

# **Music rehearsals and well-being: A comparison of choral singing, playing in a brass band, playing in a theater group and listening to music in a concert**

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## **Zusammenfassung**

Zahlreichen Studien zufolge wirkt sich (Chor-)Singen positiv auf das Wohlbefinden aus (z. B. Beck et al., 2000). Aktives Singen wurde dabei meist mit passivem Musikhören verglichen, während ein Vergleich von (Chor-)Singen mit anderen musikalischen Aktivitäten vernachlässigt wurde. Die vorliegende Studie untersucht den Einfluss folgender Aktivitäten auf das Wohlbefinden: Chorsingen, Musizieren in einer Blasmusikkapelle, Theaterspielen sowie Musikhören im Rahmen eines Konzerts. Die Stichprobe ( $N=183$ ) setzt sich aus Mitgliedern von drei Chören ( $n=58$ ), zwei Blasmusikkapellen ( $n=54$ ), drei Theatergruppen ( $n=34$ ) sowie Konzertbesucherinnen und -besuchern ( $n=37$ ) zusammen. Vor und nach einer 1,5-stündigen Probe bzw. einem Konzert wurden der *Positive Negative Affect Schedule* (PANAS), der *Perceived Stress Questionnaire* (PSQ), sowie das *State-Trait Angst Inventar* (STAI; nur State-Fragebogen) erhoben. Um eventuelle weitere Einflussfaktoren zu erheben, wurden zusätzlich Fragen bezüglich der Probe (z. B. Zufriedenheit mit der in der Probe erbrachten Leistung, Gefallen der Stücke) beantwortet und mit zwei bis acht Teilnehmerinnen und Teilnehmern pro Gruppe Interviews durchgeführt. Die Ergebnisse zeigen, dass Chorsingen, Theaterspielen und Musikhören (in einem Konzert) das Wohlbefinden positiv beeinflussen. Wider Erwarten wurde kein positiver Einfluss von Musizieren in einer Blasmusikkapelle auf das Wohlbefinden festgestellt. Dies kann zum Teil durch probenspezifische Daten erklärt werden, da die Ergebnisse zeigen, dass etwa die Zufriedenheit mit der in der Probe erbrachten Leistung sowie das Gefallen der Stücke in diesem Kontext eine wichtige Rolle spielen.

## **Abstract**

Several studies have reported positive effects of (choral) singing on well-being (e.g. Beck et al., 2000), mostly by comparison to a listening condition. There is, however, a lack of literature addressing the comparison of choral singing with other active music-making conditions. This study compares the effect of choral singing, playing in a brass band, playing in a theater group, and listening to

music in a concert on well-being. Participants ( $N=183$ ) were three choirs ( $n=58$ ), two brass bands ( $n=54$ ), three theater groups ( $n=34$ ) and a group of concert-goers ( $n=37$ ). All participants completed the *Positive Negative Affect Schedule* (PANAS), the *Perceived Stress Questionnaire* (PSQ) and the *State-Trait-Anxiety-Inventory* (STAI; state questionnaire only) before and after a 1.5-hour rehearsal/concert. They then answered a series of open questions in writing (e.g. liking of the pieces; satisfaction with the rehearsal in general) after the session (or concert). Separate interviews were conducted with two to eight participants of each group. Findings suggest that choral singing, playing in a theater group or listening to music in a concert influences well-being positively. Contrary to expectations, the brass bands lacked positive changes. This study also shows that satisfaction with the rehearsal in general and the liking of the piece(s) rehearsed play an important role in this context, which partly explains the lack of positive changes for the brass bands.

## 1 Introduction

In Austria, choral singing or playing in a brass band is a popular leisure activity. In 2013, the *Chorverband Österreich* (Austrian choral association) reported approximately 63,700 active members (Statistik Austria, 2015a). The actual number of choral singers is higher, as not all Austrian choirs are members of the association. The *Österreichischer Blasmusikverband* (Austrian brass band association) had approximately 109,300 active members in 2013 (Statistik Austria, 2015b). This indicates that approximately two percent of the Austrian population engages in choral singing or brass band music on amateur level. According to the *German Music Information Centre* (MIZ), approximately 4.5 percent of Germany's population regularly engaged in musical group activity, both vocal and instrumental, on amateur level in 2013/14 (Deutsches Musikinformationszentrum, 2016). This raises the following questions: What motivates individuals to engage in such – sometimes rather time-consuming – leisure activities? Is it the social component of meeting with the group or is there something special about the music or the music-making that motivates them? Does singing or, generally, active music-making influence our well-being in a positive way?

### 1.1 Singing and well-being

Already at the beginning of the 20<sup>th</sup> century, there were claims by researchers with diverse backgrounds that music, and especially singing, has psychological and physiological benefits; these claims were, however, mostly not backed by scientific data (Hunter, 1999). The last two to three decades have seen increasing research interest on possible effects of both choral and solo singing on well-being and health using different methodological approaches. Several studies reported psychological, physiological and social benefits of singing (e.g. Beck, Cesario, Yousefi & Enamoto, 2000; Clift et al., 2008; Kreutz, Bongard,

Rohrmann, Hodapp & Grebe, 2004; Sanal & Gorsev, 2014; Unwin, Kenny & Davis, 2002; Valentine & Evans, 2001). Beck et al. (2000) were the first to investigate physiological changes in the immune system in connection to choral singing. In a sample of professional choristers, they compared the effect of three different singing conditions – two rehearsals, one earlier and one later in the day, and a public performance – on secretory immunoglobulin A (S-IgA; an important marker for immune competence and also known to be negatively affected by stress) and the stress hormone cortisol. They found an increase of S-IgA levels in all three conditions but the greatest increase was observed after performance, whereas cortisol decreased during rehearsal but increased during performance. This suggests that different singing conditions cause different physiological responses. They also found that both pre- and post-activity cortisol levels were far below the normal range, which might suggest long-term effects of singing on cortisol concentrations. A multiple regression analysis showed that the subjective singing experience, such as relaxation, satisfaction, feeling a kind of high, can predict changes in S-IgA (Beck et al., 2000). In a second study, Beck, Gottfried, Hall, Cisler, and Bozeman (2006) addressed the question of whether similar effects would result from solo singing. Solo singers were expected to experience more stress and performance anxiety and to be more susceptible to health issues due to the higher physical demands, which accompany professional solo singing. Similar to the previous study, increased S-IgA levels were found after singing and a decrease of cortisol levels was found to be connected to satisfaction with the performance. The same correlation between upward changes in S-IgA and reported well-being and feeling a kind of high were observed. Supporting findings by Beck et al. (2000, 2006), a study by Grape, Sandgren, Hansson, Ericson, and Theorell (2002) reported differences in physiological responses and emotional states following singing lessons in amateur and professional singers. Results of various biological measures showed that both amateurs and professionals were more relaxed and energetic after the lesson. However, whereas cardio-physiological fitness for singing was higher in professional singers, increased joy was reported by amateurs; fewer well-being benefits were reported by the more achievement-oriented professionals compared to the amateurs. The fact, that positive effects of singing were reported among both choral and solo singers suggests that changes are a result of singing itself and not due to social interaction in the choir.

