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Singing and Stress

by

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Abstract

Students experience increased amounts of stress during college, which can affect their well-being, health, and dropout rates. Students use coping mechanisms such as illicit drugs, alcohol, and mindfulness to manage stress. Singing has been found to decrease stress levels in professional singers, choir members and mice. However, the effects of singing on stress in students with little to no history of singing, who sing in a naturally stressful environment have been scarcely examined. This study assessed stress levels of Hunter College students at baseline, and before and after singing. Results showed a significant decrease in stress levels after singing.

Keywords: stress levels, singing, stress reduction, coping mechanisms, college students

Singing and Stress

College marks the beginning of a life of greater independence and responsibility for students. Although it is a time to build autonomy, pursue dreams and achieve career goals, college brings with it responsibilities and changes which can be emotionally, physically, and mentally taxing. These changes can lead to increased stress, which in turn can lead to damaging consequences on students' health and academic outcomes. Adaptive and maladaptive coping mechanisms are available to students; however, not all stress-managing techniques are feasible or healthy for students. In the college population, stress levels are on the rise. Pritchard, Wilson and Yamnitz (2007) note that student stress levels have increased over the past 30 years.

Sax (1997, 2003) reports similar findings indicating an eleven percent increase in students who reported feeling, "frequently overwhelmed" from 1985 to 2002. Association for University and College Counseling Center Directors (2011) found that anxiety is one of the main reasons that students seek counseling services. While, American College Health Association (2009) notes that stress was the main issue that hindered students academically. Research has established that stress is an issue plaguing college students.

Factors such as race, major, social support, and coping skills influence student stress levels, which inherently affect dropout rates. According to Tinto (1987), 2.8 million students enter college each year, but 40% leave without completing a degree. In, (Wei, Ku & Liao, 2011) the connection between race, minority stress level, and dropout rates were examined. Wei et al., (2011) studied Asian, Hispanic, and African American students in predominantly White colleges and found that perceptions of university life served as a mediator of perseverance and minority stress. Positive perceptions of university life were positively associated with perseverance, and negatively associated with minority stress (Wei et al., 2011).

Additionally, Okamura and Agbayani (1997) noted that minority students reported a lack of access to staffs of their race to keep them from dropping out. While, Lippincott and German (2007) reports that students in minority groups may experience additional stress from trying to progress in primarily White colleges. Tinto (1987) notes that Hispanic and African American students had higher dropout rates compared to other ethnicities. However, factors such as academic major, also influence student stress.

For instance, May and Casazza (2012) examined differences in perceived stress between students in “hard” and “soft” majors. Hard science majors included, “math, nursing, dental, pre-med, exercise science, pharmacy, biology, chemistry, and engineering while soft majors included, history, languages, psychology, and business” (p. 265). May and Casazza (2012) found that students in hard majors had higher perceived stress levels than those in soft majors. Additionally, Collins, Coffey, and Morris (2010) assessed social work students’ levels of support, well-being, demands, self-esteem, and emotional exhaustion.

Collins et al., (2010) found that social work students had higher levels of emotional exhaustion when work hours increased. However, students with social work experience had higher levels of well-being and lower levels of emotional exhaustion compared to those without experience. In, Beck, Hackett, Srivastava, McKim and Rockwell (1997) nursing students were found to experience higher levels of stress compared to students in other health fields. While, Jiménez, Navia-Osorio, and Diaz (2010) found that academic and external stressors such as family issues, were sources of stress for nursing students. However, clinical stressors such as witnessing patients’ distress, affected students more than external and academic stressors.

Concerning coping skills and social support, Tinto (1987) found that the ability to be committed affected dropout rates. While, Krieg (2013) found that students’ expectations affected

stress levels and dropout rates. Krieg (2013) assessed students' stress levels, demands, and expectations of support during senior year of high school and on the first and fourth years of college. Krieg (2013) found that students with violated expectations of family involvement had higher stress levels, which increased the likelihood of student dropouts. These students expected that they would receive family support during college, but did not. According to Associated Press (2005), student dropout rates have increased to 46%, hence, understanding factors related to dropout rates such as stress, is crucial.

Selye (1974) defined stress as the, "non-specific response of the body to any demand for change" (p.14). When one encounters a stressor, the hypothalamic, pituitary, adrenal axis (HPA) activates (Tanzini, 2015). HPA axis activation turns on the sympathetic nervous system (SNS), which prompts the body to prepare for the stressful event. During HPA activation, the hypothalamus, pituitary gland, and adrenal glands work to secrete glucocorticoids, which facilitate the activation and release of catecholamines (Tanzini, 2015). Once this occurs, pupils dilate, heart rate increases, and adrenalin disperses through the body (Sapolsky, 2004). The stress response is adaptive and helps the organism avoid or fight the stressor.

Once the stressor is absent, the parasympathetic nervous system (PNS) is activated. Sapolsky (2004) notes that the PNS functions to maintain homeostasis. PNS activation decreases heart rate, constricts pupils, relaxes muscles and normalizes bodily functions, such as the digestive system. However, chronic stress leads to prolonged activation of the sympathetic nervous system. College students are at risk for chronic stress being that they are in, "developmental transition" and face academic challenges on a regular basis (Towbes & Cohen, 1996, p.199).

