The Effect of Music Tempo on the Psychophysiological Measures of Stress

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Introduction

This study investigates whether tempo has a significant impact on one’s stress response. More specifically, it was hypothesized that the slower the tempo of the music, the lower the psychophysiological measures of stress would be. This study manipulates the tempo only to ensure internal validity by utilizing only one song selection and solely altering the tempo of that one song. Additionally, the musical piece is both classical and instrumental to better control for preference and familiarity within a college population. Stress is measured through psychophysiological measures of heart rate and GSR. It was hypothesized that slower tempo music, rather than faster tempo music or silence, would result in a significant reduction in stress. This study is important and relevant to better understand the role of music’s tempo on stress within the specific population of African American female college students. There is little previous research on this specific demographic. Also, by examining the effect of music tempo on stress students may gain a possible stress reduction tool. Therefore, this study provides essential insight on music as a possible tool to better manage stress for African American female college students.

The Measurement of Stress

Stress is commonly assessed through both physiological and subjective measures of participants. Pelletier (2004) conducted a meta-analytic review of 22 quantitative studies that used music as a means to decrease arousal such as stress. Several studies measured stress/arousal as changes in heart rate, cortisol, subjective anxiety, and blood pressure (Knight & Rickard, 2001; Ellis, 2009). Other studies also included skin conductance along with those measures listed above (Carpentier & Potter, 2007; Gomez & Danuser, 2007). The study by Khalfa, Roy, Rainville, Dalla Bella, & Peretz, (2008) also incorporated the psychophysiological measures of facial muscle activity. The majority of the studies coupled their physiological measures with self-reports and other subjective measures of stress. Moreover, in other studies stress was induced through arousing tasks and/or images and assessed utilizing physiological measures (Yamamoto, Naga, & Shimizu, 2007). Stress is commonly associated with arousal as an indicator of stress and, as a result, stress is commonly measured physiologically. In investigating the effect of music on stress/arousal, current literature utilizes physiological measures coupled with self-reports (Pelletier, 2004). This study utilized only physiological measures, as this study was interested in investigating the impact

Abstract

Music and its influence on stress have been researched extensively (Pelletier, 2004). Specifically, the tempo of music has been identified as a quality of music with a greater role on impacting the stress response than other components of music (Gomez & Danuser, 2007). An experimental study was conducted in order to assess music tempo’s role in stress reduction, utilizing psychophysiological measures. This study used a convenience sample of African-American undergraduate students from an all-female, Historical Black College in the southeast region of the United States (N = 102). It was hypothesized that participants who were exposed to slower tempo music, rather than the faster tempo music or silence, would have a significantly lower stress level compared to baseline, as assessed through psychophysiological measures of arousal (heart rate and galvanic skin response). One musical piece was utilized: Nuvole Bianche by Ludovico Einaudi, and this piece was manipulated to have a faster and slower tempo. These manipulated versions were used for the slow tempo and fast tempo condition; for the silence condition (control) participants used ear buds. The results indicated that faster tempo music produces a significant increase in participant heart rate, as compared to baseline. Participants in the slow tempo music and the silent condition demonstrated a significant decrease in heart rate. GSR was significantly higher for participants in the fast tempo music and the control conditions. There was no significant change in GSR for participants in the slow tempo condition. This study is important, as it demonstrates music’s ability to influence our physiological experience of stress below our awareness. Therefore, essential insight has been gained on music tempo’s role in maximizing or minimizing one’s experience of stress.
of music on the stress response from a biological sphere. This demonstrates how music may have an impact on one’s physiological measures of arousal below conscious awareness.

Quality of Music

Music is a broad and general concept that can take a multitude of diverging forms, as the structural components of music vary. The structure of music is built on various components, such as mode, tempo, rhythm, melody, timbre, accentuation, harmony, pitch, dynamics, and other musical features. These are all used to create unique musical pieces, which can be simplified or complicated by the modifications of these components. Thus, it follows that the quality of music would elicit differing responses of the human mind, especially as it relates to music’s impact on stress. The existing literature offers an understanding on the role that the specific quality of music has on stress, as well as the implications of manipulating certain characteristics of the music to alter its impact on stress. Although many studies explored a variety of qualities of music, the majority found tempo as having a significant impact on stress levels.

