



# Management of Test Anxiety Among Pupils in Basic Science Using Music-Based Cognitive Behavior Therapy Intervention: Implication for Community Development

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## Abstract

Effectiveness of music-based cognitive behavior therapy (CBT) intervention has been established on various participants such as students in secondary schools, university students, and other categories of adults. However, there is a dearth of literature on the effectiveness of music-based CBT intervention program on the management of primary school pupils' test anxiety in basic science. Thus, this study sought the effectiveness of a music-based CBT intervention program on the management of test anxiety among pupils. A randomized controlled trial experimental design was adopted for the study using a sample of 58 primary three (3) pupils. Test anxiety questionnaire (TAQ) was adopted for data collection. TAQ was trial-tested due to the cultural differences of the participants. The internal consistency reliability of the items of TAQ was estimated to be .79 using the Cronbach alpha method, while its estimate of temporal stability index was .86 using Pearson product moment correlation. Data were analyzed using mixed-design repeated measures analysis of variance and analysis of covariance. The findings of the study revealed that music-based CBT had a significant effect on the management of test anxiety among pupils. This finding has implication for community development in the sense that test anxiety among pupils can be better managed using the music-based CBT intervention program. This will enable the children to grow better academically and contribute to the community they belong to. It was thus recommended that primary school teachers should be enlightened on how to make use of music-based CBT in the management of test anxiety among pupils.

**Keywords** Cognitive behavior therapy · Music therapy · Management of test anxiety · Pupils · Community development

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## Introduction

Test anxiety is a physiological condition which makes the students experience distress, before, during or after taking a test to such an extent that causes poor performance in such test (Ugwuanyi et al. 2020a, b). Test anxiety, according to Segool et al. (2013) is the emotional, physiological, and behavioral responses surrounding the potential consequences of negative evaluation on an upcoming test or examination. A physiological situation in which pupils experience extreme anxiety and discomfort during and/or before taking a test is known as test anxiety.

Test anxiety is an important factor in all academic levels—primary, secondary, and tertiary (Akanbi 2010; Hernandez et al. 2011). Lufi et al. (2004) found that test anxiety affects the achievements of people of different ages who need to be evaluated through an assessment. Test anxiety is more prevalent in a school setting than people could imagine and the majority of text anxiety cases are not recognized easily in schools (Nwokolo et al. 2016). This is because many students rarely seek help for any perceived emotional apprehensions from significant adults. An estimated 10 million elementary as well as secondary children have feelings of test anxiety (Hill and Wigfield 1984 as cited in Fulton 2016). For Hill and Sarason as cited in Fulton (2016), between one and three students in a typical classroom of 25 students were at risk for developing test anxiety. According to King and Ollendick 1989 as cited in Segool et al. (2013), there is a prevalence of 10% to as much as 30% of test anxiety among school-aged children. Approximately 10% of children in typical classrooms are highly test-anxious and experience impairments in test performance as a result of test anxiety (Similarly, Hill and Wigfield 1984 as cited in Segool et al. 2013).

However, Turner et al. (1993) found a high prevalence (41%) of test anxiety among African American elementary school children. Another research showed that test anxiety rates were found to be much higher than 33% among the school children and adolescents (Whitaker et al. 2007). Test anxiety constitutes a serious academic impediment to lots of students in schools in Nigeria (Nwokolo et al. 2016). In the Nigerian context, over 50% of the students are faced with anxiety before and during test conditions which usually affect their achievement in such test (Nwokolo et al. 2016). Paul (2013) opined that students who feel anxious about science standardized tests, may not take science classes in high school and may miss careers in science. Similarly, students experiencing test anxiety often feel helpless and powerless and have low self-esteem (Abdi et al. 2012). Many students experiencing test anxiety normally have poor performance on tests due to a lack of concentration (Atasheneh and Izadi 2012).

Despite the prevalence of anxiety disorder in developing regions (e.g., Nigeria), many adolescents with anxiety disorder rarely receive treatment (Chavira et al. 2004; Sweeney et al. 2005). According to Asghari et al. (2016), Herbert et al. (2009), Khalid-Khan et al. (2007), there are still a few interventions that attempt to treat anxiety disorder in students. Egenti et al. (2019) found that music therapy with cognitive behavioral therapy (CBT) intervention can help reduce social anxiety among socially anxious schooling adolescents. According to Trimmer et al. (2016), music is a universal activity that enriches every culture. Music

can allow adolescents to open up channels of self-expression at a deeply personal level (Tervo 2001). According to Egenti et al. (2019), music can be used as a tool for socializing and promoting interactions between people. Leubner and Hinterberger (2017) noted that music interventions are potential alternatives for depression therapy but the number of up-to-date research literature is quite limited. According to Trimmer, Tyo, and Naeem (Trimmer et al. 2016), music as a therapeutic metaphor facilitates the understanding of psycho-therapeutic materials, promote discussion of difficult topics, and be harnessed to promote a connection between facilitators and group members—thus placing a positive light on therapy for the client. Besides, Lin et al. (2011) found that many studies that used different designs, sample sizes, and scales revealed the positive benefits of music intervention on anxiety disorder. Guetin et al. (2009) remarked that music intervention can be an excellent mediator to restore social ties. However, some studies found that music therapy does not decrease social anxiety disorder (Evans 2002; Nilsson 2008; Richards et al. 2007).

