologically and culturally universal, I revisited the flow theory. This time my goal was to understand how that framework explained the potential for music activities to promote and sustain well-being. I argued that the way flow theory explained the relationship between music and well-being was by conceiving music activities as capable of leading to feelings of flow. That is, as activities that are structured to allow individuals to go beyond their limits and accomplish something new, promoting a feeling of intense enjoyment in the process. This perspective also suggested that this feeling can be promoted by any activity that can engage body and/or mind in complete dedication to that task at hand. However, even if the activity is structured to *promote* flow, this experience will only take place if the individual has the skills to meet the challenge (Csíkszentmihályi, 1990). Under the flow theory, both activities of music perception and production could involve the type of mental effort that can lead to flow but only activities of music production are structured to require physical effort as well. It was in this way that the flow theory proposed that it was not only possible for different music activities to promote and sustain well-being, but those that were structured to engage mind and body (e.g. singing) provided more opportunities for that to happen. Following this theoretical perspective, I raised the possibility that music activities that were structured to engage mind and body *in interaction with others* would provide an even greater potential for optimal experiences to occur. After all, activities such as group singing would offer a higher challenge and require more effort, but would still provide endless opportunities for skills to be acquired and developed. Furthermore, such activities had potential to involve not only hedonic and eudaimonic well-being, but social well-being as well.

While the Flow theoretical framework offered a convincing explanation for how music activities could promote and sustain well-being, the empirical literature offered less conclusive evidence. This was particularly the case in what regarded activities that could generate more opportunities to promote well-being – music-making activities such as group singing. I argued that the existing research raised the possibility that group singing could contribute to improve quality of life, well-being and health, but there was no clear empirical evidence of such connections. The empirical work that ensued was aimed at providing some clarification on the relationship between group singing and well-being.

As (Clift et al., 2008) had suggested, the lack of a coherent programme of systematic research was due to the absence of theoretical work connecting singing and well-being and common conceptualizations of both phenomena. In order to overcome these limitations, I decided the empirical work in this thesis should be based on a clear theoretical and conceptual framework that would allow replication and contribute towards a more consistent body of research. First and foremost, this translated into embracing a clear conceptualization of well-being as a multifaceted concept that integrates hedonic, eudaimonic and social domains. Secondly, I proposed group singing should be conceptualized as a flow activity, while adding information on its social nature. In this way, the work in this thesis was based on a conceptualization of group singing as a challenging multifaceted activity structured to engage mind and body in interaction with others. Finally, I developed a basic working model that would provide a theoretical framework connecting group singing to well-being, and guide the empirical work I was looking to conduct. This model integrated the theoretical and empirical evidence on music and well-being, the conceptualizations mentioned above and provided a platform to empirically explore the relationship between group singing and well-being. In this model I proposed that group singing was a multifaceted activity that operated on psychological, bodily and social levels, having effects that could be related to hedonic, eudaimonic and social well-being. I completed the model by

adding information on the possible moderating effects of situational factors and individual differences. The main purpose of this model was to allow hypotheses to be generated and tested. For instance, because the model predicted that group singing generated feelings of well-being, it was possible to test the hypotheses that group singing increased positive affect and led to feelings of personal growth and connection with others.

Armed with a clear theoretical and conceptual framework, I set out to answer the main question in this thesis: could group singing promote well-being in a holistic way?

## **9.2 Empirical Findings: Group singing and well-being**

Before developing work that could answer that question, I reasoned that it would be useful to conduct work aimed to clarify whether the adopted conceptualization of group singing was accurate. Several authors argued that this type of descriptive work is important in the early stages of any field of research to make sure any subsequent experimental investigations have strong basis (e.g., Field & Hole, 2003; Rozin, 2009). As a result, in chapter 4 I reported three studies conducted to clarify the nature of the experience of group singing. In particular, I investigated whether group singing involved the types of experiences that could promote hedonic, eudaimonic and social well-being. Studies 1 to 3 provided consistent evidence to support the notion that group singing was a multifaceted activity involving the types of psychological, bodily and social experiences that could generate feelings of hedonic, eudaimonic and social well-being. This evidence suggested that group singing engaged both body and mind in a challenging activity that also involved interacting with others. The particular experiences identified by studies 1 to 3 were positive emotions, mental challenge, concentration, physiological arousal, effects on breathing, posture and the vocal apparatus, and positive social experiences such as bonding and connecting with others. In further support to the proposed working model, the evidence reported in chapter 4 also suggested that some of those experiences could be enhanced

under certain situations.

The studies in chapter 4 were largely descriptive and exploratory. Nevertheless, there was a progression from more basic to more complex research designs, from qualitative to quasi-experimental quantitative research. The consistency found across the different methodological approaches and previous literature, suggested that the adopted conceptualization of group singing was accurate. Furthermore, it supported the notion that effects of group singing could be moderated by situational factors too. This offered an encouraging platform to carry on the intended empirical research using the adopted working model. However, before doing so, I decided to clarify whether group singing could be related to measures of well-being. After all, if the evidence in chapter 4 was accurate (i.e. group singing generated the types of experiences that could promote hedonic, eudaimonic and social well-being) then, according to the flow theory, such feelings would also sustain well-being over time. If this was the case, would evidence of such relationship emerge in individuals who engaged with group singing regularly? Study 4, described in chapter 5, was conducted to answer this question.

In Chapter 5 I reported evidence from a survey where the potential relationship between group singing and the three main domains of well-being was investigated. This was done by asking group singers to complete several measures of hedonic, eudaimonic and social well-being. It was then investigated whether there were significant relationships between the number of years an individual had been engaging with group singing and those well-being measures. The evidence in study 4 suggested that participation in group singing was significantly related to several facets of social and eudaimonic well-being. In particular, the longer someone had been taking part in a group singing activity, the stronger were their feelings of social integration, social contribution, purpose in life and presence of meaning in life. At the same time, the longer a respondent had been engaging with group singing the lower were their ratings in a measure of search for meaning in life.

I argued that it was possible that these relationships were present more as a result of normal development that occurs in the life span, than as a result of engaging with group singing.

In order to investigate this possibility, further investigation into the role of age was conducted. The results of this investigation revealed that age was not involved in the positive relationship between years of participation in group singing and feelings of social integration, purpose in life and presence of meaning in life. However, a decrease in search for meaning in life was significantly related to both an increase in age and years of participation in group singing. Finally, stronger feelings of social contribution were related to lengthier participation in group singing, but they also appeared to decrease with age. This last finding was particularly important as it suggested that engaging with a group singing activity could balance out negative effects of age on feelings of contributing to society.

Besides investigating relationships between the number of years someone had been engaging with group singing and the different well-being measures, I decided to also explore how enjoyment of the activity of group singing related to those measures. Enjoyment is central to the flow theory, as the mechanism through which activities promote and sustain well-being. The evidence discussed in study 4 indicated that enjoyment of group singing related to both eudaimonic well-being and hedonic well-being. There was also evidence that indicated that enjoyment of singing was related to social well-being. In particular, enjoyment of singing was positively related to personal growth, purpose in life, presence of meaning in life, subjective happiness and social acceptance. In the case of personal growth and social acceptance, the relationship was not related to the number of years someone had been a group singer. For purpose in life and presence of meaning in life, both enjoyment of singing and lengthier involvement with the activity were important factors. In the case of subjective happiness, enjoyment of singing had a stronger relationship but the

number of years someone had been involved in group singing should also be taken into account. These findings suggested that, consistently with the flow theory, enjoyment was an important aspect of the relationship between group singing and well-being, particularly in what concerned feelings of personal growth. In this case, the evidence suggested that enjoyment was essential to experience such feelings while a lengthier experience with the activity would not necessarily lead to feelings of personal growth. As the flow theory pointed out, activities that can lead to flow, don't always do.

