# RELAXATION AND COGNITIVE RESTRUCTURING THERAPIES IN THE REDUCTION OF MATHEMATICS ANXIETYAMONG JUNIOR SECONDARY SCHOOL STUDENTS IN IBADAN LAND, NIGERIA

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## ABSTRACT

*The present study examined the effects of relaxation and cognitive restructuring therapies (RT & CRT) on mathematics anxiety among junior secondary school 2 students. In a non-randomized trial with pre- and post-assessments, n = 90 of JSS2 students were allocated to relaxation and cognitive restructuring therapies (experimental groups) and no training (passive control group). Relaxation and cognitive restructuring were taught by the researcher for the period of eight weeks. Mathematics anxiety was operationalised through behavioural indicators, namely goal driving, cognitive flexibility, cognitive inhibition, and data-driven information processing. Three major instruments were used for this study; they are mathematics achievement scale, mathematics anxiety scale and students' attitude towards mathematics scale. The reliability coefficients of the three scales are 0.87, 0.89 and 0.75 respectively. The results indicated that there is significant treatment effect in reducing mathematics anxiety among the participants [F= 51.62, df. = 2/74, p<0.05] and that relaxation therapy is more effective than cognitive restructuring therapy regarding the mathematics anxiety [RT = 53.1429, CRT = 77.9722 & Control group= 89.6303] . There were significant effects of gender [F = 4.49, df. = 1/74, p< 0.05] and students' attitude [F = 4.29, df. = 2/74, p<0.05] towards mathematics of the participants on mathematics anxiety. The researcher concludes that relaxation therapy and cognitive training are effective in the reduction of mathematics anxiety among the participants and that gender and students' attitude towards mathematics of the participants' moderated mathematics anxiety of the participants. Therefore, recommendations were made that relaxation and cognitive restructuring therapies should be used to assist any student that is suffering from mathematics anxiety in his/her studies to avoid resources wastages and to enhance performance in mathematics.*

***Keywords: Relaxation therapy, Cognitive Restructuring Therapy, Reduction, Mathematics Anxiety***

## INTRODUCTION:

In fact, we are at the age where no human endeavour could survive or develop without the application of mathematics and or technology since almost all kinds of job have been computerized. Apart from this, the subject develops the computational skills of the pupils, skills of solving the day-to-day problems that requires mathematical knowledge, forming the basis for further education in almost all fields of study in all our higher institutions. The economic development also has its root in the mathematical competency of the stakeholders. As good as mathematics is, its abstract nature has always be a challenge for the learners and mathematics teachers. It is almost impossible for some mathematics teachers to teach some topics in the subjects, such that the students would be able to relate the content to real-life situations. According to Aremu and Taiwo (2014)It has been revealed by many research findings that the most common teaching method adopted by secondary school mathematics teacher, in such a situation is the traditional chalk and talk, teacher-centered method. This method has been shown not to be effective in teaching subjects that are abstract in nature like mathematics (Jalal,Hashemi and Hussani, 2018) . This call for a more effective teaching strategy that is student-centered, which could be activity-based in nature that could concretize the abstract nature of the subject there by eradicates mathematics examination anxiety. The function of a teacher is no longer merely to impart information and to hope that it will be received and retained, but also to understand and plan those conditions and activities which will result in effective learning and that at the point of accountability it will not cause undue labour by evaluating the learners continuously.

Anxiety is a relatively natural response to a situation which appears threatening or to which one is not accustomed. Most people suffer from anxiety at some stage in their lives or the other.

People are sometimes quite naturally anxious about speaking in public, going for job interviews or even passing tests/examination. They may experience 'butterflies' in their stomachs, sweaty palms, restlessness, insomnia or even slight dizziness. Anxiety in itself is not a bad experience since a certain amount of anxiety is required to perform optimally. However, scholars and researchers have reported that when anxiety becomes chronic or intense it affects a person's day to day functioning and hampers performance (Peng, 2000). Put differently, anxiety can be generally associated with ''threats to self-efficacy and appraisals of situations as threatening''.