Kreutz et al. (2004) report similar positive effects of choral singing on stress and immune markers for amateur choristers. Comparison of a one-hour choir rehearsal and a one-hour session of listening to the same piece of music a week after the choir rehearsal showed upward changes of S-IgA levels for the singing condition and a decrease of cortisol levels for the listening condition. Subjective measurements of emotional state indicated an increase of positive affect and a decrease of negative affect for the singing condition, while negative affect increased in the listening condition. The authors suggested that the increase of negative affect in the listening condition was based on participants experiencing the listening condition as “at least partly [...] unexciting, boring, and deactivat-

ing” (Kreutz et al., 2004, p. 631), hence, the decrease of cortisol levels can be seen as an indicator for psychological deactivation.

Sanal and Gorsev (2014) investigated the possible effect of choral singing on salivary amylase (a biological stress marker), emotional state and anxiety in a sample of college students. A positive impact of choral singing on affect status and anxiety was found. Following an eight-week period of rehearsing the music, data were collected after a one-hour rehearsal for the singing condition and one hour of unstructured time for the control condition. Confirming findings by Kreutz et al. (2004), a decrease of negative affect in the singing condition, and a decrease of positive affect and increase of negative affect values for the control condition were found by the authors. Singing in the choir positively influenced state anxiety levels, which were found to correlate with salivary amylase in an earlier study (Noto, Sato, Kudo, Kurata & Hirota, 2005), but the opposite effect was observed in the control condition.

Changes of mood after either choral singing or listening to choral singing were also observed by Unwin et al. (2002) in a community sample. Participants were randomly assigned to either a singing or listening condition. Data were collected before and after a half-hour session, in which the participants of the listening condition listened to the singing condition, as well as one week later. Unwin et al. (2002) found positive changes in mood for both the singing and the listening condition, showing insignificantly greater changes for the singing condition. Even in the data collection one week after the session some positive effects were still evident.

If compared to a control condition at all, choral singing was compared to listening to music, unstructured time or solo singing in the research discussed above. Valentine and Evans (2001) compared the influence of choral singing, solo singing and swimming on mood and physiological responses. Similar to singing, physical activity including swimming was associated with positive changes of mood and psychological well-being (e.g. Berger, Owen & Man, 1993; Yeung, 1996). They found significant positive changes of mood for all three activities, which were significantly higher in the swimming condition, and only slightly differed between the singing conditions. The higher changes in the swimming condition were assumed to be due to the higher degree of physical activity. An increase of heart rate was found after swimming but not after singing. While Valentine and Evans (2001) did not find any heart rate changes for the singing conditions, a more recent study by Vickhoff et al. (2013) found an increase of heart rate variability during group singing. Indications for a strong connection between the structure of songs and heart rate patterns were found, as heart rates of participants synchronized when singing in unison.

A shortcoming of most of the studies conducted on the topic is the (often very) small sample size. By far the largest sample of choir singers was addressed in a cross-national large-scale study by Clift, Hancox, Morrison, Hess, Steward, and Kreutz (2008; also see Clift & Hancox, 2010). Data were collected from 1124 choral singers from 21 choirs in England, Germany, and Australia. A questionnaire asking open-end questions on perceived benefits of choral singing was



used, followed by a singing scale consisting of twelve positively worded and twelve negatively worded statements about choral singing. This scale was devised based on questionnaires developed for previous studies by Beck et al. (2000) and Clift and Hancox (2001). The last section of the questionnaire assessed physical, psychological, social, and environmental quality of life. The central interest of this study was the connection between general psychological well-being and perceived benefits of singing. Results showed that the majority of participants reported a positive effect of choral singing on well-being. It was indicated that women perceived higher benefits of singing than men, confirming previous findings of gender differences in the report of positive emotional experience (Brody & Hall, 2008). No differences were found between the countries. A low but significant interaction between perceived benefits of singing and the general psychological quality of life was found for women, but not for men. Similarly, with regard to gender differences, Sandgren (2009) found that self-reported changes of positive emotional states in regard to choir rehearsals were higher for women than men. No gender differences were found for negative emotions. Compared to men, women tended to rate positive emotional states higher after the rehearsal.

Livesey, Morrison, Clift, and Camic (2012) analyzed answers from the open-end questions of a selected sub-sample (participants who either scored very high or very low on psychological well-being) in the study by Clift et al. (2008). Several themes of reported benefits of singing were found: most frequently mentioned were social benefits, emotional benefits, and adding meaning and purpose to life.

Several studies have also shown benefits of group singing in a clinical sample. Bonilha et al. (2009), for example, report a positive impact of weekly group singing lessons on the quality of life, and therefore well-being, and on pulmonary functions in patients suffering from chronic obstructive pulmonary disease (COPD), a condition that is characterized by limited airflow due to narrowed airways. Choral singing was suggested to be beneficial for stress related disorders, such as irritable bowel syndrome by Grape, Theorell, Wikström and Ekman (2009) and Grape, Wikström, Ekman, Hasson and Theorell (2010). A study with Parkinson's patients showed an improvement of specific speech and voice related abnormalities after voice and choral singing treatment (Di Benedetto et al., 2009). Bannan and Montgomery-Smith (2008) observed an increase of confidence and alertness in Alzheimer's patients after three weekly group singing sessions. They found that it was even possible to teach them new songs. Kenny and Faunce (2004) suggested that group singing enhances mood and coping mechanisms in chronic pain patients.

Singing as a means to preserve mental and physical health of elderly people has been reported by several authors. Cohen et al. (2006) investigated the effect of cultural programs on physical health, mental health, and social activities. Over the period of one year, individuals aged 65 and older engaged in either choral singing or other professionally conducted cultural programs (e.g. writing, painting, poetry). Results showed that after one year overall health and measures for mood were rated higher in the singing condition. Furthermore, fewer doctor

visits and number of falls were reported and less over-the-counter medication was taken.

