The Effects of Vibroacoustic Music (VAM) in Reducing Performance Level Anxiety in College Students

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ABSTRACT:

In the field of music therapy, limited research has been conducted regarding the use of vibroacoustic music (VAM) in reducing pain and eliciting relaxation in patients. The research that has been performed has largely been conducted in hospital and clinical settings to see the effect of VAM on pain and symptom management, as well as cardiovascular and respiratory system performance (Bernardi, Porta, and Sleight, 2006; Brewer and Coope, 2003; Patrick, 1999). Further research with different patient populations has been called for in an effort to test out the efficacy of VAM in reducing performance level anxiety in patients as they participate in a variety of stress induced tasks. Utah State’s Music Therapy Program has received a specially designed Sound Chair from Inge Bohme of Germany for the purpose of testing the chair’s effectiveness in reducing pain and enhancing relaxation through the use of VAM. The large wooden chair is designed with 60 metal strings strung across the back of it; all tuned in one octave increments. A quasi-experimental study was conducted during the fall semester of 2010 in which 28 college students from Utah State University participated in. Students were asked to first participate in five one-minute stress-induced activities followed by a five-minute therapy session in the Sound Chair. After the VAM session, participants again repeated the five activities. During each of the pre and post therapy performance tasks as well as during the VAM therapy session, participants’ heart rate was being monitored. Participants also completed a post-study questionnaire designed to gather physiological and psychological feedback regarding their experience. Results indicate that even a brief exposure (five minutes) to VAM through the use of the Sound Chair does decrease the participant’s overall level of anxiety as determined by a reduction in heart rate.
Introduction

Utah State’s Music Therapy Program received a specially designed Sound Chair from Inge Bohme of Germany. The purpose in sending this chair was to test the chair’s effectiveness in inducing relaxation through the use of vibroacoustic music (VAM). The research that has been performed with vibroacoustic music has largely been conducted in hospital and clinical settings to see the effect of VAM on pain and symptom management, as well as cardiovascular and respiratory system performance (Bernardi, Porta, and Sleight, 2006; Brewer and Coope, 2003; Patrick, 1999). In Patrick’s 1999 study, the purpose was to determine the effect vibroacoustic music has on patients’ relaxation responses in order to reduce burdens of symptoms in hospitals. Patients sat in VAM recliners with anxiolytic music playing for 25 minutes. Results of this study indicated an effective improvement of 33.4% in the state of relaxation, and a 53% reduction in cumulated symptoms.

The purpose of the 2006 Bernardi, Porta, and Sleight study was to investigate the changes in the cardiovascular and respiratory systems in musicians and non-musicians, induced by 6 types of music with differing rhythms, harmonies, tempos, pausing, and melodic structure. The subjects sat for 20 minutes in silence, and then had the six different songs presented to them. Results indicated that the faster tempi induced significant increases in breathing rate, blood pressure, heart rate and ventilation. The pausing between songs produced lower blood pressure and heart rate.

Brewer and Coope (2003) conducted their VAM research with oncology patients. Their study was designed to offer chemotherapy and radiation therapy patients as well as cancer survivors the opportunity to experience a VAM session for the reduction of pain and symptoms from the cancer or treatment. The patients were engaged in a 5-week program experiencing a VAM session one hour each day. Results indicated a 34% reduction of tension during the session. There was also a 64% cumulative reduction of symptom intensity for all symptoms reported. It was concluded that vibroacoustic music can offer patients assistance in gaining relaxation and being able to reduce pain and symptoms in the medical setting. Further research with different patient populations has been called for in an effort to test out the efficacy of VAM in reducing performance level anxiety in patients as they participate in a variety of stress induced tasks.

Purpose

With the specifically designed Sound Chair from Inge Boehme, the purpose of this study was to test the chair’s effectiveness in inducing relaxation through the use of vibroacoustic music. The following questions were considered: 1) Is the Sound Chair successful in decreasing performance level anxiety in college students? 2) Which strum direction on the Sound Chair is the most relaxing?

Method: Sample and Instruments

A quasi-experimental study was conducted during the fall semester of 2010 in the music therapy office of Utah State University. A total of 28 university students, ages 18-26 (7M, 21F) participated in this study. The participants varied in university majors including music therapy (n=23), business (n=2), engineering (n=2), and recreational therapy (n=1). The two evaluators were female university students, one majoring in music therapy and the other in nutritional science.
Participants were asked to first participate in five one-minute stress-induced activities followed by a five-minute VAM session in the Sound Chair. After the VAM session, participants would again repeat the five activities. The research design included two specific data collecting tools. The first tool was a pulse oximeter. The pulse oximeter was used to measure the pulse oxygen saturation levels as well as the pulse rate in the participants. Pulse oxygen saturation (SpO2) is the percentage of Oxyhemoglobin (HbO2) in the total hemoglobin in the blood, so-called the O2 concentration in the blood. It is an important bio-parameter for the respiration. Pulse rate (bpm) is measured in beats of the heart per minute. The pulse oximeter used in the study has a measurement accuracy of +/- 2%. The goal was to elicit a higher SpO2 level and a lower bpm with the Sound Chair. The other data collecting tool for the study was a personal feedback questionnaire. This questionnaire asked the following questions: 1) Which task was the most stressful for you? 2) What were your overall feelings about the chair? Did you like it? Was it relaxing? Did it make you more anxious? 3) Which strum direction was the most relaxing for you – low to high, high to low, or alternating? 4) Did you seem to have less anxiety doing the tasks the second time?