Overall, the findings reported and discussed in chapter 5 supported the argument that participation in a group singing and enjoying it, related to hedonic, eudaimonic and social well-being. While encouraging, the correlational nature of study 4 meant that no conclusions could be drawn on a causal relationship between group singing and those well-being domains. Nevertheless, these findings, together with those in chapter 4, suggested that there was enough evidence to further investigate the relationship between group singing and well-being using the adopted conceptualizations and proposed theoretical model.

In chapter 6, I reported two studies where I used the proposed working model to generate and test hypotheses concerning the effects of group singing on psychological, physiological and social domains, and how these could be influenced by situational factors. In particular, I focused on effects of group singing on affective states, the hormone cortisol (for its psychophysiological connections and ease of measurement) and social connection. The general hypothesis was that the context in which the singing occurred moderate effects of group singing on those psychological, physiological and social variables. To test this hypothesis, I collected both subjective psychological and objective physiological data before and after choral rehearsals and performances.

The findings in studies 5 and 6 provided consistent evidence to support the argument that, in the short-term, group singing has psychological and physiological effects which are moderated by factors, such as the context in which the singing occurs and the wider

emotional content of such circumstances. The relationship between group singing and social connection, however, did not seem to be affected by such situational factors. Overall, the role of those variables was more evident in what concerned endocrine changes and negative affect. Positive affect, on the other hand, appeared to be robustly associated with group singing. I argued that this particular finding explained the inconsistencies in the literature regarding endocrine changes (i.e., Beck et al., 2000 and Kreutz et al., 2004). It seemed plausible that inconsistencies could be a result of different situational factors in those studies. That last finding was also consistent with the literature that suggests that group singing is an overall positive experience. Simultaneously, there was no evidence in those studies to suggest gender differences influence effects of group singing.

So far, the empirical work conducted in this thesis had provided evidence to suggest that group singing was a multifaceted activity involving experiences at psychological, bodily and social levels that could be related to hedonic, eudaimonic and social well-being. The evidence was also consistent with the argument that experiences brought about by the activity of group singing could be influenced by situational factors. However, at this point, it was not yet possible to draw conclusions on a causal link between group singing and well-being. This was because all the studies conducted so far did not follow an experimental design. While the quasi-experimental evidence in studies 5 and 6 had clarified the relationship between group singing and variables that could be related to hedonic well-being, the evidence on social well-being or the influence of gender differences was less clear and there had been no investigation into variables related to eudaimonic well-being. As a result, there were still questions on whether the psychological, physiological and social effects observed were really caused by group singing, and whether this activity could indeed promote well-being as a whole.

The study reported in chapter 7 intended, primarily, to investigate the causal link between group singing and several correlates of hedonic, eudaimonic and social well-being.

It also meant to determine which of those effects were unique to the activity of group singing, in comparison to a non-musical group activity. In order to overcome the methodological limitations found in the previous studies and existing literature, an experimental design was followed where participants were randomly attributed an order of participation in the two different conditions, one of which was an active control. That is, an activity that was expected to be similar to group singing in its most important features, excluding its musical nature. It was hoped that this would allow an experimental comparison of short-term effects of group singing with those of an equivalent social activity involving no music perception or production. To the best of my knowledge, this was the first study to do so.

Study 7 provided experimental evidence that group singing could have, in one single experience, psychological, physiological and social effects which could be related to hedonic, eudaimonic and social domains of well-being. In the short-term, group singing improved mood by increasing positive affect and reducing negative affect; had objective effects on the endocrine system, which in the circumstances studied here, were reflected in a reduction in cortisol levels, often associated with relaxation; promoted social connection and bonding, as well as feelings of achievement and personal growth. While the control activity used in study 7 promoted some of these effects (i.e., increased positive affect, reduced cortisol levels, and involved several dimensions that indicated it was also a flow activity), I argued that group singing had effects over and above those of the control activity, as was able to have stronger psychological, physiological and social effects and, in some instances, have effects where the control activity did not (e.g. decrease negative affect).

Overall, these findings provided evidence to suggest that group singing could indeed promote well-being as a whole. Furthermore, they supported the argument that the mechanisms underlying this relationship were psychological, bodily and social in nature. Such



effects were, in their majority, similar between female and male participants. However, unlike the previous studies, gender differences were found on salivary cortisol levels and in ratings of negative affect. In the first case, male participants were found to have significantly higher levels before the group singing condition; and in the second case, female participants were found to rate of negative affect significantly higher before both conditions. In turn, salivary cortisol decreased significantly for male participants, but not female participants, and negative affect decreased significantly for female participants but not male participants. Nevertheless, there were no significant gender differences in salivary cortisol levels or ratings of negative affect *after* group singing. I argued that this suggested the gender differences *before* the activity were more likely to be situational. Group singing itself seemed to have had similar effects on endocrine function and negative affect for both genders. It seemed that this particular type of individual differences did not appear to have a strong moderating influence on effects of group singing.

The empirical findings in study 7 were the first experimental evidence to support the theoretical and conceptual framework adopted. Taken together with the findings in chapters 4 to 6, they suggest that an adult individual can be proactive and promote the three main domains of well-being in a relatively short period of time by engaging with a group singing activity. Consistent with the proposed model, the evidence in the empirical chapters also appears to suggest that situational factors play an important role in moderating effects of group singing. In particular, the wider emotional content of the social context in which the singing occurs seems to influence effects of group singing on psychological and bodily levels. However, there was no evidence that such moderating influence occurred on social effects of group singing, nor was there evidence to suggest that female and male singers experience group singing differently.

The empirical work described above reflects my effort to find answers to the question “can group singing promote well-being in a holistic way?”, while attempting to overcome

current conceptual, theoretical and methodological limitations in this field of research. One particular limitation to conduct a coherent body of research was the lack of an established conceptual and theoretical framework in this field of research. While this provided me with the unique opportunity and freedom to develop such work myself, it also meant that much of the basic, descriptive work had to be done. Nevertheless, the adopted conceptualizations of group singing and well-being, together with the proposed theoretical model, allowed me to conduct qualitative and quantitative studies with increasingly complex research designs. These not only offered the much needed descriptive research into the phenomena studied here but also provided evidence to clarify the relationship between group singing and well-being, including the possible mechanisms underlying that relationship.

As such, the theoretical and empirical work described in this thesis has considerable implications, not only in what concerns well-being promotion, but also research in the field of singing and well-being.

### **9.3 Implications for well-being promotion and singing and well-being research**

As suggested above, there are two main implications of the work described in this thesis: those that relate to research and practice of well-being promotion; and those that relate to research on the particular field of singing and well-being, particularly when considering non-musicians.

