HIGH SCHOOL EDITION
Journal of Student Research
Volume 12 Issue 3 (2023)

Analyzing Music Performance Anxiety Within the Scope of Gender in Pianists

Stephanie Ma

The Woodlands High School

ABSTRACT

Music performance anxiety, or MPA, is a condition experienced by many musicians in performance where performers are self-critical while performing music. Although previous research has established the need for a high level of specificity in researching this topic due to the wide range of factors that impact this condition, few studies have attempted this high level of specificity by combining the study of MPA with two factors: gender and instrument. Thus, this study sought to investigate how gender affected MPA in one instrumentalist group, pianists, paving the way for more effective solutions for MPA targeting the unique traits of the group investigated. A survey was conducted with a variety of participants across the United States in which varying number scales were utilized across four survey sections; these sections addressed a various number of common MPA symptoms, including both those concerning the physiological aspects of anxiety and the psychological. Findings revealed that the relationship between gender and MPA was significant in pianists across all aspects of anxiety, as females tended to have more anxiety symptoms overall. However, this relationship's characteristics were only unique to pianists in the physiological aspect of MPA, as contrary to previous studies nonspecific to this instrumentalist group, female pianists were more likely to experience physiological symptoms of MPA. While results yielded about the psychological aspect of anxiety did show significance in the impact of gender, this relationship was similar to those found in other MPA studies nonspecific to pianists.

Literature Review

Music performance anxiety (MPA) is anxiety felt during music performance, where musicians are highly self-critical. This can come in the form of a variety of symptoms ranging from physiological factors to psychological. Commonly referred to as "stage fright," this anxiety for public performances has long been a prominent obstacle in the world of music, and will be the focus of inquiry for this paper. Due to the clear variance in symptoms of MPA between different musician groups, it is imperative that MPA treatment is optimized to target varying symptoms in order to best alleviate anxiety. Thus, this necessitates the detailed research of different musician groups and their experiences of MPA in order to further the optimization of treatments for traits unique to each group. Many previous studies in this field support the need for this additional research.

Potential Solutions for MPA

Firstly, a great number of studies show the potential for effective treatments for MPA. Researcher Emily Logan of the University of British Columbia conducted a study in which the effectiveness of a multi-modal intervention, a solution where multiple types of therapy were combined, led by a trained psychotherapist was tested. The 2022 study found that a "blended intervention program lowered participants 'MPA scores" (Logan, 2022). Logan concluded that a multi-modal intervention, a form of anxiety treatment that combines multiple types of therapy, is key to alleivating MPA, especially in collegiate settings. Likewise, Erin MacAfee and Gilles Comeau of the University of Ottawa found in their study that self-modeling interventions, where patients receive therapy by watching their successes, can also be

effective in decreasing MPA in college students. Both Macafee and Gilles's study and Logan's study concluded that there are various forms of interventions which could serve as strong solutions to performance anxiety, especially in a collegiate setting.

Factors Affecting MPA

However, there is evidence to suggest that the effectiveness of such solutions to MPA can vary among populations of musicians due to differences in MPA symptoms. In this regard, many prior studies have focused on such differences in age groups. A study by researchers Dianna T. Kenny and Margarat S. Osborne of the University of Sydney, for example, suggested that children experience MPA differently from adults because they have different "innate temperament; trait anxiety; increasing cognitive capacity, self-reflective function and capacity for perspective taking" (Kenny and Osborne, 2006). The conclusions of this study revealed that there are characteristics in young children that could decrease MPA. Similarly, other studies have focused on the differences in the way various genders are affected by MPA. Erinë Sokoli, researcher at the Department of Occupational and Environmental Health at the University of Lausanne, and her colleagues found that "compared to male students, female students reported significantly more anxious feelings" (Sokoli, 2022). The study concluded that female musicians are more likely to experience strong MPA. While the Kenny-Osborne and Sokoli studies focus on different factors that affect MPA (age and gender), both their findings support the conclusion that MPA varies significantly between different groups and therefore requires more specific research to support the development of more targeted solutions.