There are reports of several ongoing community singing projects, which aim to promote well-being and health in elderly people. In the United Kingdom, singing sessions for older people are organized by the *Silver Song Clubs*<sup>1</sup> with the aim to improve well-being and health. In a qualitative study, Skingley and Bungay (2010) interviewed 17 participants attending Silver Song Clubs. They identified the following benefits of singing in Silver Song Clubs: increased well-being and health, enjoyment, social interaction, cognitive stimulation, and physical improvement. A survey addressing members of all Silver Song Clubs at the time showed that participants enjoyed participating in the clubs, looked forward to the sessions, and felt that singing made them feel better. Previous singing experience was, however, found to be important in this respect (Bungay, Clift & Skingley, 2010).

Following the same agenda as Silver Song Clubs, *Community of Voices*<sup>2</sup> is an ongoing research project based in San Francisco. The aim of *Community of Voices* is not only to look into well-being and health but also to examine the costs and cost-effectiveness of such programs (Johnson et al., 2015).

More recently, an increased interest has been shown in promoting a healthy psychosocial work environment and health and well-being of employees through cultural programs (Vaag, Saksvik, Theorell, Skillingstad & Bjerkeset, 2013). The *Sound of Wellbeing* initiative, a singing intervention for hospital employees in Norway, was found to result in changes of demand-control-support and generally improved health (Vaag et al., 2013). In a second study, *Sound of Wellbeing* addressed employees in different functions from a Norwegian municipality (Vaag, Skasvik, Milch, Theorell & Bjerkeset, 2014). In this pre-test/post-test study, higher benefits of general health and engagement and higher degrees of job control were found, however, only for female participants compared to non-participants.

## 1.2 Acting and well-being

As the present study compares choral singing with, among other conditions, playing in a theater group, two articles on performing arts and well-being will be discussed in the following paragraph. The literature on drama/theater/acting and well-being is, however, very limited.

Kemp (2006) reports findings from a study addressing the *Brother to Brother* project, a drama-based project to promote well-being in young men. Participants reported increased self-esteem and confidence after participating in the project.

Heard, Mutch, Fitzgerald, and Pensalfini (2013) investigated the role performing in a theater group may have on well-being and health of prison inmates.

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1 For more information see <http://www.singforyourlife.org.uk/silver-song-clubs> (retrieved April 08, 2016).

2 For further information, visit the homepage: <http://communityofvoices.org/home/> (retrieved April 08, 2016).

Interviews were conducted with inmates who participated in the *Queensland Shakespeare Ensemble Prison Project*, showing that participants improved their communicational skills and developed new social support networks, which may help coping with stress and foster the development and maintenance of healthy behaviors (Heard et al., 2013).

## 2 Aim of the study and hypotheses

Based on the fact that choral singing was mostly compared to a listening condition in previous studies, the aim of this study was to compare the effects of different creative leisure activities on well-being. We decided to compare choral singing with another music-making condition, namely playing in a brass band, a non-musical creative activity, i.e. playing in a theater group, as well as a passive music-listening condition.

On the basis of previous findings, we hypothesized that positive affect would increase and negative affect would decrease during the rehearsal or listening to music in a concert. We also expected perceived stress ratings and state anxiety ratings to decrease during the sessions.

As Grape et al. (2002) found similar positive effects for both choral and solo singers and, therefore, suggested that positive changes after singing were not socially induced, we hypothesized that active music-making (i.e. choral singing and playing in a brass band) would entail greater changes of well-being than playing in a theater group or listening to music in a concert.

## 3 Method

The primary data in this study were quantitative, based on standardized psychometric scales. We also collected qualitative data using an open-ended questions form and interviews, with the aim to complement and/or explain quantitative results.

### 3.1 Study Design

A  $2 \times 4$  factorial design was employed. There was one between-subjects factor (activity) with four levels (choral singing, playing in a brass band, playing in a theater group, and listening to music in a concert) and one within-subject factor with two levels (before and after the activity). The dependent variables were positive affect, negative affect, perceived stress, and state anxiety.

### 3.2 Participants

Participants were members of three choirs, two brass bands and three theater groups, as well as a sample of concert-goers. All the participants were amateur

musicians or actresses/actors, respectively. Membership in the participating groups was open to anybody; the members did not have to pass an audition to join the group. The backgrounds of the members of each group were very diverse in terms of highest completed level of education, (musical) training, and the number of years they had been a member of the group. Pre-existing choirs, brass bands and theater groups in the greater area of Graz (Styria, Austria) were contacted by email; the selected groups showed interest in participating in the study. Theater rehearsals did not include any musical elements. For the listening condition, data were collected at a Jazz-Christmas concert. The concert audience was approached by the first author immediately before the concert and asked to participate in the study. All individuals participated on a voluntary basis.

Altogether, the sample consisted of 183 individuals (112 female). 58 participants (44 female) were singing in the three choirs, 54 (20 female) playing in the two brass bands and 34 participants (21 female) were members of the three theater groups. The sample of concert-goers consisted of 37 participants (27 female). The participants' age ranged from 12 to 83 years ( $M=44.2$ ,  $SD=18.8$  years); four participants did not indicate their age. Participants' mean age in the choir condition was 59.7 years ( $SD=13.5$  years); the mean age in the brass band condition was 34.1 years ( $SD=16.4$  years), and in the theater condition 32.1 years ( $SD=10.4$  years). The concert-goers' mean age was 45.4 years ( $SD=18.2$  years).

### 3.3 Measures

The German version of the *Positive Negative Affect Schedule* (PANAS; Krohne, Egloff, Kohlmann & Tausch, 1996) was used for the measurement of emotional state. The PANAS consists of two subscales (positive affect and negative affect) which are assessed by 20 items: the 10 items depicting positive affect are *interested*, *inspired*, *strong*, *enthusiastic*, *proud*, *alert*, *excited*, *determined*, *attentive*, and *active*; the 10 items measuring negative affect are *distressed*, *jittery*, *guilty*, *scared*, *hostile*, *irritable*, *ashamed*, *nervous*, *upset*, and *afraid*. Participants were instructed to rate each item on a scale from 1 (not at all) to 5 (very much) according to their current feeling.

The *Perceived Stress Questionnaire* (PSQ) in the German version by Fliege et al. (2001) was applied to assess subjectively experienced stress. The short version of the PSQ consists of 20 items measuring four factors: *worries* (e.g. "You feel frustrated"), *tension* (e.g. "You feel tense"), *joy* (e.g. "You feel you're doing things you really like"), and *demands* (e.g. "You have too many things to do"). According to Fliege et al. (2005), the demands scale refers to perceived external stressors, whereas internal stress reactions are represented by the other three scales. The items were rated on a scale from 1 (almost never) to 4 (usually).