As discussed in chapter 1, interventions aimed at promoting well-being have been either focused on increasing hedonic well-being (e.g. Lyubomirsky et al., 2005b) or have not fully investigated the potential of certain interventions to promote eudaimonic and social well-being as well (e.g., Seligman et al., 2004). In this way, work that has designed well-being interventions has not yet acknowledged the theoretical and empirical evidence

which suggests well-being should be approached as a multifaceted concept and is better understood from an integrated perspective. I do not wish to deny that it is useful to hold knowledge on how to identify areas an individual would benefit from working on, and suggest particular interventions to enable improvement on those idiosyncratic features. But it is my strongest believe that individuals and the societies they compose would benefit from a more consistent effort to promote and sustain individual well-being through the life span. According to the flow theory, it is possible to do so by engaging in activities that allow us to experience the enjoyment of overcoming a challenge and reaching new goals. Through such optimal experiences, that theory suggests that we can promote and sustain both hedonic and eudaimonic well-being, instead of waiting to remedy one area or another. I proposed that group singing would be one the activities that could lead to such experiences. I also added that the social nature of the activity would allow social well-being to be promoted in addition to hedonic and eudaimonic well-being. The empirical evidence in this work supports this argument. As it has already been discussed, the empirical findings offer understanding on how group singing activities promote well-being in a holistic way. Group singing was not only consistently related to several correlates of hedonic, eudaimonic and social well-being, but also shown to be able to promote such effects even under a relatively short period of time. Furthermore, there was evidence to suggest that those domains of well-being were not only promoted in the short-term, but could also be sustained, particularly eudaimonic and social domains, in the long term.

Overall, this evidence suggests that integrated approaches to well-being interventions could have more effective results not only in promoting well-being but also sustaining it through time. I suggest that future research into well-being promotion initiatives should consider adopting integrated strategies that are consistent with multifaceted conceptualizations of well-being. In particular, it could be of significance to explore the potential of activities proposed by the flow theory, such as sports and games, together with other

music activities. These are activities that could be used in an effort to promote individual and social well-being, as they are already engaged with by adults and children alike. One could argue that such activities have been around for so long, we shouldn't underestimate their potential.

The theoretical and empirical work in this thesis also has implications that extend to the field of research on singing and well-being. In a relatively new field of research where the literature offers very little theoretical, conceptual and empirical consistency, the work developed here could be used as the basis for a more coherent body of research.

First and foremost, I adopted clear conceptualizations of well-being and group singing that were based on the theoretical and empirical evidence in previous literature. This translated into conceptualizing group singing as a flow activity with a social nature and well-being as a multifaceted concept that integrates hedonic, eudaimonic and social domains. These conceptualizations, particularly in what concerned group singing, found supporting evidence throughout the empirical work developed here. As Clift et al. (2008) suggested, developing systematic research into the topic of singing and well-being can only advance once researchers focus on the same phenomena. I believe that the evidence is encouraging enough for me to propose that future work on the relationship between singing and well-being embraces the conceptualizations adopted here.

I then integrated these conceptualizations in a theoretical model that connected singing, in particular group singing, and well-being. This theoretical framework was also a working model that guided the empirical work described and discussed in this thesis. The strength of this model lay in its ability to generate and test hypotheses on the relationship between group singing and well-being, the mechanisms underlying this relationship and other factors that could also play a role. This theoretical model not only allowed description of the phenomena but also exploration of the mechanisms involved in the relationship. It is my belief that the empirical research conducted for this thesis did not exhaust the

explanatory and predictive power of the proposed model. What the empirical research did demonstrate is that research into the relationship between singing and well-being can be conducted following the proposed theoretical framework. This was shown to enable replication and could be used in the future to develop a more coherent research body.

In terms of the particular studies developed here, implications for future research approaches to singing and well-being originate not only from the findings but the designs adopted as well. While future studies should consider, for instance, that group singing has effects on endocrine function, it shouldn't ignore that other factors such as the wider social and emotional context in which the singing occurs, can moderate such effects. At the same time, future studies shouldn't ignore the methodological advances conducted in study 7. While it is my belief that this field of research will continue to benefit from descriptive work, this should be done as the basis for more complex investigations. One of the main difficulties in this field of research to date has been conducting research that controls for important aspects that can influence effects of singing, or do so using conditions that are meaningful and valid (Gick, 2011). Evidence of the first point can also be found in the studies in chapter 6, where it was not possible to randomize singers into different conditions, for instance. However, the experimental design described in study 7 demonstrated that it is possible to conduct randomized controlled studies with ecological validity. Finally, the methodological approach adopted throughout chapters 6 and 7 also suggests that future studies should consider complementing subjective psychological measures with objective physiological indicators. The evidence gathered is consistent with Gick (2011) suggestion that the mechanisms underlying the relationship between singing and well-being are psychological, biological and social in nature. Furthermore, these mechanisms might interact to generate feelings of well-being. Adopting psychophysiological methodologies would not only clarify the nature of psychological, bodily and social mechanisms but also help understand how they may interact.

Last but not least, the work described and discussed in chapter 8 goes beyond the overall purpose of this thesis but has significant implications for both research and practice. It complements an investigation that was not only theoretical and empirical but also methodological, as I attempted to overcome the shortcomings of a novel field of research by developing effective solutions to the challenges encountered. In study 8 I investigated possible reasons behind the difficulties in recruiting individuals from the general population, particularly those who are not singers. Following evidence that individuals in western societies had elitist attitudes towards singing (Bailey & Davidson, 2002, 2005) or felt inhibited to engage with singing, particularly in front of others (Blacking, 1973), I asked people about their feelings towards singing and different singing behaviours. In particular, this study focused on how elitist attitudes towards singing could inhibit engagement with singing. The evidence indicate that elitist views of singing increased a person's negative views on their own singing voice, and this then decreased the likelihood of them engaging with a singing behaviour, such as singing with others in a choir or take singing lessons. More importantly, though, non-singers had more elitist views of singing. This suggests that non-singers are more inhibited from engaging with singing, possibly for carrying erroneous views of singing ability in general, and their own in particular. Presumably, this might prevent them from actively seeking the types of well-being interventions that would involve singing. Both researchers and singing group facilitators wishing to recruit participants that are non-singers, should be sensitive to the possibility that such individuals have psychological barriers to accept to join or take part. As I suggested in chapter 8, perhaps an important step towards doing research with non-singers is to first educate potential participants on the facts of singing ability and techniques. Such knowledge might help non-singers understand that singing is not a mystical gift that one is either born with or not. This could, in turn, overthrow their reservations to joining a singing group.

In sum, the work in this thesis not only provided evidence to support the argument

that well-being can be promoted in a holistic way, but also that research into the relationship between singing and well-being can be done in a systematic way following a parsimonious and culturally universal theoretical and conceptual framework with predictive power. Furthermore, the methodological approaches and empirical findings discussed in this work provide a practical point from which to draw inspiration for future studies. Overall, it is my belief that the theoretical and empirical work developed in this thesis can be used as a blueprint from which to generate systematic research that increases scientific understanding on how singing can promote and sustain the positive side of mental health.

