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RESEARCH ARTICLE

Students Who are Listening to Classical Music During Anatomic Identification Test Have Lower Stress Level

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ABSTRACT

Background: *Just like any other test, anatomical identification test can also cause high stress. Classical music intervention has proven effective in mitigating stress level in clinical context. However, whether or not it is effective as well to reduce stress level during anatomical identification test remains unknown.*
Objective: *discovering whether listening to classical music can alleviate stress level in students when attending anatomical identification examination.*
Methods: *Experimental research with post-test only control group design, involving 148 students as its sample obtained using proportionate stratified random sampling. The sample is divided into 2 groups: the group who listen to classical music and the one who did not listen to classical music. The stress level was measured using Visual Analogue Scale (VAS). The data are analyzed using Chi Square test.*
Results: *Students who do not listen to classical music are mostly experiencing moderate (33 students or 22.29%), mild (29 students or 19.59%) and severe (12 students or 8.1%) stresses. On the other hand, students who listen to classical music are mostly experiencing mild (44 students or 29.72%), moderate (29 students 19.59%) and severe (1 student or 0.67%) stresses. The Chi Square test shows significant difference, p= 0.002.*
Conclusion: *Listening to classical music makes students have lower stress level when attending anatomical identification test.*

Keywords: *Stress, Classical Music, Anatomical Identification Test*

ABSTRAK

Pendahuluan: Seperti ujian lain, ujian identifikasi anatomi juga dapat menimbulkan stress yang tinggi. Intervensi musik klasik terbukti efektif menurunkan tingkat stress pada konteks klinik. Namun, belum diketahui apakah juga effektif untuk menurunkan tingkat stres selama ujian identifikasi anatomi. **Tujuan:** mengetahui apakah mendengarkan musik klasik dapat menurunkan tingkat stress pada mahasiswa selama mengikuti ujian identifikasi anatomi.
Metode: Penelitian eksperimental dengan desain post test only control group design, melibatkan 148 orang sebagai sampel, yang diperoleh dengan cara proportionate stratified random sampling. Sample dibagi menjadi 2 kelompok: kelompok yang mendengarkan musik klasik dan kelompok yang tidak mendengarkan musik klasik. Penurunan tingkat stress diukur dengan Visual Analogue Scale (VAS). Data dianalisis dengan uji Chi Square.
Hasil: Mahasiswa yang tidak mendengarkan musik klasik sebagian besar mengalami stress dengan kategori sedang 33 orang (22,29%), ringan 29 orang (19,59%) dan berat 12 orang (8,1%). Sebaliknya mahasiswa yang mendengarkan musik klasik sebagian besar mengalami stress dengan kategori ringan yaitu 44 orang (29,72%), sedang 29 orang (19,59%) dan berat 1 orang (0,67%). Uji Chi Square menunjukkan perbedaan bermakna, p= 0.002.
Kesimpulan: Mahasiswa dengan mendengarkan musik klasik mempunyai tingkat stress yang lebih rendah selama mengikuti ujian identifikasi anatomi.

Kata Kunci: Stress, Musik klasik, Ujian Identifikasi Anatomi

INTRODUCTION

Anatomical identification test demands students to have the competence in identifying organs in cadaver. Just like any other examination, anatomical identification test also causes high stress. A systematic review and meta analysis find that musical intervention in someone who is experiencing hypertension proves effective in reducing physiological responses such as: blood pressure, heart rate frequency, respiratory frequency, and stress (Kühlmann et al., 2016). Blood pressure and respiratory frequency are tightly related to cardiovascular system and respiratory system, and they are important physiological responses to measure anxiety/stress level (Latha et al., 2014; H. J. Trappe, 2010). Music is one of methods available to reduce stress, including classical music. Many studies (Dewi, 2009; Kahloul et al., 2017; Willenswaard et al., 2017) find that classical music has proven effective in alleviating stress in clinical context. However, it remains unknown whether or not it is effective as well to reduce stress in nonclinical context such as in students attending anatomical identification examination.

Stress is a physical and mental response experienced by individuals when they find that what

they imagine is different from the reality (Fink, 2009). According to Wirawan, stress is a undesired reaction resulting from the high demand that an environment places on an individual (Wirawan, 2012). Stress can occur in anyone, including students in their first year at a university. One of the causes of difficulties that these students encounter is the different characteristics of educations at senior high school and university. As a result, students need to adapt their lives to the changes they encounter when studying at universities (Abdulghani et al., 2011; Pariat et al., 2014; Shkulaku, 2015). These differences include curriculum of field of study, examination, discipline, communication with fellow students and with lecturers, and economic issues (Mayer et al., 2016). All of these differences, particularly the ones related to academic issues and examination, may trigger stress in students (Al-Dubai et al., 2011; Devi and Shaj Mohan, 2015).