Developmental transition refers to the change from high school to college life, a time when students experience living away from home, an increase in workload, and face decisions regarding careers. Towbes and Cohen (1996) examined the reliability and validity of the 54-item College Chronic Life Stress Survey (CCLSS). The CCLSS was tested to account for the relationship between chronic stress and psychological distress in students. They found that chronic stress was a predictor of distress in students (Towbes & Cohen, 1996). Chronic stress puts students at risk for the negative health related consequences of prolonged activation of the SNS.

For instance, Fuchs and Flügge (2011) found that prolonged activation of the SNS can lead to damaging effects on the body and brain. While, McEwen, Nasca, and Gray (2015) highlight that chronic stress leads to changes, “in the structure of the hypothalamus, prefrontal cortex, and amygdala” (Tanzini, 2015, p. 2). Additionally, illnesses such as heart disease, metabolic syndrome X, sexual dysfunctions, anxiety, and depression have been linked to chronic stress (Sapolsky, 2004). With, Sapolsky (2004) noting that stress can also affect memory and learning.

Furthermore, Gulewitsch, Enck, Schwille-Kiuntke, Weimer, and Schlarb (2013) found that students with irritable bowel syndrome had elevated levels of chronic stress and mental strain. While, Rawson, Bloomer and Kendall (1994) found correlations between stress and physical illness, and between anxiety, physical illness, and depression in students. Chronic stress can also affect students’ mental health. For instance, Rosiek, Rosiek-Kryszewska, Leksowski, and Leksowski (2016) note that chronic stress affected students’ mental health and suicidal thinking. The consequences of stress on health are many; however, Gibbons, Dempster and Moutray (2011) examined how stress can potentially benefit students.

Eustress is, “stress that is beneficial or associated with a feeling of fulfillment and achievement rather than anxiety” (Colman, 2008, p.301). Gibbons et al., (2011) surveyed student’s levels of control, self-efficacy, support, and coping style, as well as what they deemed as distress or eustress. Gibbons et al., (2011) found that students experienced challenges that led to distress, but they also faced challenges that led to eustress. Students with higher levels of self-efficacy and support had higher levels of well-being and were more likely to experience eustress. According to, “Romano (1992), stress results from the interaction between stressors and the individual's perception and reaction to those stressors” (Ross, Niebling, & Heckert, 1999, p.312).

Folkman, Lazarus, Gruen, DeLongis and Sarason’s (1986) cognitive based, “stress and coping theory” supports this notion. Folkman and Hogan (1984) indicates that stress involves a, “cognitive appraisal, (primary appraisal) and a secondary appraisal” (p.839). Primary appraisal refers to how one judges a stressor - (benign or threatening). Secondary appraisal involves assessment of the resources available to cope with the stressor. If the situation or event is labeled as benign, the stress response may not ensue. However, if the situation or event is threatening, secondary appraisal occurs to assess resources. Coping allows college students to manage stress; however, some coping mechanisms are harmful rather than helpful.

According to Substance Abuse and Mental Health Services Administration (2014), 22.3% of college students use illicit drugs, while 39% engage in binge drinking. College students are also using newer drug delivering devices, such as hookah. Grinberg, Hart, Shapiro, Keith, Taha, Mcneil, and Goodwin (2015) surveyed 1799 students and found that 14.1% of students had used hookah in the past month. Hookah users were also found more likely to use illicit drugs compared to students who did not use hookah (Grinberg et al., 2015).

Similarly, alcohol, cannabis, opioid, and prescription drug use have been studied in student populations. Students are at a higher risk of using these drugs due to the amount of stress that they experience. For instance, Broman (2005) notes that substance use was related to past trauma experiences in undergraduates. While, Rutledge and Sher (2011) found that students were more susceptible to using alcohol if they experienced negative life events. Additionally, Park, Armeli, and Tennen (2004) found that drinking behavior increased on days that students perceived events as increasingly stressful. The consequences of using drugs and alcohol as coping tools are detrimental to students in various ways.

For instance, Degenhardt and Hall (2012) reports an increase in chances of contracting diseases such as HIV and Hepatitis B and C, due to drug use. While, McCabe, Knight, Teter and Wechsler (2005) found that students who abused prescription drugs reported dangerous driving behavior. Drugs and alcohol serve as an easy escape from stress. However, the consequences of substance use can last a lifetime. Finding adaptive coping strategies that are feasible and effective at decreasing stress levels in college students is essential.

“Mindfulness” is an adaptive coping strategy, which has been reviewed in the literature. Mindfulness involves, “paying full attention to the present moment through the direct perceptions of our bodily senses, emotions and thoughts, without judgment” (Leeming, Madden & Marlan, 2010, p. 571). Multiple researchers have examined mindfulness and its ability to decrease stress levels. In (Baer, Carmody & Hunsinger, 2012), eighty-seven adults with stress produced from chronic pain, illness or life circumstances, were taught Mindfulness Based Stress Reduction (MBSR). Participants were instructed to conduct MBSR at home for eight-weeks. Baer et al., (2012) found that participants’ stress levels had decreased within four weeks of treatment.