Given that the potential effects of music intervention on social anxiety disorder appear inconclusive, it is imperative to combine music therapy with CBT (Egenti et al. 2019). This can be achieved by infusing music into nearly every aspect of CBT group therapy as a means for further comprehension and engagement with the material by participants. Such infusion involves the use of critical listening to the musical material, songwriting, playing various musical instruments, and using music as a point of reference in group discussion and homework assignments (Egenti et al. 2019).

CBT according to Beck (1967) assumes that an individual's actions are determined by their cognition, emotion, and behavior. In other words, negative/automatic thinking or cognition leads to dysfunctional behaviors (Beck 1967). The major role of CBT according to Beck is to change distorted thinking cognition. Factors that result in negative thoughts are cognitive triad, negative self-schemas, and information processing skewness (Beck 1967). According to Beck as cited in Egenti et al. (2019), there are three forms of the cognitive triad which are erroneous thoughts about the self, the world, and the future. For Beck et al. (1989) as cited in Egenti et al. (2019), the interaction among these forms causes malfunctioning in perception, cognition, and behavior. Rejection, catastrophizing, personalization, minimization, selective abstraction, arbitrary inference, among others are experiences that are responsible for negative schema (Freeman et al. 1990; Sharf 2012).

CBT as a psycho-social intervention has a major aim of improving mental health (Beck 2011). CBT aims at challenging and changing unhelpful cognitive distortions like thoughts, and behaviors (Field et al. 2015). According to Beck (2011), Benjamin et al. (2011), CBT also aims at improving emotional regulation, and the development of personal coping strategies that can be used in solving emotional problems. The uses of CBT have been expanded to include treatment of several mental health conditions, including anxiety unlike its earlier use in the treatment of depression only (McKay et al. 2015; Zhu et al. 2014). CBT involves several cognitive psychotherapies that can be used in the treatment of well-defined psychopathologies using evidence-based strategies (Johansson and Andersson 2012; David et al. 2018; Hofmann et al. 2013).

Cognitive behavioral therapy (CBT) is an effective treatment of depression and anxiety (Butler et al. 2006). CBT is an approach that links cognitions to feelings and behaviors (Garry and Katie 2012). According to Garry and Katie (2012), one of the principles of CBT is that faulty thinking can lead to strong feelings and behaviors that are not appropriate for the context. CBT encourages the client to reflect on their thinking and to consider the evidence for their beliefs and resulting feelings and behaviors. Various forms of CBT are an individual, group, brief, guided self-help, and online. Among these forms, the delivery of CBT in a group format is common in North America as it has been established to be more effective than the others (Trimmer et al. 2016). According to Trimmer et al. (2016), CBT group therapy has the advantages of connecting group members to facilitate symptom reduction and insight and also increase the efficiency of service delivery which the other forms cannot do.

The group cognitive behavioral therapy is characterized by clear operationalization of the problem, and an emphasis on measurement, including measuring changes in cognition and behavior and the attainment of goals (Beck 2011). Such intentions are always met through “homework” assignments in which the patient and the therapist work together to craft an assignment to complete before the next session (Martin 2012). The completion of these assignments indicates a dedication to treatment compliance and a desire to change (Martin 2012). The therapists can determine the next step of treatment depending on how thoroughly the patient completes the assignment (Martin 2012). Effective cognitive behavioral therapy is dependent on a therapeutic alliance between the healthcare practitioner and the person seeking assistance (Beck 2011; Bender and Messner 2003). Unlike many other forms of psychotherapy such as brief and online forms, the patient is very involved in CBT (Martin 2012). For example, an anxious patient may be asked to talk to a stranger as a homework assignment, but if that is too difficult, they can work out an easier assignment first through group CBT (Martin 2012). A key issue in online form use is low uptake and completion rates, even when it has been made available and explained (Musiat et al. 2014; Twomey et al. 2014). Online completion rates and treatment efficacy have been found in some studies to be higher when the use of online is supported personally, with supporters not limited only to therapists, than when use is in a self-help form alone (Spurgeon and Wright 2010; Musiat and Tarrier 2014). This justifies the methodological weaknesses of the online form of CBT.

Several studies have proved the efficacy of music-based CBT interventions. Dingle et al. (2008) used music therapy as an adjunct to group CBT and found increased attendance and engagement for CBT. Trimmer et al. (2016) conducted a randomized control trial and found promising results for the CBT-Music group for individuals with mild-to-moderate symptoms of anxiety and depression. Egenti et al. (2019) found that music therapy with cognitive behavioral therapy was significantly beneficial in decreasing social anxiety symptoms of the treatment group. However, Trimmer et al. (2017) found that music-based CBT is effective in reducing disability, although there appears to be a negligible effect on symptoms of anxiety and depression. Besides, participants who were exposed to the CBT-Music intervention program significantly had lower test anxiety scores at the post-treatment than the participants in the control group (Trimmer et al. 2017). Ezegebe et al. (2018) found

that music therapy with cognitive restructuring significantly decreased the level of emotional distress among the participants in the intervention group.

