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Instrumental music versus Quran recitation: Which has the most influence on the accuracy and speed of work?

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ABSTRACT

Many studies have proved that instrumental music, as well as Quran recitation, affects human factors such as mood, performance, and intelligence. However, to the best of our knowledge, there is no research on the effect of listening to Quran recitation before doing mental task on work productivity. This study examined the impact of instrumental music and Quran recitation on work productivity, especially on the accuracy and the speed of work. The study involved 20 people of productive age (15-64 years) as respondents. The true experimental one group pre-test and post-test design were used in analyzing the data. The data collected are the speed and the number of errors when conducting the Stroop task. The study found that instrumental music, as well as Quran recitation, has a significant contribution to the increase of the accuracy and the speed of work (p=0.00). The study also proved that Quran recitation has a significantly higher effect on work speed and accuracy compared to instrumental music treatment (p=0.00). The average speed of conducting the Stroop task with Quran recitation treatment is 7.67% higher than with the instrumental music. Furthermore, the average number of errors with Quran recitation treatment is significantly lower (e=2.93) than with the instrumental music treatment (e=4.68).

Keywords: Quran recitation; Instrumental music; Accuracy; Speed; Stroop task.

INTRODUCTION

Music is a concrete form of uniquely human behavior and mutual influence (Djohan, 2009). Music can make the atmosphere calmer (Kusbiantoro, 2010). This opinion was also supported by Faradi (2016), who stated that music could provide certain emotions to the listener, such as emotions of sadness, pleasure, and even giving a sense of calm. In the realm of work, it is common that workers always listen to music while they work. In some offices, it is also common that they play light music at low volumes during working hours. In the work environment, music is used for several purposes, namely, to reduce the annoying sound effect and to feel more relaxed (Santoso, 2004). The impact of music on mentality has been studied by many people. Sailer and Hassenzahl (2000), citing Kjellberg and Landström (1994), state that noise has a negative influence on the concentration, productivity, work capacity, and risk of accidents, even at low sound/volume levels. Beh and Hirst (1999) learn the effects of music on the driver. They concluded that music has a positive influence to increase alertness during driving. For light duty, music has no influence, and loud music does not interfere with driver performance. Much research explores the effects of music-listening while driving. However, the results of the study by Millet et al. (2019) offer conflicting views at numerous levels. This study shows that listening to music has a statistically significant detrimental effect on driving performance, specifically for collisions and longitudinal controls.

Kim (2016) examined the main and interaction effects of job demands, job autonomy, and social support on music therapists' burnout and turnover intention. The results showed that job demands interacted with job autonomy

in predicting turnover intention, while social support had a negative primary effect on turnover intention. A study by Halliday (2019) was conducted to investigate the relative predictive power between music preference and everyday use of music and traditionally used personality assessments in the organizational psychology literature. One of the study results provided evidence indicating that listening to music and preferences are statistically significant predictors alone, and they provide a small but statistically significant amount of additive predictive power to the prediction of self-reported counter productive work behaviors. This study shows that listening to music has a statistically significant detrimental effect on driving performance, specifically for collisions and longitudinal controls. Wu and Shih (2019) explored the difference between the attention performance of musicians and that of nonmusicians. This study found that a musician's attention performance is better than a nonmusician's and that background music tends to improve the attention performance of both musicians and nonmusicians, but to a greater extent for musicians.

Giving music during working hours can have a positive impact on work morale and increased production, even giving music can reduce absenteeism and fatigue during work (Ika, 2014). The type of music it plays influences the effectiveness of using music during work. Therefore, providing music to employees should be adjusted to the conditions of the workspace and emotional work of employees (Ika, 2014). Music that is soft and following working conditions, namely, a place, time, and atmosphere, will have an impact on employees, so that employees feel happy to work inside the Office (Nova, 2010). One of the soft music that is usually heard is instrumental music.

Instrumental music is a type of music without vowels consisting of a series of regular and harmonious tones. Consistent and harmonious tones can make listeners enjoy music more (Christianti, 2012). Benefits that can be obtained by listening to instrumental music, among others, can increase muscle energy, affect heart rate, can reduce the feeling of stress and pain, reduce fatigue and drowsiness, can make emotional conditions better, and can increase creativity, sensitivity, and ability thinking (Gunawan, 2007).

Quran recitation is a recording of the verses of the Quran recited at a slow and harmonious tempo by a Qori. One of the benefits that can be obtained from listening to Quran recitation is the listener will get peace of mind. Other advantages obtained are reducing stress, activating natural endorphins, increase feelings of relaxation, and reduce feelings of anxiety, fear, and tension (Siswantinah, 2011).