In addition, there is evidence to show that the instrument a musician plays can impact MPA. For example, the Sokoli study also elaborated that "Singers reported less anxious feelings and catastrophizing than instrumentalists" (Sokoli, 2022). Such evidence suggests that an instrument can change perceptions of MPA. An additional study conducted by Dorina Iusca at the University of Arts and Ion Dafinoiu at the University of Iasi, however, found that "[singers and string players] reported significant higher anxiety scores than pianists or woodwind / brass players" (Iusca and Dafinoiu, 2011). Though Iusca and Dafinouiu's and Sokol's studies contradict each other over the level of anxiety singers feel, both emphasize the importance of evaluating different populations of musicians separately to identify the best solutions for MPA for each group of musicians, as it is clear instruments, in addition to age and gender, greatly affect this condition.

In summary, these studies beg the question of whether pre-existing solutions for MPA truly apply to much of the musician population. From factors such as age, gender, and instrument, it is evident that there are a great number of variables affecting every musician's MPA. Therefore, it is clear that individual populations of musicians should be evaluated separately to determine the ideal solutions for their MPA.

Gap in Research

In this regard, although it is evident that many studies have compared the differences in MPA between either different genders or different instruments, there has been a lack of research concerning the combination of both factors. Specifically, a major knowledge gap exists in differences in MPA between genders for pianists. For instance, one study conducted by Diana Kenny of the University of Sydney found "Female musicians reported significantly more…music performance anxiety…than male musicians" (Kenny, 2012). However, this study did not specify how its results varied between musicians in different sections of the orchestra; it generalized its findings to all of the musicians in the orchestra pit it took a sample from. A similar example, the aforementioned Iusca-Dafinouiu study, saw that "There were differences among instrument categories regarding anxiety" (Iusca and Dafinouiu, 2011). The researchers also found that "Female performers showed higher anxiety scores than male performers" (Iusca and Dafinouiu, 2011). However, this study, similar to the 2012 Kenny study, did not elaborate or display data on the differences between genders in specific instruments. Likewise, a study by Jordan M. Edmonson of the University of North Texas also lacks this

specificity. Edmonson's study also noted that "females tend to self-report higher levels of anxiety" (Edmonson, 2012), but did not go into detail about this idea within individual instrumental categories. As the mentioned studies all focused on gender and instruments as separate entities, it is clear more specific research is needed on the combination of these factors. Thus, this paper will attempt to fill this knowledge gap by combining the factors of instrument and gender; this approach examines the impact of gender differences on MPA with the influence of one instrumental group–pianists. By filling in this gap, this study aims to provide more specific research for MPA that can serve as a reference for further inquiry into possible solutions, which can greatly benefit from the specificity of such research. Thus, the research question of this study was: To what extent and how does gender affect music performance anxiety in pianists? In this research, the differences between the symptoms that pianists of different genders experience while performing were the first main point of evaluation. An additional objective of study was the variations between the relationships found in gender and MPA in pianists and similar gender-MPA relationships in the body of musicians.

Method

In designing this study, it was evident that the research had to ideally capture the feelings of the subjects during piano performance. Thus, a survey was chosen as the preferred method due to its ability to collect data directly from participants with a large enough sample size to draw conclusions about overall trends (this was in contrast to other methods such as an interview, which would have collected similar personalized data about anxiety but which would not have yielded an appropriate sample size for the purpose of this study). In addition, this method's high prevalence in previous studies in the field revealed its effectiveness in measuring anxiety; these previous studies include the aforementioned 2012 Kenny study, which surveyed musicians in an orchestra about their performance anxiety. As such studies found significance in their conclusions about MPA, it was clear that a survey was an effective tool to measure this condition.

Subjects and Delimitations

In this study's survey, a sample of pianists was asked about symptoms of MPA they experienced during performance (for a full copy of the survey questions, see appendix). Because external factors such as maturity and proficiency at the piano were not central to the study's topic, participation was not limited by age nor by the level of skill at the piano. However, delimitations included that participants were required to have played the piano in a public performance setting within the past year (this rule was set in order to reduce the chance of retrospectivity affecting the results of the survey). Overall, however, the survey had few requirements for participation, so in order to address ethical considerations, participants under the age of 18 were required to obtain parental consent prior to their completion of the survey. In addition, the identities of survey respondents were not recorded, making the process of this research anonymous.