In the study by Gomez and Danuser (2007), the specific structure of the music that contributes to physiological changes, as well as self-reports of experienced pleasantness, was examined. The researchers utilized various musical pieces with different structural forms and had the participants’ complete self-reports and they also collected physiological measures from the participants to understand the stress response. The structure of the music (tempo, mode, melody, harmony, etc.) had a greater impact on stress levels, rather than any extramusical factors (emotional perception of music, familiarity). Faster music, as well as music that was accentuated and staccato, increased breathing, heart rate and skin conductance. The findings demonstrated that out of all the various elements of music including, mode, harmonic complexity, accentuation, rhythmic articulation, and tempo, tempo and rhythmic aspects were more significant in determining physiological responses to music (Gomez & Danuser, 2007).

Type of Music

Music can be characterized by genres, which can be considered categories that include musical pieces with certain similarities that reflect a specific style of music. Different types of genres are known for having different impacts on the mind and body. Underlying these differences is the structure of the music, which beyond the quality of music, can also impact the human stress response. Current research suggests that different types of music effect stress levels differently.

In the study by Knight, and Rickard (2001), the effect of relaxing music on the subjective and the physiological responses to stress of participants was investigated. Participants were presented with a cognitive stressor task, which was done in the presence of a classical relaxing musical piece or silence. Results indicated that for those exposed to classical relaxing music increases in the physiological measures of stress were prevented (Knight & Rickard, 2001). Relatedly, Jiang, Zhou, Rickson, and Jiang (2013) studied the impact of sedative and stimulative music on the reduction of stress when participants were exposed to a stressor. Findings revealed that sedative music resulted in significantly lower tension and anxiety levels, as measured by self-reports and physiological measures, than those who listened to stimulative music (Jiang, Zhou, Rickson, & Jiang, 2013). Taken together, these two studies suggest that sedative or relaxing music elicited a decrease in stress levels.

In a distinctive study by Thayer and Levenson (1983), the effect of music on the psychophysiological responses was considered within the context of watching a stressful film. Musical scores were added to the soundtrack of an industrial safety film that is a stimulus for stress. The purpose was to construct two musical scores, one with the purpose of decreasing arousal and the other with the purpose of increasing arousal. There were three conditions or versions of the film; one with no music, one with “horror” music (music used in horror films) and one with “documentary” (elevator-type music) music (Thayer & Levenson, 1983). These types of music are unlike other divisions of music, in that they do not fall under an established genre and are not based on the binaries of relaxing or stimulative music. Arousal levels, based on heart rate and skin conductance, were increased when participants listened to the horror music, and arousal levels were decreased when listening to the documentary music, as compared to the control condition (Thayer & Levenson, 1983). This study diverges from others, as it also attempts to increase stress, rather than decrease stress. Collectively, these studies suggest that calm
and relaxing music have a significant effect on stress reduction, whereas stimulating or horror music can increase stress levels.

Music Preference

Music preference has been shown to have a significant role on stress reduction, even overriding the influence of other components of music. Radstaak, Geurts, Brosschot, and Kompier (2014) investigated if listening to self-chosen music after exposure to stress improves one's mood, decreases arousal, and aids with cardiovascular recovery. There were four recovery conditions that participants were randomly assigned to – listening to self-chosen relaxing music; listening to self-chosen happy music; listening to an audio book; and sitting in silence. Overall mood significantly improved when listening to self-selected relaxing music or happy music and cardiovascular recovery was significantly faster. The findings indicate that listening to self-selected music is a beneficial technique to improving mood. Tan, Yowler, Super, and Fratianne (2012), also explored the interplay of preference and relaxing music on stress reduction. Participants rated their preference, familiarity, and degree of perceived relaxation in a musical piece. The results demonstrated that music preference was correlated with the listeners’ perception of relaxation in music. Also, there was a significant correlation between familiarity and degree of relaxation (Tan, Yowler, Super, & Fratianne, 2012). All of these studies indicate that music preference has a substantial impact on music’s ability to reduce stress, with preference being a strong predictor of higher mood and lower stress. This study does not examine preference and the musical piece selected is instrumental and not genre-specific. Additionally, African Americans’ music preference tends to be similar. This was demonstrated in a study on the role of social identity and music preference, where African Americans generally identified with the music preference of energetic and rhythmic, which related to the genres of hip hop, soul, and electronica/dance (Rentfrow & Gosling, 2003). This study, however, utilizes music that falls within the reflective and complex music dimension, which is on the opposite side of the spectrum from energetic and rhythmic. Additionally, the song’s tempo has been manipulated to where the original song would not be recognizable. The song choice and the modifications of its tempo aid in controlling for preference. However, preference and individual differences may still have an influence on one’s stress response to the music, as individual differences in preference was not completely controlled for in this study.