Relaxation therapy reduced examination anxiety and reduced mathematics anxiety. Relaxation based treatments on mathematics anxiety of learners aim to enable individuals to flexibly respond to pain, distress, phobia and related experiences. Through its use, learners were encouraged to give up ineffective struggling with experiences that cause suffer and commit to behaviours that are in concordance with the person's goals and values (McCracken & Yang, 2006) considering the fact that learners who find mathematics anxiety unacceptable attempt to avoid it and seek available interventions to reduce or eliminate it. A review examined the effects of relaxation-based intervention and mindfulness-based stress reduction on mathematics anxiety individual's experience of chronic anxiety, and the results showed that relaxation-based treatments are effective (Veehof, Oskam, Schreurs & Bohlmeijer, 2011). Thus, the use of relaxation therapy helps mathematics learners with anxiety develop emotional flexibility that enhance their positive well-being and daily functioning, including the processes of self-acceptance (Nicholas & Asghari, 2006) mindfulness and value-based action (McCrancken & Yang, 2006), and generally enhancing emotional well-being itself (McCrancken & Gauntlett-Gilbert, 2011).

Likewise, LeKisha and Christopher (2010) found that the use of relaxation therapy in the management of the occurrence of examination anxiety crisis affect learners in a positive way psychologically, physically and emotionally because of dilation of the blood vessels. The authors also gave information about a specific case in which the self-regulation training in relaxation and imagery was used in addition to biofeedback and resulted in enhanced emotional well-being. The authors recommend that relaxation therapy be used to reduce examination anxiety among learners.

Similarly, Richardson, Smith, McCall and Pilkington (2016) posited that relaxation techniques when used help students to reduce examination anxiety that may aggravate anxiety. They affirmed that progressive muscle relaxation is one relaxation technique that teaches learners to tense and relax different muscle groups, starting with the hands and feet and then moving to more central muscles. Practically learners are asked to tense a muscle group for ten seconds and notice how it feels and then asked to relax the muscle group for ten seconds and compare the feelings. With practice, learners with mathematics anxiety should be able to detect the difference between tense and relaxed muscles and then to reduce the tension. Relaxation techniques may be combined with rhythmic breathing. Thus, deep breathing or muscle relaxation is found helpful in producing associated reductions in anxiety among individual with mathematics or examination anxiety.

Another variable of interest in this study is cognitive restricting therapy. Cognitive behavioural therapy (CBT) explores the links between thoughts, emotions and behaviour. It is a directive, time-limited, structured approach used to treat a variety of mental health disorders. It aims to alleviate distress by helping patients to develop more adaptive cognitions and behaviours. It is the most widely researched and empirically supported psychotherapeutic method. This strong evidence base is reflected in clinical guidelines, which recommend it as a treatment for many common mental health disorders. Cognitive restructuring is a therapeutic technique which refutes irrational ideas and replaces them with rational ones. Dibatolo, Frost, Dixon and Almodorar (2011) define cognitive restructuring as employing self-statements, arguments and disputations to make the

client see irrationality in his or her behaviour and to be able to devise positive alternative ways to such irrationality in case the urge arises in the future. Mcmulin (2005) affirms that human beings are generally rational, but that they can develop irrational beliefs and neurotic behaviour as a result of biological and social forces, through imitation of what people around them regard as acceptable societal norms, which sometimes are irrational thoughts. As children develop into adolescence, they tend to accept, unconsciously, these irrational beliefs. This invariably affects the psyche of the growing child, particularly students who are prone to all sorts of forces, based on peer pressure and societal beliefs passed on to the children: This is the basic reason why students' school performance, particularly in Mathematics, has been adversely affected in Nigeria.