Survey Components

Questions in the survey, conducted over Google Forms, mainly focused on various symptoms of performance anxiety. The extent to which each pianist felt certain MPA symptoms was measured, which yielded data that was important in identifying various aspects of anxiety, such as the main part of the body each gender felt symptoms in, or the prevalence of more physical or psychological symptoms in a certain gender; this addressed the many aspects of anxiety implied in the original research inquiry. In addition, the number scale used allowed for a qualification of the pianists' symptoms, which sufficiently captured the complex reactions of the human body to anxiety by creating more range in responses rather than extremities in the data resulting from more absolute answers. By presenting quantitative data through this numbering scale, the survey also allowed for comparison of the mean responses of each gender and

statistical analysis of any possibly significant differences in the average frequency of each MPA symptom between genders.

The questions in the survey were divided into four sections, with each intended to fulfill a specific purpose. Section I included basic questions about the participant's gender, their age, their average practicing time for the piano, their proficiency level at the piano, and their frequency of music performance on the piano. The purpose of this section was to identify how gender may have affected how each participant experienced MPA and to ensure a balanced, representative sample.

Section II involved questions that were designed as a self-assessment of each participant. This component asked about factors such as self-perceived anxiety and the areas of the body each subject felt they had experienced the most MPA symptoms in. Participants were asked to answer each question about their extent of overall anxiety and MPA symptoms in each part of their bodies on a scale of one to ten, with one being to virtually no extent and ten being to a great extent. The goal of this section was to gather data on whether the biological factors of different genders of pianists would affect how their body parts function under anxiety. By focusing on the concentration of symptoms in certain areas of the body, section II aimed to draw patterns between the more physical differences between genders for MPA.

The third section of questions in the survey was structured similarly to section II. It also involved questions requiring self-assessment of anxiety, but it focused on specific symptoms that were not concentrated in any part of the body in particular. These included factors such as rapid heartbeat, dizziness, trembling, and an extreme change in body temperature. These factors were selected because they were identified to be some of the most common, universal symptoms felt by musicians while performing; they were also some of the most frequently researched factors as seen in previous studies in the field. Participants rated their frequency of experience of these factors on a scale of one to ten, with one representing that they had almost never felt these factors and ten representing that they always felt these factors in performance. The goal of these questions was to identify whether different sexes had different frequencies of each symptom.

Finally, section IV of the survey was based off of the Competitive State Anxiety Inventory, or CSAI-2. Although traditionally the CSAI-2 is used to measure anxiety in athletic performance, recent studies have shown the same type of measurements apply to musicians, such as in the aforementioned Iusca and Dafinouiu study, which used the CSAI-2 to measure the differences in performance anxiety between different instruments. To emulate the CSAI-2, participants were asked to answer the questions in section IV as fast as possible, due to the CSAI-2 being most effective when answered on instinct. Topics of the questions included the thoughts of the pianists while performing and their confidence levels. Participants were given statements about these topics. They were asked to identify the extent to which they agreed with the statements given by rating them on a scale of one to four, with one being that they did not relate to the statement at all and four being that they strongly agreed with the content of the statement. The purpose of section IV was to focus on the differences in more psychological effects of performance anxiety, as the previous sections were mainly centered around physiological factors.

Overall, the questions in the survey were designed to account for both physical and psychological differences in the symptoms of MPA different genders of pianists felt in order to capture a full picture of anxiety. However, some anticipated limitations of the survey method included bias, as a completely random sample of pianists was simply not achievable within the time frame and with existing resources. In addition, as the survey consisted of questions about feelings and emotions, it was quite possible that some participants felt pressured to answer a certain way, creating response bias, though this possibility was minimized through neutral wording of questions and confidentiality of answers, which also eased any ethical concerns. Due to the sample's limited size and scope, it was also anticipated that the data generated might not be completely representative of the population of pianists. In general, however, the survey allowed for general conclusions to be drawn about the general trend of MPA in different genders, as most biases such as response bias would have affected participants of both genders equally, thus making these factors unlikely to skew survey data significantly. Therefore, the survey met the objective of this study by allowing for the investigation of

variations in MPA symptoms of different genders through quantitative data that appropriately captured the complexities of the experiences of each gender.