The Use of Music in High-Stress Populations

Much of the existing literature has focused on the effects of music on specific populations that are considered to be under high levels stress. Lai and Li (2011) investigated the specific population of first-line nurses. The participants were randomly assigned to one of two conditions: group listened to self-selected soothing music for 30 minutes during a break, while the other group sat quietly for 30 minutes during their break. Nurses who listened to music had a lower perceived stress level, cortisol, heart rate and arterial pressure as compared to those who only sat quietly in the chair. Music preference also had a significant impact on reducing perceived stress and the decreasing the physiological measures of stress. The results indicate that nurses can use soothing music as an intervention for stress reduction. On the other hand, Tseng, Chen, and Lee (2010) studied the effect of listening to music on the perceived stress and state anxiety of postpartum women. There was an experimental group and a control group, in which the experimental group listened to music at home for at least 30 minutes a day over a two-week time period along with postpartum care. The control group only received postpartum care. Unlike Lai and Li’s (2010) study, the study did not find an effect of music on the reduction of stress and anxiety among postpartum women.

The existing literature has clearly demonstrated that, not only can music significantly influence stress levels, but this influence on stress can occur in a variety of ways. Tempo is a specific component that, when manipulated, has a noteworthy influence on stress. Although the existing research is extensive, there is not much literature on college students, another population prone to high stress levels. Knowing music’s impact on stress level can be beneficial in assisting students with managing stress and providing them with a tool to do so. The literature establishes that tempo has an impact on stress level, but the methodologies used to establish this fluctuate and allow for confounding variables to influence the results. For instance, the use of different musical pieces that vary across genres, musical structuring, familiarity, etc. could impact one’s stress response. Thus, more control can be exerted to ensure that only the tempo of the music
Research is being evaluated by controlling for all other factors. This study explores the role of tempo on stress reduction, as assessed through psychophysiological measures. This study expands on the current literature by exploring the specific population of African American female college students, through the use of a single musical piece that is only manipulated by tempo and, thus, controls for other variables. It is hypothesized that the slower the tempo, the lower one's physiological measures of stress would be, as compared to the faster tempo group.

Methods

Participants
The study used a convenience sample of African-American female, undergraduate students (N = 102). The sample size was generated using the online G*Power power analysis tool. This sample was taken from students attending a private, single-gender Historically Black College in the southeast region. The participants spanned from freshmen to seniors in classification and ranged from the ages of 18 to 22 (M = 20, SD = 1.372). Participants were recruited via a mass email to all students at the college and were compensated by being put into a raffle with a chance to win one of three giveaways of items from the campus bookstore, as well as being provided with a variety of refreshments at the time of data collection.

Design
This study used an experimental design. Participants were randomly assigned to one of three conditions (n=34 in each condition) – slower tempo music, faster tempo music or silence (with earplugs) – in order to assess stress reduction through psychophysiological measures. Silence with earplugs was used instead of white noise, because white noise is used as a technique for relaxation and may be a confounding variable. Also, the use of silence with earplugs controlled for any influence noise might have on stress. It was hypothesized that the participants who were exposed to slower tempo music rather than the faster tempo music or silence would have a significantly lower stress level compared to baseline, as assessed through psychophysiological measures.

Materials/Measures
In order to assess music tempo's impact on the reduction of stress, a Biopac Student Lab system was used to obtain measures of heart rate and galvanic skin response (GSR). The Biopac system includes data acquisition hardware with universal amplifiers to record electrical signals. The data acquisition system receives the signals from the electrodes and transducers and the data acquisition system connects to the computer, which utilizes the Biopac Student Lab Program software. In order to assess music tempo, the instrumental piece Nuvole Bianche by Ludovico Einaudi was used. This piece was selected due to its being instrumental and not genre specific. Lyrics and certain genres has been shown in the existing literature to be confounding variables. Thus, this musical piece controls for that by being instrumental and not adhering to a specific genre, which limits the impact of genre and lyrical influence on one's stress response (~Jiang, Zhou, Rickson, & Jiang, 2013~). Additionally, the original tempo of this song allowed for the tempo to be altered without the song sounding modified. There were two versions of the song, one where the tempo has been manipulated to be slower and the other faster. The tempo of the piece, Nuvole Bianche, was modified utilizing the digital audio software application, Logic Pro. The original song's tempo is 120 beats per minute. The fast tempo version was changed to 300 beats per minute and the slow tempo version was changed to 25 beats per minute. The beats per minute for each tempo version falls within the range that is determined to be an either slow or fast tempo, where 120 beats per minute is mid-tempo and below that median is considered slower and above it is faster (Randel, 1986). The musical selection was played through headphones connected to an MP3 player device. For the control condition, ear buds were placed in the participants' ears.