Additionally, Cisneros, Robert-Mccomb, Norman, and Qian (2011) found that a mindfulness based exercise program led to a significant difference in anxiety scores of female college students. While, Ratanasiripong, Park, Ratanasiripong, and Kathalae (2015) found a decrease in students' stress and anxiety levels at post-test evaluations, due to mindfulness. Feasible techniques such as mindfulness, can potentially buffer the effects of stress on the college population.

Another feasible stress managing technique is singing. Singing is a free, practical and effortless action, which requires only ones' voice (Harrison, Mcneely & Earhart, 2017). Unlike speaking, singing requires the use of breath, especially when singing higher notes or for longer intervals (Greenberg, 2013). In Western Culture, singing style transformed from the 14th through the 21st century. Falsetto, castrati, and bel canto were the earliest variations in singing style and voice production used in the United States (Kennedy & Bourne-Kennedy, 2012). However, singing is an action which expands beyond the Western United States.

According to Sloboda, Davidson and Howe (1994), "musical ability" may be universal. Weinstein, Launay, Pearce, Dunbar and Stewart (2016) examined singing and social bonding in small and large groups. They found that group singing led to social closeness and positive affect. These results were also found in larger groups with individuals who did not know each other. Additionally, decreased negative affect and pain thresholds were noted (Weinstein et al., 2016). These findings support the notion that the ability to make music may be a product of evolution (Huron, 2001). However, further study is needed to determine the validity of such notion (Huron, 2001).

Although studies have not been able to determine whether singing is an evolutionary adaptation, literature has shown that singing can decrease stress levels. Beck, Gottfried, Hall,

Cisler and Bozeman (2006), studied the effects of solo-singing on cortisol and Secretory Immunoglobulin A (S-IgA) levels of performers. Saliva samples were collected before and after solo-singing to detect changes in stress markers. Results showed that S-IgA increased while levels of cortisol decreased post-singing. Additionally, decreased levels of cortisol correlated with performance satisfaction, while levels of S-IgA correlated to performers' feelings of well-being and separation from artist identity (Beck et al., 2006).

Similarly, Fancourt, Aufegger and Williamon (2015) monitored participants during high-stress (audience present) and low-stress (no audience) singing. Fancourt et al., (2015) found that high-stress performances led to increases in cortisol and glucocorticoid levels. However, low-stress singing led to a decrease in stress markers. Kreutz, Bongard, Rohrman, Hodapp, and Grebe (2004) also studied changes in emotional states and S-IgA levels. However, Kreutz et al., (2004) compared the effects of singing and listening to music on emotional states and S-IgA. Saliva samples were collected and results showed that singing led to increased positive affect and S-IgA levels, while listening to music led to increased negative affect and decreased cortisol levels.

Moreover, Grape, Sandgren, Hansson, Ericson, and Theorell (2002) studied the effects of singing on well-being in professional singers and amateurs. Professional and amateur singers were separated into two groups of eight. Oxytocin, cortisol levels, and Visual Analog Scale (VAS) distress scores were recorded thirty minutes before and after each lesson. Results showed that both groups had increased levels of oxytocin, while only amateurs had increased levels of joy based on the VAS scale (Grape et al., 2002).

Likewise, Clift and Hancox (2001) surveyed choral members' opinions on perceived benefits of singing. The first survey contained open-ended questions with results showing that

84% of participants had improved moods and lower stress levels due to singing. Based on participants' responses to the first survey, a second survey with close-ended questions was created showing that over 40% of participants, "strongly agreed" that singing improved their mood (Clift & Hancox, 2001). The benefits of singing on stress and emotional states have been studied mostly in choir members and professional singers. However, Crino, Larkin, and Phelps (2010) found that singing affects stress markers in non-human species.

Crino et al., (2010) studied singing behavior in the short-tailed singing mouse. These mice use singing for reproductive and social interactions. An open-field behavioral test was used to observe proactive and reactive coping styles in singing mice. Stress markers were measured through "fecal corticosterone metabolites" and "stress-induced CORT". Results showed that mice who sang more in the open-field test, had lower levels of stress-induced CORT than those who sang less (Crino et al., 2010, p.334).

The literature on singing and stress highlights that singing can decrease stress levels and physiological markers associated with stress. Studies have found that singing decreases stress levels in those with singing experience and mice. Additionally, few studies have shown that singing improved mood and increased joy in amateur singers. However, few studies have observed the effects of singing on stress in college students with little to no singing experience, who sing in a naturally stressful environment. The following study hypothesized that students with little to no singing experience who sang while in their natural environments, would show decreased stress levels, post-singing.

Methods

Participants

Students from the City University of New York, Hunter College were recruited via flyers (see Appendix A) which were placed throughout campus. The study was also posted on the Hunter College Psychology Department Subject Pool (SONA System) (see Appendix B) where students could sign up to obtain research credits. Eligibility criteria for the study included being a Hunter College student between eighteen and thirty-five years of age. The age range was limited to produce a concise sample of participants.