Results

The study was conducted with participants from a wide range of ages and proficiency levels at the piano across the United States, over a time period of approximately 2 months. The 105 survey respondents were 49.4% female, 45.6% male, and 5.1% non-binary. Ages ranged from 11 to 65, with a majority of participants falling between the ages of 16 and 17, with 29.1% and 24.1% respectively. 5.1% of participants were self-assessed as beginner, 35.4% as moderately skilled, 53.2% as advanced, and 6.3% as professional. Participants also reported a variety of practice times and frequencies of performance. An adequate amount of data was collected to draw conclusions for male and female pianists, but a sufficient number of responses was not received from the non-binary category to present reliable data on a third gender.

Physiological Results

The second section of the survey yielded indications of many physiological trends; some data showed significance after appropriate statistical tests were conducted (see Figure 1).

Table 1. Table showing various physiological MPA symptoms and concentration areas of MPA symptoms, the mean intensity of these symptoms for males and females (on a scale of 1 to 10), and the p-value for the hypothesis that the female mean is higher than the male mean (in other words, females had higher levels of anxiety)

Physiological Symptoms of MPA	Male mean response	Female mean response	T-test p-value for hypothesis that the female mean is higher than the male mean
Nausea/Dizziness	1.667	3.096	3.655 x 10-4
Shaking/Trembling	4.1875	5.481	0.0173
Reduction in body temperature	2.771	3.788	0.0344
Rapid heartbeat	5.896	7.288	0.006
Symptoms concentrated in the lungs/chest	2.375	3.173	0.0485
Symptoms concentrated in the hands/arms	5.771	6.827	0.048
Symptoms concentrated in the legs/feet	3.146	4.481	0.009

Overall, when asked to rate their frequencies of MPA symptoms from 1 to 10, females had a significantly higher rating. Other notable averages included a higher self-reported anxiety and self-reported audience-perceived anxiety in females. In addition, statistical analyses found significance in the hypothesis that female pianists tended to experience higher average rates of MPA symptoms across all parts of the body when a p-value of less than 0.05 in a

two-sample t-test was considered significant. This included symptoms concentrated in the lungs or chest, the hands or arms, and the legs or feet.

The third part of the survey also showed that females had higher average frequencies of all symptoms (see Table 1). When a two sample t-test was conducted on the means for males and females for low body temperature, the corresponding p-value was found to be 0.0344 for the hypothesis that females had significantly lower body temperatures, which indicated that females were much more likely to have a drop in body temperature during performances due to anxiety (according to a significant p-value of 0.05). This comes in line with the common conception that females have a naturally lower body temperature; however, the data did not conclude a significant difference in whether a certain gender was more likely to experience sweating, although males are known to have higher body temperature. In addition, nausea and dizziness were also significantly more common in females, with an extremely low p-value of 3.655 x 10-4 for the hypothesis that females had more nausea and dizziness during performance (which met the threshold of a p-value of less than 0.01, indicating scientific significance).

Psychological Results

The fourth section of the survey, which included the CSAI-2 based questions, showed that the averages females rated their frequencies towards certain psychological factors were, as in previous sections, higher than male averages (see Table 2).

Table 2. Tables showing various psychological MPA symptoms, the mean intensity of these symptoms for males and females (on a scale of 1 to 4 and using the CSAI-2), and the p-value for the hypothesis that the female mean is higher than the male mean (or, in the case of the last symptom, the hypothesis that the male mean is higher than the female mean)

Psychological Symptoms of MPA	Male mean response	Female mean response	T-test p-value for hypothesis that the female mean is higher than the male mean
Negative thoughts	1.854	2.423	0.001
Frequent doubt of oneself	2.146	2.731	0.0014
Anticipating one's mistakes during performance	2.646	3.192	0.00446
Psychological Symptoms of MPA	**Male mean response**	**Female mean response**	**T-test p-value for hypothesis that the male mean is higher than the female mean**
Improved performance/focus	1.979	1.692	0.0576