The foregoing has shown that there are inconsistencies in the findings of previous works on the effectiveness of CBT-Music in the reduction of psychological disorders like test anxiety, depression, etc. Moreover, the participants used for the studies are mainly secondary school students or in-school adolescents and university undergraduates. It has been recommended that teachers' use of cognitive behavioral strategies in their classrooms will have an effective and positive effect on managing students' psychological behaviors (Smith and Daunic 2006). Cognitive behavioral therapeutic interventions are increasingly recognized as a viable, research-based approach appropriate for use in school settings (Asghari et al. 2016; Trimmer et al. 2017). Egenti et al. (2019) opined that the use of CBT techniques like mindfulness training, cognitive restructuring, systematic exposure, and assertive training improve the mental wellbeing of an individual with social phobia. For Cuncic, CBT is healthful for social anxiety patients who suffer cognitive-behavioral and emotional problems. Adolescents with social phobia develop automatic negative patterns of thinking that are misinterpreted with reality, maintain anxiety-provoking stimuli, and reduced the ability to adjust (Albano and DiBartolo 2007; Egenti et al. 2019). Thus, CBT has empirically contributed to the treatment of mental health problems like anxiety disorder among people of different categories. Based on these premises, the researchers sought to determine the effectiveness of music-based CBT on the management of test anxiety among pupils in Basic Science. Thus, the researchers hypothesized that music-based CBT would have a significant effect on the management of text anxiety among pupils in Basic Science.

## Methods

### Ethical Considerations

Research Ethics Committee of the Faculty of Education at the University of Nigeria Nsukka granted ethical approval for the conduct of this research with unique approval number REC/FE/2019/000046. Before the recruitment of the children for the intervention program, the children, as well as their parents and teachers, were presented with informed consent forms to fill and sign. The informed consent forms were properly filled and signed by the children, parents, and teachers. The authors adhered to the ethical standard specification of the American Psychological Association APA (2017), and with that of the World Medical Association, (2013).

### Design of the Study

A randomized controlled trial (RCT) experimental design was adopted for the study. Subjects were randomized into experimental and control groups through simple random sampling technique. RCT experimental design sought to measure and compare the outcomes after the participants have received the interventions. This study

design has been used by Ogbuanya et al. (2017a, b), Nwokeoma et al. (2019), Onyishi et al. (2020), Ugwuanyi et al. (2020a, b), Ede et al. (2020), Ugwuanyi and Okeke (2020) to carry out similar studies.

## Participants

A total of 58 primary three (3) male ( $n=25$ ) and female ( $n=33$ ) pupils in Enugu State Nigeria, who met the inclusion criteria formed the participants for the study. G-Power, version 3.1 at medium effect size ( $f^2$ ) of .15, level of significance of .05 and power of .84 gave an adequate sample size of 58 for this study. Other parameters used in determining the sample size were the number of groups (2), the number of independent variables (2), and the number of dependent variables (1). The power of .84 was considered to be good enough in determining an adequate sample size (Faul et al. 2007). A total of 103 pupils who showed interest and volunteered to participate in the intervention program were screened for eligibility based on the eligibility criteria set by the researchers, including that: (1) the pupil must be regular in school attendance register; (2) pupil must have a high score on test anxiety scale which was used for the identification of the pupils who showed signs of test anxiety. To create a state of tension on the pupils, they were informed 30 min before the screening for eligibility that there will be a Basic Science test. Even though there was no Basic science test for the pupils, the researchers had to do that to instigate test anxiety condition in the pupils. A period of 15 min was allowed for the pupils to respond to the items of the TAQ which served as the pretest assessment. In the end, the copies of the questionnaire were collected and analysis done by the analyst for 1 week after the administration. The result of the analysis enabled the researchers to select 58 pupils who met all the inclusion criteria and randomly assigned them to experimental and control groups conditions using a simple randomization procedure (participants were asked to pick 1 envelope containing pressure-sensitive paper labeled with either E-experimental group or C-control group) from a container. The students were randomly assigned to experimental (29) and control (29) groups as shown in the figure below (Fig. 1).

## Measures

### Demographic Questionnaire

A demographic questionnaire was administered to the participants to obtain their demographic characteristics such as gender, age, and location as shown in Table 1.

Table 1 shows that the experimental and control group participants did not vary significantly in terms of number of male pupils, children who are  $\leq 7$  years,  $> 9$  years, and children of Hausa and Yoruba tribes,  $\chi^2(1) = .73$ ,  $p = .841$ ;  $\chi^2(1) = 1.93$ ,  $p = .659$ ;  $\chi^2(1) = .76$ ,  $p = .795$ ;  $\chi^2(1) = .75$ ,  $p = .836$ ;  $\chi^2(1) = .71$ ,  $p = .869$ . However, experimental and control group participants significantly varied in terms of number

