

The Mozart Effect On The Short-Term Emotional Intelligence Status Among Medical Students In Manipal University College Malaysia: A Pilot Randomized Controlled Trial

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ABSTRACT

In 1993 Rauscher et al. discovered that after listening to Mozart's sonata for a short period of time, participants showed significantly better spatial reasoning skills. Since then, the Mozart effect has become widely used especially among students. The purpose of this study was to determine the impact of Mozart effect on short term emotional intelligence among undergraduate medical students. This study was a pilot randomized controlled trial conducted among batch 45 undergraduate medical students in a private medical university in Malaysia. Participants were divided into control (n=20) and intervention (n=20) group by block stratified randomization. A piece from Mozart Sonata for two Pianos in D, K.448 was played for 15 minutes and was given a content validated, self-developed questionnaire for the intervention group whereas only the self-developed questionnaire was given to the control group (no preceding music was played). The data analyzed by using unpaired t-test, mean, standard deviation and mean difference was calculated. The level of significance was set at $P < 0.05$. Our research was divided to four main domains under emotional intelligence. First domain; emotionality was assessed using four questions and a mean (SD) of 13.90 (4.13) for intervention group and 11.35 (2.76) for control group was obtained ($p = 0.027$). The second domain; self-control was assessed by two questions and a mean (SD) of 8.00 (1.81) for the intervention group and 6.55 (1.79) for the control group ($p = 0.016$). The third domain; sociability was assessed by four questions and a mean (SD) of 14.80 (3.93) for the

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intervention group and 13.05 (2.99) for the control group ($p= 0.121$). The fourth domain; wellbeing was assessed by five questions and a mean (SD) of 19,9 (4.35) for the intervention group and 17.6 (3.68) for the control group ($p= 0.079$). The result of our study is in alignment with prior research that had been done in South Africa whereby the outlook, emotionality, and self-discipline of high school students were improved due to music involvement.

INTRODUCTION

In the year 1993, researchers by the name of Rauscher, Shaw and Ky conducted a study whereby three groups of participants were exposed to three different listening conditions and afterwards all participants were tested on one of the three abstract reasoning tests taken from the Stanford Binet Intelligence scale [1]. The results of the study were that normal subjects showed significantly better spatial reasoning skills after listening to Mozart's sonata for two pianos (K448) for ten minutes as compared to the other two groups that were exposed to relaxation instructions and silence [1]. The IQ scores of the participants who listened to music were 8-9 points higher than their counterparts in the other groups [1]. After the publication, the widespread attention from the media caused this finding to be coined as the "Mozart effect" [2].

Intelligence Quotient, or more conveniently known as IQ, is the measure of an individual's intelligence compared to others of similar age [3]. Research has proven that the relationship between music and cognition is very well established [4]. It has been critically reviewed by Costa-Giomi in 2012 that individuals with a musical background have a better performance, generally, in reading, spelling and in vocabulary [5]. A study was also conducted in 2011 by Schellenberg to examine the relationship between music and intelligence, and it was found that children with musical background have higher IQs and perform better in cognitive ability tests compared to children without a musical background [4]. It is known that music engages both hemispheres of the brain of an individual, thus keeping a balance between hemispheric preference towards language and visuo-spatial abilities [4]. Music generally involves an association between the various segments of the brain. The frontal lobe of the brain is involved in the ability to learn musical skills and in the expressiveness of music emotionally. The parietal and temporo-occipital lobe of the brain co-ordinates different sensory inputs and creates a musical experience to the listeners. The cerebellum, on the other hand, is vital in motor integration such as processing of the rhythm and synchronization of the melody. The cingulate gyrus, the base of the frontal lobes, inner surfaces of the frontal lobes, and the amygdala is vital for the understanding of music emotionally. Hence, it is strongly believed that music may influence the neurohormonal status of an individual and benefit the individual in terms of cognitive and emotional ability through its integration in several areas of the brain that works in a collective manner [6].