According to Gargus (2012), when students encourage themselves with positive self-talk on issues or areas that have been a burden to them, they tend to increase their level of determination to succeed in that particular area of interest. This helps the adolescent to attain the aspired level to achieve success. Achievement according to Dahir & Stone (2013) is a common life experience, which is obtained by the acquisition of skills and using these acquired skills to the best of the individual's abilities and capabilities, so as to enhance his/her performance in life. In the words of Bandura (1997), people's personal expectations for achievement play an important role in enhancing their desire to succeed. For instance, if you believe that your effort at studying will lead to a good grade in your examination, you will be motivated to study. This belief helps to mobilize the individuals' energy in performing a lot better. This is why students who constantly solve Mathematics problems with a mindset to achieve success in the subject always excel.

Darling-Hammond (2010) opines that the desire to achieve success helps people to succeed, particularly in their area of interest. This desire to achieve becomes realistic when rational thinking is adopted by the individual, through the cognitively restructuring of their thought pattern. According to Okoye (2011), cognitive restructuring technique is adopted among students whose Mathematics achievement level has been declining consistently over the years, to see if their level of understanding the subject could be upgraded to a standard that will give them the confidence, they desire to be successful and the positive self-belief to write examinations into the tertiary institutions. Empirical studies have shown that cognitive restructuring has significant effect in reducing Mathematics anxiety and improve performance (Davis, 2001;Okoye, 2001).

Previous studies have reported the effectiveness of CT in the treatment of a wide range of mental disorders such as depression, anxiety, attention deficit (Telner, 2005), bipolar disorder (Coben, Donoghue, Fitzsimons, 2000), substance use disorders (Jalali, Hashemi and Hasani, 2018) and attention regulatory symptoms associated with failure. From information available in the literature attitude is a moderating variable in this study. In confronting this situation, Mckee (2002) opines that there is growing evidence on the importance of students' negative attitude and belief about Mathematics and that, through various teaching and learning styles adopted by guidance counsellors to aid students understanding, by making the students talk to themselves positively, the students' positive attitude and self-esteem become actualized. Students, according to Dahir and Stone (2003), do not learn automatically, particularly in Mathematics. They need guidance and direction before real interest is developed in the subject, eventually leading to effective learning. Some of the diverse ways sought by guidance counsellors include trying to adopt the technique of cognitive restructuring to encourage the students, particularly the females, who have unconsciously developed a phobia for the subject and to re-address their minds with positive statement such as, "1 will understand Mathematics, if I practice the concepts regularly".

Attitude is one of the moderation variables, the researcher belief that if the learner has positive attitude to the learning of mathematics this will go a long way to alleviate learners' anxiety about mathematics. Traditionally mathematics is viewed as a male-dominated domain which is evident in career choices and jobs (Peng, 2009). Studies in stereotyping and development in adolescence

support the idea of gender intensification during middle and late adolescence accompanied by less flexibility to stereotyping (McKee, 2002 and McMullin, 2005). This leads to the assumption of roles according to gender, assuming gender-type interests which could explain the less positive attitudes towards mathematics exhibited by girls at Secondary school.

Gender is another moderating factor that has the potential to justify a line of variance in students' Mathematics anxiety and performance. There have been mixed results in the literature on if being a male or female is the reason for poor performance in Mathematics or a factor for Mathematics anxiety exhibited by the students. According to Davis (2001), female students still have not attained Mathematics equity as their male counterparts in school because the female students see the subject as emotionally draining and cognitively difficult, coupled with the routinely negative self-statements the female students make about Mathematics being a difficult subject to pass. He also attributes these lapses to some parents' negative attitude towards science inclined courses for their daughters, a shortage of female Mathematics teachers to serve as role models, early marriage age for females and, most especially, the societal discriminatory attitude in terms of job opportunities. These factors seem to create a negative attitude amongst the female students thereby inhibiting their enhancement in Mathematics performance.