Specifically, females reported significantly lower average confidence levels during performance when the threshold of significance used was a p-value less than 0.01. A two-sample t-test conducted with the female average for the symptom of frequent self-doubt in performance compared to the average given by males yielded a p-value of 0.0014, signaling great significance in the hypothesis that females doubted themselves more while performing. Another factor females had a higher average frequency for was the factor of negative thoughts during music performance anxiety. A t-test comparing the average for this factor between the two genders revealed a p-value of 0.001 for the

hypothesis that females had more negative thoughts while on stage. Lastly, females were more likely to anticipate their own mistakes in performance, which was supported by a t-test comparing the two genders that yielded a p value of 0.004. Another difference in MPA between the genders revealed by this section of the survey was the idea that the symptoms often accompanying performance anxiety may be beneficial to one gender, as when participants were asked how strongly they felt performance anxiety made their playing better, out of the individuals who indicated they felt very strongly about this statement, 83.333% were males. One factor, however, that did not appear to be affected by different genders was that of audience size or audience members (see Table 3).

Table 3. Table showing statements concerning audience-related factors and practice time prior to performance and the mean intensity of the symptoms described in these statements for males and females (on a scale of 1 to 4 using the CSAI-2), with the p-value for the hypothesis that the female mean is different from the male mean

Audience-related or practice-related factors affecting MPA	Male mean response	Female mean response	T-test p-value for hypothesis that the female mean is different from the male mean
Practicing more has reduced my music performance anxiety.	**2.771**	**2.904**	**0.526**
In the past, I have felt less anxious performing if the audience is a smaller group of people.	**2.458**	**2.577**	**0.627**
In the past, I have felt less anxious if the audience includes many people I am familiar with.	**2.458**	**2.5**	**0.863**

Discussion

In general, survey data showed that gender did affect music performance anxiety in pianists to a great extent; the data also showed that some aspects of this gender-MPA relationship were unique to pianists and different from gender-MPA relationships found when looking at musicians as a whole. Over most categories, females tended to respond with a higher average number, signaling that female pianists typically feel more anxiety symptoms during performance. This supports existing research in the aforementioned Sokoli, Iusca-Dafinouiu, and Edmonson studies, which also found that females tended to feel significantly more anxious in performance. In addition, this study revealed that some generalizations of the traits of MPA in pianists made by previous studies applied differently between various genders of pianists. For instance, while previous studies in the field, such as the Sokoli study, have shown an increased probability of pianists overall experiencing more anxiety symptoms in the arms and hands, the results of this survey showed that this trait is more likely to occur in females, as female pianists tended to have higher levels of anxiety across all parts of the body.

Unique Physiological Trends

When participants were asked about their symptoms of music performance anxiety, some data found in this study contradicted previous research nonspecific to pianists, implying a possible correlation between MPA and gender in pianists that may be different from the pre-established correlation between MPA and gender in the general population

of musicians. For example, while it has been established that females tend to have more self-reported anxiety in general, males have been found in past studies to have more physiological responses to anxiety during performance than females (Edmonson, 2012). Contrary to this notion, this study's results showed a higher rate of physiological responses to anxiety in females. Among these results were the findings that females were significantly more likely to experience nausea, dizziness, shaking, a rapid heartbeat, a reduction in body temperature, and trembling, all of which are central physical symptoms of MPA. These results show that the trends between gender and physiological MPA in pianists differ from more general trends about gender and MPA.

Conclusions Concerning Psychological Aspects of MPA

On the psychological aspects of MPA, however, the survey showed few notable differences from previous studies conducted; that is, results showed the relationship between psychological symptoms of MPA and gender in pianists was no different from the relationship between psychological symptoms of MPA and musicians as a general population. Across most categories of psychological symptoms of MPA, females appeared to have lower confidence levels, as they were more likely to anticipate their mistakes, face doubt, and have negative thoughts during performance. This supports previous studies, such as the aforementioned Sokoli study, which have shown that females tend to feel more distressed during performance than males, likely due to the natural tendency of women to underestimate their abilities, as opposed to the common trait in males to take risks, which results in overestimation of abilities.