Demographics: Demographic information on each participant was recorded before the time of data collection; these demographics included gender and classification.

Procedures
The participants were recruited conveniently through a mass email to all students, as well as recruiting from places on campus with high traffic. The participants signed up for the study utilizing a Google Form that allowed participants to fill out their demographics and availability and submit those electronically. All participants were assigned a unique identifying number to ensure privacy and confidentiality. Utilizing these numbers and a random number generator, the participants were randomly assigned to one of the three conditions and instructed via text message to come to the lab's
location at their specific timeslot. Before participants arrived, the researcher set up the Biopac system and the music. Upon arrival, each participant was greeted at the door of the lab by the researcher. They were then administered a consent form (Appendix A) informing them of the purpose of the study, any potential harm and/or benefits, and their right to withdraw from the study at any time. Upon participant completion of the consent form, the researcher attached two electrodes to the subject’s index and middle fingertips on the left hand, one electrode on the medial surface of the left leg above the ankle, and one electrode on the right forearm at the wrist. The electrode lead set was then connected to the leg and wrist and the GSR leads to the fingertips. The researcher started the Biopac Student Lab Program and performed a calibration and then obtained a baseline for the subject for 2 minutes. Following the collection of baseline measures, the participant was then instructed to insert the earphones and Nuvole Bianche by Ludovico Einaudi, either the slow tempo condition or fast tempo condition, played for 2 minutes. For the control condition, the participant inserted the ear buds and sat in silence for 2 minutes. During this segment of the study, heart rate and GSR was continuously recorded. Upon completion of the experiment, participants were debriefed on the study. Also, the participants were put into a raffle with a chance to win one of three giveaways of items from the campus bookstore, as well as being provided with a variety of refreshments after data collection was completed.

Data Analysis

In order to examine if there was a significant difference between the mean baseline physiological measures of stress and the mean physiological measures after being exposed to one of the three conditions – slow tempo song, fast tempo song, or silence – a 2 x 3 mixed design ANOVA was conducted. The two factors of this design were time (pre-test versus post-test), and music condition (slow tempo, fast tempo, silence). Significant main and interaction effects were followed by planned comparison t-tests. The statistical analyses were conducted utilizing SPSS.

Results

A 2 x 3 mixed design ANOVA was conducted to investigate whether participants who were exposed to slower tempo music, faster tempo music, or silence, would have a significant difference between baseline measures of heart rate and GSR as compared to the measures after exposure to one of the three conditions. There was no main effect of time, indicating that the average baseline heart rate as compared to the post measures of heart rate, independent of the condition, were not significantly different. Also, there was not a main effect for condition, signifying that there was no significant difference in heart rate between the conditions, independent of time condition. However, there was a significant interaction between time and condition for heart rate, F(2, 99) = 9.005, p<.001, partial eta squared = .154 (See Figure 1). This suggests that there’s a significant interaction between the pre and post test measures for heart rate and the specific condition of either fast music, slow music, or silence. To explore this significant interaction, paired samples t-test were conducted as planned comparison post-hoc tests. These results demonstrated that participants exposed to fast tempo music (M = 81.440, SE = 9.340) had a significantly higher average heart rate as compared to baseline measures of heart rate (M = 79.137, SE = 9.404), t(33) = 2.287, p = .029. Additionally, participants who listened to the slow tempo music (M = 77.600, SE = 9.687) had
a significantly lower average heart rate than their average baseline heart rate (M = 80.196, SE = 8.724), t(33) = 3.289, p = .002. Furthermore, participants in the silence condition (M = 79.136, SE = 8.328) had a significantly lower average heart rate as compared to their average baseline heart rate (M = 80.778, SE = 9.618), t(33) = 2.101, p = .043. These findings suggest that compared to the baseline heart rate, heart rate decreases when one is exposed to the slow tempo music, and when exposed to the silence condition, yet increases when exposed to the fast tempo music. However, slow tempo music yielded a greater change from pretest to posttest, compared to the silence condition.