The 20-item state scale of the German version of the *State-Trait Anxiety Inventory* (STAI-s; Laux et al., 1981) was used to measure anxiety in the present emotional state. Ten items are weighted towards anxiety (e.g. "I am worried";



“I am tense”; “I feel nervous”), the other ten towards the absence thereof (e.g. “I feel calm”; “I feel content”; “I feel secure”). All items were rated on a 4-point scale from *not at all* to *very much so*.

In addition to the three psychometric scales listed above, the first author devised a Satisfaction Questionnaire. The objective was to measure how satisfied participants were with the rehearsal. The questionnaire consists of two open-end questions (“How was your day?” and “Does singing/playing in this group influence your life and if so, in what ways?”) as well as four questions assessing (a) the satisfaction with the rehearsal in general, (b) the satisfaction of respondents with their own performance in the rehearsal, (c) the importance of singing/playing in that particular group, and (d) the liking of the piece(s) currently rehearsed. These questions were rated on a 5-point Likert-like scale. Each of them was followed by an open-end question asking for an explanation of the rating. For the concert-goers the Satisfaction Questionnaire only consisted of two questions: (a) the liking of the concert, and (b) the importance of going to concerts in general, which were also rated on a 5-point Likert-like scale.

Semi-structured interviews were conducted to collect further information on the rehearsal in particular and possible perceived benefits of the activity.

### 3.4 Procedure

Data were collected before and after a single regular rehearsal in each of the participating groups. The rehearsals lasted for approximately 1.5 hours, including a short break, and started with routine warm-up exercises. Participants were asked to complete the Positive Negative Affect Schedule (PANAS; Krohne et al., 1996), the Perceived Stress Questionnaire (PSQ; Fliege et al., 2001) and the state questionnaire of the State-Trait Anxiety Inventory (STAI-s; Laux et al., 1981) before and after the rehearsal/concert. Furthermore, participants answered demographic questions before the rehearsal/concert, as well as the Satisfaction Questionnaire after the rehearsal/concert. Additionally, short interviews were conducted with two to eight participants per group after the rehearsal.

### 3.5 Data Analysis

Quantitative data were analyzed using SPSS 23. Mean scores were calculated for positive (PA) and negative affect (NA), for the perceived stress (PSQ) and state anxiety (STAI-s) scores, as well as for the satisfaction questions.

A series of one-way analyses of variance (ANOVA) were performed to determine potential significant differences between conditions for age and the baseline measurements of positive and negative affect, stress and state anxiety as well as for the satisfaction questions.

Two-way repeated measures analyses of covariance (ANCOVA) were conducted to detect differences between conditions, as well as pre- and post-activity measurements for positive (PA) and negative affect (NA), stress (PSQ) and

state anxiety (STAI-s) scores. Age was added as a covariate in the ANCOVA for PA, NA, PSQ and STAI-s. Satisfaction with the rehearsal in general and liking of the concert were included as a covariate in the ANCOVA for PA, NA and STAI-s, and the baseline-stress-rating in the ANCOVA for PSQ. Pearson's product moment correlations were calculated to determine possible correlations between all the variables used.

Content analyses of the responses collected through the open-end questions form and the interviews were performed.

## 4 Results

The results of a series of one-way ANOVAs for age and the baseline measurements of positive and negative affect, stress and anxiety indicated a significant difference between conditions for age ( $F [3, 175] = 35.68, p < .001, \eta^2 = .38$ ); Scheffé post hoc showed that the mean age in the choir condition was significantly higher than in all the other conditions ( $p < .001$ ), the mean age in the concert listening condition was significantly higher than in the brass band and theater condition ( $p < .01$ ). A significant difference between conditions was found for the baseline stress scores ( $F [3; 175] = 3.22, p < .05, \eta^2 = .05$ ). Stress levels were significantly higher in the theater condition in comparison to the choir condition ( $p < .05$ ). Pearson's product moment correlations showed a significant correlation between age and the dependent variables. To control eventual effects which might occur from these significant differences between the groups and due to the significant correlations, age and baseline-stress-scores (in the ANCOVA for PSQ scores only) were added as covariates in the repeated measures ANOVAs.

### 4.1 Satisfaction ratings

For the questions of the Satisfaction Questionnaire a series of one-way ANCOVAs (with age as a covariate) were performed. Significant differences between conditions were found for two questions: *satisfaction with the rehearsal in general* ( $F [2; 136] = 10.78, p < .001, \eta^2 = .14$ ), and *liking of the piece(s) currently rehearsed* ( $F [2; 136] = 19.05, p < .001, \eta^2 = .22$ ). Post hoc Bonferroni tests at the 5 percent level of significance showed that members of the choirs were significantly more satisfied with the rehearsal in general than members of brass bands ( $p < .001$ ) and theater groups ( $p < .01$ ). Furthermore, the liking of the piece(s) currently rehearsed was significantly lower in the brass bands compared to the choirs ( $p < .001$ ) and theater groups ( $p < .001$ ).

Pearson's product moment correlations revealed significant positive correlations between *satisfaction with the rehearsal in general*, *liking of the concert* and the mean difference score ( $t2-t1$ ) for positive affect. Significant negative correlations were found between *satisfaction with the rehearsal in general* and the mean difference scores for negative affect and state anxiety. Due to the sig-

nificant correlations and the significant difference between conditions for the question *satisfaction with the rehearsal in general*, it was added as a covariate in the ANCOVAs for the PANAS, and STAI-s scores.