Academic intelligence is measured by standardized test and is represented by IQ scores [7]. Whereas emotional intelligence can be defined in a four-branch model that has been proposed by Mayor and Salovey in 1997, whereby emotional intelligence is characterized by a set of four related abilities such as perceiving, using, understanding and managing emotions [8]. In 1998, a coined term called the "Goleman theory" states

that emotional competence is a learned capability and grasp of emotions that results in outstanding performance at work. In this theory, Goleman states that the framework for emotional intelligence which includes self-awareness, self-management, social awareness, and relationship management can translate into meeting goals and targets while creating a happier and healthier working culture [9]. Goleman states that emotional intelligence is a key component in any type of success and should be given the utmost importance especially to do with the factors affecting the emotional intelligence of an individual [9]. A study found that an individual's emotional intelligence can be affected by many factors such as communication, marital status, emotional experience, expressivity, culture, relationships with in-laws, family members' support, etc. [10]. There has been an established relationship between the direct effect of music on the mood of an individual. The principle of music therapy is commonly used in psychiatry to alter the affective and disruptive states of mental patients. It is started by selecting the music that best matches the current mood of the patient and is then gradually the quality and content of the music is increased in a step wise vectoring movement towards a more positive and upbeat type of music that is happy and cheerful [11]. Hence, there is a direct correlation of music and performance [11].

Stress occurs when an individual attempts to get used to unfavorable conditions or environment. These responses occur mainly to protect the internal milieu of an individual and for the maintenance of optimal cell and body functions [12]. It has been studied that 'relaxing' music has a calming effect on the mood of students, thus reducing stress levels. Participants were asked to provide their saliva samples after listening to music. It was noted that their cortisol concentrations were lower after listening to calming music, and alpha-amylase concentration varied depending on the type of music listened to [13]. A study was carried out on 56 college students, who were attending a southeastern university in the States, expressing the relationship between listening to music of different genres and mood. It was concluded that classical music decreased physiological arousal and emotions, compared to heavy metal music or silence [14]. It is also worth noting that music therapy is used till this day to reduce cortisol levels in certain patients, mainly in pediatrics. The calming effect produced by listening to relaxing music could be due to three main mechanisms; regulation of the activity of the mesolimbic dopaminergic system, suppressed effect on anxiety levels due to the downregulation of the amygdala's central nuclear activity, and decrease in hypothalamic and brainstem nuclei activity [15]. However, it was also noted that there was an increase in dopamine levels when listening to crescendo through a study conducted on eight students at McGill University, Toronto. In this study, mood of the individuals was improved, but there was no association of the effect of crescendo music on stress levels [16]. Music is also being used in hospitals to comfort patients undergoing surgery due to its effect on the autonomic nervous system that reduces blood pressure and heart rate [17].

There is a quantitative research study that investigated emotional intelligence under four main interrelated dimensions which are Emotionality, Self-control, Sociability, and Well-being [18]. According to The Penguin Dictionary of Psychology, emotionality can be defined as the observable behavioral and physiological component of emotion. It is a measure of a person's emotional reactivity to a stimulus [19]. In a research conducted involving 66 college students who were allocated to three groups, one with stimulative music, the other with sedative music and the last group being a control group without

any music, it was found that emotionality and anxiety markedly increased after listening to stimulative music compared to the groups with sedative music and silence [20]. The next dimension of emotional intelligence which is self-control can be defined as one's ability to prolong instantaneous gratification for an immediate and smaller reward for a greater reward in the future [21]. In a project that was carried out on 25 pianist and violinist and 30 school-going children assessing three components through the modified Mehrabian and Epstein Empathy Scale, it was found that there was an improvement in the aspects of responsibility, concentration and inner self control [22]. The third aspect of the emotional intelligence questionnaire, which is well-being which can be defined as the merging of positive emotions and functioning well which includes the experience of emotions of happiness and joy, enhancing one's potential, autonomy over one's life, a strong development of one's sense of purpose and involvement of positive relationships [23]. With respect to Erving Goddman's work, Asylums, Tia DeNora formulated a relationship between music, health and general well-being, in which she showcased the importance and positive role of music in the general well-being of individuals [24]. The last component of the emotional intelligence aspect is sociability which can be defined as the verbal participation in a setting of unstructured conversation [25]. A thesis was formulated in 2009 by Boniface and Emma Jane, where 9 students with the aid of a teacher underwent music therapy, with the sole purpose of promoting social skills in an educational setting. It was found that sociability was enhanced and a favorable social environment was formed within the classroom after the music therapy [26].

In a whole, the component of emotional intelligence is a very crucial factor not only in the mental health of medical professionals but also in providing a more effective medical care as having a high EI ultimately results in a more conducive doctor-patient relationship, high empathy, better communication, and stress management skills as well as organizational commitment and teamwork as proved in a cross-sectional study that was conducted among resident doctors [27]. This study concluded that by enhancing emotional intelligence by the means of training, could potentially target in reducing burnout [27]. As the medical field is a very high stress job, a study among doctors and nurses in 3 different hospitals showed that 78.9% of the participants claimed that playing music in the operating room produced a calm and efficient environment [28]. In another study, researcher by the name of Perretti measured galvanic skin responses and results showed that playing music significantly produced a calming effect when carrying out stressful tasks [29]. In another similar study showed that playing music is a two-way coin, whereby not only does music decrease blood pressure, heart rate and muscle effort of surgeons which eventually result in increasing the accuracy of surgical performance but also significantly reduces patient's anxiety leading to a better patient prognosis post-surgery [30].