In addition, one notable trend found was that when asked to rate the extent to which the symptoms in music performance anxiety had helped them in performance, most participants who answered that MPA strongly improved their performances were male. While it is possible that this trend occurred due to the natural tendency of males to report lower anxiety levels, other psychological characteristics may have been responsible for the difference in this category. However, more research is needed to establish the nature of the link between males and using MPA to an advantage, as it is unclear in this study the true strength of the correlation of this relationship.

Overall Findings

In summary, this study found that gender affects MPA in pianists to a great extent both in physiological and psychological factors of anxiety, as females were significantly more likely to have greater symptoms of anxiety across all categories of symptoms, including in all parts of the body and in other symptoms such as a rapid heartbeat or negative thoughts. In addition, the study found connections between gender and physiological aspects of MPA that were unique to pianists because females had higher rates of physiological MPA symptoms (which was a male characteristic in previous studies which analyzed musicians as a whole), such as higher rates of nausea, dizziness, shaking, trembling, drop in body temperature, and a rapid heartbeat. However, the connection between psychological symptoms of MPA and gender in pianists was revealed to be similar to relationships between psychological performance anxiety and gender in musicians investigated in previous studies that were nonspecific to pianists. In this regard, the data showed, as expected, that females tended to have more psychologically detrimental conditions, such as more negative thoughts, more self-doubt, and more anticipation of mistakes.

Filling in the Gap

In addition, the conclusions from this study addressed a major gap in previous research done in the field. Although many past studies have investigated either the effects of gender on MPA or the effects of instrument on MPA, few have attempted a higher level of specificity by combining both factors and focusing on the impacts of gender on MPA in one instrument. This study, however, chose to fill this gap by researching the impact of gender on MPA in pianists. Because the study found characteristics of the gender-MPA relationship that were unique to pianists, its results filled

the knowledge gap in the field by achieving greater specificity in MPA research. In addition, in presenting information about gender trends in pianists not seen in previous studies, which lacked such a high level of specificity, the study's results emphasize the importance of this new level of specific investigation; if the analysis of the gender-MPA relationship in this paper had not been limited to pianists, trends found in the study that were exclusive to pianists would not have been evident.

Implications, Limitations, and Opportunities for Future Research

Implications

Implications of this study involve optimizing solutions for MPA. The results of this survey show that the relationship between gender and MPA in pianists is different from the relationship between gender and MPA in other instruments, especially in terms of the physiological effects of performance anxiety. Thus, possible solutions for MPA can be optimized to account for these differences. Since the study concluded that certain trends in gender and physiological effects of MPA are unique to pianists, for example, solutions must address these specific traits. In addition, another important implication is the benefits the results may bring to music educators. With the trends found through this study, teachers can tailor teaching methods by gender to help both their male and female students overcome anxiety in performance. This could also positively impact on a wide scope of pianists.

Limitations

However, this study contains a few limitations, including a limited sample size, which was no doubt small compared to the wide number of pianists affected by music performance anxiety. Thus, there may have been underlying factors preventing the data from being truly representative of all pianists. In addition, although the survey placed few restrictions on its participants, respondents were exclusive to the United States. This lack of diversity in nationality may have caused flaws in the conclusions of the study due to differences in perspective of pianists across the world. In addition to this, because of the quantitative nature of the survey, there were no open-ended questions for the participants to voice their experiences of MPA outside of the symptoms they were asked about. Thus, the conclusions made in this study might not have considered the full scope of MPA symptoms, and thus may not have accurately depicted MPA trends in all pianists.

Secondly, some participants may have mis-reported their anxiety levels during performance, as they were simply asked to recall their most recent performance. It is certainly possible that some of those surveyed had not performed on the piano in a substantial period of time, as participants were only required to have performed in public within the year prior to which they took the survey. Thus, these participants may not have remembered their latest piano performance clearly, causing their data to possibly be flawed. This is due to the factor of retrospectivity, which may have caused some of the participants to have distorted recollections of their experiences of anxiety. However, this factor was not anticipated to highly skew the results of the research, as retrospectivity as a factor would have affected both genders, so it likely would not have hindered any conclusions drawn about gender and MPA.