There was a significant main effect of time for GSR, F(1, 99) = 38.219, p<.001, partial eta squared = .279. GSR values were lower during the baseline period (M = 5.038, SD = 2.172) compared to exposure to a condition (M = 5.756, SE = 2.102), independent of the music condition. There was a trend towards significance for the main effect of music condition, F(2, 99) = 2.498, p = .087. An evaluation of the means suggests that GSR values were lower for the silent condition, (M = 4.685, SE = 1.024), as compared to the fast tempo condition (M = 5.702, SE = 1.298) and the slow tempo condition (M = 5.804, SE = 1.713), independent of the time condition.

There was also a significant interaction between time and music condition, F(2, 99) = 7.788, p = .001, partial eta squared = .136 (See Figure 2). To further explore this interaction, three paired samples t-tests were conducted as planned comparison post-hocs. These findings indicated that the average GSR after exposure to fast tempo music (M = 6.367, SE = 1.841) was significantly higher than the average baseline measures of GSR (M = 5.037, SE = 1.105), t(33) = -5.801, p < .001. Following exposure to the silent condition, GSR values were higher (M = 4.986, SD = 2.146) than the average GSR baseline measures (M = 4.383, SE = 1.023), t(33) = -3.692, p = .001. However, there was no significant difference between the average baseline measures of GSR (M = 5.916, SE = 1.678) and post post exposure to the slow music condition (M = 5.916, SE = 1.678).

Discussion

One can gather from the results that the tempo of a musical piece has a significant impact on one’s physiological levels of arousal, specifically heart rate and GSR. This implies that music has the ability to influence physiological measures below one’s level of conscious awareness. Tempo can either maximize or minimize the experience of psychophysiological stress. More specifically, heart rate was influenced by fast tempo, slow tempo, and silence. Fast tempo music was able to significantly increase one’s heart rate, while slow tempo music significantly lowered heart rate, and silence also lowered one’s heart rate. In a practical sense, this means that listening to fast tempo music increases measures of arousal, which may be indicative of stress, while slow tempo music and silence lower those measures. Slow tempo music, however, elicited a greater reduction in heart rate than silence. Consequently, slow tempo music and silence would be means of lowering these physiological measures, but slow tempo music, based on these findings, would yield a greater reduction in heart rate. This is beneficial to utilizing music as a means of influencing heart rate levels that have an impact on one’s experience of stress.

On the other hand, participants in the fast tempo music and silence exhibited an increase in GSR measures across the two time points. GSR is an indicator of skin conductance, which quantifies sweat (Carlson, 2013). Sweating is an indicator of arousal and, based on the results of this study,
sweating increased for those participants who listened to fast tempo, as well as for those who were in the silence condition. The claim can be made that the fast tempo music elicited an increased arousal response, as the high speed of the music may have created an augmented experience of anxiety or psychological arousal that led to physiological arousal of the autonomic nervous system. Additionally, for those sitting in silence with ear plugs, it is possible that GSR increased due to the use of the ear plugs, and the resulting period of complete silence creating an experience of heightened arousal, as compared to when baseline measures were collected and participants were simply sitting and able to hear the noise of their environment. It is important to note that across all three conditions GSR increased over time from baseline to post measures. This may explain why slow tempo music did not result in decreased levels of GSR, as predicted. GSR is a measure indicative of increased arousal, which is highly responsive to emotions or other external and internal stimuli that lead to increased secretion of the sweat glands. Therefore, GSR is a common measure of autonomic nervous system activity, which is usually indicative of an increase of some kind in secretion of sweat and a tool of monitoring the stress response and anxiety. As a result, GSR is more likely than heart rate to increase based on external or internal stimuli, than decrease (Mendes, 2009). This explains why slow tempo music elicited a slight increase in GSR, but this increase was not as significant as that of fast tempo music or silence. Subsequently, this may imply that slow tempo music was able to lessen the natural increase in GSR when a person is exposed to a stimulus of some kind (i.e. music or absolute silence). GSR increases as a startled response and orienting response, which could both be produced when listening to slow tempo music (Pflanzer, 2013). The slow tempo music may have been less startling or required less orienting than fast tempo music or silence, which is why slow tempo music did not yield a significant increase, although there was an increase in GSR from baseline. Silence may not have resulted in as great of an increase as fast, but still larger than slow, due to the anxiety that ear plugs and complete silence might yield. Thus, a person might experience arousal in their secretion of sweat when exposed to total silence and the use of ear plugs, whereas the slow tempo music may have lessened that arousal. However, fast tempo resulted in the largest increase in GSR, as the upbeat tempo of the music may have resulted in more arousal than slow or silence. The fast tempo music may have been perceived as more rousing, whereas slow tempo more soothing. Therefore, the findings demonstrating that GSR increases over time, independent of the condition, coincides with the notion of GSR being highly susceptible to increasing rather than decreasing, particularly when a person is exposed to a stimulus that elicits an emotional or physiological response. This accounts for there being no significant difference in baseline measures as compared to post GSR for slow tempo music and the level of increase in GSR that was observed for fast tempo and silence.