This topic of research was chosen because there has been extensive research that investigated the causal relationship between music exposure and academic intelligence, but none explored the direct relationship between music exposure (Mozart effect) on an emotional intelligence test. Hence, the research gap would study the key components that link musical exposure and emotional intelligence among medical students. Specifically, this study is designed to observe the emotional intelligence in four different but co-related domains which are emotionality, self-control, well-being, and sociability. As stated above in the literature, emotional intelligence is very important among healthcare professionals and medical students. The aim of this study correlates with the

hypothesis of using music to promote empathy and understanding that might lead to better patient doctor communication and more efficient medical care as well as better overall well-being and mood among medical students. Hence, studying about the potential increase in emotional intelligence with music might contribute not only to the betterment as individuals and as medical students but also to society as a whole. This study aimed to evaluate the Mozart effect on an emotional intelligence test among medical students in a private medical university in Malaysia.

METHODS

Study design and setting

This study was a pilot randomized controlled trial to assess the Mozart effect on a current emotional intelligence among medical students. This study was conducted for six weeks from October to November 2022 in a private medical university in Malaysia.

The purpose of this study was to assess the Mozart effect on an emotional intelligence test among medical students. We included one experimental group (with Mozart effect) and one control group (without Mozart effect) to compare the effect on emotional intelligence.

Sample size and sampling

Sample size was calculated by using the software "Open Epi" version 3. To determine the appropriate sample size, we also took the data with 95% confidence interval and 80% power. A total of 40 students were recruited. Hence, there were 20 participants in each group.

The medical students were invited to participate in our research through an online Google form including questions on demographic data (e.g. - name, age, gender), chronic illness, medications that they are currently using and lifestyles (alcohol consumption and smoking). Based on the inclusion and exclusion criteria, the participants who were willing to provide online informed consent were selected to participate in this study. The details of the inclusion criteria were (i) written informed consent providers, (ii) MBBS students from clinical year, (iii) both genders, any ethnicity including international students. The exclusion criteria were (i) students below 18 years old, (ii) students with uncorrected hearing impairment, (iii) chronic illness including migraine and frequent headaches or any medications which alters the cognitive function, alertness, and concentration, (iv) any clinically diagnosed mental illness (depression, schizophrenia, anxiety, bipolar disorder, etc.).

Procedure of experiment & data collection

The duration of the experiment was around 35 minutes. Participants were divided into two classrooms: A and B. For the intervention group, experiment was conducted in Classrooms A, while the control group was conducted in classroom B. The plan for this pilot randomized controlled study is presented in Figure 1.