Finally, a third limitation of this research is that it depended heavily on self-reported anxiety factors. Thus, it is possible that responses to the survey conducted were not entirely accurate to each participant's experiences with MPA, therefore limiting the conclusions made; since data was based entirely on respondents 'perceptions of their own anxiety and not from concrete tests on MPA symptoms done with appropriate tools, there may have been adverse impacts on the conclusions made. In addition, previously anticipated limitations with the survey method, such as response bias, may have impacted survey responses by pressuring respondents to answer a certain way (although, as previously mentioned, measures were taken to reduce this), which reveals another limitation in the use of self-reported data to draw conclusions.

Future Research

Opportunities for future research could include deeper investigation into the solutions for the trends found in this study. More specifically, it is evident that solutions for MPA in pianists must address the physiological differences between male and female pianists in performance, as shown in the data in this survey. Thus, future studies could involve testing various solutions made for pianists that address the unique patterns of MPA and gender found in this study. In addition, the differences between MPA in various ages of pianists could also be investigated on top of gender factors. This could help to identify even more trends within groups of pianists that could further improve any possible solutions found, as solutions for MPA greatly benefit from specificity. Also worthy of future research is the possibility of performance anxiety being more beneficial to male pianists when compared to female pianists, as it was not investigated in sufficient depth in this study. Later studies would ideally focus on this issue to prove any possible correlations between gender and the potential benefits of MPA.

In addition, as this survey only investigated self-reported anxiety levels, which was a big limitation to its conclusions, future research could investigate the trends found in this study by utilizing technology to measure physiological MPA traits. For example, the symptoms of a rapid heartbeat could be measured with a fitness tracker or other device that measures heart rate. With results from such tests for symptoms, future studies could further confirm or examine the traits found in pianists through this research. By using equipment to test for physiological MPA symptoms, future studies can also examine the effectiveness of solutions proposed to address the symptoms detailed in this study.

Furthermore, later studies could also create a performance environment for participants to perform in prior to taking the survey or undergoing tests for symptoms; this would address a limitation of the current study because it would reduce the negative impact of retrospectivity on the results of the study. In creating a performance environment, future researchers could investigate the trends found in this study both in greater detail and with fewer limitations to their data.

References

Annisa, A. A., & Milyartini, R. (2021). Music Performance Anxiety Among Undergraduates piano majors. https://doi.org/10.31124/advance.14132120

Brooker, E. (2017). Music performance anxiety: A clinical outcome study into the effects of cognitive hypnotherapy and eye movement desensitisation and reprocessing in advanced pianists. Psychology of Music, 46(1), 107–124. https://doi.org/10.1177/0305735617703473

Chang-Arana, Á. M., Mavrolampados, A., Thompson, M. R., Pokki, N., & Sams, M. (2022). Exploring the interpersonal level of Music Performance Anxiety: Online Listener's accuracy in detecting performer anxiety. Frontiers in Psychology, 13. https://doi.org/10.3389/fpsyg.2022.838041

Dawson, T. E., & Logan, E. C. (2022). Managing music performance anxiety : A performer's perspective. Open Collections. Retrieved September 7, 2022, from https://open.library.ubc.ca/soa/cIRcle/collections/ubctheses/24/items/1.0406377

Edmonson, J. M. (2011, November 30). Differences in music performance anxiety levels between underclassmen and upperclassmen music education undergraduates. Texas Music Education Research. Retrieved March 29, 2023, from https://eric.ed.gov/?id=EJ1102261

Furuya, S., Ishimaru, R., & Nagata, N. (2021). Factors of choking under pressure in musicians. PLoS ONE, 16(1), e0244082. https://link.gale.com/apps/doc/A647638898/AONE?u=j170902003&sid=bookmark-AONE&xid=81ccbfea

Huang, W.-L., & Yu, H. (2022). Social support in university music students 'coping with performance anxiety: people, strategies and performance situations. Music Education Research, 24(1), 124–135. https://doi.org/10.1080/14613808.2022.2028752

Iusca, D., & Dafinoiu, I. (2012). Performance anxiety and musical level of undergraduate students in exam situations: The role of gender and musical instrument. Procedia - Social and Behavioral Sciences, 33, 448–452. https://doi.org/10.1016/j.sbspro.2012.01.161