## **9.4 Future research and final considerations**

I have discussed how the theoretical model used in this thesis allowed me to develop an organized set of studies investigating the relationship between singing and well-being. However, I also noted that the studies conducted did not exhaust the predictive ability of the model. At the same time, these studies raise a number of issues that may prove to be stimulating topics for future research. One first important question, in my mind, is to what degree the descriptive work conducted to empirically investigate the proposed conceptualization of group singing, generalizes to other forms of amateur group singing, both in England and in other cultural contexts. As noted before, the participants in the studies in chapter 4 were largely recruited from choral ensembles in England. Although I tried to focus on what may be essential to the activity of group singing, there is the possibility that there are idiosyncrasies in the way the English choral tradition structures singing groups. The work here has not ruled out the existence of such idiosyncrasies nor that they would not have a significant impact on the effects of group singing on well-being. For instance, the type of group singing investigated here did not involve much body movement. In fact, the choral tradition structures group singing in a way that inhibits body movement. It is possible that greater physical and physiological changes would

be involved in types of group singing that are structured to involve more vigorous body movements (e.g., in singing groups that also involve dancing). Future research should, therefore, explore whether the assumption of universality is upheld when investigating the psychological, bodily and social experiences of singers from singing groups that may have a different structure or cultural background to the English/European choral tradition.

Another issue that deserves further discussion is whether findings on the effects of singing generalize to other hedonic, eudaimonic and social well-being correlates. For instance, feelings of social connection were used as correlates of social well-being. However, there is evidence to suggest that social well-being is composed of several dimensions (Keyes, 1998) that were not included in the measure used in this work (e.g. feelings of social contribution). Future studies should consider replicating the current findings to such well-being correlates that were not investigated here.

This issue of generalization to other well-being correlates also arises when considering long-term measures such as levels of life satisfaction; measures of psychological well-being such as autonomy and self-acceptance; and, again, the different dimensions of social well-being proposed by Keyes (1998). The evidence discussed in chapter 5 suggests that group singing can have a durable impact on well-being but longitudinal studies would allow an investigation into how group singing affects those different correlates over time.

Considering predictions generated by the theoretical model, in particular, further research would be necessary to clarify the moderating power of situational factors and individual differences. The findings discussed in chapter 6, for instance, suggest that the social context in which the singing occurs and factors such as whether the group is performing for the first time or if it has done similar performances many times before, influence the effects the activity has on psychological and bodily mechanisms. However, similar effects on the social domain were less clear. Subsequent studies could focus on manipulating different situational factors, including social and emotional components of context, to determine



the extent of their influence and whether some mechanisms are more sensitive to this than others. At the same time, research should be conducted on the moderating influence of individual differences. Gender, experience, and personality, for instance, could also play a role in the strength or direction of the effects of singing. Gender was approached in this work but the evidence indicated that both male and female singers shared similar experiences. This was despite most studies having a female bias in the sample. The only study where there was a balanced female/male sample was study 7. Interestingly, this was also the only case where significant gender differences were found. However, it seemed that these could be more a result of situational factors as the activity of group singing in itself appeared to have similar effects on female and male participants. The hypothesis that group singing has similar effects for men and women could be investigated by conducting studies with female and male participants with similar levels of experience and expectations, in order to control for other aspects that could also influence effects of group singing.

There were several issues that were raised by the theoretical work in this thesis but were not empirically investigated here. For instance, the literature suggests that psychological, bodily and social mechanisms that underlie the relationship between singing and well-being can interact with one another (e.g. emotions and social connection – Lawler, 2001; Barsade, 2002; Spoor & Kelly, 2004). If this is the case, it is possible that such interactions would influence overall feelings of well-being. However, the evidence in this thesis did not clarify how effects of singing might interact and whether that would be of any measurable consequences. Future research could clarify, for instance, whether increases in positive affect could indeed enhance feelings of social connection. This would be more easily investigated with a group of individuals that had no previous experiences bonding as a group so to be able to record baseline levels. At the same time, positive affect would have to be manipulated. I suggest this would be done through the manipulation of challenge levels.

Such a study could be done by inviting singers for two or three types of singing sessions: one that would match their skills, one for which their skills would be too high and/or one for which their skills would be too low. According to the flow theory, such unbalances on the skills-challenge dichotomy can lead to frustration or boredom, respectively, while balanced skills-challenge lead to optimal experiences. Manipulating levels of challenge could, therefore, help manipulate feelings of positive affect and allow us to see whether this would, in turn, affect feelings of social connection.

The findings in chapter 4 also suggested that the role of the conductor or facilitator may be crucial. While singers on study 1 identified the role of the conductor as central to their experience with group singing, this remained untested in subsequent studies. However, it is possible that the conducting style is of central importance to the relationship between singing and well-being. One possible reason for this is because the individual coordinating the group effort has control over how the activity is engaged with and can then influence factors such as the level of challenge. If this is the case, future research should clarify how different conducting, facilitating or leading styles might do so.

One other question that may arise from the topic of research approached in this thesis is whether group singing can promote social well-being at the societal level, and the extent of this influence. The social well-being domains investigated here referred to individual dimensions but presumably these could have ramifications at the wider community level. This could be of particular interest for communities where social well-being is traditionally absent (e.g., correction facilities or prison communities as the ones described by Silber, 2005, for instance). Future studies could investigate whether using a social activity such as group singing to promote individual social well-being of prison inmates, also had positive effects on the wider prison community. Such a study should be done longitudinally and would have to complement measures of individual well-being with indicators of social well-being at the wider prison context, such as number of physical conflicts.

Finally, I believe that it would be of interest to compare such effects of group singing to effects of other activities of music-making, both in group and solo, and other non-musical activities. This would help clarify particularities of group singing and explore whether this activity has added benefits over other activities that can lead to flow. Such studies should not only include investigations on the psychological, bodily and social effects discussed here, but also other practical cost-benefit analysis, including practical issues with the overall organization of sessions and materials. After all, well-being promotion has a strong practical component.

In sum, I propose that future research focus on building upon the evidence that group singing activities are multifaceted activities which can have psychological, bodily and social effects that relate to hedonic, eudaimonic and individual social well-being. Furthermore, future studies should clarify whether those effects interact and, if so, what consequences those interactions might have on the different well-being domains. Finally, subsequent studies should also attempt to explore how effects of group singing might be influenced by situational and individual circumstances. This research should be done while simultaneously comparing group singing to other group or solo music and non-music activities. These lines of investigation reflect the extensive research work on the relationship between singing and well-being that can be framed by the proposed theoretical model. While they also indicate that this field holds a stimulating wide range of research opportunities, those interested in undertaking such research should remain mindful of its interdisciplinary nature and seek to implement methodologically sound and ecologically valid studies.

Returning to the main motivations that guided this work, I started my doctoral research with a great love of music and a strong wish to consider mental health from a positive perspective. These two interests combined, stimulated me to seek the potential of music-making activities, in particular group singing, to promote and sustain individual well-being. The theoretical and empirical work that I developed to investigate this poten-

tial clarified the relationship between this captivating human activity and positive mental health. But perhaps the greatest achievement of this work is offering consistent evidence that singing for well-being is a line of investigation worth pursuing.

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## Appendix A

# Brief Summary of Cortisol

## Physiology and

# Psychoneuroendocrine Research

### A.1 Introduction

The following pages contain a brief summary of the mechanisms underlying Cortisol release and a review of the relevant psychoneuroendocrine literature focusing on the variables that influence levels of Cortisol.

I will start by situating endocrine responses within the larger brain-body communication system and will proceed with a special focus on cortisol as a biomarker of stress. I will attempt to concisely describe the physiological mechanisms underlying cortisol release noting the complexity of the neuroendocrine system and the non-linearity between stimuli classification as *stressful* or *challenging* and actual cortisol release. I will then review the relevant psychoneuroendocrine literature focusing on the different variables that may influence cortisol levels both in the body and in a study sample. I will conclude by drawing attention to the need to understand the physiological mechanisms underlying cortisol re-



lease and keep in mind the internal and external variables that have an impact in them in order to better plan and design a psychoneuroendocrine study and interpret results that ensue.