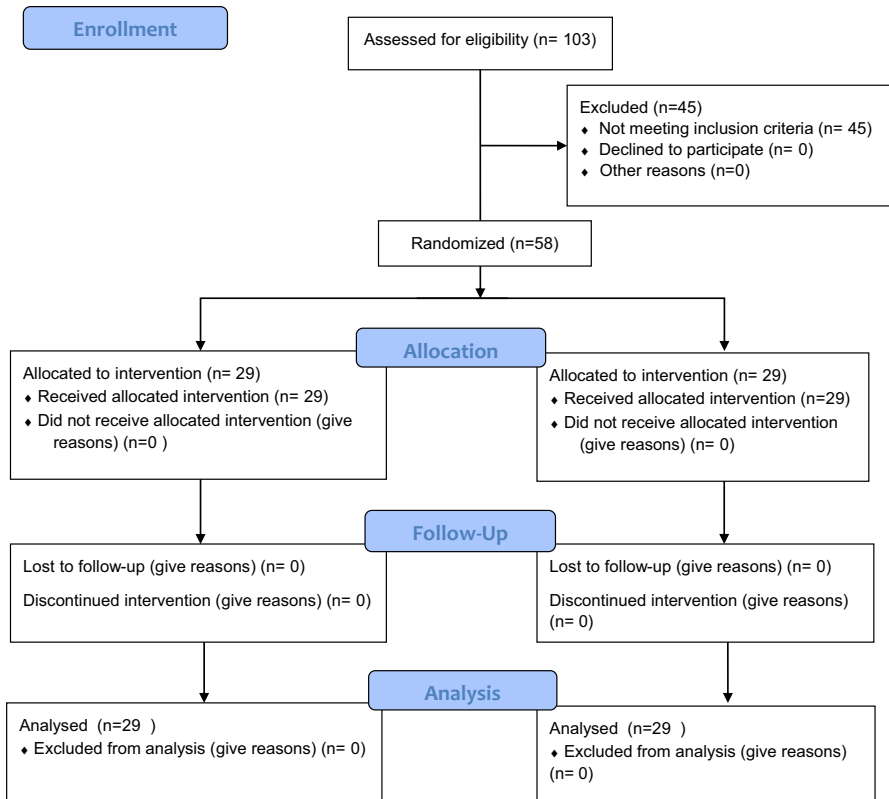


Fig. 1 Flow Diagram

Table 1 Demographic characteristics of the participants

Demographics characteristics	Experimental	Control	n (%)	$\chi^2$	P
<i>Gender</i>					
Male	12	13	25(43.10)	.73	.841
Female	13	20	33(56.90)	10.41	.001
<i>Age</i>					
≤7 years	6	4	10(17.24)	1.93	.659
8-9 years	17	28	45(77.58)	13.09	.000
>9 years	2	1	3(5.17)	.76	.795
<i>Tribe</i>					
Igbo	17	25	42(72.41)	11.32	.000
Hausa	2	3	5(8.62)	.75	.836
Yoruba	6	5	11(18.97)	.71	.869

of female pupils, children who are within 8-9 years and children of Igbo tribe,  $\chi^2(1) = 10.41, p < .050$ ;  $\chi^2(1) = 13.09, p < .050$  and  $\chi^2(1) = 11.32, p < .050$ .

### Test Anxiety Questionnaire

Test anxiety questionnaire (TAQ) developed by Nist and Diehl (1990) was adopted for the study. TAQ was a 10-item instrument structured on a 5-point scale of Never = 1, Rarely = 2, Sometimes = 3, Often = 4, and Always = 5. Example of such items are: "I have visible signs of nervousness such as sweaty palms, shaky hands, and so on right before a test.", "I have butterflies in my stomach before a test", "I feel nauseated before a test". The researchers were around when the pupils were responding to the items of TAQ to monitor the conduct of the TAQ administration and assist the pupils in filling the TAQ if there was a need for assistance. The TAQ being a standardized instrument and adopted for the study was not re-validated. However, TAQ was trial-tested due to the cultural differences of the participants. The internal consistency reliability of the items of TAQ was estimated to be .79 using the Cronbach alpha method. Besides, the estimate of the temporal stability of TAQ was ensured through a test re-test after two weeks interval. A stability index of .86 was obtained for the two administrations of the TAQ showing that the instrument demonstrated good stability.

The scores obtainable from the TAQ ranged from 10 to 50. A low score (10-19) indicates that a pupil does not suffer from test anxiety, scores between 20–35 indicate that, although the pupil may exhibit some of the characteristics of test anxiety, the level of stress and tension is probably healthy, scores over 35 suggest that the pupils are experiencing an unhealthy level of anxiety. Thus, a cutoff score of 35 was used in determining the pupils who had test anxiety. This implied that any pupil who had a score within 10-34 was considered not to have test anxiety while anyone who had scored within 35-50 was classified as having test anxiety.

### Procedure

The researchers visited the headmasters of each of the schools in Enugu state Nigeria to notify and obtain permission to carry out the study from them. At the course of the visits, the researchers explained to the school authorities what music-based CBT is all about and how the intervention can be beneficial to them by reducing test anxiety among pupils. With the permission of the headmasters, the researchers went to the schools the next day to conduct the selection process based on the inclusion criteria as explained in the participants' section.

A demographic questionnaire was administered to the eligible participants to access their age, gender, and tribe as pupils. To remove randomization bias, information from the demographic questionnaire were concealed from the person who randomized the participants to experimental and control conditions by the lead researcher. The randomization was done by one of the researchers. The intervention program was carried out once a week at a central location which was suitable for the participants since the pupils were randomized from different schools within the



study area. The timing of the intervention was done in such a way that it does not clash with the normal school program of the participants. In other words, Tuesday at 15:30 h -17:00 h every week for the 12 weeks were scheduled for the intervention program. The intervention program was presented by two of the researchers who are specialists in music-based CBT. Before the commencement of the pretesting testing and treatment package, the researchers assured the participants of the confidentiality of interactions and personal information as they work together in self-disclosure.