Students also had to answer, “No” to the following questions; Are you currently part of a choir, chorus, singing group, band or other, which requires you to sing? Have you ever been part of a choir, chorus, singing group, band or other, which requires you to sing? Do you sing more than two times a day? All participants signed up for the study through SONA Systems. The final sample consisted of 26 participants, 92.31% of them female. Ethnic distributions were as follows; 65.38% Asian, 15.38% Other, 11.54% Native Hawaiian/Pacific Islander, 3.85% White and 3.85% African American or Black.

Materials

Qualtrics Survey Software, a web-based survey software, was used to create the online survey. The survey contained the Distress Thermometer Subjective Units of Distress Scale (SUDS) (Department of Veteran Affairs, 2012; Wolpe, 1990), which students used to assess their stress levels (see Appendix C). The Singing Report (see Appendix D) was also within the survey and it measured duration and quantity of song.

Procedure

Participants emailed the Primary Investigator (PI) to state their interests in the study or signed up for the study via Hunter SONA Systems. Participants who emailed the PI were instructed to visit SONA Systems to sign up for the study. Once participants signed up for the

study they gained access to the survey link, which was posted by the PI on SONA. SONA System provided a syntax that when added to the survey link, allowed for the creation of a uniquely coded id for each participant.

Once participants clicked the survey link, they saw the Intake Questions (see Appendix E). The intake questions were used to gather demographic information from participants and to screen for eligibility. Participants who did not meet eligibility criteria for the study were prompted to the end of the survey. Participants who met eligibility requirements gained access to view the Consent Form (see Appendix F). Those who did not consent were prompted to the end of the survey.

After consenting, participants viewed the directions (see Appendix G) and the SUDS scale-no singing (see Appendix H). Participants answered the SUDS scale-no singing, twice a day, for the first three days of the study. On the 4th-6th days of the study, participants sang for at least two minutes, three times a day, and recorded their stress levels on the SUDS scale-before singing (see Appendix I) and the SUDS scale-after singing (see Appendix J).

On day seven through nine, participants did not sing but they still recorded their stress levels twice a day on the SUDS scale-no singing. The singing report was to be completed once a day on days that participants sang. Once participants finished the study, the PI sent participants a thank you email. Participants received credit towards their research requirement for participating in the study.

Results

Twenty-five participants did not complete the study and sixty-five did not meet eligibility requirements. Twenty-six students participated in the study, but one participant did not complete the baseline portion of the study and this participant's data was excluded from the analysis. For

each participant that completed the study, each day's average stress levels at baseline, before singing, and after singing were calculated. These daily means were then used to calculate the participant's three stress-level averages: their baseline average, before singing average and after singing average.

There were no outliers in the data, and the data distribution did not differ significantly from normal, as assessed by a boxplot and the Shapiro-Wilk test ($p > .05$), respectively. The assumption of sphericity was not violated, as measured by Mauchly's test of sphericity, $\chi^2(2) = 2.953$, $p = .228$. A one-way repeated measures ANOVA showed a significant main effect for Condition, $F(2, 48) = 17.378$, $p < .0005$, partial $\eta^2 = .420$. Post hoc Bonferroni comparisons showed there was a statistically significant difference in stress level from baseline ($M = 36.71$, $SD = 12.96$) to before singing ($M = 43.75$, $SD = 14.31$), $p = .008$, 95% CI [1.60, 12.48]; from baseline to after singing ($M = 28.65$, $SD = 16.86$), $p = .031$, 95% CI [0.62, 15.52]; and from before singing to after singing, $p < .0005$, 95% CI [8.35, 21.85]. Data obtained from completed singing reports was inconsistent hence; we were unable to examine the relationship between duration of singing and stress.

Discussion

Studies have found that singing decreases stress levels in those with singing experience and mice (Crino et al., 2010; Fancourt et al., 2015; Gottfried et al., 2006). However, it is unclear whether singing decreases stress levels in college students with little to no singing experience, while singing in a naturally stressful environment. College students experience increased amounts of stress, which increases their risk of negative health and academic outcomes (Pritchard et al., 2007; Rawson et al., 1994; Tinto, 1987). Therefore, it is essential that stress

managing techniques which are feasible and effective at decreasing stress levels in the college population be examined.

The current study examined whether singing would decrease stress levels of college students with little to no singing experience, who sang in their natural environment. Results showed a significant decrease in after singing stress average, compared to stress average before singing. Although previous studies have been conducted on singing and stress, many focus on those with singing experience. This study screened participants for past and present singing experience and asked participants if they sang more than twice a day. This criterion was included to account for singing experience, as well as for changes in stress levels due to singing three times a day. Results indicated that singing three-times a day, decreased stress levels in our sample.

Furthermore, this study aimed to have participants sing in a low-stress singing environment. Fancourt et al., (2015) found that low-stress singing (no audience present) decreased stress markers in participants. However, high-stress singing (audience present) increased stress markers. Participants in this study could sing wherever they wanted, in a low voice. This option was included to account for the findings of (Fancourt et al., 2015). The present study provided a low-stress singing option for students. Results propose that high-stress singing did not take place being that participants in the sample did not experience an increase in stress levels after singing.

