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Efficacy of Music Genre on Memory Recall amongst people with Special Needs

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Abstract
Despite the fact that music is a variable that is employed frequently in a variety of settings, its significance has not been fully explored in educational settings. As a result of its widespread use, it is important to comprehend the dynamics it has on memory function among people with cognitive impairments for its effective application in life, particularly in educational settings. This study examined the effect of music genre on memory recall amongst people with special needs. Eighteen (18) students were purposively selected from a population of Special Education Center for Children with special needs, Mbiabong Etoi Oron Road, Uyo, Akwa Ibom State, Nigeria. They were randomly assigned into two experimental groups (classical music group and country music group) and a control group. The study was a between-group experimental design utilizing the Analysis of Variance (ANOVA) for statistical analysis of the obtained data. The first hypothesis which stated that Participants in the classical music group will recall better than those in the country music group and the control group was confirmed and duly accepted. The second hypothesis which stated that females will perform significantly better than males in memory recall tasks was rejected. In the light of the findings, it is recommended that practical applications of the result of this research be applied in schools and other educational facilities; and the use of music while learning should start from early childhood so that its positive effect would linger and the child can grow into a more learned adult.

Keywords: Memory, Recall and Music genre

Introduction

A large percentage of learners believe that music, when played in the background while they study, is a helpful aid for focusing and regulating their mood (Li, Hu & Que, 2020). Several studies on music and memory have shown disparities in their results. While some have shown that there is a cause-and-effect relationship between certain music genres and memory retention (Odeh, Ochinya, & Timothy, 2018; Bugter, & Carden, 2012), others seem to be of the conclusion that there is no significant difference between the outcome of the genres and memory retention (Buerger-Cole, Agyemang, Cotting, Joottu, & Vetter, 2019; Birman & Ferguson, 2022). Some other studies concluded that music affects

memory negatively and should not be paired with learning but rather with silence (Musliu, Berisha, Musaj, Latifi, & Peci, 2017).

In research associated with memory deficits and disabilities, according to one finding, music can specifically operate as a helpful encoding background for verbal episodic memory, bringing up significant implications for music as a treatment method for episodic memory deficits (Ferreri, Bigand, & Bugaiska, 2015). In another research, music is said to improve access to personal memories in patients with Alzheimer's disease, music was said to constitute an interesting way to stimulate recall (Chevreau, Nizard, & Allain, 2017).

Buerger-cole, et. al, (2019) suggested that further tests be carried out, exploring different genres of music, without music, and with a varied range of participants. Reviews done on research pertaining to background music and memory have shown that the findings are inconclusive and stated the need for more rigorous research methods (de la Mora Velasco & Hirumi, 2020). Also, very few studies, if at all any, have researched the interaction between music genre and memory recall amongst people with special needs, specifically those with cognitive impairments like people with Autism spectrum disorders, Down's Syndrome, and Intellectual Disabilities.

Based on the above discussion, it can be seen that very few studies have been done regarding the effect of music genres and memory, especially amongst people with learning disabilities, both globally and in Nigeria. Although different measures have been put in place to aid individuals with learning disabilities, pairing background music while learning has not quite been explored, especially in Nigeria.

Despite the fact that music is a variable that is employed frequently in a variety of settings, its significance has not been fully explored in educational settings. As a result of its widespread use, it is important to comprehend the dynamics it has on memory function among people with cognitive impairments for its effective application in life, particularly in educational settings. This raised the question of whether the discrepancy in earlier studies was the consequence of experimental abnormalities and whether a definitive conclusion would be found if some of the constraints experienced by earlier studies were taken into account or if a different population is used. It is for this reason that the researchers attempts to close this gap and contribute to the field of literature that concerns the variables in concern.

The study hypothesized the following;

H1: Participants in the Classical music group will recall better than those in the Country music group and the control group.

H2: Females will perform significantly better than males in Memory Recall task.

Method

Research Design

An independent measures design was used in this experiment. Each of the Participants was assigned to one of the three different study conditions; classical music group, country music group, and the control group. For each of the groups, memorization and recall time were kept constant.

Research Setting

The experiment was carried out at the Special Education Center for Children with special needs, Mbiabong Etoi Oron Road, Uyo, Akwa Ibom State, Nigeria. This was because of its easy access to the students and the availability of a comfortable environment the students were acquainted with.