After the pretest, the experimental group was exposed to 90 min of music-based CBT program while the control group was exposed to normal conventional counseling. The normal conventional counseling administered to the control group served as a placebo to that of the experimental group. The program lasted once a week for 12 weeks. At the end of the treatment, a posttest assessment was conducted. Three months after the intervention program, a follow-up assessment measure was conducted by the researchers. Data collected from the experimental group at each stage of the assessment were compared to that from the control group at the analysis stage.

### **Control of Extraneous and Confounding Variables**

The following extraneous variables were identified and controlled for the study: avoidance of interaction and contamination, consistency in assessment measures, elimination of selection bias, a non-differential selection of participants, elimination of experimental mortality.

Avoidance of interaction and contamination was eliminated by ensuring that the two groups attended their program at different locations. Consistency in assessment measures was controlled by the use of the TAQ at three different times of assessment. Non-differential selection of participants was controlled by keeping every other condition constant for the two groups except the intervention program.

Elimination of selection bias was controlled by asking the participants to pick an envelope containing either “E” or “C” from a container. Elimination of experimental mortality was controlled by making sure that the only participants who filled the informed consent forms were rewarded and allowed to participate.

### **CBT-Music Intervention Program**

CBT-Music program is a 12-week guided self-help group derived from a guided self-help approach which is an established protocol (Naeem et al. 2016). The program was implemented by two facilitators with basic training in CBT and music therapy. The program aimed to reduce the level of test anxiety among pupils using music-based CBT group therapy by infusing music into nearly every aspect of CBT group therapy as a means for further comprehension and engagement with the material by participants. Such infusion involved the use of critical listening to the musical material, songwriting, playing various musical instruments, and using music as a point of reference in group discussion and homework assignments.

There was alternation in music therapy and cognitive behavioral therapy during the sessions. This implied that some sessions started with CBT while music therapy

followed while in some other sessions, music therapy came first followed by CBT, and so on. This program manual also adopted techniques of music therapy such as opera, rock, pop, classical and folk music relaxation skills, song, and breathe control, as well as cognitive-behavioral and psycho-educational techniques (Canadian Association for Music Therapy 2006; Egenti et al. 2019 as cited in Egenti et al. 2019). CBT techniques such as cognitive restructuring, cognitive disputation, reframing, rhythmic-based skills, attention training, and mood monitoring skills were used (Ezegbe et al. 2018). These techniques were used to handle cognitive and behavioral responses that are rationally inclined. Thus, the participants were made to understand how to connect activating events in the school to their emotional and behavioral consequences they experience.

All music playing was geared towards the non-musician through the use of easily playable instruments (e.g., shakers and bells) that integrate well together (i.e., all pitched instruments are played in the key of C). The group adhered to a traditional CBT group structure, including theme works (e.g., thinking, behavior and emotions), and the use of CBT tools such as behavioral experiments, thought records, and homework after each session. A secondary goal of the therapists was to promote a feeling of coherence similar to attending band practice. The summary of the activities in each of the sessions follows thus.

During sessions one to three, the facilitators familiarized the participants with the objectives of the intervention, built rapport, established rules and regulations, discussed anxiety, symptoms, and causes of basic science phobia. After the sessions, an assignment was given based on basic science workbook.

During the fourth to seventh sessions, activation of events, consequences, how to change automatic thoughts about a task in basic science to rational thoughts were discussed and followed by a review of previous exercise and homework.

Sessions eight and eleven involved critical listening to the musical material, song-writing, playing various musical instruments, and using music as a point of reference in group discussion and homework assignments were learned. Every week was devoted to the performance and discussion of a CBT-related distinct song. Songs chosen for each week were pre-written and adapted from recognizable classic rock songs with the original lyrics replaced with lyrics on CBT (Egenti et al. 2019).

## Data Analysis

A mixed design repeated measures analysis of variance (ANOVA) was used to analyze the data. The assumption of the sphericity of repeated-measures ANOVA was not violated, Mauchly  $W = .920$ ,  $p = .631$ . The effect size of the intervention on the management of test anxiety among pupils was reported using Partial Eta squared ( $\eta_p^2$ ) value. The SPSS software version 22 was used to conduct the statistical analysis (Fig. 2).