Many studies have been conducted to find out the influence of music and Quran recitation on someone. One such study was conducted by Yoannes (2016) concluded that there was a significant effect between giving background music and industrial music to employee work productivity. Research on the influence of Quran recitation on someone was also carried out by Nirwana (2014) who concluded that there were significant differences before and after Quran recitation therapy on changes in anxiety levels of patients with diabetes mellitus in Labuang Baji Hospital Makassar. Another study conducted by Ayudiah (2013) found that there were differences in the level of depression in the elderly before and after Quran recitation therapy.

Research on the influence of Quran recitation and instrumental music on humans has been done a lot. However, those studies more often discuss the influence of Quran recitation on human cognition such as depression, anxiety, and concentration. Yet, no studies have been found regarding the impact of both Quran recitation and instrumental music on work productivity, especially those related to accuracy and speed of work. Therefore, this study examines the influence of instrumental music and Quran recitation on work productivity, especially on work speed and accuracy.

METHOD

The type of study is true experimental design, where the researcher assigns test units and treatments to the experimental groups, and where all external variables that affect an experiment can be controlled, so that the validity of this experiment can be high. The study used one group pre-test and post-test design; it began with the pre-test phase of a group, then proceed with giving treatment. Then the post-test phase was carried out to determine the effect of the treatment given. The treatments were listening to the instrumental music and Quran recitation. The subjects for each treatment were similar.

Variables

The variables involved in this study include (1) independent variables, which were instrumental music and Quran recitation; (2) control variables, which were the temperature of the room (20-25^{o}C) and the lighting of the room (250-300 lux). Another control variable was the condition of the respondent, where the researcher always reminds the respondent not to do the following things a day before the data was taken such as not taking the medication with a drowsy effect, not drinking coffee, and not sleeping late (less than 8 hours); (3) dependent variables, which were the speed and accuracy of one's work.

Replication

Replication is important in an experimental study to provide more accurate results. The number of replications used in the experiment was three replications for each treatment (Instrumental music and Quran recitation). So, the total tests needed was six times from the two treatments given. Each experiment was conducted on a different day.

Location

The experiment was conducted in the Laboratory of Work System Design and Ergonomics, Department of Industrial Engineering, Universitas Andalas, Padang, West Sumatra. This place is designated as the experiment location because it has lighting and room temperature that can be controlled, and the condition of the room that is not noisy so that the concentration of the respondents can be maintained.

Subjects

Twenty subjects involved in the experiment consists of ten males and ten females. Of the total number of participants, 16 were university students (8 males and 8 females, 18-23 years old), with the mean age (SD) of 20.88 (1.71) years. Others come from private and public employees (2 males and 2 females, 40-58 years), with the mean age (SD) of 50.75 (7.89) years. The reason for choosing samples refers to Sugiyono (2011) which suggests that the sample size for experimental research that requires an experimental group is that the number of sample members is 10 to 20 people. Type of sampling was quota sampling, where subjects were taken randomly by fulfilling the following criteria: (1) Moslem; (2) have a handphone with an Android, IOS operation system and headset; (3) not color-blind; (4) can follow all of the experiments.

Data collection

The data was collected for three weeks on November 8-25, 2018. Each experiment was held on a different day at 11am-2pm. Retrieval of data at that time is based on reason because at that time the hormone melatonin (sleep hormone) has dropped sharply, so the body is better equipped to do challenging work which requires more energy (Gonnissen, et al. 2013).

Preparation

The preparation started in the first week by collecting 20 subjects distributing a willingness questionnaire to take part in the study. Subjects then asked to download the Stroop task application on the Google Play Store or I-Store application. Next, instrumental music and Quran recitation used in the experiment were distributed to each respondent's mobile phone.

Treatment 1

The experiment for the first treatment was carried out in the second week, which was focused on experiments with instrumental music. The procedures were as follows: (1) subjects were first asked to fill out the questionnaire to find out the condition of the subjects before the experiment was conducted; (2) subjects were asked to perform an initial trial of the Stroop task for 10 minutes as the learning stage. Stroop task is a concentration test tool by reading words given different colors. Stroop effect is the most well-known phenomenon in cognitive science and the world of psychology (Scarpina and Tagini, 2017); (3) the pre-test stage was that the subjects were asked to perform the Stroop task by determining the ink color of a color word that appears on each subject's mobile screen. For example, the word

BLUE was printed in red ink. The task was carried out for 30 words, each of which appears sequentially after one task has finished. An example of a Stroop task problem is presented in Figure 1. In this stage, the duration and error data, which show the speed and the level of accuracy in performing the questions, were recorded; (4) the treatment stage: subjects listened to instrumental music entitled Instrumental Piano Relaxation Music from the Relax River with a duration of 14 minutes while sitting and in relaxed conditions; (5) the post-test stage was that the subjects were asked to perform the Stroop task for 30 questions. The duration of task and error data of each subject were recorded on their mobile phone.

