# **Musical Stress Relief**

A Look into the Effects of Different Types of Music Practice on the Perceived

Stress Levels of Student Musicians

AP Research

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### **Literature Review**

The American Physiological Association reports that as of 2020, adult members of Generation Z (18-23 years old) report the highest stress level over the course of a month out of all generations (On a ten point scale, Gen Z averaged 6.1, Millennials averaged 5.6, Gen X averaged 5.2, Baby Boomers averaged a 4.0, and older adults averaged a 3.3), most likely due to an uncertain future induced by the COVID-19 pandemic (Stress in America, 2020). Additionally, the American Psychological Association found that in 2019 "nearly twice as many in the iGen 1999 cohort (7.8%) compared to the Millennial 1982 cohort (3.8%) reported thinking about suicide," which is the highest percent out of all generations (Binau, et al., 2019). Researchers from the University of Illinois and the University of California Berkeley found that increases in daily stress can lead to illness, and even slight increases in daily stress can lead to a negative mood (DeLongis, et al., 1988). Every person tries to minimize their stress; it simply is not something that people want to experience. Increased levels of stress can have effects on not only one's mental health, but also their physical health. Additionally, some symptoms of increased stress can snowball into depression and suicidal behavior. Therefore, we should be able to identify these stressors and find methods to counteract them.

Before going any further, it is important to acknowledge that "stress" is a very broad term that has many different definitions and uses. However, it is important to define stress for the terms of this paper as "the physiological or psychological response to internal or external stressors. Stress involves changes affecting nearly every system of the body, influencing how people feel and behave"(APA Dictionary of Psychology). Furthermore, this study will focus on perceived stress, which is defined to "typically [include] several psychological components of the stress response – feelings of overwhelm, or anxiety, as well as cognitions that demands

outweigh resources, or not having control" (Epel, et. al., 2018). Examples of stressors that might affect high school students' perceived stress include: tests/quizzes, extracurricular activities, postsecondary plans, work, social life, etc.

Student musicians are a specific group of people in Generation Z that have a potential added source of stress. Studies show that college age student musicians, particularly percussionists, have a heightened level of mental and physical stress due to the expectation of perfection while performing, and/or performing being their livelihood (Sandell, et al., 2009). This extra source of stress is often seen in a grade school setting too, where music students (4th-6th grade) were found to have increased academic stress as compared to students who had never or were not actively taking part in music lessons which involved performing in music competitions and participating in music playing tests (Wong, 2018). However, little comparable research has been conducted on high school student musicians. It stands to reason that high school student musicians, who are most often playing at a higher level and in a more competitive setting than elementary students, also experience a good amount of stress from their more advanced musical experiences.

This stress that students think they will experience from participating in music programs in high school is one reason as to why many students choose to not participate in music.

Research conducted by a graduate student from Georgia State University found that many middle school students choose not to continue band in high school because the band practices too much (Gibson, 2016). They think participating in band will increase their stress, as it is more work and time in addition to their school work and other activities. However, an interesting result appears when the effects of music on mental health and stress are looked at in a non-professional/recreational setting where the people playing often are either non-musicians or

are playing just for fun. When people who had experience in playing the piano were asked to play a piece of their choice after experiencing a stress inducing situation such as being asked to complete a puzzle in a timed manner, their stress levels lowered more than those who were experience in calligraphy and sculpting and asked to do their activities after the same stress inducing scenario (Toyoshima, et al. 2011). A similar study was conducted in which participants were asked to perform a stress inducing task (completing a puzzle in a set amount of time) and then were asked to either relax, continue the puzzle, or participate in a group music session. The method that was used differed from the aforementioned studies however, as they took blood samples to determine stress looking at the participants' DNA for genomic indicators of stress (Bittman, et al. 2005). After testing before and after the group music session, they found that the group music making session reversed stress indicators more than the other two groups, which shows that this method of testing for stress reduction corroborates the other studies' findings that recreational music making seems to lower stress levels in adults. Another study found that learning to play piano as an adult with no experience in a group setting also helped reduce stress levels of those learning (Dillon & Jutras, 2009). This soothing quality that playing music for fun seems to have extended into more serious mental health issues, with many mental health institutions using music in the form of group drumming sessions to help mediate recovery (Perkins, et al., 2016). These patients do not have any experience with making music, but all claim that making music in an informal group setting helps improve their mental health. All of these studies show that when people are making music in a recreational manner with no expectations that the music is performed well, the process of making music helps lower stress not only for trained musicians, but non-musicians as well.