This work does not intend to replace the consultation of the psychoneuroendocrine literature for a more in-depth understanding of the topic of cortisol. Instead, the present work aims to be a directional tool pointing towards the relevant issues for our work connecting psychological and behavioural events to their neuroendocrinological underpinnings. Ultimately, it should improve our understanding of how some physiological states relate to psychological well-being and health and help us design adequate research studies exploring these issues.

## **A.2 Brain-Body Communication**

Any human behaviour has psychological and physiological substracts. Mind and body interact to create our feelings and inner experiences of outside events and decide on behavioural outputs.

With the help of our sensory system, our brains receive and interpret all the information from the outside world generating a cascade of mechanisms throughout our bodies that have short-term implications in how we feel and act. If an outside event repeats itself often enough, our brains are also prepared to save the necessary information and log the pathway for the required action on how to respond to that input for future reference. In that way, the stimuli we receive from the outside world have the capability of having long-term effects. In other words, our experience also influences our psychological and physiological responses.

This is also true if the information is not coming from the outside world but from inside our bodies. The brain also has to analyze the set of information arising from within our bodies, interpret and decide on what actions to command.

Whether we are talking about external stimuli or internal stimuli, action itself will always reside outside the brain. This structure then needs to communicate its interpretations and directions for action to the relevant parts of the body (i.e., the effector or neuromuscular system).

The way the brain communicates is through substances which are classified differently depending on the location and mechanism of their release in the nervous system: neurotransmitter (e.g., Glutamate, Acetylcholine), neuromodulators (e.g., serotonin, dopamine) neurohormones (e.g., Oxytocin, Corticotropin-releasing Hormone), and hormones (Cortisol, Testosterone, Insulin) (see Soares, Bshary, Fusani, Goymann, et al. 2010, pp.2740, for a description of this terminology). Some of these substances may act as neurotransmitters in some instances and neuromodulators or neurohormones in others (e.g., oxytocin, dopamine, serotonin). This message system works both ways so hormones (messengers that are released outside the central nervous system) also bring back information to the brain that will help it regulate or adjust its response.

It is important to note, however, that behaviour is driven by internal and external stimuli. Hormones do not cause behaviour - they modulate the expression of behaviour. This modulation by hormones can have an impact on the nervous system both at a functional level (short-term effects) - by changing the activity of a neural circuit - or a structural level (long-term effects) - by changing the architecture and/or connectivity of different nodes of the neural circuit (Soares et al., 2010). One of these powerful substances is Cortisol.

### **A.3 Cortisol - A Biomarker of Stress**

Cortisol is an important hormone released from the zona fasciculata and zona reticularis of the adrenal cortex (cortical part of the adrenal gland). The first research step towards identifying Cortisol as one of the adrenal cortex's hormones was reported in 1949 by Kendall and Hench. This work led to Cortisol synthesis in 1951 by Woodward, Sondheimer

and Taub (and also to a Nobel prize for Physiology or Medicine for Kendall and Hench in 1950). Since then it has featured as one of the most important hormones in our body and in Psychology research the interest arose mainly due to its connection to Stress: the release of this hormone occurs mainly when the organism is presented with external (or internal) challenges or emergencies - or stressors. It is thus called a Stress hormone (Soares et al., 2010).

Cortisol release is controlled by the central nervous system through the hypothalamus. Some of the functions of cortisol are the mobilization of energy reserves and suppression of the immune system preparing the organism to carry on in the face of various life stresses. These can range from physiological stress such as blood loss, to psychological stress like anxiety over an exam, but also positive emotional stimulation like “falling in love” (Bear, Connors & Paradiso, 2007).

However, these extreme examples of stressors are not the sole responsible stimuli for cortisol release. Cortisol has an important role in preparing us for activity, and that includes helping us wake up in the morning and inform the relevant systems in the body that there is light outside. This function is necessary on every single day of our lives and thus cortisol has a daily rhythm with an important role in synchronization to light/dark cycles.

It seems though that the pathway that leads to cortisol release in the face of a routine challenge such as waking up is different from the one that leads to cortisol release in the face of other less foreseeable stressors.

### **A.3.1 Two Pathways to Cortisol Production and Release**

#### **The HPA axis**

Stress hormones are organized in a specific neuroendocrine axis - the Hypothalamic-Pituitary-Adrenal (HPA) axis (Soares et al., 2007). The first structure in this axis - the

hypothalamus - is responsible for connecting the central nervous system with the endocrine system via the second structure of the axis, the pituitary gland. This communication is made through the synthesis and secretion of neurohormones that stimulate or inhibit the secretion of hormones from the pituitary gland.

The pituitary gland has two lobes that are controlled by the hypothalamus - the posterior and anterior pituitary. The posterior lobe of the pituitary is constituted of axons derived from neuronal cells in the hypothalamus - magnocellular neurosecretory cells - and capillary blood vessels. Those neurons act like glands releasing neurotransmitters into the bloodstream which act like hormones (neurohormones), namely oxytocin and vasopressin (Antidiuretic hormone, ADH). The anterior pituitary is an actual gland - its cells synthesize and secrete a wide range of hormones that regulate secretions from other glands throughout the body (including the adrenal glands, the third structure of the HPA axis). This anterior lobe of the pituitary is under the control of hypothalamic neurons called parvocellular neurosecretory cells. These hypothalamic neurons do not extend axons into the anterior lobe of the pituitary gland (like the case of the magnocellular neurosecretory cells); they communicate via the bloodstream through hypophysiotropic hormones they secrete into capillary vessels. These blood vessels run down the stalk of the pituitary and branch in the anterior lobe. The hypophysiotropic hormones released travel downstream until they bind with specific receptors on the surface of anterior pituitary cells. Activation of these receptors cause these pituitary cells to either secrete or stop secreting the relevant hormones into the general circulation (Bear et al., 2007).

When the parvocellular neurosecretory cells in the hypothalamus determine a stimulus is stressful they release a peptide - corticotropin-releasing hormone (CRH) into the bloodstream. This then travels a very short distance to the anterior pituitary where it stimulates the release of corticotropin or adreno-corticotropic hormone (ACTH). This hormone enters the general blood circulation and travels to the adrenal cortex where it

stimulates the release of cortisol (Bear et al., 2007).

### **Cortisol Daily Rhythm and an Extra-Pituitary Pathway to Cortisol Release**

Cortisol has a daily rhythm that seems associated to the light/dark cycle in healthy individuals. It starts with a typical response for the first 45 minutes after awakening - the Cortisol Awakening Response or CAR (Pruessner, Hellhammer, Buske-Kirschbaum et al., 1997). This dynamic increase in cortisol after awakening initiates the diurnal rhythm of cortisol, which changes levels about 20 times a day (Clow, 2004) in a decreasing fashion that seems to accompany the reduction of light throughout the day. Towards the end of the night and with the return of the light, cortisol levels start slowly increasing again just before awakening.