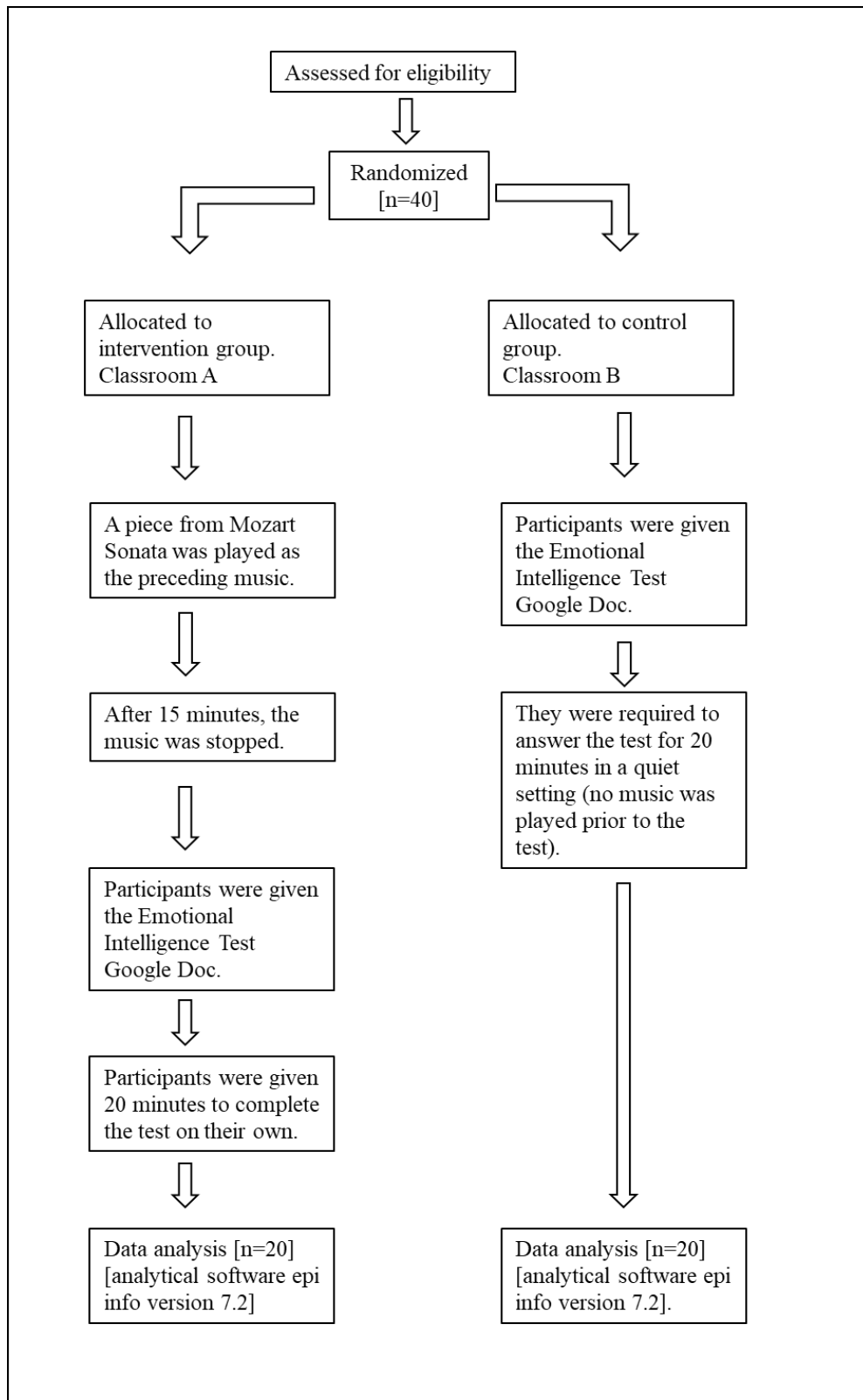


Figure 1: Study flow chart to assess the Mozart Effect on the short-term emotional intelligence status

Intervention

Forty participants were chosen from undergraduate medical students in the study university. An online Google form with questions about demographic data, chronic illness, medications, or any ongoing treatments was distributed to all the students via WhatsApp. Participants who voluntarily agreed to participate were then screened further using the inclusion and exclusion criteria. Participants who fulfill the inclusion criteria were the subjects in our study while those who fulfill the exclusion criteria were exempted from the study.

1. Pre-intervention

Participants were briefed about the study and given the opportunity to clarify any questions or concerns they had about the study. A written consent form was distributed to all the participants. Participants were advised to use their mobile devices only when answering the questionnaire in order to minimize any interruptions during the intervention process. The Emotional Intelligence questionnaire was created by the members of this research group according to the four elements of Emotional Intelligence which were proposed by Mayor and Salovey in 1997. The intervention process began only after the questionnaire has been validated. Participants were further divided into intervention and control groups before the intervention process begins. The Block randomization method was applied to assign the participants to the intervention and control groups. The random assignment is applied by using the block randomization method (<https://www.randomizer.org/>). Participants in the intervention group were directed to Classroom A, while those in the control group were directed to Classroom B. The current emotional intelligence was measured by using the newly developed scale, which was prepared based on the previous literature on EI and is described in detail below.

The Self-Developed questionnaire on the Current status of emotional intelligence was developed through these three steps. Firstly, by recognizing the elements, creating the questions, and finally developing the questions. The elements are identified based on the four-branch model which was proposed by Mayor and Salovey in 1997.

PHASE I

Step 1: Recognizing the elements

Element 1: Emotionality

Emotionality refers to a range of subjective feeling states that have a predictable influence on observable behavior and physiological responses for adaptation-related purposes. Emotions generally have several components, including autonomic, hormonal, behavioral, and cognitive components [32]. A theoretical model derived from neuroscientific studies of emotion specifies six major dimensions of emotional life, each of which is crucial to psychological well-being. The six dimensions are outlook,

resilience, social intuition, self-awareness, sensitivity to context, and attention [33]. Each of these dimensions describes a spectrum with two categories that typically reflect increased or decreased activity in the brain circuits that underlies these dimensions [33].