Interestingly, this stress relieving property of making music extends to professional musicians who perform in more relaxed groups. When musicians in several samba bands in Toronto were interviewed about how participating in their groups relates to stress, members stated that they felt that making music helped to improve their mental health and stress levels, with some respondents calling playing samba music a spiritual experience (Pravaz, 2010). The difference between these musicians and and the musicians mentioned earlier that showed increased stress from performing is that the samba musicians do not see their performance in the same manner as other musicians view their performances. While musicians performing in a classical band or orchestra setting might feel pressured to play every single note perfectly, the samba musicians do not really even see their music making as a performance; they view it as a jam session with their friends that they do in public.

These two differing groups of studies show that in a professional context, making music can increase stress, while in an informal or recreational context making music can help lower stress levels. These two scenarios can be represented by practicing a piece of music for a performance versus playing a piece of music that will not be performed for one's own enjoyment. However, these types of studies have not been applied to high school musicians, a large group of musicians that experience consistent stress. High school students need to know how to minimize their stress as aforementioned studies have shown that this increased stress can lead to depression or even suicide. It is the intention of this study to identify if the trends found in older demographics apply to high school student musicians, particularly asking: How are the perceived stress levels of student musicians in the northwest suburbs of Chicago affected by practicing their instrument for a performance versus playing their instrument recreationally?

### **Methodology**

One method that has not been used to look at the effects of making music on stress is the Perceived Stress Scale (the PSS). This mainly has not been used previously because other researchers have had access to instruments such as cortisol tests that are a little bit more conclusive, but are more tedious and costly to administer. The PSS measures stress with a ten question survey that measures the respondent's feelings and thoughts about how much stress they are under at a given point in time or over a given time period, which is referred to as their perceived stress (Phillips, 2013). As mentioned in the literature review, this perceived stress includes things like feelings of overwhelm, and anxiety (Epel, et. al., 2018). This scale is a useful instrument as it is not as tedious or invasive as other stress detecting instruments, making it more accessible for participants to take. It is also more cost effective as it does not require purchasing chemical tests to administer. As mentioned earlier, one of the most common ways to detect stress is to collect a sample of a participant's saliva and measure the levels of the cortisol hormone which is an indicator for level of stress. While this method gives a more tangible result, the PSS has been shown to provide results that align with cortisol test results. Researchers in India studied the stress levels of biology majors over the course of a school year, collecting PSS and cortisol data three times per semester. The study found that both tests showed a peak towards the end of the semester when assignments were due (Batabyal, et al., 2021). Another study looked into which version of the PSS is the most accurate (Figalová & Charvát 2021). The PSS has three used versions, the PSS-4, PSS-10, and PSS-14 (having 4, 10, and 14 questions respectively). The researchers administered all three versions of the scale to teachers in the Czech Republic, and found that the PSS-10 gives the most consistent results out of the three. Consequently, the

PSS-10 is the most widely used version of the scale. Therefore, the PSS-10 looks to be a reliable research instrument that will be easy to administer over the course of this study.

In order to find participants, the convenience sampling method was used. The band director at a public high school in the northwest suburbs of Chicago was contacted and asked to share a participation interest form with all band students. This form asked simply if the respondent would be interested in participating in the study. This initial form resulted in 38 participants representing a total group of about 200 students. After all data was collected, only 25 (10 in group A, 15 in group B) participant's responses were used for analysis due to some participants only filling out the form once, or not meeting the minimum number of hours played per week. This means that about 13 percent of the target population was represented, with all of the participants being between 14-18 years old and in high school. After using convenience sampling to find people who were interested in participating, volunteers were split randomly into two groups. Group A was asked to play music of their choice that they enjoyed for at least an hour a week with the only stipulation being that it couldn't be current school ensemble repertoire. Group B was asked to rehearse current school ensemble related music for at least an hour a week. Each group was asked to continue this over the course of four weeks, filling out the survey at the beginning of the study, again at the two week mark, and finally at the four week mark.

The aforementioned survey consisted of three portions. The first portion asked for the number of hours played in the past two weeks, the instruments played, and the individual's research ID number. The second portion consisted of the 10 PSS questions along with basic directions for responding to the PSS questions. The final portion consisted of an optional open ended question that asked participants to share their thoughts on how making music affected

their stress levels over the course of two weeks. Additionally, there was an informed consent form that participants had to agree to in order for their information to be used. Participants under the age of 18 were asked to have their parents agree to the informed consent form as well.