Participants in this study were also asked to sing when they were stressed and practice was not arranged by the PI. Results showed that before-singing stress average was higher than baseline stress average, which provides possible confirmation that participants sang when they were stressed, and that they adhered to instructions. Gale, Enright, Reagon, Lewis, and Van

Deursen (2012) found that cancer patients and caregivers who sang in a choir, experienced decreased stress levels post-singing. However, these patients practiced and were trained to sing in the choir. According to Cottrell (2010), singing in trained choir members is accompanied by a combination of diaphragmatic breathing and chest breathing.

Diaphragmatic breathing is known to decrease stress levels and it is promoted as a stress managing technique (Kim & Burge, 2012). Therefore, it is possible that the stress reduction found in the current study was not due to diaphragmatic breathing being that participants were not trained singers; however, this is not clear. Participants in the current study were not assessed for use of diaphragmatic breathing techniques during singing. Future studies may distinguish if diaphragmatic breathing in trained singers vs. non-trained persons, mediates decreased stress levels.

The current study also had participants sing in their natural environments, while they were stressed. Previous studies such as, Sakano et al., (2014) observed the effects of singing on the mental and oral condition of elderly patients in a lab and found that VAS scores and total mood disturbance scores improved. However, in Sakano et al., (2014) participants sang when prompted and they were informed to sing three songs in their entirety. Our study had no restrictions on what students sang aside from a time duration of at least two minutes, and singing while stressed.

The lack of stringency on song choice and environment, provided participants the liberty to sing when they were stressed. Additionally, this aimed to decrease the likelihood of students worrying about singing the songs correctly. Lastly, results showed that after-singing stress average was significantly lower than baseline stress average. This finding was unexpected and

suggests that students who signed up for the study were stressed and interested in a stress managing technique, however, this is unclear.

Limitations

Despite the confirmation of our hypothesis, this study presents limitations which future studies may resolve. For instance, the number of students who did not qualify for the study may support the notion proposed by Huron (2001). Many participants whom signed up for the study had singing experience and did not qualify. If singing is an evolutionary adaptation, many people may already sing or use singing as a stress managing technique.

Another limitation of this study was attrition rate. Attrition rate for the study and the singing report was high. Because of this, we were unable to examine the relationship between duration of singing and stress. Future studies may be able to capture song duration more precisely. Reasons for high attrition rates are unclear, however, shortening the amount of days required to complete the study may lower attrition. In addition, offering daily incentives or incentives of high value (money or gift cards) may also help to decrease attrition.

The use of self-report data was another limitation of the study. Participants were informed to sing and the data suggest that participants sang when stressed however, we are not certain that singing occurred. In future studies, including a question that asks participants if they sang, could shed light on whether the intervention was performed. A controlled environment such as a lab, may also increase validity and reliability of the results.

For instance, a lab experiment would allow the experimenter to assess stress levels upon entrance to the lab, to then compare stress levels pre-and post-singing. Sakano et al., (2014) which used a lab environment used this design. However, a lab design would have defeated the purpose of this study, which aimed to assess stress levels of college students in their natural

environments while they were stressed. Paradiso, Faetti and Werner (2011) highlight a possible solution to account for the issues associated with a natural design; the use of wearable monitoring systems.

Wearable monitoring systems (WMS) are devices that facilitate remote monitoring of biofeedback measures and provide information on psychological and physiological states of users. They can be used, “during the usual daily life, during sleep or even to monitor behavioral indexes and mood disorders” (Paradiso et al., 2011, p.2250). In conjunction with journaling of times of day that singing occurred, WMS may serve to assess stress levels before and after singing without the use of a lab.

In future studies, adding a control group may also increase reliability and validity of the results. Including a control group that conducts an activity other than singing at the same rate as the experimental group, may shed light on whether singing is decreasing stress levels. Lastly, the sample in this study was mostly female and a high percentage of the women were Asian. It is unclear as to why the sample was mostly female. This phenomenon was also found in the complete sample that signed up for the study. Literature suggests that females are more likely to experience stress (American Psychological Association, 2012); however, it is unclear whether this phenomenon affected the sample.

The current study shows that singing is effective in decreasing stress levels in students with little to no singing experience. Additionally, students in this sample sang when they were stressed and in their natural environments. The results of this study suggest that singing is an effective stress management tool for college students with little to no singing experience. Furthermore, this study brings into question the use of diaphragmatic breathing in trained singers vs. non-trained singers. In future studies, the distinction between trained singers and non-trained

singers can be explored to distinguish whether singing or diaphragmatic breathing leads to decreased stress levels while singing. Singing is a stress management technique which not only decreases stress levels in those with singing experience, but that may also benefit non-singers. However, due to limitations of this study further studies are needed to increase validity and reliability of these results.