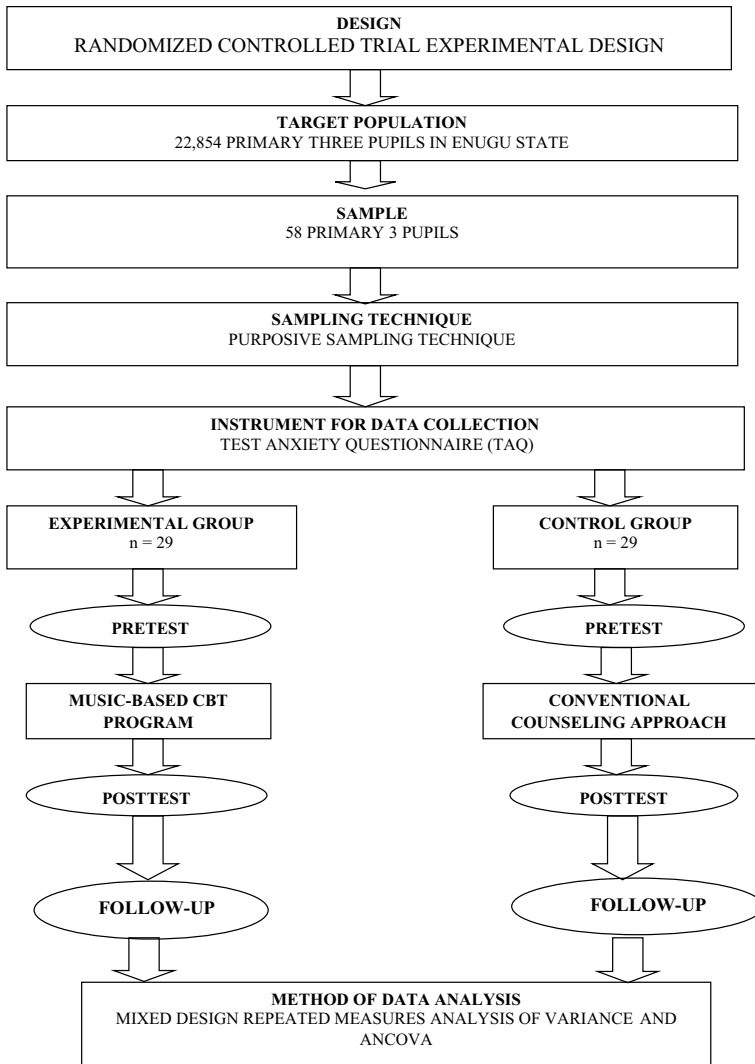


Fig. 2 Schematic Representation of the Methodology

Table 2 Mean and analysis of variance of the differences in the mean test anxiety ratings of the experimental and control groups at three different times

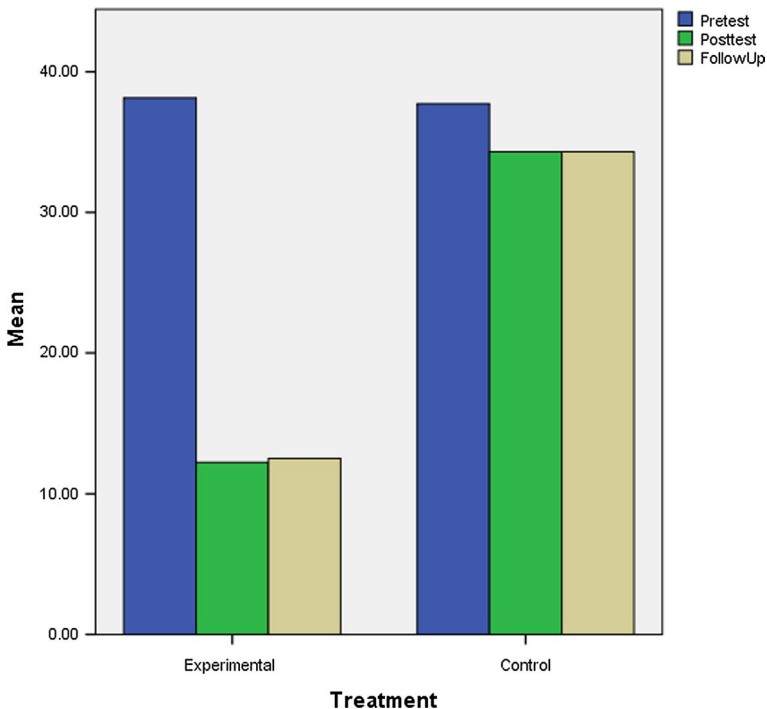
Treatment	n	Pretest				Posttest				Follow-up			
		M	SD	F	p	M	SD	F	p	M	SD	F	p
Experimental	29	38.14	4.66	.98	.83	12.24	1.62	153.23	.00	12.52	2.28	161.98	.00
Control	29	37.72	4.46			34.31	10.33			34.32	10.33		

M = Mean, SD = Standard Deviation

## Results

Table 2 shows that the mean test anxiety rating of the participants of the experimental group ( $M=38.14$ ,  $SD=6.66$ ) did not differ significantly from that of the participants of the control group ( $M=37.72$ ,  $SD=4.46$ ) at the baseline,  $F(1, 53)=.98$ ,  $p=.83$ . However, at the posttest, the mean test anxiety rating of the participants of the experimental group ( $M=12.24$ ,  $SD=1.62$ ) was significantly lesser than that of the control group participants ( $M=34.31$ ,  $SD=10.33$ ),  $F(1, 53)=153.23$ ,  $p<.05$ . Similarly, at the follow-up measure, the mean test anxiety rating of the participants of the experimental group ( $M=12.52$ ,  $SD=2.28$ ) was significantly lesser than that of the control group participants ( $M=34.32$ ,  $SD=10.33$ ),  $F(1, 53)=161.98$ ,  $p<.05$ . Figure 3 shows the bar chart illustration of the mean test anxiety ratings of the experimental and control group at three different times.

Table 3 revealed that there was a significant difference across the three time measures,  $F(2, 112)=234.290$ ,  $p<.050$ ,  $\eta^2=.807$ , and significant differences between groups,  $F(1, 56)=94.660$ ,  $p<.050$ ,  $\eta^2=.628$  in the management of test anxiety among pupils. There was also a significant interaction effect of time and treatment,  $F(2, 112)=137.462$ ,  $p<.050$ ,  $\eta^2=.711$ .