As mentioned in the literature review, high school students experience large amounts of stress in general, and participation in the study could potentially affect participants' stress levels and therefore results. This is why participants were only asked to play their instrument for about an hour each week (with the option to play more as long as they reported the approximate amount of time). Additionally, all data was collected through google forms, which made participating much more easier and accessible compared to having participants fill out physical forms and submit them to the researcher. Any stress that could come from having to spend time filling out the data form was hopefully negated by simplifying the data submission process and making it online. The researcher was also a member of the band program at the high school in question, and therefore would know the majority of participants. So, in order to maintain confidentiality and to prevent any bias coming from the researcher knowing participants, each participant was assigned a random ID number for them to enter into the collection form each time they filled it out. This allowed a change over time to be seen for each individual while also keeping their identities and information confidential.

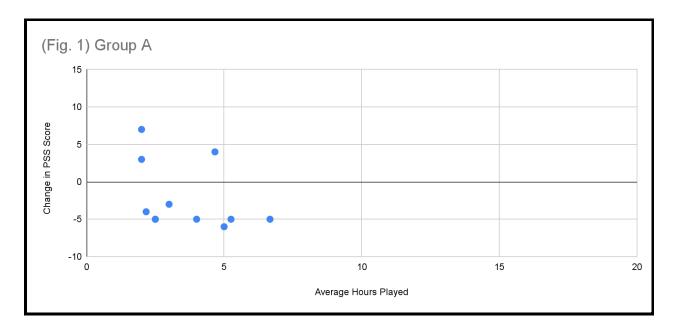
Although this method is well suited to answer the research question, there are still some limitations. The first limitation is that convenience sampling was used. By collecting data from participants who volunteered to participate, there may be a bias. For example, the type of students that would want to participate in a research study might generally be the same type of students that participate in many other stressful activities, which would skew the data to show higher stress levels despite any effect making music might have. Another limitation is the time

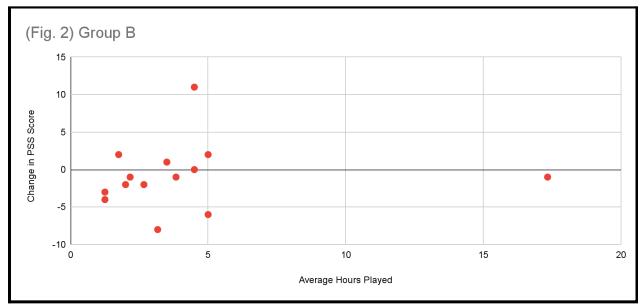
frame of the study. Because the study took place over the course of 28 days (including a 9 day spring break), participants may have forgotten to do their hour per week of playing. However, steps were taken to prevent this as reminder emails were sent out every two weeks, and participants were asked to report hours spent playing music. Additionally, a longer time frame to examine changes in PSS scores (such as 2-6 months) would help further eliminate errors contributed by outside stressors. Further research could also consider looking at a larger sample size, maybe even looking at students from multiple schools with different programs. This would allow a wider perspective to be reached as rigor and challenge in different programs might affect how stressed students are from practicing.

### **Results**

Over the course of four weeks, the average change in PSS score for both groups was negative, meaning that the participants' perceived stress levels decreased after spending at least an hour a week playing music, no matter what the music was for. Group A participants, who played at least an hour of music for their own personal enjoyment every week, experienced an average change of -2.18 points over the course of four weeks. Group B participants, who were asked to practice a piece that was going to be performed at a concert for at least an hour every week, experienced an average change of -0.86 points over the course of four weeks.

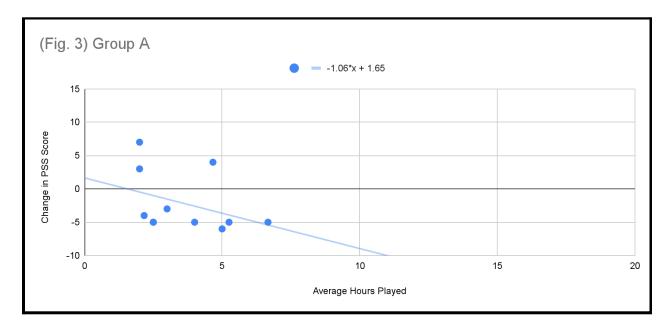
Additionally, plots of change in PSS score versus average hours of music played per week were created to see if there was a correlation between playing more and change in stress. These are shown below in figures 1 and 2.