On the contrary, Beilock (2008) reminded female participants of the stereotype that 'men are better at mathematics than women. Women under this condition performed more poorly on mathematics problems than those receiving no stereotype. These women also reported "worrying more about the experimental situation and its consequences than controls did (Beilock, 2008). That is discrimination which creates fear in female students and makes them perform poorly in Mathematics-related subjects. Feelings and notion initially created in students essentially determine their academic output in Mathematics. Curtain-Phillips (2001) found that, among males and females, math anxiety was rated lower among males than females and those males who reported being dyslexic.

From the literature on alleviating fear and improving students' performance in Mathematics, two major schools of thought are identified the problem-focused and the solution-focused. The problem-focused school is interested in identifying the problem causing Mathematics performance, the solution-focused school identifies the area of strength, exalts the achievers in mathematics in the three schools that will be used for the experiment. That is, an average of students score in mathematics across the three academic terms will be a yardstick for sorting students with poor achievement in mathematics from the entire SS2 students.

**Purpose of the Study**

The general purpose of this study is to investigate the effect of relaxation techniques and cognitive restructuring therapy in reducing mathematics anxiety among junior secondary school students II in Ibadan, Oyo State, Nigeria. The specific purposes of the study are to:

1. Examine the main effect of treatment in reducing mathematics anxiety among junior secondary school students.
2. Determine the main effect of moderating variables (gender and attitude towards mathematics) in reducing mathematics anxiety among junior secondary school students.

**Hypotheses**

The following null hypotheses were tested at $\alpha = 0.05$ level of significance.

1 There is no significant main effect of treatment in reducing mathematics anxiety among junior secondary school students.
2 There is no significant main effect of gender in reducing mathematics anxiety among junior secondary school students.

3 There is no significant main effect of students' attitude in reducing mathematics anxiety among junior secondary school students.

**Design**

A 3 x 2 x 3 pretest-posttest and control group experimental design was used for this study. There were two treatment groups (relaxation techniques and cognitive restructuring therapy) and one control group. The two experimental groups and the control group make the three rows i.e. $A_1$, $A_2$, and $A_3$ while the columns contain the moderating variables which are gender varying at two levels (Male $B_1$ and Female $B_2$) and students' attitude subsumed under gender and varying at three levels (high $C_1$, moderate $C_2$, and low $C_3$). The effect of such on dependent variable (mathematics anxiety among junior secondary school students) was also determined.

**Population**

The population for this study consisted of Junior Secondary School Two Students (JSS II) in Ibadan, Oyo State, Nigeria. The students were selected from public Junior Secondary Schools. It was believed that students in private secondary schools would not be true representatives of students in the city because of difference in school ownership and the kind of orientation given to students in private schools. Three Local Governments selected in Ibadan Municipality and one school each was selected from each of the local government. The schools selected were Abadina Grammar School from Ibadan North, while Oba Abbas Alesinloye was selected from Ibadan South East and Oke Ibadan High School from Ibadan North East respectively. They have JSSII students' population of 204, 172 and 291 respectively; totaling 667 students.

**Sample and Sampling Technique**

Multistage sampling technique was used in this study in that out of two areas in which Ibadan land is divided to an area was selected, out of Ibadan municipality that was chosen three local government education areas were picked and in each chosen local government area a junior secondary school was finally chosen for the study and 30 students who exhibited anxiety for mathematics couple with their performance in three consecutive terms were selected for the study. The total sample size consisted of 90 students for the study. The mean age of the students used is 13.45 years with $\sigma = 1.75$. These students are mixture of learners from different tribes in Nigeria. Oyo state is the largest state of Southwest geopolitical zone of Nigeria. Therefore, the results obtained from this study can be generalised to the whole south-west geopolitical zone and the rest five geopolitical zones we have in the country. This study is conceptualized here in Oyo state since the researcher lives and sees what is operating in terms of how mathematics anxiety can affect performance in mathematical education in the state and the Southwest geopolitical zone.

**Instrumentation**

The three reliable assessment scales that were used for this study are Mathematics Achievement Test, Mathematics Anxiety Scale and Students' Mathematics Attitude Scale.