As mentioned above, activation of the HPA axis is not the sole regulatory pathway for cortisol secretion (Clow, Hucklebridge, Stalder, Evans & Thorn, 2010). Cortisol levels can be dissociated from ACTH levels and connected to the light/dark cycle. This dissociation can be observed, in one instance, just before awakening. Although levels for both substances show an increase towards awakening, ACTH levels are much steeper than those of cortisol. There is evidence that the suprachiasmatic nucleus - one of the three groups of cells in the periventricular zone of the hypothalamus which lies just above the optic chiasm and receives direct innervations from the retina - is responsible for an additional extra-pituitary cortisol regulation that may explain this dissociation. It appears that the adrenal cortex does not always have the same degree of sensitivity to ACTH. In the period just before awakening, coinciding with an increase of light outside, adrenal sensitivity to ACTH is reduced. Clow et al. (2010) suggest this decrease in adrenal sensitivity to ACTH is regulated by the suprachiasmatic nucleus through sympathetic innervations of the adrenal gland by the splanchnic nerve. Cortisol levels are then also regulated by changes in adrenal sensitivity and not only the activation of the anterior lobe of the pituitary gland.

## A.4 Cortisol and Psychoneuroendocrine Research

From a psychologist's point of view, having a measurable and objective physiological response that can be connected to a psychological event, an environmental stimulus or a behaviour is a highly significant opportunity to improve the scientific status of the discipline. However, as one might conclude from the description above of the mechanisms involved in the regulation of cortisol release, this is a very complex system with many intervening variables (Bornstein, Engeland, Ehrhartbornstein, & Herman, 2008).

As with any other instrument, paradigm or technique used in psychological research there are some important aspects to consider when such physiological measures such as Cortisol levels are used in psychological research. The most important idea to retain is that the connection between a stressor, the HPA axis activation, ACTH release and cortisol in saliva is not a linear one (Hellhammer, Wüst & Kudielka, 2009).

Cortisol release is activated at least once an hour, night and day. However, it is not the frequency of these pulses of cortisol that account for different cortisol concentrations through the night/day cycle - it is their amplitude (Clow et al., 2010). Many internal and external variables influence the amplitude of the cortisol pulse. First, there is cortisol's daily rhythm described above: the morning cortisol levels in healthy individuals will be higher than evening levels, specially after sleep onset.

Parallel to this rhythm there are different variables that influence cortisol levels either by having an impact somewhere in the cascade of events that precede cortisol release or by influencing its availability in the sample tested. Variables such as estrogens (gender, menstrual cycle, oral contraceptives) or medical conditions could affect both cortisol binding to other molecules in the blood and HPA axis responsivity. Some characteristics inherent to the cortisol's molecule, the quality of the stimuli, habituation, and time of testing are examples of variables that may affect HPA axis activation and subsequent cortisol responses (Hellhammer et al., 2009).

Understanding these variables and how they influence cortisol synthesis, release, binding, availability and analysis will help inform design of experiments and subsequent understanding of results.

## **A.5 Variables that Influence Cortisol Levels - From the body to the sample**

### **A.5.1 Characteristics of the Cortisol Molecule**

One variable that affects levels of cortisol is its ability to self-regulate. Cortisol is a steroid, related to cholesterol, and therefore a lipophilic molecule. This means it dissolves easily in lipid membranes, such as the ones present in the blood-brain barrier, readily crossing them. Once in the brain cortisol interacts with specific receptors in the hypothalamus that lead to the inhibition of CRH release. However, neurons with cortisol receptors are found throughout the brain, not only in the hypothalamus. In these central nervous system locations, cortisol has significant effects on neuronal activity. In this way, the release of hypophysiotropic hormones by cells in the secretory hypothalamus can produce widespread alterations in the physiology of both the body and the brain (Bear et al., 2007; Soares et al., 2010).

### **A.5.2 Sex, Menstrual Cycle, Oral Contraceptives**

Sex is a main variable to consider as there is evidence men and women have different cortisol responses to psychological stress (Kirschbaum, Wüst & Hellhammer, 1992; Kudielka, Hellhammer & Wüst, 2009). In a study where psychosocial stress was elicited, an increase in salivary cortisol levels in men has been demonstrated to be up to twice as high as in women. Moreover, the sole anticipation of an upcoming psychosocial stress task led to a significant saliva cortisol response in men while no such response was observed in

women (Kirschbaum et al., 1992).

Furthermore, salivary cortisol response levels in women seem to be influenced by the menstrual cycle phase and oral contraceptives intake - women in the luteal phase showed salivary cortisol levels comparable to those of men whereas women in the follicular phase or taking oral contraceptives showed significantly lower salivary cortisol responses (Kirschbaum et al., 1992).

This last finding can be understood in the light of what happens to cortisol in the blood. When cortisol is released by the adrenal gland into the bloodstream it splits into two forms: most of it will be bound to carrier proteins in the blood (i.e., corticosteroid binding globulin, CBG; sex-hormone-binding-globulin, SHBG; and albumin) but a small fraction will exist in a free form (Levine, Zagoory-Sharon, Feldman, Lewis & Weller, 2007). Oral contraceptives are known to alter levels of CBG. In a study where women taking oral contraceptives were exposed to the Trier Social Stress Test (TSST), a negative correlation between salivary cortisol levels and CBG was found (Kirschbaum, Kudielka, Gaab, Schommer & Hellhammer, 1999; Kumstan, Entriger, Hellhammer & Wüst, 2007).

This finding implies that the more CBG is present in the blood, the less cortisol will be found in saliva. This finding also suggests one important and common misconception about salivary cortisol - that cortisol salivary levels are constituted of unbound or free cortisol only. Although it is generally accepted that salivary cortisol is a reliable reflection of free cortisol (Levine et al., 2007), a small percentage of protein-bound cortisol has been found in uncontaminated saliva samples (Chu & Ekins, 1988) suggesting that salivary total and plasma free concentrations are not entirely identical. Here researchers need to understand that most salivary assay only pick up free cortisol. Therefore, it is not that saliva only contains free cortisol but more that its the only form of cortisol that generally gets picked up by the testing kit used. This finding does call to the need to distinguish between correlational and actual biological identity (Levine et al., 2007).



### **A.5.3 Influence of Other Substances - Nicotine, Caffeine and Alcohol**

Cortisol secretion can also be influenced by other substances that interfere with the brain functioning such as nicotine, caffeine and alcohol. Nicotine is a potent stimulator of the HPA axis through induction of CRH release after binding to cholinergic (neurons that have receptors for the neurotransmitter acetylcholine) receptors in the locus coeruleus and hypothalamus. Acute and habitual smoking increases cortisol levels and is, therefore, a potential intervening variable to be taken into account when measuring salivary cortisol (Kudielka et al., 2009). Like nicotine, caffeine and alcohol may also activate components in the HPA axis. Although the literature is not as agreeing as the one for nicotine, these two variables have been shown to influence salivary cortisol responses to psychological stress tasks and should therefore be controlled for when doing studies measuring psychological stress variables (see Kudielka et al., 2009 for a review).

### **A.5.4 Stimuli Quality - Is it stressful enough?**

When thinking of variables that may influence the activation of the HPA axis, the quality of the stimuli is of central importance. For instance, not all psychological stressors elicit the release of cortisol. A meta-analysis by Dickerson and Kemeny (2004) revealed that acute psychological stressors can elicit cortisol activation but social-evaluative, uncontrollable conditions resulted in greater cortisol changes as well as a delayed time to recovery. These authors proposed a model that poses that uncontrollable threats to the social self elicit robust and reliable cortisol responses. The results of their analysis support said model: performance tasks characterized by social evaluative threat and/or uncontrollability triggered significant elevations in cortisol levels, and the largest increases were found for performance tasks containing both elements. According to this analysis, these conditions affected not only the overall magnitude of cortisol responses and time to recovery, but also the ACTH responses. Dickerson and Kemeny (2004) concluded that social

self-preservation is a key priority across human cultures; threats to this goal may be one important set of eliciting conditions for activating a central physiological system with psychological and health implications.