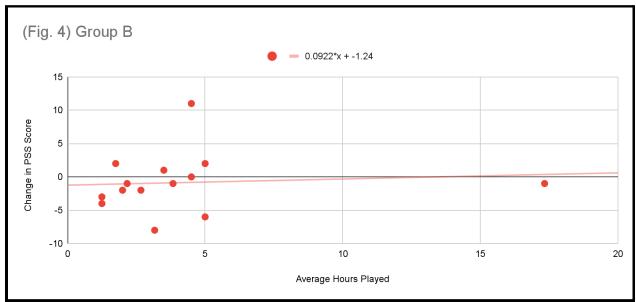




After adding linear lines of best fit to the data to try to identify a trend in change in PSS score with respect to hours played, separate trends were found for Group A and Group B. The line of best fit found for Group A (the group that played music for their own enjoyment) is  $\Delta P = -1.06H + 1.65$ . The line of best fit found for Group B (the group that practiced music that was going to be performed in concert) is  $\Delta P = 0.0922H - 1.24$ . In these equations, delta P represents change in PSS score, and H represents average hours played biweekly. The graphs

for this data are shown below in figures 3 and 4.





Finally, many participants used the optional free response to voice how they felt making music affected their stress levels. Participants in Group A mostly commented on how they felt that making music for their own enjoyment helped them manage stress from other academic and extracurricular responsibilities, with participant 17 stating that "playing music has helped [them] to relax on days that [they are] feeling overwhelmed at times", and participant 27 stating that

"sitting down and playing a fun instrument [they're] trying to learn was a way of escaping [stress] and just calmly letting [their] nerves go". Participants from Group B had similar outlooks on how practicing concert music affected their stress, with participant 36 stating that "practicing has been a way to focus on something other than the daily stresses", and participant 35 sharing that "Music was a good break to have when [they] had a good amount of homework," but they also noted that some stress came from "[having] to learn a new piece".

### **Discussion**

After calculating average change and looking at the trends of Change in PSS versus Average hours played, some conclusions can be made about the difference between the effects of playing music for fun and practicing for a concert on perceived stress. The group of participants who played music for their own enjoyment (Group A) experienced an average change of -2.18 points over the course of four weeks, while the participants ho practiced for a concert (Group B) experienced an average change of -0.86 points over the course of four weeks. This means that while participants who played music for their own enjoyment experienced a greater decrease in stress in a four week period, participants who practiced concert repertoire also experienced a smaller decrease in stress in the same period, insinuating that making music, regardless of the context, can help lower stress levels in high school student musicians. This was corroborated by some of the open ended feedback that was given by participants on how they thought making music affected their stress levels. Participants from Group A said that "making music helps [them] deal with [stress] and give [them] a break from doing ... homework and studying all the time." Students from Group B who only played music that was going to eventually be played in concert also said that "Music helped [them] take a break from homework and stress to just make

music and be happy." However, some participants from Group B also noted that practicing for auditions and other highly stressful performances did make them more stressed.

Another interesting aspect that seems to vary with what music is being played is the trend between Change in PSS Score and Hours Played. After plotting lines of best fit for both sets of data, Group A shows a trend of greater decreases in PSS scores as more time is spent playing, with a slope of -1.06. Group B, however, shows change in PSS scores increasing as more time is spent playing, with a slope of 0.0922. This is interesting because it means that the stress levels of student musicians who played music for fun decreased the longer they played, while the stress levels of students who practiced concert repertoire increased the longer they played. This is really interesting, as it means that while both ways of playing music seem to lower stress levels, they are opposite in how time spent playing affects them. However, these trend lines are prone to errors, as there are outliers in both data sets, and Group B in particular, has a much smaller trend as compared to Group A. This can be explained by the small sample size, and therefore this data should not be taken to be 100 percent accurate.

The findings of this study can be useful in many ways, and to many groups of people. First of all, this study shows that student musicians in high school can use their musicianship as an outlet to combat stress. As mentioned in the literature review, today's high school aged students are showing more signs of stress than any other generation. With students facing so much stress from school work, social life, extracurriculars, and other activities, it is pertinent that they have an outlet for relieving it. Students who happen to know how to play an instrument can use that as an outlet knowing that it will help lower their stress. They can achieve this by just playing in a school ensemble, or taking time out of their day to play music just for their own enjoyment if they want more effective stress relief. With that being said, if a student wants to

relieve stress by making music, the study shows that they should play more if they play music for fun, and play less if they are practicing concert music, if they want to have the most effective stress relief.