**Mathematics Achievement Scale:** This measuring scale was developed by the researcher. It was designed to measure students' knowledge in Mathematics (specifically plane geometry). Plane geometry was the basis for testing the participants' knowledge in Mathematics because it carries over 60% of the topics in the Nigerian secondary school curriculum. Geometry also has a reasonable percentage in WAEC/NECO yearly examination. Thirty (30) items were systematically generated from the blueprint designed for this study. The table of specification was designed to match Blooms cognitive domain. Sub-topics under plane geometry were selected in accordance with the NERDC (Nigerian Educational Research and Development Council) recommended

Mathematics curriculum. The psychometric property of the instrument was established through a pilot study on a sample of 30 students. Kuder Richardson 20(KR 20) was used to determine the reliability coefficient. It recorded Kr= 0.87. Item analysis was used to ascertain the item difficulty index and discriminating power of the test. Receiver Operator Characteristics (ROC) analysis was computed to ascertain the sensitivity and specificity of the scale, which is an index for criterion validity. This was done between higher and lower achievers in Mathematics. Items that refused to meet up with the criteria were expunged and the 24 items that survived the validation process were used for the study.

**Mathematics Anxiety Scale:** Mathematics anxiety scale is a self-reported psychological instrument adapted from Betz (1978) with a coefficient alpha of 0.90 to assess students' Mathematics anxiety level. This scale has been used and found reliable by Aremu and Taiwo (2014). The items include statements on the factors to which students attribute their predicaments in Mathematics. It was a 14-item scale with response ranging from strongly agree=5 to strongly disagree'. Participants will be made to tick the option that best describes their Mathematics anxiety level. The items will be added to give a total score of 70 and a minimum of 14. A score of 42 and above reveals that the participants' Mathematics anxiety is high, while a score below the norm reveals low anxiety level. The items will be coded because there are both positive and negative statements which will be reversed. The Cronbach coefficient observed and recorded by Aremu and Taiwo (2014) was 0.89 and an internal consistency of the instrument ranged between 0.46 and 0.75.

**Students' Attitude Towards Mathematics (SATMS) Scale**

SATM scale was developed by the researcher for the purpose of this study. Typical examples of the items are: I hate mathematics subject, I always vacate the classroom whenever we have mathematics, If there is no assistance I cannot do my take-home mathematics assignment, My parent hire a home lesson teacher for me because of mathematics. The instrument had 15items and was structured in the modified Likert scale that is Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The scoring pattern of the instrument ranges from 1 to 4 points as follows: SA = 1, A = 2, D = 3 and SD = 4 respectively. It has a reliability coefficient of 0.75 using Cronbach Alpha method of consistency.

**Data Collection Procedure**

**Experimental Group One: Relaxation Therapy**

**Week One:** General orientation and administration of instrument to obtain pre-test scores

**Week Two:** Importance of being emotionally calm

**WeekThree:** Progressive muscle relaxation

**Week Four:** Visualizations

**Week Five:** Exercises

**Week Six:** Listening to Music

**Week Seven:** Behaviour Modification

**Week Eight:** Revision of all activities in the previous session and administration of instrument for post treatment measures

**Experimental Group Two:** Cognitive Restructuring Therapy

**Week 1:** General orientation and administration of instrument to obtain pre-test scores. Introductory talk (the power of thought)

**Week 2:** Identification of psychological distraction

**Week 3:** Identification of unrealistic beliefs

**Week 4:** Expression of thought/Self-Instruction Therapy

**Week 5:** Using positive self-statements.

**Week 6:** Thought stopping and Good study habit

**Week 7:** Systematic desensitization

**Week 8:** Revision of all activities in the previous session and administration of instrument for post treatment measures.

**Control Group:** Students in this group will receive the pre-test assessment after which they will be taught normally by their Mathematics-teacher. Eight weeks after, a post-test will be administered. No special cognitive enhancement technique will be administered to them throughout the eight weeks' lessons with their Mathematics teacher.