### **A.5.5 Habituation and Time of Testing**

In their review of determinants of human salivary cortisol responses to challenge, Kudielka et al. (2009) also looked into the literature on methodological factors such as habituation and time of testing. As noted earlier, the brain has the ability to store repeated and relevant information for future reference. The literature on psychological stress seems to support this notion - a rapid habituation of a salivary cortisol response after repeated exposure to a stressful stimulus has been found in several studies using diverse psychological stress protocols.

In relation to time of testing, when designing experiments to test salivary cortisol responses to psychosocial challenges the first thing experimenters should keep in mind is the cortisol awakening response (CAR). This typical increase in cortisol would provide salivary levels of cortisol that the experimenter would not be able to attribute to the stress condition. Secondly, there is a difference related to time of testing on whether levels of cortisol are being measure from saliva or from plasma. For saliva samples, reliable measures can be made in both the morning and afternoon. For plasma samples, the afternoon seems preferable. In any case, late afternoon is suggested as the most convenient time for stress research (Kudielka et al., 2009).

### **A.5.6 Different Psychological and Endocrine Response Onset**

The basis of all psychoneuroendocrine studies is the assumption that acute stressors trigger both psychological and physiological responses and that these are strongly associated. However, Kudielka et al. (2009) note in their review of determinants of human salivary

cortisol response to challenge that subjective psychological responses are much faster than the cortisol response. Looking at the information above on how cortisol is secreted, this is not difficult to understand. However, when planning a study looking into both psychological and physiological answers, the experimenter needs to remember that although she/he may be able to collect psychological answers just a few seconds after the onset of the stressor, cortisol will reach its highest peak 15 to 20 minutes after that same onset.

### **A.5.7 Social Modulation of Hormonal Expression**

There is as well an extensive literature on social modulation of hormonal expression (Oliveira, 2009; Soares et al., 2010). In relation to cortisol, Kirschbaum, Klauer, Filipp, and Hellhammer(1995) investigated the effects of social support and subjective responses to acute psychological stress. In this study, healthy adults anticipated a public-speaking task and either received no social support, or received social support from an opposite-sex stranger, or from their boyfriend/girlfriend (this support was both instrumental and emotional). Replicating previous sex-related differences in stress responses, men cortisol levels were higher than women's in the no support and stranger support conditions. Men supported by their girlfriends showed significant cortisol decrease compared to men with no social support or supported by a stranger. Women showed no significant decrease in cortisol with social support from a stranger but, unlike men, showed a tendency towards increase in cortisol when supported by their boyfriends. These sex differences were not found in perceived stress, well-being changes and social desirability measures. However, opposite to their cortisol responses, women did tend to rate both stranger and partner support attempts more favorably than men. This study was limited in that it did not include conditions with same-sex social support. However, it provided the first evidence for sex-differences in cortisol response modulated by social support.

Heinrichs, Baumgartner, Kirschbaum and Ehlert (2003) have proposed that oxytocin

release is the possible biological mechanism underlying the social support buffering effect on cortisol release in men. In their study, 37 healthy men took part in a standard stress test (the Trier Social Stress Test). Before the test, participants either received intra-nasal oxytocin or a placebo, and either social support from their best friend or no social support. Their results revealed that the participants who received oxytocin and social support had not only the lowest levels of cortisol but also decreased anxiety and increased calmness.

These studies reveal the physiological influences of social interactions and contexts and note the importance of considering these aspects when planning studies looking into how the body responds to external stimuli. For instance, social variables should not be disregarded when interpreting findings from studies where the benefits of different activities for psychological well-being and health are being studied.

#### **A.5.8 Choosing from where to assay cortisol levels - Salivary Cortisol**

Cortisol levels can be assayed in several substrates, e.g., saliva, blood, and urine. Although I am coming to this topic last, deciding on which to choose to assay cortisol is a very important first step as it will have implications not only on the study protocol and budget but, more importantly, in the conclusions we will be able to draw from our results.

In psychology research, this decision may be quite simple - the researcher wants to reduce the discomfort as much as possible, specially if one is investigating stress-related variables. In this way, salivary cortisol appears as the best option - it's a non-invasive procedure that puts at ease all those who are weary of giving blood and does not require medical personnel to collect the samples. With saliva, all the participant has to do is chew on a cotton bud or provide some saliva into a tube through a straw. The collection can be made in more naturalistic settings with the participant himself being able to collect samples on his/her own and in his/her own home.

However, when choosing this option, researchers should bear in mind its limitations

(Levine et al., 2007). When designing a study or drawing conclusions from studies where saliva samples are assayed instead of blood samples, it is important that the researcher takes into account that salivary cortisol can be biased in an upwards direction by eating or drinking substances with low pH before sampling, and the presence of blood in the sample from lesions in the mouth. It is also a possibility that participants providing samples when alone (e.g., in their home) may not follow the procedure or provide insufficient saliva. These limitations should encourage researchers to follow a rigorous planning and always try to obtain information from the participants about these influential aspects.

## A.6 Conclusion

In conclusion, psychoneuroendocrine research might aid a better understanding of mind, brain and body interactions. Although Cortisol is quite well established in the scientific literature as a biological marker of stress and anxiety, there are many aspects to note before conclusions can be drawn. The most important aspect to keep in mind is that there is no direct relationship between the stimuli or behaviour and the cortisol response.

When deciding to investigate endocrine responses to psychological variables or a certain behaviour it is important to understand many of the determinants of this response. Knowledge about the complexity of the functioning of the endocrine system and the variables that may have an impact in it is important for different stages of such research - design, participant selection and exclusion, data analysis and data interpretation.

Two of the most important variables to hold into consideration when designing a psychoendocrine study are the time of day when participants are exposed to the challenge and sex. Unless the focus of research is on the CAR or complete individual cortisol cycle, studies should be done in the late afternoon. Researchers might also want to obtain information from female participants on menstrual cycle and oral contraceptives intake. Variables such as smoking and oral contraceptives may be used as exclusion criteria or kept

for later covariate analysis. Researchers should also inform their participants about drinks - such as coffee - and food they should avoid and for how long before saliva samples need to be obtained. If participants will be providing some samples on their own, researchers might want to make sure participants understand the instructions for collection, and keep detailed records. If looking into psychological stress, researchers should note that the quality of the stimuli is of utmost relevance with tasks characterized by social evaluative threat and/or uncontrollability triggering the highest elevations in cortisol levels. Other methodological factors such as habituation and social contexts are also known to affect cortisol levels. Another important methodological decision regards the length of exposure to the challenge. It should be taken into account that psychological and physiological responses have different onsets. Although psychological responses may be obtainable right after the exposure to the challenge, physiological cortisol responses may take 20 minutes to reach their highest levels after that same exposure. Last but not the least, choosing to obtain cortisol levels from saliva samples may be the most practical option in psychology research but caution must be taken in any interpretations of such levels. Issues related to compliance, time of collection and identity between salivary and free cortisol should be taken into account before any generalizations are made and conclusions are drawn.