Element 2: Self-control

Self-control is the ability to overcome the person's impulses and immediate desires in favour of behaviour that is in line with their standards and long-term goals [34]. In Layman's term, self-control is the ability to choose what one ought to do over what one desire to do. The TOTE-model of self-regulation will be the base for this concept as it provides detailed guideline for the inclusion of self-control as an element of, but not the same with, self-regulation [35]. A related model of self-control is the strength model of self-control [36]. It is one of the most important and widely discussed model, which defines self-control as '... an act of self-control by which the self-alter its own behavioral patterns so as to prevent or inhibit its dominant response [36].

Element 3: Sociability

Social and emotional intelligence is the ability to be aware of one's emotions and those of others at the moment, and to use that information to effectively manage ourselves and our relationships [37]. It is a form of intelligence that ensures our success at work, in life, and in our interactions with others [37]. The term "social skills" refers to a wide range of abilities [38]. In terms of Emotional Intelligence, social skills include persuasion and influence techniques, communication abilities, competence in conflict resolution, leadership qualities, change management capabilities, rapport, teamwork capabilities and many more [38].

Element 4: Well-being

A clear association between EI and well-being is supported by conceptual models that outline the potential causal frameworks by which EI may influence well-being, as well as existing research that documents a few of those relationships [39]. EI influences social well-being by instilling adaptive methods for dealing with social challenges, social stress, and interpersonal conflicts; encouraging the development of supportive social networks, decreasing negative and increasing positive emotions as well as enhancing emotional regulation [39]. EI is also conceptually associated with psychological well-being, with a focus on one's own growth and self-actualization [39]. Studies documenting relationships between EI and social support and between EI and coping efficiency, stress reduction, and emotional regulation support the conceptual frameworks of the pathways between EI and well-being [40].

Step 2: Creating the questions

The self-developed questionnaire on the current status of emotional intelligence was created based on various existing literature. The members of the research team have carefully reviewed the literature and created the questions. Following that, the research members discussed and modified each item before settling on a final general agreement.

Step 3: Developing the questions

The developed questions were structured based on the reviews and suggestions of the experts. Each element of emotional intelligence was clarified, and opinions on the relevance of the questions from the experts were taken. Besides that, assistance from the experts was requested for any suggestions or clarity regarding the questions developed.

PHASE II**Selection of the expert participants**

The invited experts who were the psychiatrist, psychologist, and public health research specialists were chosen to provide ratings and feedback for the questionnaire. Six experts were requested to provide the ratings. A brief explanation of the research project and content validation form was sent to the experts via email.

Expert rating analysis

According to the experts' reviews, the item content validity index (I-CVI) was calculated. The I-CVI of 0.83 and above is included in the questionnaire [41]. The initial questionnaire included 20 items in total. After the calculation of I-CVI, the items with score of less than 0.83 were excluded. The final questionnaire included 15 items in total. The amendment of the items was done according to the suggestions from the experts, for example, the sentence from the Self-Control domain "If I am upset about a situation at this current time, I am more likely to be patient and not overreact" was replaced with "If I am upset about a situation at this current time, I am more likely to control my emotion and not overreact on it".

2. Intervention

A piece from Mozart Sonata which is known as 'Sonata for Two Pianos in D, K. 448' was downloaded from YouTube [58]. It was then played as the preceding music for the participants in the intervention group prior to the Emotional Intelligence Test. During this time, the participants were not allowed to communicate with one another and electronic gadgets should not be used. After 15 minutes, all participants received an Emotional Intelligence Test Google Doc. They were 20 minutes to complete the test on their own. This session took place for 35 minutes.

3. Control

As for the participants in the control group, they were required to answer the Emotional Intelligence test for 20 minutes in a quiet setting. Prior to the Emotional Intelligence test, no preceding music was played.

4. Outcome measures

The outcome of Emotional Intelligence Test based on the results of the participants in the intervention and control groups were compared.

Data analysis

Students' Emotional Intelligence Test results with and without preceding music were collected and transferred to Microsoft Excel. The data recorded in Microsoft Excel was used for statistical calculation, using the analytical software Epi Info version 7.2. Descriptive statistics such as frequency, percentage, mean, and standard deviation were calculated. Finally, an unpaired T-test which was used to compare the mean scores of EI in intervention and control groups.

Ethical consideration

All the participants who have taken part in this study voluntarily were briefed thoroughly regarding the objectives and relevant information via an informed consent form. Before the intervention begins, written informed consent was obtained from the participants. They had the choice to withdraw from this study at any point in time if they wish to do so. This research has been approved by the Research Ethics Committee, Faculty of Medicine, Manipal University College Malaysia (MUCM), Malaysia.