The five tasks the participants were asked to complete were designed to increase the level of anxiety in the participant. The five one-minute tasks included: 1) playing the game “Operation”, 2) simple math equations, 3) memorizing a word list, 4) sight singing, and 5) performing a dramatic reading. The large wooden Sound Chair the participants had the opportunity to sit in between task sessions was designed with 60 steel strings strung across the back. These strings were played with high to low strums, low to high strums, and alternating strums throughout the five-minute VAM session.

**Method: Session Procedure**

The research evaluators would invite the participant into the music therapy office at Utah State University. Upon entering, the participant would be informed of the five one-minute stress inducing tasks as well as the Sound Chair session following. Evaluators asked the participants for identifying information – name, age, and major. The pulse oximeter was then placed on the participant’s index finger, and results would be read and recorded by the evaluator every 30 seconds during the entire session. In a random order each session, the five tasks were completed by the participant. Following the five tasks, the participant would sit in the Sound Chair for a VAM session of 5 minutes. During the first two minutes, the evaluator would play only low to high strums. During the next 2 minutes, the evaluator would only play high to low strums. For the last minute, the evaluator would alternate between low to high strums and high to low strums. For the duration of the Sound Chair session, the second evaluator was reading and recording the pulse oximeter results every 30 seconds. Following the Sound Chair session, the participants would complete all 5 one-minute tasks once more in a random order, continuing to wear to pulse oximeter. Rates were again recorded every 30 seconds during the tasks. At the end of the session, the participant removed the pulse oximeter, and completed the personal feedback questionnaire.

**Data Analysis**

The data from the complete sessions were recorded in a Microsoft Excel spreadsheet. Each of the five tasks was listed, followed by the Sound Chair session, and
then the five tasks once more. Every thirty seconds during the entire session the participant’s O2 and pulse rates were recorded. During the tasks, the number of errors and pieces removed from the game of “Operation” were recorded. The number of math problems completed as well as words memorized in the one minute for each task was also recorded. For the analysis of the data, the average O2 level and bpm was calculated for the first round of tasks, Sound Chair session, and the second round of tasks. Any decrease or increase in levels between task sessions and VAM session were recorded. The average decrease in bpm from the first task session to the Sound Chair session was ordered and a range and overall average for the group was calculated and recorded. The qualitative data from the personal feedback survey was also organized.

**Results**

We return to the purpose of this study, which was to test the chair’s effectiveness in inducing relaxation through the use of vibroacoustic music therapy. The following questions were considered: 1) Is the Sound Chair successful in decreasing performance level anxiety in college students? 2) Which strum direction on the Sound Chair is the most relaxing? The overall results proved an average of 89.29% of the participants had a decreased pulse rate after sitting in the Sound Chair VAM session for 5 minutes. Results also showed 71.43% of the participants had a decrease in pulse rate from the first group of tasks to the second group of tasks. And 21.43% of the participants showed a continual decrease in pulse rate successively throughout the study. From the first group of tasks to post VAM Session participants showed a range of .46 – 31.03 bpm decrease. The average result of the Sound Chair VAM session was a 10.97 bpm decrease. With the pulse oxygen saturation levels (SpO2), 35.71% of the participants showed an increased SpO2 after the Sound Chair VAM session, 39.29% of the participants showed an increased SpO2 from the first group of tasks to the second group of tasks, and 21.43% of the participants showed a continual increase in SpO2 successively throughout the study.

As was stated earlier, records were kept of the participant’s completion on three of the tasks. Results showed that during the second time doing the tasks: 75% of the participants completed more math problems tasks, 53.57% of the participants memorized more words, and 42.86% of the participants had fewer errors and picked up more pieces in the “Operation” game. With regards to these three tasks, during the second session of tasks: 39.29% of the participants improved overall on one task, 42.86% improved overall on two tasks, and 17.86% of the participants improved overall on each of the three tasks mentioned.