As stated in the introduction, the information contained in this summary does not discard the consultation of relevant literature for a deeper understanding of the issues listed above.

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## Appendix B

# Song Materials used in Study 7

### Warm-up Rhyme

Hi - - my name is Joe - - And I work in a button factory. - - One day my boss came to me and said "Joe are you busy?" - (1-6) And I said, "No", so I pulled on the lever with my: ... right hand. ... left hand. ... hips. ... right foot. ... left foot. ... head.

(7) And I said "YES!!!!"

### Familiar warm up songs

#### Frre Jacques

Frre Jacques, Frre Jacques Dormez vous? Dormez vous? Sonnez les matines,sonnez les matines, Din, Din, don, din, diin don.

#### London's Burning

London's burning, London's burning, Fetch the engine, fetch the engine, Fire, fire, fire, fire, Pour on water, pour on water.

#### Row, row, row the boat

Row, row, row the boat Gently down the stream. Merrily, merrily, merrily, merrily Life is  
but a dream.

### **New songs**

#### **Janie Mama**

Janie Mama, Janie Mama Janie Mama, Janie Mama Janie Mama, Janie Mama Janie  
Mama, Janie Mama Ya tu- suzika, i ya- turnmina Ya tu yavana, hey yavana Turnmina  
suzika.

#### **Rhythm of life**

Du du du Du du du Du du du Du du du Oh the rhythm of life is a powerful beat, Put's a  
tingle in your fingers And a tingle in your feet, Rhythm in the basement Rhythm in the  
street, Oh the rhythm of life is a powerful beat. (X X) Do you feel the rhythm of life? (X  
X) Do you feel the powerful beat? (X) Do you feel the tingle in your fingers? (X) Do you  
feel the tingle in your feet?

(X) = clap

## Appendix C

# Ethical Approval - Chapter 4

8 September 2010

Ref: 10/A&H/054C

Ms Rita Bento  
PhD student (Psychology)  
Sidney de Haan Research Centre for Arts and Health

Dear Rita

**Confirmation of ethics compliance for your study "*Building the 'Singing Experiences' questionnaire.*"**

I have received a completed and countersigned Ethics Review Checklist dated 7 September 2010 for the above project. Because you have answered "No" to all of the questions in Section B of the form, no further ethical review will be required under the terms of this University's Research Ethics and Governance Procedures.

In confirming compliance for your study, I must remind you that it is your responsibility to follow, as appropriate, the policies and procedures set out in the *Research Governance Handbook* ( <http://www.canterbury.ac.uk/research/governance/index.asp> ) and any relevant academic or professional guidelines. This includes providing, if appropriate, information sheets and consent forms, and ensuring confidentiality in the storage and use of data. Any significant change in the question, design or conduct of the study over its course should be notified to the **Research Office**, and may require a new application for ethics approval. [You are also required to inform me once your research has been completed.](#)

Wishing you every success with your research.

Yours sincerely



Roger Bone  
Research Governance Manager  
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Dr Robin Baker CMG, Vice Chancellor

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## Appendix D

# Ethical Approval - Chapter 5

1 March 2012

Ref: 12/A&H/084C

Ms Rita Bento  
Sidney De Haan Research Centre for Arts and Health  
University Centre, Mill Bay  
Folkestone CT20 1JG

Dear Rita

**Confirmation of ethics compliance for your study "*Effects of singing on global well-being.*"**

I have received a completed and countersigned Ethics Review Checklist dated 29 February 2012 for the above project. Because you have answered "No" to all of the questions in Section B, no further ethical review will be required under the terms of this University's Research Ethics and Governance Procedures.

In confirming compliance for your study, I must remind you that it is your responsibility to follow, as appropriate, the policies and procedures set out in the *Research Governance Handbook* ( <http://www.canterbury.ac.uk/Research/GovernanceandEthics/GovernanceAndEthics.aspx> ) and any relevant academic or professional guidelines. This includes providing, if appropriate, information sheets and consent forms, and ensuring confidentiality in the storage and use of data. Any significant change in the question, design or conduct of the study over its course should be notified to the **Research Office**, and may require a new application for ethics approval. [You are also required to inform me once your research has been completed.](#)

Wishing you every success with your research.

Yours sincerely



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## Appendix E

# Ethical Approval - Chapter 6

18 April 2011

Ref: 11/SAS/069

Ms Rita Bento  
Sidney De Haan Research Centre for Arts and Health  
University Centre, Mill Bay  
Folkestone CT20 1JG

Dear Rita

**Project Title: *Investigating effects of choral singing on psychological states and cortisol during a rehearsal and a performance.***

The Faculty of Social and Applied Sciences Research Ethics Committee reviewed your application during March 2011, and gave notice of their intention to grant approval once a series of minor points were addressed.

The Committee Chair is content that the revised documents submitted on 11 April 2011 fully meet the Committee's requirements, and I am writing to confirm formally that you can commence your research. Any significant change in the question, design or conduct of the study over its course should be notified to the **Research Office**, and may require a new application for ethics approval. [You are also required to inform me once your research has been completed.](#)

With best wishes for a successful project.

Yours sincerely



Roger Bone  
Administrator, Faculty of Social and Applied Sciences Research Ethics Committee  
Research Office, Eg21  
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## Appendix F

# Ethical Approval - Chapter 7

24 November 2011

Ref: 11/SAS/095

Ms Rita Bento  
Sidney De Haan Research Centre for Arts and Health  
University Centre, Mill Bay  
Folkestone CT20 1JG

Dear Rita

**Project Title: *Randomized, controlled study on the effects of group singing on psychological states and cortisol.***

The Faculty of Social and Applied Sciences Research Ethics Committee reviewed your application during November 2011, and gave notice of their intention to grant approval once a few minor points were addressed.

The Committee Chair is content that the revised documents submitted on 22 November 2011 fully meet the Committee's requirements, and I am writing to confirm formally that you can commence your research. Any significant change in the question, design or conduct of the study over its course should be notified to the **Research Office**, and may require a new application for ethics approval. [You are also required to inform me once your research has been completed.](#)

With best wishes for a successful project.

Yours sincerely



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## Appendix G

# Ethical Approval - Chapter 8

29 November 2011

Ref: 11/A&H/075C

Ms Rita Bento  
Sidney De Haan Research Centre for Arts and Health  
University Centre, Mill Bay  
Folkestone CT20 1JG

Dear Rita

**Confirmation of ethics compliance for your study "*Survey of attitudes towards singing.*"**

I have received a completed Ethics Review Checklist dated 17 November 2011 for the above project. Because you have answered "No" to all of the questions in Section B of the form, no further ethical review will be required under the terms of this University's Research Ethics and Governance Procedures.

In confirming compliance for your study, I must remind you that it is your responsibility to follow, as appropriate, the policies and procedures set out in the *Research Governance Handbook* ( <http://www.canterbury.ac.uk/Research/GraduateSchool/GovernanceAndEthics.aspx> ) and any relevant academic or professional guidelines. This includes providing, if appropriate, information sheets and consent forms, and ensuring confidentiality in the storage and use of data. Any significant change in the question, design or conduct of the study over its course should be notified to the **Research Office**, and may require a new application for ethics approval. [You are also required to inform me once your research has been completed.](#)

Wishing you every success with your research.

Yours sincerely



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