RESULTS

In this study, 40 participants were randomized into the control and intervention group, both equally distributed with 20 in each group respectively. Table 1 depicts the demographic variables of the participants such as age, gender, ethnicity, nationality, music preference and music listening habit. The mean (SD) age in the music intervention group was 21.95 (1.15) while in the control group was 22.45 (1.4) years. In the context of gender, the highest density of participants were females with both the control and intervention having (75%) each. The male participants also were also equal in both groups with the music intervention group having (25%) each. The majority of the participants in the intervention (95%) and control groups (100%) reported preference to music (Table 1).

Table 1: Baseline characteristics of participants among intervention group (Mozart music) and control groups (n= 40)

Variables		Intervention	Control
		(n=20) n(%)	(n= 20) n(%)
Age (years)	20	3 (15%)	NA
	21	2 (10%)	6 (30%)
	22	10 (50%)	7 (35%)
	23	3 (15%)	1 (5%)
	24	2 (10%)	4 (20%)
	25	NA	2 (10%)
	Mean (SD)	21.95 (1.15)	22.45 (1.4)
	Gender	Female	15 (75%)
Male		5 (25%)	5 (25%)
Ethnicity	Malay	1 (5%)	NA
	Chinese	2 (10%)	1 (5%)
	Indian	12 (60%)	8 (40%)
	Others	5 (25%)	11 (55%)
Nationality	Malaysian	15 (75%)	10 (50%)
	International Students	5 (25%)	10 (50%)
Music Preference	Yes	19 (95%)	19 (100%)
	No	1 (5%)	NA
Music Listening Habit (days/week)	Everyday	11 (55%)	14 (70%)
	Almost everyday	5 (25%)	5 (25%)
	Once/ twice a week	4 (20%)	1 (5%)
	< once per week	NA	NA
	Never	NA	NA

Table 2 includes the first aspect of emotional intelligence. When the emotionality aspects of the students were tested and evaluated, it was found that the students who were exposed to Mozart's music prior to answering the questionnaire had an average total score of 13.90, compared to the control group, that had a total average score of 11.35 (P = 0.027) (Table 2).

Emotionality	Intervention	Control	Mean difference (95% CI)	P value
	Mean (SD)			
I feel much more at ease and more peaceful at heart at this current moment	3.60 (1.09)	2.95 (0.83)	0.65 (0.03, 1.27)	0.04
If I was feeling agitated, stressed or sad earlier in the day, my mood has alleviated now, and the intensity of the negative feelings has subsided	3.55 (1.09)	2.70 (1.13)	0.85 (0.14, 1.56)	0.02
I feel satisfied and proud of myself for the work and effort I applied today in my tasks	3.50 (1.15)	3.05 (1.05)	0.45 (-0.25, 1.15)	0.203
I feel that I'm very much more focused now compared to how I was earlier in the day	3.25 (1.21)	2.65 (0.93)	0.60 (-0.09, 1.29)	0.087
Total score	13.90 (4.13)	11.35 (2.76)	2.55 (0.3, 4.8)	0.027

Table 2: Emotionality between intervention (Mozart effect) and control group (n=40)

Table 3 shows the questions of self-control measured by the self-developed questionnaire on the current status of emotional intelligence between the control group and intervention group at post- intervention. Overall, the domain of self -control under emotional intelligence had a mean (SD) of 8.00 (1.81) at post- intervention in the intervention group whereas the control group had 6.55 (1.79) (P= 0.016). The mean difference (95% CI) was 1.45 (0.29, 2.61) which states that the intervention group has slightly higher emotional intelligence score compared to the control group at post-intervention (Table 3).

Self-control	Intervention	Control	Mean difference (95% CI)	P value
	Mean (SD)			
If someone were to say something hurtful to me right now, I am less likely to have an outburst of emotion	3.75 (1.12)	3.20 (0.95)	0.55 (1.21)	(-0.11, 0.102)
If I am upset about a situation at this current time, I am more likely to control my emotion and not overreact on it	4.25 (0.97)	3.35 (1.04)	0.90 (1.54)	(0.26, 0.007)
Total score	8.00 (1.81)	6.55 (1.79)	1.45 (2.61)	(0.29, 0.016)

Table 3: Self-control between intervention (Mozart effect) and control group (n=40)

Table 4 includes the third domain under emotional intelligence, Sociability. Sociability domain has a mean score and a standard deviation of 14.80 (3.93) for the intervention group and 13.05 (2.99) for the control group. The mean difference was 1.75 with a 95% confidence interval of -0.49,3.9 (P = 0.121). Therefore, it can be concluded as there is no association between prior listening to Mozart music and the domain sociability under emotional intelligence (Table 4).