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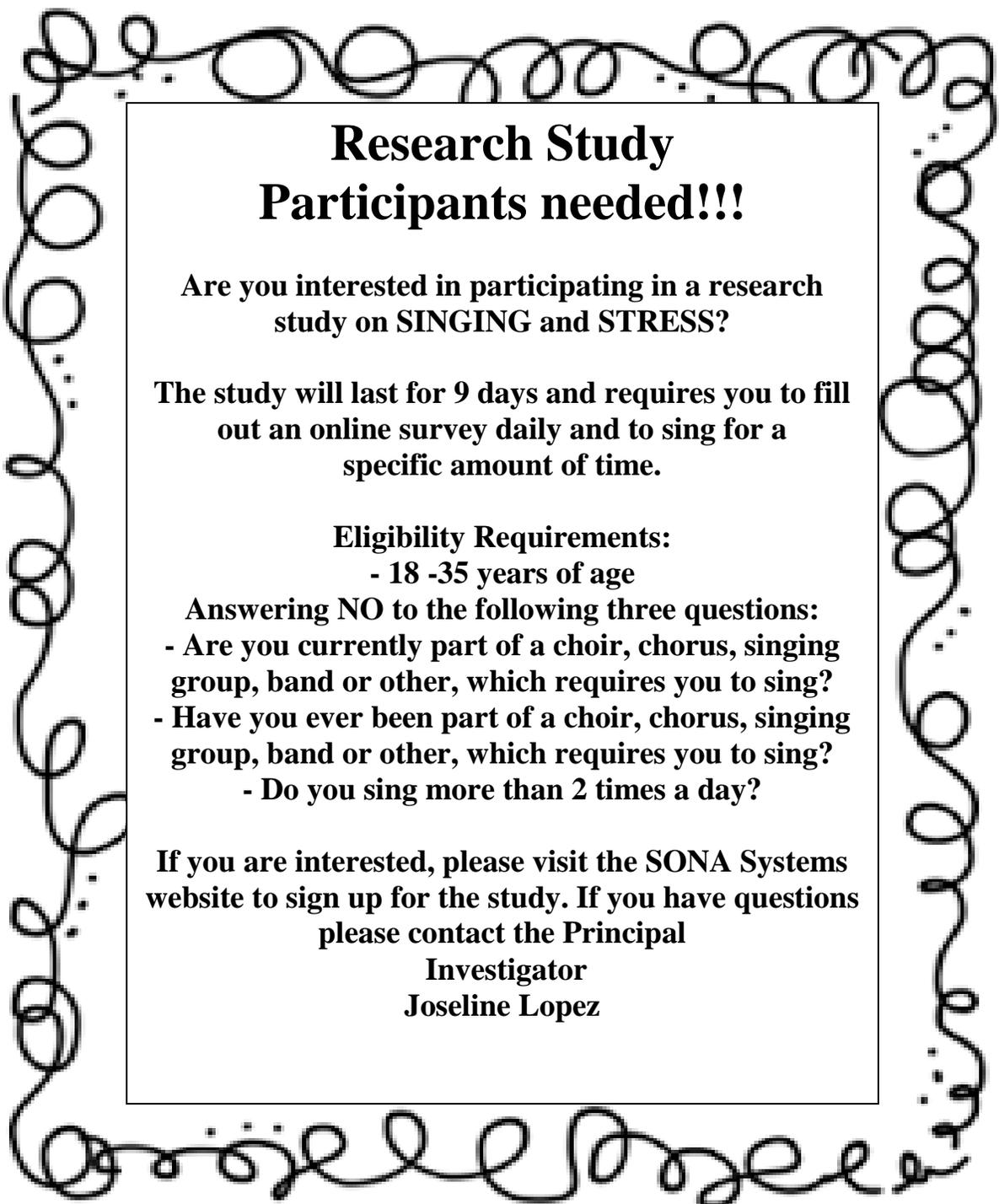
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Appendix A

Flyer



**Research Study
Participants needed!!!**

Are you interested in participating in a research study on SINGING and STRESS?

The study will last for 9 days and requires you to fill out an online survey daily and to sing for a specific amount of time.

Eligibility Requirements:

- 18 -35 years of age

Answering NO to the following three questions:

- Are you currently part of a choir, chorus, singing group, band or other, which requires you to sing?**
- Have you ever been part of a choir, chorus, singing group, band or other, which requires you to sing?**
- Do you sing more than 2 times a day?**

If you are interested, please visit the SONA Systems website to sign up for the study. If you have questions please contact the Principal

**Investigator
Joseline Lopez**

Appendix B

SONA Advertisement

****THIS IS A 9 DAY STUDY** YOU WILL HAVE TO ANSWER THE SURVEY MORE THAN ONCE A DAY USING THE LINK PROVIDED TO YOU ONCE YOU SIGN UP FOR THE STUDY.**

***YOU SHOULD CHECK THE EMAIL ASSOCIATED WITH YOUR SONA SYSTEMS ACCOUNT EVERY DAY FOR REMINDERS ABOUT THE STUDY. ***

This research study will examine the effects of singing on daily stress levels. You will be asked a few questions to determine if you are eligible for the study. **IF YOU ARE NOT ELIGIBLE YOU WILL BE INFORMED WHEN ANSWERING THE QUESTIONS IN THE SURVEY LINK.** If you are eligible, you will be asked to sign a consent form and do the following:

DAY 1- 3 of the study

-DO NOT sing

-Answer the SUD Scale for “NO SINGING” 2 times a day.

DAY 4- 6 of the study

-*SING* (3 times a day for at least 2 minutes **WHEN YOU ARE STRESSED**)

-Answer the SUD Scale for “DAYS ON WHICH YOU SING” before and after singing, each time you sing.

-Answer the singing report.

DAY 7-9

-DO NOT sing

-Answer the SUD Scale for “NO SINGING” 2 times a day.