Kaleńska-Rodzaj, J. (2020). Music performance anxiety and pre-performance emotions in the light of psychology of emotion and emotion regulation. Psychology of Music, 49(6), 1758–1774. https://doi.org/10.1177/0305735620961154

Kenny, D. T., & Osborne, M. S. (2006). Music performance anxiety: New insights from Young Musicians. Advances in Cognitive Psychology, 2(2), 103–112. https://doi.org/10.2478/v10053-008-0049-5

Kenny, D., Driscoll, T., & Ackermann, B. (2012). Psychological well-being in professional orchestral musicians in Australia: A descriptive population study. Psychology of Music, 42(2), 210–232. https://doi.org/10.1177/0305735612463950

Kim, Y. (2005). Combined treatment of improvisation and desensitization to alleviate music performance anxiety in female college pianists: a pilot study. Medical Problems of Performing Artists, 20(1), 17+. https://link.gale.com/apps/doc/A173230531/AONE?u=j170902003&sid=bookmark-AONE&xid=d643a563

Kirchner, J. M. (2003). A qualitative inquiry into musical performance anxiety. Medical Problems of Performing Artists, 18(2), 78+. https://link.gale.com/apps/doc/A173187272/AONE?u=j170902003&sid=bookmark-AONE&xid=318471ec

LeBlanc, A., Jin, Y. C., Obert, M., & Siivola, C. (1997). Effect of Audience on Music Performance Anxiety. Journal of Research in Music Education, 45(3), 480–496. https://doi.org/10.2307/3345541

LeBlanc, Albert (2021) "A Theory of Music Performance Anxiety," Visions of Research in Music Education: Vol. 16 , Article 34.

Lin, Mei-Chuan, "An Investigation Of Music Performance Anxiety In Taiwanese Pianists, Vocalists, String And Wind Instrumentalists At The College Level" (2019). Theses and Dissertations. 2571. https://commons.und.edu/theses/2571

Logan, E. C. (n.d.). Managing music performance anxiety: A performer's perspective. UBC Library Open Collection. Retrieved March 29, 2023, from https://open.library.ubc.ca/media/stream/pdf/24/1.0406377/3

MacAfee, E., & Comeau, G. (2020). Exploring music performance anxiety, self-efficacy, performance quality, and behavioural anxiety within a self-modelling intervention for Young Musicians. Music Education Research, 22(4), 457–477. https://doi.org/10.1080/14613808.2020.1781074

Matei, R., & Ginsborg, J. (2017). Music performance anxiety in classical musicians – what we know about what works. BJPsych. International, 14(2), 33–35. https://doi.org/10.1192/s2056474000001744

Sokoli, E., Hildebrandt, H., & Gomez, P. (2022). Classical music students 'pre-performance anxiety, catastrophizing, and bodily complaints vary by age, gender, and instrument and predict self-rated performance quality. Frontiers in Psychology, 13. https://doi.org/10.3389/fpsyg.2022.905680

Spahn, C., Krampe, F., & Nusseck, M. (2021). Classifying different types of music performance anxiety. Frontiers in Psychology, 12. https://doi.org/10.3389/fpsyg.2021.538535

Sylvia S. Appel, Modifying Solo Performance Anxiety in Adult Pianists, Journal of Music Therapy, Volume 13, Issue 1, Spring 1976, Pages 2–16, https://doi.org/10.1093/jmt/13.1.2

Yoshie, M., Kudo, K., & Ohtsuki, T. (2008). Effects of psychological stress on state anxiety, electromyographic activity, and arpeggio performance in pianists. Medical Problems of Performing Artists, 23(3), 120–132. https://doi.org/10.21091/mppa.2008.3024

Yoshie, M., Kudo, K., Murakoshi, T., & Ohtsuki, T. (2009). Music performance anxiety in skilled pianists: Effects of social-evaluative performance situation on subjective, autonomic, and electromyographic reactions. Experimental Brain Research, 199(2), 117–126. https://doi.org/10.1007/s00221-009-1979-y