This study’s findings contribute to the existing body of literature. Music clearly influences physiological occurrences, which in turn can influence psychological measures. The tempo of the music can contribute to one’s experience of arousal, which relates to one’s experience of stress. Thus, fast tempo music can increase physiological arousal, which could maximize one’s perceptual experience of stress by adding the physiological arousal. Slow tempo music, in contrast, can lessen one’s physiological arousal, which can diminish the overall experience of stress. Silence is similar to slow tempo music in this way, but slow tempo music has a greater impact in lessening the psychophysiological measures of stress. This can provide insight, specifically to Black women college students, the participants of this study, on the tempo of music they should be listening to, if they are trying to monitor or influence their stress levels. Slow tempo music could serve as a stress reduction tool and fast tempo music could be beneficial if one is trying to increase their arousal to generate eustress, or positive stress, as a means of motivation. Moreover, one can monitor the tempo of music that plays in the background, such as in the car, while studying or working out, to monitor whether that music will increase or decrease their level of arousal.

There were several limitations of this study, which should be addressed in future research. The location of data collection was in an area of relatively high traffic and was also next to a copier machine. Thus, background noises may have interfered with the participants’ ability to only be exposed to the music, as well as variance in the ability of the ear plugs to block out all sounds. This limitation could be controlled for by utilizing a location that is sound proof, as well as ensuring that the music is loud enough for each individual participant and that the ear plugs are blocking out sound for each
individual participant. Furthermore, there were many physiological limitations, individually and overall. Individually, this study did not control for participants’ previous activity or consumption of certain foods or drinks that may impact heart rate or GSR prior to data collection. Although participants were asked not to use the stairs, participants may have used the stairs prior to entering the building, while others may have just started their day and this was their first physical activity. Additionally, time of day could have impacted the physiological measures accessed. Overall, the Biopac system is sensitive to the application of the electrodes, which are not consistently adhesive. The electrodes are susceptible to losing their adhesive more quickly for skin that is well moisturized. Additionally, heart rate and GSR can be influenced by external factors, such as temperature and humidity, and internal factors, such as medications. Thus, this can result in inconsistencies. These limitations can be addressed by the utilization of more sophisticated tools in acquiring heart rate and GSR, as well as requiring information from participants, regarding anything that could interfere with their physiological responses (i.e. level of physical activity prior to coming, consumption of coffee, list of current medications, etc.). Additionally, one’s affinity to fast or slow music may have also served as a limitation; if the participant prefers slow music or fast music or perceives one to be more soothing than the other, this can have an impact on their stress response. Moreover, another limitation was body movement, especially when listening to the fast or slow music. Heart rate and GSR are sensitive to bodily movements and participants were not always sitting completely still; whether that was because of general fidgeting or their moving to the beat of the music. These movements could have contributed to their external level of arousal, especially during the fast tempo condition, when a participant might have been responding to the tempo by making fast movements.

In future research, music affinity to either slow or fast tempo can be further explored. It is possible that one’s affinity to fast or slow music may predispose people to have higher or lower heart rate and GSR measures, which can increase or decrease their susceptibility to physiological experience of stress, which can in turn maximize or minimize their psychological experience of stress. Future research could also explore manipulating the tempo of musical selections that fall in other genres, such as rock, hip hop, or pop, to evaluate if these genres elicit the same results in changes in heart rate and GSR.

References