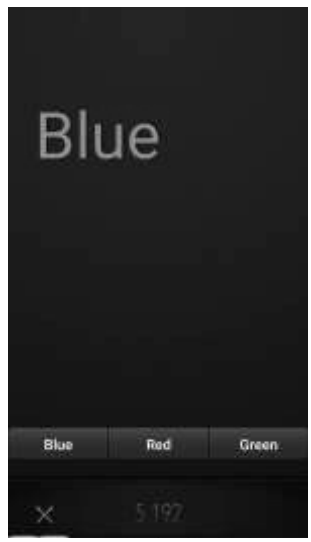

Figure 1. Stroop task.

Treatment 2

The experiment for the second treatment (Quran recitation) was carried out in the third week. The procedure used was the same as that carried out in the previous experiments with instrumental music. The treatment was to listen to Surah Ar-Rahman from Shaikh Mishary Rashid Ghareeb Mohammed Rashid Al-Afasy with a duration of 13 minutes, during which the respondent listens in a state of sitting and in relaxed conditions.

Data analysis

A normality test with SPSS software (version 22.0) was conducted for speed and error data performing the Stroop task before being used for further analysis. The normality test used was Shapiro Wilk, where $p<0.050$ was regarded as statistically significant. Data was then processed using Wilcoxon signed rank test to determine whether instrumental music and Quran recitation significantly affect work productivity, especially on work speed and accuracy.

Another analysis using Wilcoxon signed rank test was performed to compare the speed and accuracy in performing the Stroop task with the instrumental music versus with Quran recitation. The test found out which treatment has the best impact on work speed as well as work accuracy. The hypothesis was:

H_1: $\mu_{murottal} = \mu_{music}$ (The speed of performing the questions of the Stroop task with Quran recitation is similar to the instrumental music treatment)

H_2: $\mu_{murottal} > \mu_{music}$ (The speed of performing the questions of the Stroop task with Quran recitation is faster than with the instrumental music treatment).

For the comparison of the accuracy in performing questions between the instrumental music and Quran recitation, the hypotheses used were as follows:

H_3: $\mu_{murottal} = \mu_{instrumental}$ (The number of errors in performing the Stroop task with Quran recitation is similar to the instrumental music treatment)

H_4: $\mu_{murottal} < \mu_{instrumental}$ (The number of errors in performing the Stroop task with Quran recitation is less than with the instrumental music treatment)

RESULTS

The influence of instrumental music on work productivity

Table 1 shows a comparison of the average speed while performing 30 questions in the Stroop task before and after listening to the instrumental music for 1st replication, 2nd replication, and 3rd replication. The average speed after listening to instrumental music was significantly higher than before listening to instrumental music (p=0.00). It means that subjects were significantly faster while performing questions in Stroop task after listening to instrumental music.

Table 1. The average speed in performing the Stroop task before and after listening to the instrumental music.

Replication	Before Treatment (word/minute)	After Treatment (word/minute)
1st	4.37 (1.09)*	4.82 (1.18)*
2nd	4.77 (1.30)*	5.05 (1.25)*
3rd	5.02 (1.33)*	5.18 (1.36)*

*Significant at p<0.05

On the other hand, Table 2 presents the comparison of the numbers of error, while subjects were performing 30 questions in Stroop task before and after listening to the instrumental music for 1st replication, 2nd replication, and 3rd replication. The numbers of error were significantly lower after subjects listening to instrumental music (p=0.00).

Table 2. The average number of errors in performing the Stroop task before and after listening to the instrumental music.

Replication	Before Treatment	After Treatment
1st	11.05 (6.85)*	6.25 (4.84)*
2nd	5.10 (2.85)*	3.95 (2.50)*
3rd	5.55 (3.27)*	3.85 (3.03)*

*Significant at p<0.05

The influence of Quran recitation to work productivity

The comparison of average speed (word/minute) for performing Stroop task before and after listening to Quran recitation was presented in Table 3. The statistical analysis using Wilcoxon signed rank test proved that the average speed after listening to Quran recitation was higher than without Quran recitation for all the replications (p=0.00). Table 4 shows that the average numbers of error for performing Stroop task were also significantly lower after subjects listening to Quran recitation (p=0.00).