**Tab. 1:**  
Means (and standard deviations) of positive affect (PA), negative affect (NA), perceived stress (PSQ) and state anxiety (STAI-s) values before and after the activity for the four conditions

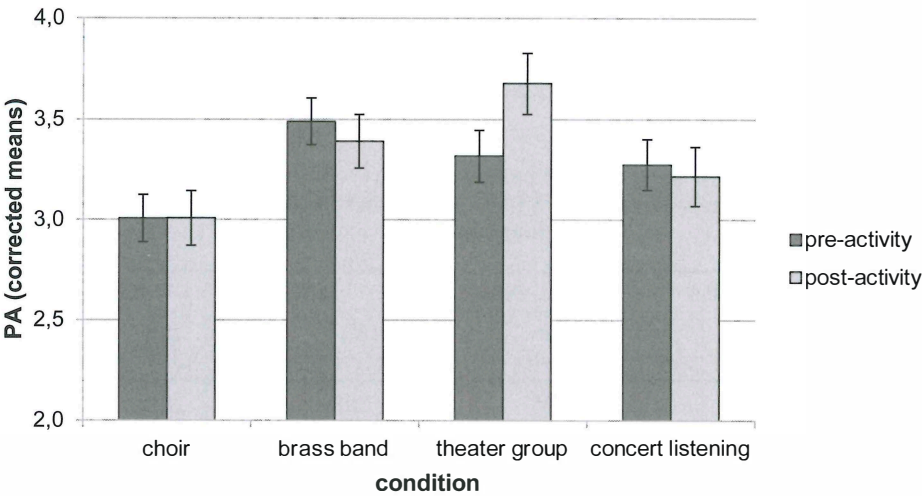
	PA		NA		PSQ		STAI-s	
	pre-activity	post-activity	pre-activity	post-activity	pre-activity	post-activity	pre-activity	post-activity
choir	3.17 (0.72)	3.30 (0.09)	1.25 (0.34)	1.17 (0.23)	2.08 (0.34)	1.99 (0.31)	2.24 (0.52)	2.12 (0.45)
brass band	3.34 (0.74)	3.08 (0.86)	1.41 (0.48)	1.34 (0.46)	2.12 (0.32)	2.11 (0.40)	2.24 (0.42)	2.24 (0.44)
theater group	3.18 (0.64)	3.41 (0.79)	1.39 (0.33)	1.28 (0.31)	2.29 (0.26)	2.15 (0.26)	2.43 (0.57)	2.18 (0.36)
concert listening	3.40 (0.64)	3.49 (0.82)	1.33 (0.49)	1.28 (0.29)	2.23 (0.37)	2.10 (0.37)	2.22 (0.45)	2.18 (0.42)

4.2 Positive and negative affect (PANAS)

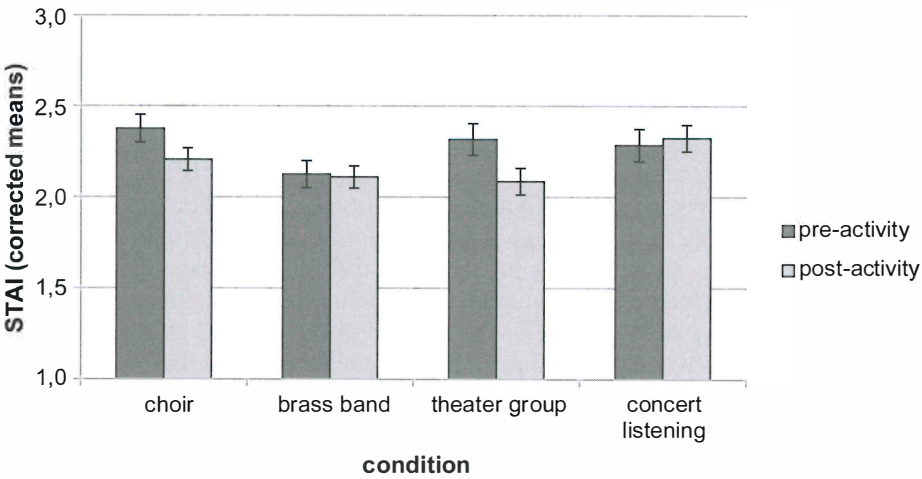
An ANCOVA for positive affect scores did not indicate any significant main effects for time or condition (cf. Figure 1). There was, however, a significant interaction between time and condition ( $F [3; 149]=3.75, p<.05, \eta^2=.07$ ). Age ( $F [1; 149]=8.84, p<.01, \eta^2=.06$ ) and satisfaction ( $F [1; 149]=11.01, p<.01, \eta^2=.07$ ) were found to have a significant influence. To determine differences between conditions, an ANCOVA for the mean difference values (t2-t1) of positive affect was performed. It indicated a significant difference between groups ( $F [3; 149]=3.75, p<.05, \eta^2=.07$ ). Post hoc Bonferroni tests showed that the difference score between pre- and post-activity measurements was significantly higher in the theater condition compared to the brass band condition ( $p<.05$ ), showing that the theater condition benefited significantly more than the brass bands (cf. Figure 1). No significant changes were found for negative affect scores.

4.3 Perceived Stress Questionnaire (PSQ)

An ANCOVA for the stress (PSQ) scores did not show any significant main effects for condition or time. A significant interaction between time and condition was found ( $F [3; 170]=3.53, p<.05, \eta^2=.06$ ). An ANCOVA for the mean difference values (t2-t1) for stress showed a significant effect for condition



**Fig. 1:**  
Means corrected by covariates and standard errors of positive affect (PA) before and after activity for the four conditions



**Fig. 2:**  
Means corrected by covariates and standard errors of anxiety (STAI-s) before and after activity in the four conditions

( $F [3; 170]=3.53, p<.05, \eta^2=.06$ ). Post hoc Bonferroni tests showed that the difference score was significantly higher in the choir condition compared to the brass band condition ( $p<.05$ ); a tendency towards a significantly higher diffe-



rence score was found for the concert listening condition compared to the brass band condition ( $p < .09$ ).

#### 4.4 State-Trait Anxiety Inventory (STAI-s)

An ANCOVA for the state anxiety (STAI-s) scores did not show any significant main effects for condition or time (cf. Figure 2). There was, however, a significant interaction between time and condition ( $F [3; 165] = 5.50, p = .001, \eta^2 = .09$ ). A significant influence of satisfaction ( $F [1; 165] = 14.16, p < .01, \eta^2 = .08$ ) and age ( $F [1; 165] = 5.50, p = .05, \eta^2 = .03$ ) was indicated. An ANCOVA for the mean difference values ( $t_2 - t_1$ ) for anxiety showed a significant difference between conditions ( $F [3; 165] = 5.50, p < .01, \eta^2 = .09$ ). Post hoc Bonferroni tests indicated that the choir condition benefited significantly more than the concert listening condition ( $p < .05$ ), and the theater condition benefited significantly more than the brass band ( $p < .05$ ) and the concert listening condition ( $p < .05$ ).

#### 4.5 Satisfaction Questionnaire: qualitative data

*How was your day? Did anything special happen today (positive or negative)?*

When asked about their day, more than half of the members of the theater groups reported something negative, e.g. the day was very stressful, they had had a lot of appointments, they were tired or exhausted, or even reported to be in pain or feeling a bit sick. The remainder of the actresses/actors reported that the day went well and without any special (positive or negative) incidents.