The SUD scale will be available to you via Qualtrics Software system online provided through the link on SONA.

THE ENTIRE STUDY WILL LAST 9 DAYS.

Criteria for participating in this study include:

Being a Hunter college student who is at least 18-35 years of age. You would also have to answer no to the following questions:

1. Are you currently part of a choir, chorus, singing group, band or other, which requires you to sing?
2. Have you ever been part of a choir, chorus, singing group, band or other, which requires you to sing?
3. Do you sing more than 2 times a day?

Participants will be compensated for their time with three credits towards their PSYCH 100 research requirement. Joseline Lopez is the Principal Investigator on this study. If you have any questions about this experiment, you can contact her. The Faculty Advisor is Dawn Dugan.

Appendix C

The Distress Thermometer-Subjective Units of Distress Scale (SUDS) (Department of Veteran Affairs, 2012; Wolpe, 1990).

Try to get used to rating your distress on a scale of 0-100. Imagine you have a 'distress thermometer' to measure your feelings according to the following scale.

- 100 Highest distress/fear/anxiety/discomfort that you have ever felt
- 90 Extremely anxious/distressed
- 80 Very anxious/distressed, can't concentrate
- 70 Quite anxious/distressed, interfering with performance
- 60
- 50 Moderate anxiety/distress, uncomfortable but can continue to perform
- 40
- 30 Mild anxiety/distress, no interference with performance
- 20 Minimal anxiety/distress
- 10 Alert and awake, concentrating well
- 0 Totally relaxed

Appendix D

Singing Report

Please insert the total amount of songs you sung today.

Please insert the amount of time you spent singing today. (Minutes, seconds, etc.)

Appendix E

Intake Questions

1. Are you 18 or older? Yes or No?

2. "Is this your first time taking the survey?"

Yes or no?

3. Are you currently part of a choir, chorus, singing group, band or other, which requires you to sing? Yes or no?

4. Have you ever been part of a choir, chorus, singing group, band or other, which requires you to sing? Yes or No?

5. Do you sing more than 2 times a day? yes or no?

6. Please indicate your sex:

7. Please indicate your ethnicity:

White

Black or African American

American Indian or Alaska Native

Asian

Native Hawaiian or Pacific Islander

Other

Appendix F

Consent Form

THE CITY UNIVERSITY OF NEW YORK

Hunter College

Psychology Department

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Title of Research Study: Singing and Stress.

Principal Investigator: Joseline Lopez BA in Psychology Student

Faculty Advisor: Dawn D. Dugan, PhD.

You are being asked to participate in a research study because you are a student at Hunter College between the ages of 18-35 who has little to no prior history of singing.

Purpose:

The purpose of this research study is to investigate the effects of singing on stress.

Time Commitment:

***** THIS STUDY IS 9 DAYS LONG AND YOU WILL HAVE TO FILL OUT THE SURVEY MORE THAN ONCE A DAY. ***** You should check the email associated with your SONA systems account every day for reminders about the study.**

The breakdown of the time is illustrated below.

Procedures

If you volunteer to participate in this research study, we will ask you to do the following:

Day 1-3 of the study

-DO NOT sing

-Answer the SUD Scale for "NO SINGING" 2 times a day

Day 4-6 of the study

- **SING (3 times a day for at least 2 MINUTES WHEN YOU ARE STRESSED)**
- **Answer the SUDs scale for “DAYS ON WHICH YOU SING” before and after singing, each time you sing.**
- **Fill out the singing report once a day.**

Days 7-9 of the study

- **DO NOT sing**
- **Answer the SUD Scale for "NO SINGING" 2 times a day.**

Potential Risks or Discomforts:

Include minimal:

Fatigue from singing and reporting your singing and stress behaviors

Vocal fatigue from singing

Feeling self-conscious of others hearing you sing

Feeling self-conscious of your own voice

Triggering of emotions

Increased stress levels

Eligibility Requirements for the Study:

- 18 -35 years of age

Answering no to the following questions:

-Are you currently part of a choir, chorus, singing group, band or other, which requires you to sing?

-Have you ever been part of a choir, chorus, singing group, band or other, which requires you to sing?

-Do you sing more than 2 times a day?

Potential Benefits:

-Participating in the study may lead to a decrease in stress levels.

-This study may also help to make known the benefits of singing on stress.

If you feel that your stress level is increasing due to singing, you should stop singing right away and inform the Principal investigator, Joseline Lopez or the Faculty Advisor.

If you feel that you cannot sing due to illness, you should stop singing as well and inform the Principal Investigator. You can stop singing and stop filling out the forms at any time if you start to feel fatigued. You should inform the Principal Investigator or the Faculty Advisor if you feel fatigued from filling out the surveys.

Alternatives to Participation:

You will not receive any payment for participating in this research study.

Participants will receive three credits towards their research requirement for completing the study.

Participants who withdraw from the study will receive credits as described below.

One credits for 1-3 days of participation

Two credits for 4-6 days of participation

Three credits for 7-9 days of participation

Hunter College has alternatives to participating in research for fulfilling the research requirement. For further information on alternative ways to receive the research credit, please contact the Hunter College Psychology department

New Information:

You will be notified about any new information regarding this study that may affect your willingness to participate in a timely manner.