Sociability	Intervention Mean (SD)	Control	Mean difference (95% CI)	P value
At this moment, I feel comfortable and positive by being surrounded with my classmates	3.75 (1.07)	3.30 (1.03)	0.45 (-0.22, 1.12)	0.184
If I'm being elected as the class representative now, I will accept the position and will complete my responsibilities accordingly.	3.30 (1.38)	2.20 (1.39)	1.10 (0.21, 1.99)	0.017
I feel confident about myself regardless of the opinion of the people around me currently	3.80 (1.11)	3.60 (0.94)	0.20 (-0.45,0.86)	0.541
If someone were to asks my assistance right now, I would willingly help them.	3.95 (1.05)	3.95 (0.94)	0 (-0.64, 0.64)	1
Total score	14.80 (3.93)	13.05 (2.99)	1.75(-0.49,3.9)	0.121

Table 4: Sociability between intervention (Mozart effect) and control group (n=40)

Table 5 presents the mean scores of wellbeing domain. The total score of the mean (SD) of students who had been exposed to Mozart’s music before answering the questionnaire was 19.9 (4.35) while the mean (SD) of students who had not been exposed to Mozart’s music before the questionnaire was 17.6 (3.68). The mean difference (95%CI) was 2.3 with a 95% CI range from -0.28 to 4.88 (P = 0.079). Thus, it can be concluded that there is an insignificant association between listening and not listening to Mozart’s music prior to answering the questionnaire in the aspect of well-being of the students (Table 5).

Well being	Intervention	Control	Mean difference (95% CI)	P value
	Mean (SD)			
I am capable of making my own decisions without the influence of others at this present moment	4.20 (1.01)	3.95 (0.69)	0.25 (-0.30, 0.80)	0.364
I feel in control of the environment around me right now	3.95 (1.05)	3.40 (0.99)	0.55 (-0.10, 1.20)	0.097
I have a positive outlook on the people around me right now	3.80 (0.95)	3.40 (0.75)	0.40 (-0.15, 0.95)	0.149
I am feeling optimistic about the future at present moment	4.00 (0.86)	3.40 (0.88)	0.60 (0.04, 1.16)	0.036
I am feeling good about myself right now	3.95 (0.99)	3.45 (0.94)	0.50 (-0.12, 1.12)	0.112
Total score	19.9 (4.35)	17.6 (3.68)	2.3 (-0.28,4.88)	0.079

Table 5: Baseline well-being between intervention (Mozart effect) and control group (n=40)

DISCUSSION

This study assessed the Mozart effect on the four domains of current emotional intelligence which are emotionality, self-control, sociability and well-being. According to the initial research by Rauscher, Shaw and Ky, a significant increase in IQ scores were observed with a 10-15 minutes of music intervention [1]. Subsequently, other researchers assimilated similar studies but with varying outcomes such as the studies conducted in three college trigonometry classes whereby there was a significant enhancement in the performance of students in the mathematical quotient [42]. Other noteworthy studies that clearly and significantly portray the unquestionable benefits of

the Mozart effect is the enhancement of spatio-temporal gait parameters and trunk range of motion in patients with Parkinson's disease [43], anti-epileptic effect [44], and lastly a significant increase in cognitive ability [45]. That initial study conducted in 1993, inspired our research to further probe into the other beneficial effects of Mozart music that has, to our knowledge not yet been studied. Specifically in the discipline of emotional intelligence, a relatively new concept that has yet to be fully understood. In this randomized controlled trial, the effects of Mozart music on undergraduate medical students were assessed to see if there was significant association between listening to music and an individual's aspect of emotionality, self-control, sociability and well-being.

First and foremost, the first domain of the study which is emotionality had four sub-questions which were categorically classified under the accepted headings of outlook, resilience, social intuition, self-awareness, sensitivity to context and attention [46]. When the emotionality aspects of the students were tested and evaluated, it was found that the students who were exposed to Mozart's music prior to answering the questionnaire had an average total score of 13.90 (4.13), compared to the control group, that had a total average score of 11.35(2.76). This significant result indicating that the intervention group experienced a more positive outlook after listening to the Mozart music.