Table 3. The average speed in performing the Stroop task before and after listening to Quran recitation.

Replication	Before Treatment (word/minute)	After Treatment (word/minute)
1st	5.08 (1.46)*	5.40 (1.47)*
2nd	5.01 (1.33)*	5.42 (1.48)*
3rd	5.01 (1.43)*	5.47 (1.54)*

*Significant at $p<0.05$

Table 4. The average number of errors in performing the Stroop task before and after listening to Quran recitation.

Replication	Before Treatment	After Treatment
1st	4.95 (2.96)*	2.85 (2.23)*
2nd	5.50 (3.98)*	2.95 (2.42)*
3rd	6.00 (5.55)*	3.00 (2.73)*

*Significant at $p<0.05$

Comparison of the speed and accuracy in performing the Stroop task with the instrumental music versus Quran recitation

Table 5 shows the comparison results of the speed and accuracy of work between treatment using Quran recitation and instrumental music. This proves that the average speed of performing the Stroop task with Quran recitation treatment was significantly faster than instrumental music. The data shows that a person's work speed is better with the Quran treatment compared to the instrumental music. This results also show that the average number of errors performing the Stroop task for the treatment of Quran recitation was smaller than the treatment of instrumental music. The data prove that the accuracy of one's work is better with Quran recitation treatment compared to the instrumental music.

Table 5. Comparison of the speed and number of errors in performing the Stroop task with the instrumental music versus Quran recitation.

Work Productivity Indicator	Mean		Sig. (2-tailed)
	Instrumental Music	Quran Recitation	
The speed (word/minute)	4.63	4.93	0.00
Number of Errors	4.68	3.31	0.00

DISCUSSION

Effects of instrumental music on work speed and accuracy

The statistical analysis has found that instrumental music has a significant impact on the speed of one's work. Instrumental music also significantly influences the accuracy of one's work, where both results show that $p=0.00$. Thus, it can be said that instrumental music has a significant influence on work productivity.

The reason for this is because instrumental music provides a comfortable sensation to the respondents so that the concentration of respondents increases and can answer questions faster than before listening to instrumental music. This is also following the research conducted by Hidaya (2011) who said that instrumental music could make an individual more focused and concentrated, because instrumental music can have the effect of increasing attention, retention, and memory, increasing one's focus, and can develop thinking skills. Instrumental music can also cause heart rate and blood pressure to relax according to the rhythm of the music, which makes a person able to concentrate more efficiently (Gunawan, 2007).

When someone has listened to instrumental music, the harmonization of the music will enter the ear in the form of audio which causes the eardrum to vibrate and ear fluid to shake, and the hair cells inside the cochlea vibrate which then proceed to the brain into beautiful harmonization in the right brain and left brain. This creates a feeling of comfort and change in feeling. This change of feeling is caused by instrumental music can reach the left area of the cerebral cortex (Mindlin, 2009). The hearing is then continued to the hippocampus, and the signal continues entering the Amygdala as an area of conscious behavior that works in the subconscious, and the signal is then forwarded to the hypothalamus.

The hypothalamus is an area where there is regulation of vegetative function and endocrine of the body, such as one's emotional behavior. The hearing stage is then continued towards reticular formation as a conduit of impulses to autonomic fibers. This fiber has two nerves, namely the sympathetic nerve and the parasympathetic nerve, where both of these nerves can influence the contraction and relaxation of organs. This relaxation can lead to calmness for an individual (Ganong, 2005). But in this study, some respondents had a low level of concentration after listening to instrumental music. This was due to respondents who had less than 8 hours of sleep. Sleeping less than 8 hours can cause a person's concentration in work to decrease (Japardi, 2002).

Effects of Quran recitation on work speed and accuracy

The results of the statistical analysis of the effect of Quran recitation treatment on work speed data show that Quran recitation significantly influences the speed of one's work ($p=0.00$). Besides, Quran recitation also substantially affects the accuracy of one's work ($p=0.00$). So, it can be said that Quran recitation has a significant influence on work productivity.

The reason for this is because Quran recitation provides sound effects related to impulses, where the impulse in the form of electrons moves from a positively charged extra cell and has a cation of an excess Na^+ atom to a negatively charged instrument and has many K^+ ions. This impulse will be forwarded to the brain and will be processed in the brain. The sound received by the brain will then be sent to the central nervous system, which will be transmitted to all parts of the body, which causes the body cells to rearrange the particles in it. Quran recitation can stimulate the vagus nerve and limbic system which controls the emotions and behavior of an individual, so that Quran recitation sound effect can influence one's emotions and behavior in a better direction such as creating a sense of comfort and calm (Mayrani and Hartati, 2013).