Data Analysis: Analysis of Covariance (ANCOVA) was used to analyse data that was collected from the responses of the participants at $\alpha = 0.05$ level of significance in order to determine the main effects of the independent and moderating variables on the dependent variable. Magnitude of the mean scores of the participants in each of the treatment groups and control group was treated and ascertained by Scheffee Post-hoc analysis.

## RESULTS

**Hypothesis One:** There is no significant main effect of treatment in reducing mathematics anxiety among junior secondary school students.

**Table 1: Analysis of Covariance (ANCOVA) showing the significant main and interaction effect of Treatment group, Gender and Students' Attitude towards Mathematics on the reduction of Mathematics Anxiety among Junior Secondary School Students**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 9987.09 | 15 | 665.81 | 15.14 | .000 | .754 |
| Intercept | 3684.33 | 1 | 3684.33 | 83.75 | .000 | .531 |
| Post-score | 119.72 | 1 | 119.72 | 2.72 | .103 | .035 |
| Treatment group | 4541.26 | 2 | 2270.63 | 51.62 | .000 | .582 |
| Gender | 197.50 | 1 | 197.50 | 4.49 | .037 | .057 |
| Attitude | 377.62 | 2 | 188.81 | 4.29 | .017 | .104 |
| Treatment group * gender | 236.61 | 2 | 118.30 | 2.69 | .075 | .068 |
| Treatment group * Attitude | 127.16 | 3 | 42.39 | 0.96 | .415 | .038 |
| Gender * Attitude | 377.07 | 2 | 188.54 | 4.29 | .017 | .104 |
| Trt. group * Gender * Attitude | 16.95 | 2 | 8.47 | 0.19 | .825 | .005 |
| Error | 3255.31 | 74 | 43.99 | | | |
| Total | 596948.00 | 90 | | | | |
| Corrected Total | 13242.40 | 89 | | | | |

a. R Squared = .754 (Adjusted R Squared = .704)

Table 1 reveal that there was significant main effect of treatment in reducing mathematics anxiety among junior secondary school students ($F_{2, 74}$ = 51.62; p< 0.05, ñ = 0.582). This denotes that the treatment were effective in reducing mathematics anxiety among junior secondary school students. Hence hypothesis one was not rejected.
To find the degree of significance among the treatment groups Table 2 is presented. Table2 is presented showing the Duncan Post-Hoc test in reducing mathematics anxiety among junior secondary school students.

**Table2: Duncan Post-hoc Analysis Showing the Direction of the Difference among the Treatment Groups Grand Mean = 61.73**

| Treatment group | N | Subset for | Alpha | = 0.05 |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| Relaxation Therapy | 30 | 53.1429 | | |
| Cognitive Restructuring Therapy | 30 | | 77.9722 | |
| Control | 30 | | | 89.6303 |
| Sig. | | 1.000 | 1.000 | 1.000 |

Table 2 above reveals that the control group obtained the highest adjusted post-test mean score in reducing mathematics anxiety (X = 89.6303). This is followed by Cognitive restructuring therapy (X = 77.9722) while the minimum mean score was obtained by the Relaxation therapy group (X = 53.1429). To this end, the relaxation therapy was most effective in reducing mathematics anxiety among junior secondary school students than the cognitive restructuring therapy and the control group respectively.

**Two:** There is no significant main effect of gender in reducing mathematics anxiety among junior secondary school students.
Table 1 shows that gender has significant effect in reducing mathematics anxiety among junior secondary school students ($F_{1,74}$ = 4.49; p< 0.050, ñ = 0.280. This means that there is significant main effect of gender in reducing mathematics anxiety among junior secondary school students. Hence hypothesis two was statistically not confirmed. Further, Table 2 shows that male participants benefited more from the treatment (X = 44.64, SD = 0.60) than the female participants with (x= 55.63, SD= 0.69)