Similarly, in the sub-domain of resilience, the findings were significant implying that the intervention group perceived a higher sense of resilience after the musical intervention as compared to the control group. And lastly, there was a significant finding in the sub-domain of sensitivity to context and attention that suggest that the intervention group that was exposed to music felt an elevated sense of the aspect mentioned earlier as compared to the control group. The result of this study is in alignment with prior research that has been done in the spring of 2008 in the region of KwaZulu-Natal, South Africa whereby the outlook of high school students was improved due to music involvement [47]. In another study, whereby ten musicians were assessed on their resilience after the devastating effects of Hurricane Katrina, further confirming the direct correlation between the positive effects of music in the lives of victims and improving their resilience to tragedies [48]. In another randomized control trial done on workers in Taiwan, showed that non-lyrical background music could potentially increase worker attention and performance [49]. Per contra, our results reflected that the other two sub-domains which are social intuition and self-awareness, did not however yield a significant finding which implies that there was no difference of perceived social intuition and self-awareness between the music intervention group and the control.

Regarding the self-control domain, it was studied under the subheading of emotional impulse control that was adapted from the literature on "Ego depletion and self-control failure" by Roy F. Baumeister [50]. The domain of self-control under emotional intelligence had a mean (SD) of 8.00 (1.81) at post-intervention in the intervention group whereas the control group had 6.55 (1.79). The mean difference (95% CI) was 1.45 (0.29, 2.61) which states that the intervention group has slightly higher emotional intelligence score compared to the control group at post-intervention. This finding is in alignment with a study that was done in a sample of 72 participants whereby the association of music and self-control was studied with the results relatively suggesting that there could be a potential relationship between the two variables [51].

In a similar trope, the third domain of this study's research questionnaire was the domain of sociability whereby the sub-domains of our questionnaire included persuasion and influence technique, communication abilities, competence in conflict resolution, leadership qualities, rapport, and teamwork capabilities [52]. Sociability has a mean score and a standard deviation of 14.80 (3.93) for the intervention group and 13.05 (2.99) for the control group. The mean difference was 1.75 with a 95% confidence interval of -0.49, 3.9. The P value which was 0.121 is more than the level of significance which is 0.05. Hence, there was no significant difference and therefore, it can be understood as there is no association between prior listening to Mozart music and the domain sociability under emotional intelligence when comparing both the intervention and control group. Contradictorily, past research has been conducted on the measures of association between exposure of music and sociability such as the study done to correlate musicality with sociability and emotionality in Williams Syndrome where a positive association was found [53]. Another positive correlation of the above-mentioned variables is the study done on severely impaired elderly diagnosed as having Dementia of the Alzheimer's Type (DAT) where there was an overall positive effect of music exposure on the subjects [54].

Homogenously, the last domain of emotional intelligence in this study was the domain of well-being under which autonomy, environmental mastery, personal growth, positive relation with others, purpose in life and self-acceptance were investigated [55]. The total score of the mean (SD) of students who had been exposed to Mozart's music before answering the questionnaire was 19.9 (4.35) while the mean (SD) of students who had not been exposed to Mozart's music before the questionnaire was 17.6 (3.68). The mean difference (95%CI) was 2.3 with a 95% CI range from -0.28 to 4.88. There is an insignificant association between listening and not listening to Mozart's music prior to answering the questionnaire in the aspect of well-being of the students. Contrastingly, research done to test a model of the relationships between young people's habit of music and their well-being whereby music was linked to social well-being [56]. Another study done among the elderly population in Sweden aged 65-75 years of age where they found that there was a significant association between music listening behavior and overall well-being [57]. This study also reported limitations, among which included insufficient sample size and lack of previous studies in the research area which ultimately might have influenced the non-significant findings in two domains.

In conclusion, this research highlights that the Emotional Quotient (EQ) of an individual should be given the utmost priority along with the factors that may potentially increase it such as music. This research has successfully proven based on certain significant data, that there might be a substantial but vital correlation between music exposure on the short-term status of emotional intelligence of an individual.

RECOMMENDATION

For future related research, there are a few suggestions that could be highlighted. If similar studies are conducted in the future, the study population should include participants from public universities for comparison with participants from private universities. A potentially more significant, accurate, and generalized results will be produced. Furthermore, a larger study sample size results in a smaller margin of error hence a more precise result will be produced. Other types of music, such as classical music, Yanni music, pure rhythm, and pure melody, can also be used to assess the participants' Emotional Intelligence. By comparing the results of the test by playing music prior to answering the questionnaire as well as during the intervention itself is a good potential relationship worth investigating. Finally, future similar studies should include participants of various ages to determine if age influences one's emotional intelligence status.

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