The personal feedback questionnaires also provided important results for the study. When asked, “Which of the tasks was the most stressful?”: 53.57% of the participants stated sight-singing, 28.57% stated the math problems, 14.29% stated the memorizing words, 3.57% stated the dramatic reading, and there were no participants who stated the “Operation” game. When asked, “Which strum direction was the most relaxing for you?”: 28.57% of the participants stated high to low strumming, 25% stated alternating, 21.43% stated low to high, 3.57% stated only low strums, 3.57% stated only high strums, and 17.86% stated they either could not remember, or they were not paying attention so they couldn’t answer. Two participants who enjoyed the high to low strumming commented, “I could feel myself exhale as she [the evaluator strumming] descended” and “It reminded me of releasing tension”. One participant commented on the alternating
strumming, “It felt like a rocking motion”. Another participant commented about the low to high strumming, “It felt like a rocking motion”. When asked on the questionnaire, “Did you feel like you had less anxiety performing the tasks the 2nd time?”: 78.57% of the participants stated “yes”, 17.86% stated “maybe a little”, and 3.57% stated “no”. There were many comments following this question. Some of these answers are listed below:

- “I knew what was coming and I wasn’t as scared of messing up.”
- “I wanted to do better.”
- “I wasn’t as rushed. It felt like I had more time.”
- “I was more relaxed. I also knew which tasks I would have to do.”
- “I felt I could think clearer.”
- “I felt much more calm.”
- “I did everything more slowly.”

Overall, it was recorded that 96.43% of the participants had a positive experience with the Sound Chair. A few of the positive responses are recorded below:

- “Loved it! The harmonies were cool to find, and the vibrations felt nice.”
- “I loved it! My mind wandered, but I thought it felt cool. It felt like meditating because there was a ton going the whole time. It was relaxing.”
- “I loved it. It was very relaxing. I want one in my room.”
- “Loved it. I was relaxed and able to tell my body to relax. It was neat to feel the vibrations through my entire body, that helped me relax.”

There were 3.57% of the participants who recorded an overall negative experience. When asked to state why this was, the following answers were given:

- “It would have been more relaxing if the lights were off and people weren’t watching me.”
- “I just kept focusing on the clinking noises the strings seemed to be making.”
- “It made me uncomfortable. The structure is claustrophobic. The vibrations all over my body was overwhelming.”

Discussion

Results show that the Sound Chair is successful in decreasing performance level anxiety in college students as evidenced by lower pulse rate and positive feedback from participants. The Sound Chair induces relaxation, with the high to low strum direction being the most preferred. On average, students were able to improve their performance on the tasks a second time after sitting in the Sound Chair VAM session for only 5 minutes. Participants also expressed an overall positive experience with the chair, and said they felt they had relaxed. An interesting finding occurred with the one participant who expressed negative feelings towards the Sound Chair. It was recorded that this individual actually had an average decrease in pulse rate of 8.03 bpm between the first group of tasks and sitting in the chair. She also had an improved performance on the math and memorizing tasks the second time. We see here that physiological and psychological
results don’t always complement one another. One other interesting find was that the majority of participants had a lower pulse rate within the first 30 seconds of sitting in the Sound Chair.

There were many limitations with this research design and study. There were a very limited number of participants, with a limited variety of education. As this was the research design of a music therapy student, there were many participants in the same program who wanted to support the evaluator. This provided a possible Hawthorne effect. The participants wanted the researcher to find positive results and therefore could have indicated that there was a positive effect that the chair had on them. A large distracter in the study was the common occurrence of loud sounds such as laughter and music that would come from the outside room. These sounds would occasionally distract the participants during the study and affect their performances as well as the VAM session. Another limitation to the study is the old saying of “Practice makes perfect!” The participants performed the exact same tasks the second time around after the VAM session. The evaluators tried to control for this by changing the math problems, and using different word lists, monologues, and sight singing melodies. However, the participants knew of the type of tasks ahead of them, and had already had the opportunity to try them out. One last limitation with this design was the possibility of a Halo effect. Because the chair is supposed to help participants relax, simply by sitting in the chair did the students mentally calm down? A question to ask is if just sitting in the chair without strumming after the tasks for 5 minutes would have produced similar results. These are questions for future designs and studies with the Sound Chair.

There are many other future implications for future research with the Sound Chair. First, the research design should include more college students of a larger diverse background. These students also need to be unfamiliar with the research evaluators to prevent a possible Hawthorne effect. Second, the research evaluators should consider using a different pulse rate monitor that allows reading to be taken without disturbing the participant. Because of the light in the room, and the pulse oximeter being on the participant’s finger, it was occasionally difficult to read the rates without moving the participant’s finger and distracting them. Third, the study should be conducted in a quieter and secluded research location with no distractions or interruptions. And fourth, evaluators should repeat the study without informing the participants they will be tested on the five tasks again after the VAM session. This could prevent some of the “practice makes perfect” results, as well as an automatic decrease in anxiety because of having done the tasks before. Overall, this study proved the Sound Chair to be effective in inducing relaxation in college students through the use of vibroacoustic music.
References