**Hypothesis Three:** There is no significant main effect of students' attitude towards mathematics in reducing mathematics anxiety among junior secondary school students.
The results from table 1 showed that there is significant main effect of students' attitude towards mathematics in reducing mathematics anxiety among junior secondary school students ($F_{2,74}$ = 4.29; p< 0.05, ñ = 0.104). This means that students' attitude towards mathematics is effective in moderating mathematics anxiety among junior secondary school students with high, moderate and those with low students' attitude towards mathematics differ significantly. Hence hypothesis three was rejected. Further, the results showed that high students' attitude towards mathematics benefited most from the treatment (X = 24.58), followed by the moderate students' attitude towards mathematics participants with (x= 36.61) and finally followed by the low students' attitude towards mathematics with (mean = 44.80).

## DISCUSSION OF FINDINGS

The purpose of this study was to determine the effect of relaxation and cognitive restructuring therapies in the reduction of mathematics anxiety among junior secondary school students in Ibadan land, Nigeria. The result indicated that there is a significant main effect of treatment of Relaxation and Cognitive restructuring in reduction of mathematics anxiety among junior secondary school students when compared with the control. The treatments were found to be

significantly capable of reducing the mathematics anxiety of the learners. The relaxation group was the most effective of all the groups, as this was indicated through its mean score which came out as the smallest, followed by that of Cognitive restructuring group which had a higher mean score when compared to that of the control group.

Relaxation therapy effectively regulated the mathematics anxiety of the learners better than the cognitive restructuring therapy. The learners through the help of clinicians were exposed to the three major aspect of relaxation therapy which include, deep relaxation, deep breathing and guided imagery as well as the five domain of imagery which are, thought, feelings, spirit, breathing and guided imagery which makes it easier for the students to mimic real life situation before its occurrence in the mind. The effect of this treatment cut across gender and any subjects for equal opportunity to benefit from the technique.

The finding of this study is in line with series of empirical documentations. For example, the studies of McKee (2002). McMullin (2005) revealed that relaxation is often viewed as "the cornerstone of educational psychologist interventions "and involves the use of one or more of the senses to create or recreate a mathematics skill or situation. Also, the previous findings of Lekisha & Christopher (2010) also supported the finding of this study by stating that it is also believed that students can use relaxation techniques to evoke the physical characteristics of an object, event or activity which has been perceived in the past or may occur in the future. Richardson, Smith, McCall and Pilkington (2006) concluded therefore, that due to these benefits, relaxation therapy is used extensively by students at all levels and is advocated by Counselling psychologist.

Cognitive restructuring being the next technique that had main effect on the mathematics anxiety of the students was supported by the empirical findings of Peng (2009) revealing that the ability any student has in refocusing after a mistake on the right cures is a basic tool for reducing anxiety or other related emotional problems in academic performance Nicholas and Asghari (2006). Gargus (2002) further stated that the ability of a student to know what to pay attention to, how to identify one's attention or concentrate a well as avoiding distractions are skills essential for performing optimally in academic. Lastly CRT, was found to be effective on mathematics anxiety in reduction among junior secondary school students and further emphasized on how the students would be able to understand their nature. The students were taught on how they can feel their muscles been tensed and learning how to adapt and apply these techniques when they find themselves in an anxiety crisis situation. Okoye (2001) posited that relaxation techniques are helpful tools for coping with stress and promoting long-term health by slowing down the body and quitting the mind. Beilock, Gunderson, Ramirez and Levine (2010) reported that the Jacobson progressive muscle relaxation exercise had been proven to have helped students deal appropriately with cases of tension for optimum performance in Kuwait.

The second hypothesis that talks about main effect of Gender in reducing mathematics anxiety among the junior secondary school students was significant. The result revealed that there is significant main effect of gender in reducing mathematics anxiety of junior secondary school students. The implication of this result is that gender influences mathematics anxiety of the junior secondary school students. This result is supported by the study of Dahir& Stone (2003) which shows that gender differences are important interpersonal factor in learning mathematics and that women respond to pressure by actively experiencing anxiety, while men are more likely to repress such anxiety. In the same vein, other research findings have revealed that there was no significant relationship between male and female learners in mathematics anxiety (Gargus, 2002).