Another effect obtained from listening to Quran recitation is that it can reduce anxiety, this is because when someone hears Quran recitation, brain waves are in alpha waves which range from 7-14 Hz. This situation is where brain energy can reduce levels of stress and anxiety in a person (MacGregor, 2001). This is following the research conducted by Ayudiah (2013) that Quran recitation therapy can reduce a person's stress level.

Comparison of the effect of instrumental music and Quran recitation on work speed and accuracy

The results of statistical analysis have shown that Quran recitation treatment can result in the time to answer the Stroop task questions more quickly than with instrumental music treatment. This indicates that the speed of one's work is faster with Quran recitation treatment compared to instrumental music. Testing of work accuracy also shows

the results of Quran recitation treatment resulting in a significant number of errors that are less than the instrumental music treatment. This proves that the accuracy of one's work is better with Quran recitation treatment compared to instrumental music.

This is because Quran recitation has more effects than instrumental music. Quran recitation can reduce levels of stress and anxiety in a person, while instrumental music only provides a relaxing effect on a person. The statement shows that Quran recitation has two essential points, namely a beautiful rhythm and can give motivation to motivate oneself so that one can be more enthusiastic in carrying out the problems that exist in his life, while instrumental music only has one important point namely the beautiful rhythm (Faradisi, 2012). Both treatments can indeed cause a relaxing effect so that they can increase concentration when answering the Stroop task. But after answering the questions, the respondents were again feared by the existence of anxiety about the problems that existed in the respondent if the treatment provided was only instrumental music. This is different from Quran recitation treatment, which can reduce anxiety in the respondent so that the concentration in answering the questions will be higher than the instrumental music treatment.

Additional analyzes were carried out to determine the effect of instrumental music and Quran recitation on different gender and age ranges. The analysis using the independent t-test found that gender factors do not affect a person's speed and accuracy after listening to instrumental music and Quran recitation. The age factor also has no effect on a person's accuracy in doing task after listening to the music instrumental and Quran recitation. However, this study found that the age factor affects a person's speed in completing tasks, without and with the treatment. Respondents aged under 40 years work significantly faster than respondents over 40 years of age. This is in accordance with previous research which found that older participants' comprehension was less accurate and there was age-related slowing of online processing times. In addition, increasing age also causes a decrease in the efficiency of parsing and interpretation (Caplan et al., 2011).

However, one of the lacking of this research is the study involved only Moslem samples. The results might be different if the subjects are non-Moslems. In the future, we shall use a much larger sample size which involve non-Moslem samples to better understand the influence of Quran recitation on work performance for all workers.

CONCLUSION

The conclusions obtained from the results of this study consist of the following: (1) treatment of instrumental music has a significant influence on work speed and accuracy ($p=0.00$). The reason for this is because instrumental music provides a relaxed sensation to the respondents, so that the concentration of respondents increases and can answer questions faster than before listening to instrumental music. Instrumental music can also cause heart rate and blood pressure to relax and relax according to the rhythm of the music, which makes a person able to concentrate more easily; (2) Quran recitation treatment has a significant influence on work speed and accuracy ($p=0.00$). This is because Quran recitation sound can stimulate the vagus nerve and limbic system, which controls the emotions and behavior of an individual, so that Quran recitation sound effect can influence one's emotions and behavior in a better direction such as creating a sense of comfort and calm. Another result obtained from listening to Quran recitation is that it can reduce anxiety; this is because when someone hears Quran recitation, brain waves are in alpha waves, which range from 7-14 Hz. This situation is where brain energy can reduce levels of stress and anxiety in a person; (3) Quran recitation treatment has the time to answer the Stroop task questions significantly faster than instrumental music treatment ($p=0.00$), whereas, for the number of errors answering the Stroop task, Quran recitation treatment has a significantly smaller number of errors compared to instrumental music treatment ($p=0.00$). Quran recitation reduces levels of stress and anxiety in a person, while instrumental music only provides a relaxing effect on a person.

Future research can examine the influence of instrumental and Quran recitation on other types of work, such as in field workers. This aims to determine whether the treatment of instrumental music and Quran recitation produces the same effect on these workers. Further research can also use other types of instrumental music and Quran recitation. It aims to determine whether instrumental music with different songs has the same effect on work productivity.

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