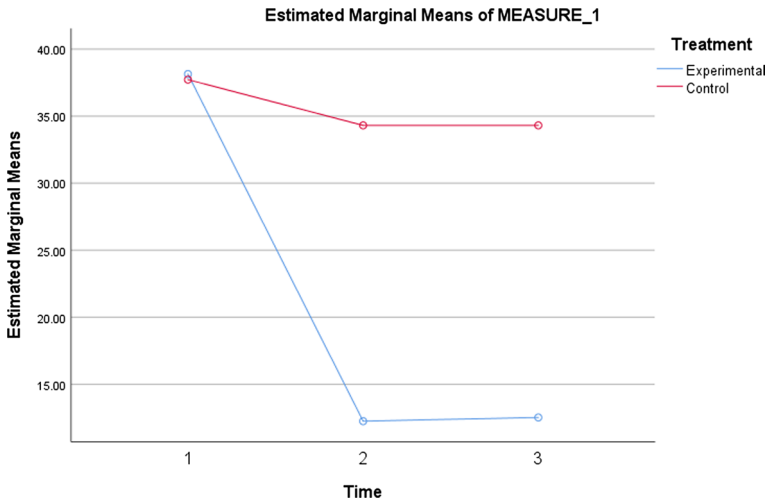


**Fig. 3** Bar chart of the pretest, posttest, and follow-up mean test anxiety ratings of the participants in experimental and control groups

**Table 3** Mixed design repeated measures analysis of variance for the tests of within-subjects effect and between-subjects effects of the intervention

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
<b>Within-subjects effect</b>						
Time						
Sphericity Assumed	8227.172	2	4113.586	234.290	.000	.807
Greenhouse-Geisser	8227.172	1.045	7876.182	234.290	.000	.807
Time * Treatment						
Sphericity Assumed	4827.034	2	2413.517	137.462	.000	.711
Greenhouse-Geisser	4827.034	1.045	4621.102	137.462	.000	.711
Error(Time)	1966.460	112	17.558			
	1966.460	58.496	33.617			
<b>Between-subjects effect</b>						
Intercept	138,439.448	1	138,439.448	1436.268	.000	.962
Treatment	9124.138	1	9124.138	94.660	.000	.628
Error	5397.747	56	96.388			

$\eta^2$  = effect size



**Fig. 4** Interaction graph of time and treatment as measured by TAQ

The interaction effect indicated that there was no significant difference between the baseline data of the participants, and the control group did not change over time in their management of test anxiety. However, the mean test anxiety ratings of the experimental group decreased over time, implying that music-based CBT had a significant effect on the reduction of test anxiety among pupils. Besides, the effect sizes of .807 indicated that 80.7 percent reduction in the test anxiety of pupils can be

**Table 4** Post Hoc between groups comparisons at pretest, posstest and follow-up measures

Time	(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig. <sup>a</sup>	95% Confidence Interval for Difference <sup>a</sup>	
						Lower Bound	Upper Bound
Pretest	Experimental	Control	.414	1.198	.731	- 1.986	2.814
	Control	Experimental	- .414	1.198	.731	- 2.814	1.986
Posttest	Experimental	Control	- 22.069 <sup>*</sup>	1.942	.000	- 25.960	- 18.178
	Control	Experimental	22.069 <sup>*</sup>	1.942	.000	18.178	25.960
Follow-up	Experimental	Control	- 21.793 <sup>*</sup>	1.965	.000	- 25.730	- 17.857
	Control	Experimental	21.793 <sup>*</sup>	1.965	.000	17.857	25.730

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni

attributed to the effect of music-based CBT intervention program. Figure 4 showed the nature of the interaction effect of time and treatment on the management of test anxiety among pupils as measure by TAQ.

Table 4 showed that at pretest, the mean differences for the various pairs of experimental and control are not significant ( $p > .050$ ). However, at both posttest and follow-up measures, the mean differences for the various pairs of experimental and control are significant at  $p < .050$ . This implies that the mean differences at post-test and follow-up measures contributed to the significant difference in the mean test anxiety ratings of the pupils in the experimental and control groups after exposure to music-based CBT. Thus, music-based CBT had significant effect on the management of test anxiety among pupils in Basic science.

### Test of Potential Effects of the Participants' Demographic Variables on Their Test Anxiety After Exposure to Music-Based CBT

Table 5 revealed that age, gender and tribe of the participants had no significant effects on their test anxiety after exposure to music-based CBT,  $F(1, 53) = .012$ ,  $p = .914$ ;  $F(1, 53) = .827$ ,  $p = .367$ , and  $F(1, 53) = .269$ ,  $p = .606$ . This implies that the music-based CBT was effective in the management of test anxiety of the participants irrespective of their age, gender and tribe.

## Discussion

The findings of the study showed that there was no significant difference between the baseline data of the participants, and the control group did not change over time in their management of test anxiety. However, the mean test anxiety ratings of the experimental group decreased over time, implying that music-based CBT