Music has frequently been used as a therapy to improve, maintain internal harmony, develop mental spritual and emotional health. This has something to do with the ability of music to trigger passionate, relax and peaceful, sad or happy, safe and comfortable feelings, as well as releasing pain (Djohan, 2005). Music influences perception through distraction, i.e. shifting one's focus of attention to something pleasant that stress, anxiety or concern can decrease or even vanish (Campbell, 2001). This relaxation mechanism takes place when cortisol hormone decreases (Thoma et al., 2013) and β-Endorphin is released, which then gives a euphoria feeling (Wahida et al., 2015). In principle, all types of music can be used to reduce stress and anxiety levels. Since classical music has calm rhythm and flows softly, it is often chosen for a therapy (Thoma et al., 2013). In addition, classical music also has a rhythm and tempo which match human heart rate speed at around 60 beats/minute, thus allowing the body to be in an optimal rest condition (Campbell, 2002; Evangelista et al., 2017). Furthermore, the calm rhythm and soft flow of classical music can trigger alpha wave at a frequency range between 8 and 13 hertz, thus making it capable of stimulating limbic system to cause comfortable, calm, and peaceful feelings, and disappearance of pain resulting from endorphin release (Wahida et al., 2015). Moreover, the classical music rhythm can also reduce thyroxine hormone which serves to alleviate tension (Fukui et al., 2012a), as well as to stimulate amygdala to enhance concentration (Hall, 2016). This research aims at discovering whether students who are listening to classical music when attending anatomical identification examination have their stress level decreased or not.

METHODS

In posttest only control group design, the sample amounts to 148 students of 2012-2013 academic year (first year at medicine faculty at Unissula) obtained using proportioned stratified random sampling, divided into two groups. The group of students who listens to classical music and the one who does not listen to classical music during anatomical identification test. Each group consists of 74 male (37) and female (37) students. The classical song used is Mozart's Concerto for Flute, Harp, and Orchestra in C Major, K299 and played for 28:57 minutes via a laptop connected to a speaker at 60 decibel. At the end of research, the stress is measured using Visual Analogue Scale (VAS). Prior to conducting this research, all students participating in it are briefed on its objective and the instruments used. This research is conducted upon the approval from the Committee of Bioethics of Medicine Faculty at Unissula, Semarang under a letter number: 290/XII/2013/Komisi Bioetik.

Method for Measuring Stress using VAS

The stress is measured using Visual Analogue Scale (VAS) which is employed to assess the subject conditions, such as stress and pain. This tool consists of a 10-cm line within which some signs indicating extreme symptoms are added (zero means no stress and 10 means maximum stress). Students are asked to sign the stress level at the appropriate point in the scale (0-10).

STATISTICAL ANALYSIS

The data are inputted to SPSS version 13.0 in 3 categories: 0-4 = mild; 5-7 = moderate; 8-10 = severe. Univariate statistical test is used to find out the frequency distribution of each independent variable on the dependent variable. The data test for the influence of independent variables on the dependent variable using Chi Square test at a significance value $p < 0.05$.

RESULTS

148 students take the anatomical identification test in this research. 74 of these students are assigned to the group who listens to classical music and the other 74 are assigned to the group who does not listen to classical music. Both groups have comparable basic characteristics (table 1). The observation result using VAS indicated that all students, both those in the groups who listen and did not listen to classical music, experience stress during the anatomical identification test, despite the differences in their stress level profiles (table 1).

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Table 1. Basic characteristics of sample and observation result after listening to Classical Music

Variables		Music-G		Non-music-G		P
		Male	Female	Male	Female	
Sex		37	37	37	37	0.801
Age (years)	17-18	0	0	3	2	0.167
	19- 20	37	37	34	35	
Body Weight (kg)	50-60	20	23	22	25	0.701
	> 60	17	14	15	12	
VAS	Mild	19	25	18	11	0.002
	Moderate	17	12	12	21	
	Severe	1	0	7	5	
	Total	37	37	37	37	

Table.2. Table of cross influence of listening to classical music on stress alleviation in students while attending anatomical identification examination

Musik	VAS			Total	P-value
	Mild	Moderate	Severe		
With Music	44	29	1	74	0.002
Expected count	36.5	31.0	6.5	74.0	
Without Music	29	33	12	74	
Expected count	36.5	31.0	6.5	74.0	
Total	73	62	13	148	
Expected count	73.0	62.0	13.0	148.0	

In this table, it was shown that the number of students in the group who did not listen to classical music while attending the anatomical identification test experiencing mild stress is 29 (19.59%) moderate 33 (22.9%), and severe 12 (8.1%). On the other hand, the students in the group who listen to classical music while attending the anatomical identification test were mostly experiencing mild stress or 44 students (29.72%), moderate 29 (19.59%) and severe 1 (0.67%) (figure 1).