Participants

A total number of eighteen (18) people with special needs participated in the experiment. Sex statistics from 18 participants show that 9 (50.0%) were female and 9 (50.0%) were males. These individuals had disorders ranging from Downs syndrome, autism spectrum disorder, and mental retardation. They were all mentally challenged.

Sample Selection and Technique

All the special needs person's which made up a total number of 18 participants were purposively used for the study. The sample was then randomly assigned into the three different experimental conditions. 12 participants were assigned to the experimental group (6 each for classical music and country music groups) and 6 participants were assigned to the control group.

Inclusion Criteria

Participants must be

i. Mentally challenged
ii. 18 years and above
iii. A student of the class
iv. Showing willingness to participate

Exclusion Criteria

Below the age of 18 years

Randomization: Participants were randomly assigned to experimental or control groups.

Time of learning/memorization: The researcher ensured all participants were taught simple addition for 10 minutes by using a blackboard and chalk to write out the five different mathematics for memorization and using chalks to count, a Montessori method of teaching.

Interaction Prevention: The researcher ensured the participants do not interact with each other during the experiment by employing a research assistant who was adequately trained and positioned to prevent any interaction.

Instrument

The experimental tools used for this research were - A memory recall test containing simple arithmetic (mental mathematics) which was boldly written on the blackboard with chalk. Five of this mathematics were randomly selected from a pool of ten other simple mathematics. They were arranged vertically and well-spaced from each other. A JBL Boombox 2, and a music player set at an average volume were also used. The recall sheet was a blank paper shared to all participants.

Procedure

Participants were first tasked to write their names on a blank sheet of paper. Those who could successfully perform this task with little or no help were separated from those who could not. Random selection was made of individuals from both groups into the experimental groups and the control group. The first group was the classical music group. They were all seated one person at a desk and were taught the simple addition (by using chalks to count the numbers) for 10 minutes with Canon in D major by Kevin MacLeod playing in the background. The answers to the mathematics problems were cleaned off and the students were given a blank sheet to write out the mathematics problems and recall the answers to each. They were given 6 minutes for recall time.

The second group was the country music group. They were seated one person to a desk and were taught simple addition (by using chalks to count the numbers) for 10 minutes with A little too late by Toby Keith playing in the background. The answers to the mathematics problems were cleaned off and the students were given a blank sheet to write out the mathematics problems and recall the answers to each. They were given 6 minutes for recall time.

The third group, which was the control group, were taught simple addition (by using chalks to count the numbers) without music for 10 minutes and were also asked to recall the answers to each in 6 minutes.

Ethical Consideration

The general ethical principles obtainable in the social sciences research regarding the humane treatment of human participants have been employed by the researcher in the conduct of research for this work. It is also pertinent that the standpoint of the entire participants is considered for the investigation such that it seeks to eliminate foreseeable threats to their psychological well-being, health, values, and/or dignity. In carrying out the research, it must be recognized that the participants' involved may be of multicultural and multi-ethnic society, varying ages, gender and social background. In this experiment, the following ethical guidelines were observed:

Confidentiality and privacy

Adequate and honest information about the goals of the experiment, the time commitment and the assurance of the anonymity of the responses of participants was provided to the facility head in order to attain full understanding of the involvement of the participants. All used tools were stored securely with access to data only given to the research team.

Risk/benefit ratio

This study caused no harm to the participants as it is a simple memory assessment experiment.

Voluntariness & informed consent

Participation in the study was made entirely voluntary. Participants were not pressured, deceived or bribed into participation.

Statistics

Descriptive and inferential statistics were employed in the study. The descriptive statistics showed the demographic characteristic (gender) of the participants. The inferential statistics used for the study was the One-Way Analysis of Variance. This statistic is used to determine a mathematical relationship among several random variables. It examines if the two levels of the independent variable (classical music and country music) will affect one dependent variable (Memory recall). Once each of the independent factors has been determined to exert an effect on the dependent variable, the information can be useful in creating an accurate prediction on the level of effect they exert on the outcome variables.