Another use for the results of this study is to encourage students to participate in high school music programs. One of the reasons that a student might not participate in music in high school is the fear of being overwhelmed with music and school work. This study actually suggests the opposite, and therefore can be used as a reason to participate in musical ensembles in high school, as even simply practicing school ensemble music is shown to be a good method of stress relief.

### **Conclusion**

In the end, this study sought to look into the effects of music on stress for high school musicians, and it had some reliable preliminary results. However, it would be pertinent for future, more long term research to be done in order for more definitive results to be obtained. While this study did a good job at looking at short term effects of making music for fun and practicing concert repertoire on perceived stress in high schoolers, it had several limitations that could be addressed in further research. These limitations include a small sample size, and a short time frame. If future research is done on this topic, it would need to utilize a larger, preferably random, sample population in order to have more accurate data. This study had one or two outliers in each data set that could have easily skewed the data and results. Further research should also consider collecting data from multiple schools, as each school's music program is different, and could yield different results. As the study looked at changes over time, it would also be important that any future studies looked at change over a longer time frame than one

month. Another consideration would be to limit playing time to exactly one hour per week, so that there is one less variable in play. This was not an option in this research study, as requiring an exact amount of time could have lowered participation since some participants might not have been willing to play/practice less. Finally, future research in this area could look to confirm this study's results using cortisol or other stress indication tests. These tests were not used in this study as the researcher did not have access to them, and they could potentially hinder voluntary participation.

Despite this study's limitations, it was ultimately able to reach its goal of providing preliminary insight into how making music recreationally, and professionally affects the stress of high school musicians. With its preliminary findings, the study gives music programs data that shows that musicianship can have a positive effect on stress, which can help to tear down barriers that some students see with participating in music. More importantly, it presents student musicians with a viable method for relieving stress, which helps them avoid the negative mental health effects that stress has had on their generation in particular.

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### **Appendix: Perceived Stress Scale**

## **Perceived Stress Scale**

A more precise measure of personal stress can be determined by using a variety of instruments that have been designed to help measure individual stress levels. The first of these is called the **Perceived Stress Scale**.

The Perceived Stress Scale (PSS) is a classic stress assessment instrument. The tool, while originally developed in 1983, remains a popular choice for helping us understand how different situations affect our feelings and our perceived stress. The questions in this scale ask about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly. That is, don't try to count up the number of times you felt a particular way; rather indicate the alternative that seems like a reasonable estimate.

 l. In the last month, how often have you been upset because of something that happened unexpectedly?
 2. In the last month, how often have you felt that you were unable to control the important things in your life?
 3. In the last month, how often have you felt nervous and stressed?
 4. In the last month, how often have you felt confident about your ability to handle your personal problems?
 5. In the last month, how often have you felt that things were going your way?
 6. In the last month, how often have you found that you could not cope with all the things that you had to do?
 7. In the last month, how often have you been able to control irritations in your life?
 8. In the last month, how often have you felt that you were on top of things?
 9. In the last month, how often have you been angered because of things that happened that were outside of your control?
 10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

### **Figuring Your PSS Score**

You can determine your PSS score by following these directions:

 First, reverse your scores for questions 4, 5, 7, and 8. On these 4 questions, change the scores like this:

$$0 = 4$$
,  $1 = 3$ ,  $2 = 2$ ,  $3 = 1$ ,  $4 = 0$ .

- Now add up your scores for each item to get a total. My total score is \_\_\_\_\_\_.
- Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress.
  - ► Scores ranging from 0-13 would be considered low stress.
  - ► Scores ranging from 14-26 would be considered moderate stress.
  - ► Scores ranging from 27-40 would be considered high perceived stress.

The Perceived Stress Scale is interesting and important because your perception of what is happening in your life is most important. Consider the idea that two individuals could have the exact same events and experiences in their lives for the past month. Depending on their perception, total score could put one of those individuals in the low stress category and the total score could put the second person in the high stress category.

**Disclaimer**: The scores on the following self-assessment do not reflect any particular diagnosis or course of treatment. They are meant as a tool to help assess your level of stress. If you have any further concerns about your current well being, you may contact EAP and talk confidentially to one of our specialists.

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