To figure out whether the stress level profile of students in the group who listen to classical music is significantly different from that of those who did not listen to classical music, a statistical test was needed. The Chi-square test result indicated that the stress level profile of students in the group who did not listen to classical music during anatomical identification test is significantly higher than those students who listen to classical music, p= 0.002 (table 2). This statistical test result shows that listening to classical music can reduce the stress level profiles of students while attending anatomical identification examination.

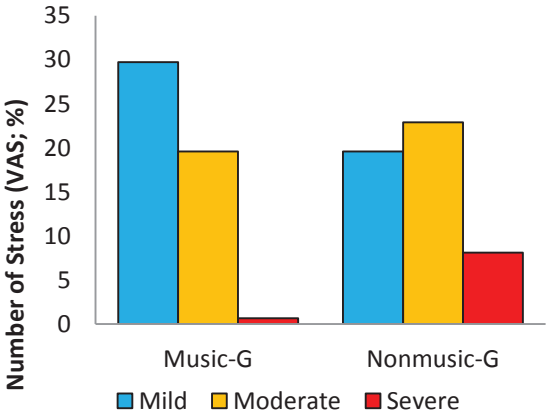

Figure 1. Student's Stress Profile in Anatomical Identification Test

DISCUSSION

This research has proven that listening to classical music results in the decreased stress level in students while attending anatomical identification test. This research finding confirms the study conducted by Adareth and Purwoko (2017) who find that listening to classical music can alleviate the stress level of students who are about to take examination (Adareth and Purwoko, 2017). Ardiansyah (2014) and Rosanty's (2014) studies also find reduced stress in students who are completing their final projects (Ardiansyah, 2014; Rosanty, 2014). The same results found in Bharadwaj's (2017) research stated that classical music was proven capable of alleviating

stress in students who are experiencing academic stress (Bharadwaj, 2017). However, the research conducted by Alagha and Ipradjian (2017) was reported to find different result, i.e. no correlation was found between listening to classical music and stress reduction using Perceived Stress Scale (PSS) as the measuring tool (Alagha and Ipradjian, 2017). It was likely because the small amount of sample used, i.e. 94 respondents, and the fact that the questionnaire was completed after 30 minutes of lunch break. The mechanism of how the stress alleviation resulting from listening to classical music remains unknown and it was strongly suspected that it has something to do with some brain oscillation in a combined form (Basar, 2006; Uhlhaas and Singer, 2013).

In a process of conscious thinking, the brain will activate beta wave. Beta wave is the brain wave with the highest frequency among other brain waves. Beta wave consists of three parts, namely beta at 12-15 Hz frequency, beta at 16-20 Hz frequency, and beta at 21-40 Hz frequency. Beta wave is used for such processes as thinking, interacting, and performing daily life activities. While beta wave is one of the most important part in our conscious condittion, when its use is emphasized only in this type of wave, with no support from other waves with lower frequency, it will then result in a life full of anxiety, tension, concern and unfocused thinking process (Zahara, 2015). This is experienced by students who have negative and irrational thinking as well as lack of control in dealing with examination situation while attending anatomical identification examination. This causes limbic system to activate, particularly at amygdala and hippocampus regions, where both then propagate signals to posterior medial hypothalamus section, at the paraventricular nucleus of the hypothalamus to be precise (Hall, 2016). These stimulated amygdala, hippocampus and paraventricular nucleus of the hypothalamus can then cause fear, anger, and guilt and nearly similar effect as the effect resulting from hypothalamus stimulation, i.e. in sympathetic system, and it is suspected to cause the encouragement to change short term into long term, leading to one remembering for a long what has just happened to them. Amygdala itself is deemed as helpful in determining the pattern of behavioral response to an event, hence one can adapt to any situation (Hall, 2016). This amygdala causes students, while attending anatomical identificationtest, to have varied patterns of behavioral response and expressions to an event (stress) they are facing, ranging from mild to severe ones.

The increased limbic system activity above causes the beta wave to increase as well. This condition should be balanced by a wave at a lower frequency, i.e. alpha wave (Zahara, 2015). Claproth (2010) suggested that the brain wave that humans have could resonate from audio and visual vibrations and touch touch or taste signal, thus we could stimulate our brain to produce certain brain wave as needed by our body/surrounding environment (Claproth, 2010). Conditioning the brain by listening to music is intended to allow it to produce or reduce certain types of brain wave frequency (alpha), so that it can generate a stable mental and emotional condition, particularly in a stressful circumstance like during an examination.