Result

Table 1: Summary showing Frequencies and Cumulative percentage of participants Gender, Age, (n = 18)

Variables	N	Percentage	Cumulative percentage
Gender			
Male	9	50.0	50.0
Female	9	50.0	100.0
Total	**18**	**100.0**	
Age			
21 – 25YRS	10	55.6	55.6
26 – 30YRS	8	44.4	**100.0**
Total	**18**	**100.0**	

Frequency distribution revealed that 9 (50.0%) respondents were males while 9 (50.0%) were females. In terms of age, 10 (55.6%) respondents were between the age range from 21 – 25 years while 8 (44.4%) participants were between the age range from 26 – 30 years.

Table 2: Mean and standard deviation between groups of study and the memory recall

Variables	N	X	SD
Control	6	1.67	1.03
Classical	6	4.67	.52
Country	6	4.33	.82
Total	18	3.56	1.58

Table 2 show the mean and the standard deviation of the three groups adopted in this study. Classical music group (X = 4.67; SD = .52) had a higher means score than the country music group (X = 4.33; SD = .82) as well as controlled group respectively (X = 1.16; SD = 1.03). This implies that respondents in classical music group performed better than those in the country music group as well as the controlled group.

Table 3: Mean and standard deviation gender and the memory recall

Variables	N	X	SD
Male	9	3.56	1.24
Female	9	3.56	1.94
Total	18	3.56	1.58

Table 3 show the mean and the standard deviation between the gender and performance of the respondents. Female respondent had the same mean score (X = 3.56; SD = 1.94) as the male respondents (X = 3.36; SD = 1.24) respectively.

H1: Classical music group will perform better than the Country music group and the Control group.

Table 4: Summary table for ANOVA on the effect of types of music on memory recall

Sources	SS	df	MS	F	P - Value
Between Group	32.44	2	16.22	24.33	< .01
Within Group	10.00	15	.67		
Total	42.44	17			

The result in Table 4 shows that there is a significant effect of music genre on memory recall [F (2, 15) = 24. 33, p < .05). This was revealed in the mean score where the respondents in classical music group had a higher means score (X = 4.67; SD = .52) than the country music group (X = 4.33; SD = .82) as well as controlled group respectively (X = 1.16; SD = 1.03). Hence, the first hypothesis which stated that participant in classical music group will perform better than participants in country music group was accepted.

H2: Females will perform significantly better than males in Memory Recall task

Table 5: Summary table for T-test on the significant difference between gender and memory recall

Variable	N	X	SD	df	t	P - Value

Male	9	3.56	1.24	16	.00	> .054
Female	9	3.56	1.94			

Table 5 above shows a significant difference between male and female on memory recall (t (16) = 0.00; *p* >0.05 two-tailed). It was also found that the male and female group have the same mean {(X=3.56; SD = 1.24) and (X=3.56; SD = 1.94)} respectively. This implies that there is no difference between male and female on memory recall. Hence, the second hypothesis which stated that females will perform significantly better than males in memory recall task was rejected.

Discussion

The study investigated the effect of music genre on memory recall amongst people with special needs. Memory recall has been extensively reviewed in this study. Findings from literature reviewed and the results of the study have proven beyond doubt that Memory recall is an essential and delicate aspect of an individual's life, so that individuals can learn better and recall experiences as well as information. The results of the data analyzed to test the two hypotheses in this study are hereby discussed.

Hypotheses 1 stated that participants in the classical music group will perform better than those in the country music group and the control group. The results showed that the first hypothesis was accepted for the tests conducted. It proved that the classical genre is more effective in aiding memory recall than country music genre and those without music. This could be as a result of the peaceful atmosphere and calmness this pattern of music elicited. Based on the study by Ferrari, Bigand, & Bugaiska (2015) which explained that music might offer an especially useful encoding environment that will probably enhance subsequent memory performance, it could be said that the music used in the experiment provided a proper encoding environment tone that aided in the performance of the participants.

The result of the study is consistent with the findings of Mammarella, Fairfield, & Cornoldi (2007) who concluded that classical music significantly increased working memory performance of older adults compared with the no-music condition. It also agrees with the results from the study by Odeh, Ochinya & Timothy (2018) who concluded that the classical genre is the most effective in memory retention, while the country genre is the least effective in memory retention. Another study that supports the results from the first hypothesis is that of Bugter & Carden (2012) who concluded that participants in the classical group scored significantly better on the memory task than those in the rap group.