Mathematics anxiety is significantly moderated by students' attitude towards mathematics. This finding corroborates the results of other research that claims that boys and girls present very similar attitudes towards mathematics Okoye (2001) and Beilock, Gunderson, Ramirez and Levine (2010)]. Traditionally mathematics is viewed as a male-dominated domain which is evident in career choices and jobs (Peng, 2009). Studies in stereotyping and development in adolescence support the idea of gender intensification during middle and late adolescence accompanied by

less flexibility to stereotyping (McKee, 2002 and McMullin, 2005). This leads to the assumption of roles according to gender, assuming gender-type interests which could explain the less positive attitudes towards mathematics exhibited by girls at Secondary school.

Our findings concerning the relationship between math achievement and attitudes towards mathematics are consistent with research showing that good achievers develop more positive attitudes than lower achievers (Coben, Donoghue, Fitzsimons, 2000 and Jalali, Hashemi and Hasani, 2018). Achievement is usually related to self-belief in competence (McCrancken & Yang, 2006; McCrancken & Gauntlett-Gilbert, 2011 and Dibatolo, Frost, Dixon and Almodorar 2001) and self-belief in competence can be related to attitudes towards mathematics anxiety, which suggests that when students succeed at a math task, it increases their sense of competence and this may promote more positive attitudes.

**Conclusion**

The findings showed that relaxation and cognitive restructuring therapies were effective in reducing mathematics anxiety among junior secondary school students in Ibadan and Oyo State, Nigeria at large. This is evidenced from the findings; relaxation therapy was more effective than cognitive restructuring therapy in reducing mathematics anxiety among junior secondary school students. As such, if the interventions were adequately applied and the gains of the training sustained, the application of these treatment packages will help in reducing mathematics anxiety among junior secondary school students.

The study also found that mathematics anxiety among Junior Secondary School students does not differ along gender line which obviously means that gender is one of the variables that determines mathematics anxiety among junior secondary school students. Students' attitude towards mathematics was established as essential variable that affect mathematics anxiety among Junior Secondary School students as individual with high students' attitude towards mathematics tend to be more mathematics anxiety among Junior Secondary School students than those with moderate and low students' mathematics anxiety respectively.

Based on the findings of this study, it was concluded that since the major aim of the school and academia is the attainment of sound academic standard which is not achievable without eradicating or lowering mathematics anxiety among Junior Secondary School students, the two interventions used in the study had therefore demonstrated the effectiveness and relevance in reducing mathematics anxiety among junior secondary school students in Ibadan Oyo State, Nigeria and the need for the full integration of psychological counselling service into the secondary school system.

**Recommendations**

Based on the findings in this study, the following recommendations were highlighted for considerations;

- Since relaxation and cognitive restructuring therapies were effective in reducing mathematics anxiety among junior secondary school students, it is therefore recommended that concerted effort should be provided by counselling psychologists, educational counsellors and other related professionals to adopt these two interventions when handling issues related with mathematics anxiety among Junior Secondary School students.
- Public and private schools should endeavour to provide enabling environment for the students. This will help in enhancing their mathematics anxiety among Junior Secondary School students and invariably improve students' academic achievement generally.
- It was recommended that the school should employ the service of at least a practicing counselling/educational psychologist who will be saddled with the responsibility of using the psychological principles and therapies in attending to several psychological challenges that students might be facing in the school system.

- The home (parents/guardians) and school (school management) should work as a team to collaboratively look for ways by which mathematics anxiety among Junior Secondary School students could be reduced and be improved upon.
- Experts in the field of Counseling/Educational psychologists should intensify their effort to organize seminars/conferences on the implications of this moderating variable (that is students' attitude towards mathematics) as they interact with students' mathematics anxiety among Junior Secondary School students.

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