Examination will always creates high stress for students (Rony Wahyudi, Eka Bebasari, 2016). Anatomical identification test is one of examinations which requires students to be able to answer the questions quickly and correctly. They have this identification test for the first time in musculoskeletal movement module. This constitutes their first experience, thus it is possible to cause a psychological effect. Istadi's (2012) study shows that the stress level of students attending anatomical identification examination in musculoskeletal movement module ranges between moderate and severe, i.e. 167 and 51 of 244 students and the dominant factor influcing stress is the psychological one (ß = - 0.123, p = 0.017). If this stress condition remains, it might disrupt their academic achievement and cause mental health and personal development problems (Ab and I.N, 2009; Pariat et al., 2014; Saeedan et al., 2013). Sarafino (2010) suggests that there are four disorders which constitute a response to stress. The first one is emotional disorder, which causes sensitive feeling, anger, bad temper, nervousness, restlessness, anxiety, depression, sadness and excessive self-blaming. The second one is cognitive disorder which causes such complaints as forgetfulness, lack of focus in thinking, and inability to make decisions. The third one is behavioral disorder which renders an individual unable to interact in social life and creates problems in their interpersonal interaction and roles in social scope. The fourth one is health disorder which triggers physical complaints, including stiffness, headache, tremble, stomachache, palpitation, weariness, sleep disorder, and so forth (Sarafino, 2010). Such a condition needs appropriate solutions to lower the stress the students experience during anatomical identification examination. One of the solutions available is by listening to classical music.

The reduced stress in students while attending anatomical identification test by listening to classical music is possible due to the fact that the rhythmic tone produced by musical instruments create vibrations.

These vibrations of classical music stimulate the non-specific reticular nuclei which surround the thalamus and the inner nuclei which are diffused within the thalamus. This stimulation can trigger waves in thalamocortical system at 8-13 Hz frequency which generate alpha wave. It is these waves which influence two systems in human body. The first one is the hormone system, i.e. stimulating hypothalamus activities by restraining the release of corticotrophin-realising hormone (CRH). As a result of this CRH restraint, the maka pituitary anterior gland is also restrained from producing adrenocorticotrophic hormone (ACTH) (stress hormone), thus restraining further the adrenal gland from releasing cortisol, adrenalin, and noradrenalin hormones (Fukui and Toyoshima, 2011). The further effect is that the thyroxin hormone is restrained by thyroid gland (Parle, 2016; Safaria and Saputra, 2012; Thoma et al., 2013). The high thyroxine hormone level will leads an individual to seemingly get easily tired, tense, and anxious, thus as they listen to the melodious flow of classical music they will feel calmer and more peaceful in such a way that they will be psychologically more relaxed (Fang et al., 2017; Fukui et al., 2012b; Safaria and Saputra, 2012). The second one is the autonomic nervous system, i.e. activating the parasympathetic nerve works which result in decreased heart rate and blood pressure, decreased body muscle stiffness, and reduced glucose level in blood, as well as reduced energy consumption. This condition allows the occurence of relaxed, calm, and peaceful feeling and enables the individual to improve their concentration (Cheng, 2013; Fukui and Toyoshim, 2011; Fukui and Toyoshima, 2008; Groarke, 2017; H.-J. Trappe, 2010). This confirms Djohan (2006), Trappe (2012), and Tsiris's (2008) opinions who argue that listening Mozart's music or other music in general can be a method to reduce stress since it has some influence in creating a relaxed condition in an individual which eventually leads to body metabolism and hormonal balance.

The very existence of music which accompanies students while taking anatomical identification examination gives a relaxing effect. This effect can be a way or access into one's unconsciousness, allowing the brain to work more optimally and, furthermore, absorb information quickly and focus their attention better and eventually understand a problem better (Yuwono, 2010).

The limitation of this research was its lack of consideration of the familiarity and preference of the music being played. According to Marin et al. (2016) whose research revisits Berlyne's theory, it was stated that the hedonism values which consist of pleasure, preference, and utility become lower when the music is entirely new for the one listening to it and it will improves as they get more familiarized and will decrease once again when the music has been too familiar. Marin's research confirms Berlyne's theory. Therefore, it is suggested for further research to control this familiarity factor.

CONCLUSION

This research indicated that during anatomical identification test, those students listening to classical music was found to have lower stress level as compared to those who did not listen to classical music.

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CONFLICT OF INTEREST

No conflict of interest is involved in this research.

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