In the choir and brass band conditions positive and negative comments regarding the day were quite balanced, the number of positive comments being slightly higher. Positive comments included that the day went well; they were satisfied with what they had achieved throughout the day; they had made pleasant experiences; they were relaxed or experienced joy. Negative comments included: the day had been stressful and/or very tiring; they were worried about something or someone (e.g. a sick family member or friend); they had had to complete unpleasant tasks.

#### *Satisfaction with the rehearsal in general*

The highest number of positive comments was collected in the choir condition, followed by the theater condition. Reasons for being satisfied with the choir and theater rehearsals were: the energy and/or motivation in the group was good and therefore the rehearsal was very productive; it was a lot of fun; a lot of progress was made; they sang songs which they already knew quite well, therefore the quality of the output was very good; the conductor was very motivating. For members of the theater groups, the main reason for being dissatisfied with the

rehearsal was that they had problems remembering the lines. In the brass band condition negative comments outweighed positive ones by far: participants reported a lack of concentration among the brass band members; the rehearsal being the first one after a break and therefore lacking quality; important/leading/strong voices being absent; new pieces were rehearsed which made the rehearsal demanding; it was not rehearsed in a very efficient way, downtimes in between and within pieces were too long.

### *Satisfaction with one's own performance in the rehearsal*

Quite a lot of negative answers were collected for this question in all conditions. Choir singers mentioned that health problems (breathing problems, voice problems) or being tired prevented them from giving their best; that several new songs were sung and they cannot sight-sing; that they had problems with intonation. Actresses/actors reported to have had problems remembering the lines; that they were not yet "in character"; that they were tired and/or having problems with concentration. The brass band players reported being dissatisfied with their own performance due to the break since the last rehearsal and because they had not practiced (enough or at all) at home; that they had problems concentrating and made too many mistakes. Reasons for being satisfied mentioned in all conditions were that they gave their best and their own expectations were met; that they knew the pieces well and/or they were quite easy. One of the choir members mentioned: "I am hardly ever not satisfied when I sing."

### *Does singing/playing in this group influence your life; if so, how?*

Generally, participants of all conditions indicated that being a member of the group influenced their life in a very positive way. Social benefits, such as having made plenty of good friends within the group and the connectedness/community spirit within the group were mentioned. Furthermore, the activity in the group brings variety into or presents a distraction from daily life, gives the opportunity to wind down and relax and supports stress relief or at least helps to forget stressful situations for a while. It presents an important, regular item on the members' weekly agenda which they are looking forward to. Choir singers reported that they experience a lot of joy when singing and that singing lifts their spirits. Several members of the theater groups mentioned that acting boosts their self-confidence. One participant even indicated that being a member of the theater group enormously helped her getting through a time when suffering from depression. Another actor reported that he can apply certain techniques acquired in theater rehearsals, such as elocution and posture, in his work as a teacher. Both choir singers and actresses/actors indicated that they simply feel better after rehearsal. A negative aspect which was particularly mentioned in the brass band condition was that it is a very time consuming activity which can be even stressful at times due to the amount of performances.

*Of what importance is singing/playing in this group for you?*

Participants of all groups indicated that being a member of the group was a very important part of their life. It presents a great opportunity to take part in a creative activity.

*Liking of the piece(s) currently rehearsed*

The brass band condition was the one liking the pieces rehearsed least, indicating that the pieces were boring, not challenging enough, not suitable for the upcoming concert or simply did not meet their taste. Some brass band members, on the other hand, indicated to have liked the pieces because they were quite easy and fun to play. Members of the theater groups listed the following reasons for liking the piece: it is very funny and entertaining; there is a good balance between dialogue and action; the characters are complex and funny; it is a very dynamic piece. Songs rehearsed in the choir condition were described as catchy melodies; being a bit challenging but not too demanding; mirroring the current emotional state; or simply being beautiful music.

## 4.6 Interviews

With regard to the interviews, it has to be mentioned that the number of interviews is based on the willingness of the group members to be interviewed. Members of one theater group were especially eager to participate in the interviews, which resulted in a higher number of interviews in this particular group. The quotes introduced below have been translated by the first author from the interviews conducted in German to reflect their purport as accurately as possible.

For the choir condition it can be said that interviewed participants indicated to, in general, feel better after a choir rehearsal than before. They report it to be stress relieving, relaxing, uplifting:

“Especially when I am not feeling that well before the rehearsal, it has a very positive effect: the music, the choir, the singing, the people – that all affects me very positively.” (female, 75 years, choir)

The effect the rehearsal has on well-being does, however, depend on how active one engages in the rehearsal, according to this participant:

“When I am fully concentrating on the singing the positive effect is, of course, bigger.” (female, 34 years, choir)

Some participants reported that the pleasant anticipation of the rehearsal can be stress relieving already:

“Throughout the day I was stressed. But once I arrived in the rehearsal room, only the thought that I will be singing let me forget all the stress. During the rehearsal I was able to completely tune out everything that happened during the day.” (female, 56 years, choir)

Members of the theater group also report positive effects of the rehearsal, but also indicate that it depends on how well the rehearsal goes:

“It depends on the rehearsal. After an exhausting day one might not be very motivated in the beginning, but if the rehearsal is fun and everything goes well, one leaves exhilarated and happy. On the other hand, in some rehearsals you have a scene where you don’t exactly know how to perform it or convey it... And you go home thinking, that didn’t work so well today.” (female, 27 years, theater group)

“It was the first complete run-through today; taking full risk... It was a great experience. Even though I still have to work on my lines it was very exciting for me.” (male, 29 years, theater group)

“We rehearsed the play from beginning to end for the first time today without the textbook; many of us had problems remembering the lines. What I found a bit annoying is that we all lacked concentration. There was a lot of laughing throughout the rehearsal. It could have been more efficient.” (female, 27 years, theater group)

Feedback gathered in the interviews from members of the brass bands was less positive:

“We made quite some progress today, but the pieces were quite easy... surprisingly easy.” (male, 59 years, brass band).