Confidentiality:

We will make our best efforts to maintain confidentiality of any information that is collected during this research study, and that can identify you. We will disclose this information only with your permission or as required by law.

We will protect your confidentiality by storing data on Qualtrics software systems, which is a password protected software program. Private computers, which require a password to access, will be used to analyze the data. Your survey will not contain identifying information however; coding will be used to know if you have completed the survey. The codes will be stored separately from the surveys and only the principal investigator will have access to the codes through Qualtrics software systems, on a password-protected account and password-protected computer.

Authorized CUNY staff, the Faculty Advisor Dawn Dorothy and government agencies that oversee this type of research may have access to research data and records in order to monitor the research. Research records provided to authorized, non-CUNY individuals will not contain identifiable information about you. Publications and/or presentations that result from this study will not identify you by name.

Participants' Rights:

-Your participation in this research study is voluntary. If you decide not to participate, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled.

-Your participation or non-participation in this study will not affect your grades, your academic standing with CUNY, or any other status in the College.

-You can decide to withdraw your consent and stop participating in this research at any time, without any penalty.

Questions, Comments or Concerns:

If you have any questions, comments or concerns about the research, you can speak to one of the following researchers: Joseline Lopez, Principal Investigator, or Dawn Dugan PhD. Faculty Advisor.

If you have questions about your rights as a research participant, or you have comments or concerns that you would like to discuss with someone other than the researchers, please call the CUNY Research Compliance Administrator

Alternately, you can write to:

CUNY Office of the Vice Chancellor for Research

Attn: Research Compliance Administrator

205 East 42nd Street

New York, NY 10017

Signature of Participant:

If you agree to participate in this research study, please click yes.

You will receive a copy of this consent form to keep via email.

Appendix G

Directions

THIS IS A 9 DAY STUDY. Please see below for instructions on completing the study.

*Please start the study on the day you consent. *

DAY 1- 3

- DO NOT Sing
- Answer the SUDS for “NO SINGING” 2 times a day.

DAY 4- 6

- ****SING**** WHEN YOU ARE STRESSED, 3 times a day for at least 2 minutes
- Answer the SUD Scale for “DAYS ON WHICH YOU SING” before and after singing, each time you sing.
- Answer the singing report once a day

DAY 7-9

- DO NOT sing
- Answer the SUD Scale for “NO SINGING” 2 times a day.

Please Click Next and answer the SUD Scale based on the directions above.

Appendix H

The Distress Thermometer-Subjective Units of Distress Scale (SUDS)-No singing (Department of Veteran Affairs, 2012; Wolpe, 1990).

Answer this question 2 times a day on days that you DO NOT SING. If you SANG TODAY, please leave this blank and click next.

Try to get used to rating your distress on a scale of 0-100. Imagine you have a 'distress thermometer' to measure your feelings according to the following scale.

- 100 Highest distress/fear/anxiety/discomfort that you have ever felt
- 90 Extremely anxious/distressed
- 80 Very anxious/distressed, can't concentrate
- 70 Quite anxious/distressed, interfering with performance
- 60
- 50 Moderate anxiety/distress, uncomfortable but can continue to perform
- 40
- 30 Mild anxiety/distress, no interference with performance
- 20 Minimal anxiety/distress
- 10 Alert and awake, concentrating well
- 0 Totally relaxed

Appendix I

The Distress Thermometer-Subjective Units of Distress Scale- Before Singing (Department of Veteran Affairs, 2012; Wolpe, 1990).

Answer this question 3 times a day ON DAYS THAT YOU SING; please choose your daily stress level BEFORE SINGING.

Try to get used to rating your distress on a scale of 0-100. Imagine you have a 'distress thermometer' to measure your feelings according to the following scale.

- 100 Highest distress/fear/anxiety/discomfort that you have ever felt
- 90 Extremely anxious/distressed
- 80 Very anxious/distressed, can't concentrate
- 70 Quite anxious/distressed, interfering with performance
- 60
- 50 Moderate anxiety/distress, uncomfortable but can continue to perform
- 40
- 30 Mild anxiety/distress, no interference with performance
- 20 Minimal anxiety/distress
- 10 Alert and awake, concentrating well
- 0 Totally relaxed

Appendix J

The Distress Thermometer-Subjective Units of Distress Scale- After Singing (Department of Veteran Affairs, 2012; Wolpe, 1990).

Answer this question 3 times a day ON DAYS THAT YOU SING, please choose your daily stress level AFTER SINGING.

Try to get used to rating your distress on a scale of 0-100. Imagine you have a 'distress thermometer' to measure your feelings according to the following scale.

- 100 Highest distress/fear/anxiety/discomfort that you have ever felt
- 90 Extremely anxious/distressed
- 80 Very anxious/distressed, can't concentrate
- 70 Quite anxious/distressed, interfering with performance
- 60
- 50 Moderate anxiety/distress, uncomfortable but can continue to perform
- 40
- 30 Mild anxiety/distress, no interference with performance
- 20 Minimal anxiety/distress
- 10 Alert and awake, concentrating well
- 0 Totally relaxed