**Table 5** Analysis of covariance for the effect of the participants demographics on their test anxiety after exposure to music-based CBT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7110.279 <sup>a</sup>	4	1777.570	31.244	.000	.702
Intercept	809.339	1	809.339	14.226	.000	.212
Age	.673	1	.673	.012	.914	.000
Gender	47.037	1	47.037	.827	.367	.015
Tribe	15.332	1	15.332	.269	.606	.005
Treatment	5043.079	1	5043.079	88.642	.000	.626
Error	3015.307	53	56.893			
Total	41,548.000	58				
Corrected Total	10,125.586	57				

a. R Squared = .702 (Adjusted R Squared = .680)

intervention program had a significant effect on the management of test anxiety among pupils with a high effect size. Moreover, music-based CBT was effective in the management of test anxiety of the participants irrespective of their age, gender and tribe. This result goes to validate the efficacy of music-based CBT intervention program on pupils, which has in the past proved effective when used on secondary school and university students. Perhaps, the music component of the program stimulated the attention of the pupils as children have an attachment to music. Cognitive behavioral therapeutic interventions are increasingly recognized as a viable, research-based approach appropriate for use in school settings (Asghari et al. 2016; Trimmer et al. 2017). Egenti et al. (2019) opined that the use of CBT techniques like mindfulness training, cognitive restructuring, systematic exposure, and assertive training improve the mental wellbeing of an individual with social phobia. For Cuncic, CBT is healthful for social anxiety patients who suffer cognitive-behavioral and emotional problems. Adolescents with social phobia develop automatic negative patterns of thinking that are misinterpreted with reality, maintain anxiety-provoking stimuli, and reduced the ability to adjust (Albano and DiBartolo 2007). Buttressing this finding are the findings of Yoosefi and Hosseiny (2003), Trimmer et al. (2016), Trimmer et al. (2017), Egenti et al. (2019). Akagi (2001), Bradshaw and Slade (2003), Saunders and Shni (2000).

Yoosefi and Hosseiny (2003) found that the cognitive therapy method is significant in reducing depression, aggression, and anxiety among students. Trimmer et al. (2016) conducted a randomized control trial and found promising results for the CBT-Music group for individuals with mild-to-moderate symptoms of anxiety and depression. Egenti et al. (2019) found that music therapy with cognitive behavioral therapy was significantly beneficial in decreasing social anxiety symptoms of the treatment group. Participants who were exposed to the CBT-Music intervention program significantly had lower test anxiety scores at the post-treatment than the participants in the control group (Trimmer et al. 2017). Ezegebe et al. (2018) found that music therapy with cognitive restructuring significantly decreased the level of emotional distress among the participants in the intervention group.

However, some studies found that music therapy does not decrease social anxiety disorder (Evans 2002; Nilsson 2008; Richards et al. 2007). The discrepancy in the findings of Evans (2002), Nilsson (2008), Richards et al. (2007) with others may be attributed to the fact that the researchers used only music therapy while most of the others combined music therapy and CBT intervention which is sufficient enough to make a difference.

The current study is a valuable study of its kind in the examination of the effectiveness of music-based CBT on the management of test anxiety among pupils in basic science. This present study has a serious contribution to knowledge in that no such study has been carried out in Nigeria. To effectively make use of this therapy on pupils, the teachers should note the following roles: always work with pupils in groups to improve mental health, encourage pupils to discuss emotions and experiences, help pupils define goals, plan action and gain insight, develop therapeutic processes, refer pupils to psychologists and other services, and take a holistic (mind and body) approach to mental health care. In other words, the community has a role to play in this regard for the proper development of the pupils in the community they belong to. In this case, the



community leaders should assist the teachers in carrying out their roles of exposing the pupils to the music-based CBT intervention program by making available the resources needed for its effective implementation. Based on that, therefore, the researchers made the following recommendations:

1. Community leaders should create a conducive environment for teachers to apply for a music-based CBT intervention program in the management of test anxiety among pupils to enable them to grow better academically and contribute to the community they belong to.
2. A music-based CBT intervention program should also be adopted by guidance counselors in the treatment of other irrational fears responsible for examination malpractice and problem behaviors among pupils.

### **Strength of the Study**

This study empirically established the efficacy of a music-based CBT intervention program on the management of test anxiety among pupils in basic science using a sample of Nigerian pupils in Enugu State. This is the first research of its kind in Enugu State Nigeria which will go a long way in ameliorating the poor performance of pupils in Basic science. Thus, teachers and counselors in primary schools have a program they can leverage on in managing psychological problems among the pupils to enhance their academic performance.

### **Limitations**

As an experimental study, this present study has some methodological weaknesses. Firstly, allowing the pupils to complete the test anxiety questionnaire within 15 min and then subjecting the pupils who are considered to be minors to a 90-minute intervention session are potential limitations to the findings of this study. Secondly, there is a possibility of inappropriate control for the effect of music and the inability to query previous exposure to CBT at baseline. Secondly, the songwriters encountered difficulties in writing lyrics that convey the basic concepts of self-help material in structured sessions. Also, this study was not able to factor in the possible moderating effects of any of the moderators (gender, age, and location), which may affect the generalizability of the findings. Thus, it was suggested that future researchers can explore the moderating effect of any of the moderators on the effectiveness of a music-based CBT program on the management of text anxiety among pupils. With these limitations, the generalizability of the findings of the study should be done with caution.

### **Conclusion**

The effectiveness of music-based CBT on the management of test anxiety among pupils has been proven to be significant. The intervention program which lasted for 12 weeks produced a significant effect on the management of test anxiety among

the participants. Thus, test anxiety among pupils can be better managed using the music-based CBT intervention program to enable the children to grow better academically and contribute to the community they belong to. The researchers, therefore, concluded that music-based CBT has demonstrated significant effectiveness in the management of test anxiety among pupils.

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## Compliance with Ethical Standards

**Conflict of Interest** The researchers have no potential conflict of interest to declare.

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