The findings of this study was also in-line with the study of Nguyen & Grahn (2017) who concluded that for recall memory, participants, regardless of mood or whether context was consistent between study and test, recalled more words when listening to low arousal music than high arousal music. Mohan & Thomas (2020), whose research concluded that adolescents performed significantly better on reading comprehension tasks when music was played in the background also supports the result of this study. Another research whose findings align with the result of this study is that of Ferrari, Bigand, & Bugaiska (2015) who

concluded that listening to music improved memory performance compared to listening to environmental sounds or silence. The finding of this study was also in-line with the finding of Li et al. (2020) who concluded that there is a significant relationship between specific musical qualities (such as genre and emotion) and learners' task engagement and perceived task performance.

Based on the population used in the study, the findings are consistent with the results of Rejito, (1973), Savarimuthu and Bunnell, (2002), Welch and Ockelford (2015) who concluded that there is a positive effect of music on people with learning disabilities. The instruments used in testing memory recall in this study, which was simple mathematics, and the results gathered from the data aligns with the findings of Bryant-Jones, Shimmins and Vega, (2003), Kell (2008) and Yoho (2011) who concluded that music helps with the improvement of mathematical skills and that all students, including those with learning disabilities and mental impairments, benefit from classical background music.

However, the results of this study contradicts with several other studies like that of Cassidy & MacDonald (2007) who concluded that performance on all tasks was worse when background sound (music and noise) was present as opposed to when the tasks were completed in silence. Also contradicts with the finding of Lehmann & Seufert (2017) who concluded that Working memory capacity and background music had no main effects on recall performance, and neither did their interactions. The findings of this study also negates the result of Musliu et al. (2017) who concluded that music affects memory negatively resulting in students being able to memorize better without music.

Hypothesis 2 stated that females will perform significantly better than the male counterpart. The second hypothesis shows that there is no statistically significant difference between male and female on memory recall, therefore, the hypothesis was rejected. The result of this study could be due to the sample used in carrying out the experiment. The finding of this study was consistent with the study of Odeh et al. (2018) who concluded that there is no statistically significant difference between males and females in terms of information retention.

The finding of this study contradicts with the study of Gunn (2014) and Bloise and Johnson (2007) who concluded that women recall emotional information more than the male counterparts. The finding of this study also contradicts with the finding of Baer, Trumpeter and Weathington (2006) who reported that females remembered significantly more neutral and feminine items than men.

Conclusion

The objective of this study which was to determine if music genres would have an effect on the recall performance of people with special needs have been identified and findings have been discussed. With the help of the 18 participants employed in the experiment and the use of classical and country music, memory recall was tested. It was an experimental study using One-way Anova. Based on the hypotheses stated, it was concluded that the classical music genre has a more positive effect on the memory recall of people with learning disabilities, in comparison with country music genre or no music.

This means that people with learning disabilities will learn better when background music is playing during learning.

The implication of the findings of this study is very important because it reveals that music genres have an effect on memory recall amongst people with special needs and as well also brings to light that gender and does not determine the recall performance. This study can be seen as a groundbreaking one, reason being that with the findings of this study, parents, teachers and guardians of these individuals can apply the usage of music when teaching individuals with learning disabilities. The application of classical music during learning can cut across the educational sector and also be used in the health sectors as well. It can be applied during the care and treatment of individuals with these disabilities. Hence, it was therefore suggested that Practical applications of the findings of this research in schools and other educational facilities. Also, classical music should be played in the background by teachers and guardians when teaching individuals with learning disabilities. Furthermore, the use of music while learning should start from early childhood so that its positive effect would linger and the child can grow into a more learned adult.

Limitations of the Study

The study is not without limitations. Firstly, a larger sample size would have provided a more efficient result but due to the number of students available in the school, the researcher was restricted to the sample size used. The use of a purposive sample limits generalisability, since it doesn't pave the way for randomisation of participants.

Secondly, the inability of the researcher to control for the extraneous effect of Intelligence which could have affected memory recall of the participants was another limitation of this study. Another major limitation of the study is the unequal representation of the demographics, specifically the age of the participants. Lastly, the use of just two music genres in the study, does not give a full representation of the effect of the several music genres on memory recall.

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