“Today’s rehearsal could have gone better. A bit of restlessness went through the whole group today. People had problems with concentration and we did not make much progress.” (male, 49 years, brass band)

“We had to start over and repeat the same stuff again and again. I find that a bit annoying!” (female, 30 years, brass band)

“I came to the rehearsal full of expectations and then came the kick in the teeth... There is a lack of mutual appreciation; a lack of willingness to make music together. And that’s what makes me angry.” (male, 54 years, brass band)

“It was the first rehearsal after the Christmas break and it was obvious that people didn’t take it very serious. The rehearsal could have been more effective. There were quite long downtimes. I find that very annoying! And then, of course, people become twitchy and start chatting...” (female, 40 years, brass band)

When asked in the interviews what they found to be more important, the activity itself or the social aspect/component of being a member of the group, choir members indicated that it was primarily the singing itself, members of the brass bands stated that the social component was more important, and the majority of the interviewed actresses/actors found it to be of equal importance.

“The choral singing is more important. The social aspect is a nice side-effect, but it is primarily the choral singing.” (male, 59 years, choir)

“The community spirit is paramount. You meet up with your fellow musicians and do something together and have fun.” (female, 30 years, brass band)



"Fifty-fifty I would say. I primarily joined the group for the sake of acting, but since then the social aspect has gained importance as I have made a lot of friends here." (male, 39 years, theater group)

Several interviewed members of the theater groups reported that they also sing in choirs. When asked if they could observe a difference in how choir and theater rehearsals influenced their well-being, they reported that theater rehearsals have an even more positive effect. They were of the opinion that it depends on the size of the group and that theater rehearsals are more intense, which makes it easier to leave everything else behind. More energy has to be invested in acting, as one has to impersonate another character. Each individual has more "power" and the presence of each member of the group is of more importance.

"If I miss choir rehearsal once it is not a big problem; I will catch up next time and it does not make that much of a difference when one voice is missing. But in acting, the rest of the group counts on you and it is really bad if you miss a rehearsal." (female, 27 years, theater group)

## 5 Discussion

Consistent with previous studies, our findings suggest that choral singing has a positive effect on well-being. Positive changes of well-being were also found for playing in a theater group and listening to music in a concert. Contrary to expectations, the brass band condition lacked positive changes, which might, however, be due to sample-specific confounding factors. With respect to the four conditions, different patterns of changes for positive affect, perceived stress and state anxiety were found. Seen in the context of previous cited research, we may conclude that group music making usually or typically improves well-being but there are several factors involved, some of which may cancel the effect or even cause well-being to be reduced.

We hypothesized that positive changes would be greater in the music-making conditions (i.e. the choirs and brass bands) than in the theater and concert listening conditions. This hypothesis was not confirmed, as the participants in the brass bands benefitted least from the rehearsal, whereas the choir and theater conditions benefitted most.

As for positive affect, we found that the theater condition experienced the biggest positive change during the rehearsal, significantly differing from the difference score of the brass band. Contrary to expectations and findings by Unwin et al. (2002) and Kreutz et al. (2004), we did not find a significant positive change of emotional state in the choir condition. Swimming was found to have a bigger positive effect on mood than singing in a study by Valentine and Evans (2001), underlining the role of physical activation and exercise. As we found the biggest improvement of positive affect in the theater condition, it could be argued that physical movement was part of the reason: theater rehearsals require more physical activity (or at least more physical movement) than choir or brass band rehearsals: actresses/actors have to move around on stage whereas participants in the two latter conditions are seated for the entire duration of

the rehearsal or at least the greater part of it. The comparably higher physical activation in the theater condition might have contributed to the greater improvement of emotional state.

Our hypothesis that negative affect would decrease during rehearsal was not confirmed as we did not find any significant changes for negative affect scores in any condition. This also contradicts findings by Kreutz et al. (2004) that negative affect decreased during singing and increased during listening to music.

Previous studies investigated the effect of choral singing on stress by measuring physiological indicators, such as cortisol levels (e.g. Kreutz et al., 2004), salivary amylase and amylase/protein (Sanal & Gorsev, 2014) or secretory immunoglobulin A (Beck et al., 2000). As far as the present authors are aware, this study was the first to measure subjectively perceived stress by means of a psychometric scale (i.e. the Perceived Stress Questionnaire by Fliege et al., 2001). Our hypothesis that stress levels would decrease during rehearsals was partly confirmed: perceived stress decreased significantly more in the choir than the brass band condition. Similarly, Beck et al. (2000) found a decrease of cortisol, which is known to be an indicator for stress, during choir rehearsals in a professional chorale. The difference between the choir and brass band conditions was unexpected, as we had hypothesized greater positive changes in the music-making conditions than the theater and concert listening condition. Contrary to expectations, we found a tendency towards a significantly higher decrease of perceived stress for the concert listening condition compared to the brass band condition. A study by Kreutz et al. (2004) did, however, also show a significant decrease of cortisol levels for the listening condition but not the singing condition.

Some participants, especially choir members, reported a reduction in subjective stress upon arriving at the rehearsal room due to the pleasant anticipation of the rehearsal; no-one reported an increase in stress just before the rehearsal. To our knowledge, the role of anticipation has not been considered in previous research. If stress levels decreased shortly before the start of the rehearsal when the baseline measurement was made, and continued to decrease during the rehearsal, the final result would be an underestimation. Changes between pre- and post-activity measurements would be smaller due to the mentioned change shortly before the rehearsal. To determine possible changes of stress levels shortly before rehearsal, an additional measurement, e.g. two hours before the rehearsal, could be taken. Our data suggest that average choir members perceived stress reduction both before and during the rehearsal, reinforcing the conclusion that choir singing is particularly effective for reducing stress.

As stress scores correlated with the other dependent variables in our study, this conclusion might also apply to positive and negative affect and state anxiety, but a separate study would be necessary to test this hypothesis.

The lack of stress reduction in the brass band could have resulted from a mismatch between challenge and ability. A precondition for musical flow is a good match between challenge and ability (Csikszentmihalyi, 1996). Interview transcripts and answers to the open-end questions showed that some members of the brass bands found the musical pieces which were rehearsed too challeng-

ing, which could have caused stress or canceled out the expected stress decrease. An additional factor is that errors in brass band rehearsals might be more audible than in choirs, as, generally, voice groups in brass bands are smaller. Choristers more likely have the option to singing more quietly and singing along with other stronger singers when they are unsure of the material.

For the anxiety values, significantly greater changes between pre- and post-activity measurements were found for the choir compared to the concert listening condition, confirming to some extent findings by Sanal and Gorsev (2014), who found state anxiety to decrease during singing but increase during listening to music. Furthermore, changes in the theater condition were higher compared to the brass band and concert listening condition.

Satisfaction with the rehearsal was highest in the choir condition. The fact that participants in the brass bands were least satisfied with the rehearsal is consistent with the lack of changes of positive and negative affect, perceived stress and state anxiety observed in the brass band condition, as leisure satisfaction is suggested to be an important predictor of psychological well-being (Brown, Frankel & Fennell, 1991). Beck et al. (2000) also reported satisfaction as a predictor of well-being, however, only with regard to a public performance and not the rehearsals. Satisfaction has been reported to increase with increasing age (e.g. Herzog & Rodgers, 1981). The choir condition being the one with the highest satisfaction rating and the highest mean age, we may speculate that, generally, older people benefit more from rehearsals due to the correlation between satisfaction and changes of emotional state. Furthermore, we found the liking of the piece(s) rehearsed to play an important role in changes of well-being during rehearsals. Participants in the brass band condition liked the pieces rehearsed significantly less than participants in the choir and theater condition, which provides another explanation for the lack of changes in the brass band condition.

From data collected through the open-end questions form and interviews we found that choral singing, playing in a brass band and playing in a theater group are perceived as positive activities. Especially choir singers reported to often feel better after rehearsals. This confirms findings of previous studies on choral singing and well-being by e.g. Beck et al. (2000), Clift et al. (2008, 2010), who report a positive effect of choral singing on well-being.

It was, however, also indicated by participants in the interviews that the positive effect ultimately depends on the particular rehearsal. This was less frequently reported by choristers, which generally speaks for higher benefits resulting from choral singing. In this respect, the absence of strong voices could also have influenced the outcome of the choir or brass band rehearsals, as all the participating groups were on amateur level.

An aspect which has not been considered in previous studies on choral singing and well-being is the role of the conductor. According to Colin Durrant (2005), "the musical and interpersonal skills of the conductor are vital in the motivation of the singers" (p. 88). Several participants in one of the choirs reported the very committed and motivating conductor being one of the reasons for singing in that particular choir. This suggests that the conductor, or stage

director in the theater condition, and their way of leading the rehearsal, e.g. their “capacity to create a positive non-threatening environment, [...] ability to make singers feel confident and comfortable, [...] skills to pace rehearsals effectively” (Durrant, 2005, p. 90), may influence the effect of the rehearsal on well-being. Reasons for the lack of satisfaction with the rehearsal in the brass band condition were problems with concentration and inefficient rehearsal techniques, which can be influenced, at least to a certain extent, by the conductor.

Contrary to findings by Kreutz et al. (2004) and Sanal and Gorsev (2014), we did not detect any negative changes of emotional state for the listening condition. The difference in our study was, however, that measurements for the listening condition were taken at a concert. In the studies by Kreutz et al. (2004) and Sanal and Gorsev (2014), participants in the listening condition were choral singers who were instructed not to sing for the time of the session. It has to be taken into account that the concert-goers attended the concert because they wanted to and were not instructed to be at that concert. We could argue that going to a concert may even feature similar characteristics as a rehearsal. In most cases, people do not go to concerts alone, which means that, similar to a rehearsal, they meet up with friends and jointly pursue an activity they like. Therefore, attending a concert can be seen as a social or group activity similar to the rehearsals. This would explain why, contrary to the findings by other authors, the results of the present study were more positive for the listening condition.

Generally, the natural setting of our study has to be pointed out. Participants were not randomly assigned to the conditions, but pre-existing groups were recruited for the study. A very important fact, which should be taken into consideration, is that participants are engaging in the activities voluntarily and it is a safe assumption that they enjoy pursuing the activity. It can be assumed that these factors also influenced the outcome. Results might look different if participants were assigned to conditions randomly. Furthermore, unlike in many of the above mentioned studies, the sample in our study did not solely consist of students but consisted of individuals with various backgrounds and of different age.

Five members of the theater groups, who indicated that they also sing in a choir, reported in the interviews that they perceive a greater positive effect of theater rehearsals than choir rehearsals, pointing out that the presence of each member is more important and each member has more “power” in theater rehearsal compared to choir rehearsal. We suggest that this reported difference may, however, be explained by personality traits. If we assume that members of a theater group are more extraverted, and therefore enjoy being the center of attention, they perceive a greater effect in a smaller group where their presence is of more importance. A similar effect might be found in smaller vocal ensembles. A more introverted person, on the other hand, may benefit more from participating in a larger group (i.e. choir or brass band), as performing in a smaller group would draw more attention on them, which in turn could put pressure on them and therefore negatively affect their well-being.



## 6 Limitations

Several limitations of this study have to be mentioned. Firstly, a more homogeneous group-size among the individual participating groups would have been preferable, as group-size might have an influence on well-being (Weinstein et al., 2015). Secondly, data were collected only before and after one rehearsal. Data collection for at least two rehearsals would allow controlling the effect that one particular rehearsal might have, such as those reported in the brass band condition (e.g. lack of concentration, the rehearsal being the first one after a break, strong voices being absent). It should also be considered to take the second measurement already in the break after the first half of the rehearsal, as participants may have gotten tired by the end of the rehearsal, which might in turn lower the positive effect again. Especially for the brass bands this U-shaped effect could be expected, as playing a brass or woodwind instrument puts special demands on facial muscles and shaping of the lips. Considering that the participants were all amateurs, many of whom reported that they do not practice that much or at all throughout the week, a 1.5 hour rehearsal can be expected to be quite exhausting. Thirdly, the exact time in the rehearsal schedule should be considered. In the brass bands, the rehearsal was the first one after the Christmas break, which was not the case for the other conditions. Depending on the timing of the rehearsal, e.g. first rehearsal after a break or shortly before a performance, results are expected to differ, which was also suggested by Beck et al. (2000).

## 7 Conclusion and further research

The findings of this study suggest that choral singing, playing in a theater group or listening to music in a concert positively influences well-being. Contrary to expectations, the brass band condition lacked positive changes. This study also showed that satisfaction with the rehearsal in general and the liking of the piece(s) rehearsed play an important role in this context. A possible explanation for the small differences found for positive affect, perceived stress and state anxiety scores could be the positive anticipation of the rehearsal, which might lead to changes in well-being already prior to the actual activity. Given that we also found positive changes in the theater and listening group, the results suggest that not only music but also other factors, such as group interaction, might cause changes in well-being. We collected from qualitative data that especially choral singing, but also the other activities, are perceived very positively by the participants. Further research could include other variables influencing changes in well-being, for example group coherence, group size or random assignment to conditions. The possible influence of positive anticipation of the rehearsal should also be considered in future studies, by adding another measurement approximately two hours before the start of the rehearsal. Furthermore, data should be collected for at least two different rehearsals in each condition.

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