

**EFFECT OF SYSTEMATIC DESENSITIZATION TECHNIQUE ON TEST ANXIETY
IN MATHEMATICS AMONG JUNIOR SECONDARY SCHOOL STUDENTS IN
KACHIA EDUCATION ZONE, KADUNA STATE, NIGERIA**

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Abstract

This study examined the effect of systematic desensitisation on test anxiety in mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria. A quasi experimental design of pre-test, post-test design was employed for this study. The population consisted of 814 junior secondary school students. A purposive sampling technique was used to arrive at a sample size of ten (10) students with severe and extreme level of test anxiety in mathematics as identified using the anxiety inventory from the selected schools in the education zone. Burns Anxiety Inventory (BAI) developed by Burns (1999) was the instrument adapted for collection of data for this study. The instrument had a reliability coefficient of 0.78. The participants were exposed to six weeks treatment (intervention) of systematic desensitization. Three hypotheses were formulated and tested at 0.05 level of significance using paired sample t-test. The findings revealed that systematic desensitization had significant effect in reducing physical, cognitive and psychological dimensions of test anxiety in mathematics among junior secondary school students. It was recommended that counsellors, psychologists and teachers should be encouraged to use systematic desensitization technique in helping students who are suffering from test anxiety in mathematics to cope better for optimal performance in school. In addition, seminars, workshops, symposia and campaign programmes should be organised for parents, head of schools and potential scholars to properly educate them on the dangers and implications of test anxiety in mathematics on performance.

Keywords: Systematic desensitisation, Test anxiety, Intervention, Junior secondary students

Introduction

Anxiety is an emotion characterised by feelings of tension, worries, thoughts and physical changes like increased blood pressure. It is a feeling of uneasiness and worry usually generalised and unfocused

as an over-reaction to a certain situation that is only subjectively seen as menacing. Anxiety is an unpleasant state of inner turmoil, often accompanied by nervous behaviour such as somatic complaints and ruminations, it also involves having thoughts of failure as related to academic performance by the students, inability to concentrate in the class, distractions, sweating, panic which affects the proper functioning of an individual (American Psychological Association, 2018). Learners with anxiety problem tend to worry constantly, feel tensed and uneasy throughout most of the day in the school which could have a negative impact on their performance, the general goal and essence of being to school as it is often accompanied by muscular tension, restlessness, fatigue and problems in concentration. However, anxiety can be appropriate, but when experienced regularly it may be a disorder (APA, 2018).

Test anxiety is an overwhelming feeling of disturbance and distress among students globally and can be a devastating problem for them because it may impair their performance and well-being later in life. Test anxiety can also be labeled as anticipatory anxiety, situational anxiety or evaluation anxiety. Some anxiety is normal and often helpful to stay mentally and physically alert (Lowe & Ang, 2015). Serason as cited in Wang (2013) considered test anxiety as a trait characterised by debilitating psychological, physical and behavioural responses exhibited by someone prior to sitting for test or in anticipation of an examination. Such debilitating responses include; panic, worries and sweating which constitute threatening situations that are not in the good health interest of the test anxious individuals. Zeidner (2012) outlined three components of test anxiety as cognitive, affective and behavioral. The cognitive component involves worry or negative thoughts, depreciating self-statements that occur during assessments and performance inhibiting difficulties that may arise from anxiety problem in recalling facts, difficulty in reading and understanding questions. The affective component includes the person's appraisal of his/her physiological state such as tension, tight muscles and trembling. The behaviour component includes poor study skills, avoidance and procrastination of work.

Mathematics is a formal science and defined as science of numbers. It is regarded as a core subject which all students regardless of gender or ethnic background must study at primary and secondary school level as contained in the National Policy on Education of the Federal Republic of Nigeria (FRN, 2013). It is observed that students' performance in Mathematics in Nigeria has been on the decline over the years, efforts as put forward by stakeholders in the educational sector to improve students' performance has yielded little or no appreciable results as envisaged. Diverse

reasons have been adduced for this perennial problem, some scholars view the problem as that of gender apathy, others view the problem as systemic while some emphasized pedagogical factor. Ajogbeje (2013) identified different factors responsible for the consistent poor performance of students in Mathematics which he listed as; lack of proper digestion and utilization of research findings by Mathematics teachers, sex-stereotyping, transfer of poor attitudes of older students to younger ones and poor self-concept (phobia/anxiety) the focus of this study.

Systematic desensitisation is a therapeutic intervention that reduces the learned link between anxiety and objects or situations that are typically fear-producing. Systematic desensitization technique has been shown to have effectively decrease anxiety levels in individuals who have difficulties relaxing in anxious situations (Larson, El Ramahi, Conn, Estes & Ghibellini, 2010). The aim of systematic desensitization is to reduce or eliminate fears or phobias that sufferers find distressing or that impair their ability to manage daily life. Rachman (2008) cited in Anyamene, Igboanugo and Ezunu (2020), opined that the aim of systematic desensitization technique is to remove the fear response of phobia and substitute it with a relaxed response to the stimulus. By substituting a new response to a feared situation, a trained contradictory response of relaxation which is irreconcilable with an anxious response, phobic reactions are diminished or eradicated. Literature have equally shown that systematic desensitisation technique is a therapy aimed to remove the fear response of a phobia and substitute a relaxation response to the conditioning stimulus gradually using counter conditioning.

Ventis, Higbee and Murdock (2013) reported a study where test anxiety was reduced using humor in systematic desensitisation. Systematic desensitisation is a behavioural technique whereby a person is gradually exposed to an anxiety-producing object, event or place while being engaged in some type of relaxation at the same time in order to reduce the symptoms anxiety (Lazovik, 2013). This technique of behaviour therapy involves gradually introducing a patient to increasingly fear-arousing stimuli in such a way that his fear of them all is gradually extinguished (Keane, 2018). Systematic desensitisation uses learning theory and counter conditioning to effectively deal with a wide range of behavioural problems such as test anxiety. The study conducted by Bokanola (2014) on the effectiveness of systematic desensitisation on the treatment of test anxiety found systematic desensitization to be effective towards having clients replace their anxious feelings with relaxation. In this study, systematic desensitisation refers to a counselling technique used in helping students to extinguishing test anxiety reactions.

Statement of the Problem

Over the years, the poor performance of students in Mathematics at the secondary school level is tied to so many factors, some of these include; teachers' weak content knowledge, inadequate teachers in the core subject area, dearth of instructional materials; students' poor attitude towards the subject and test or examination phobia/anxiety. The academic performance could be explained in terms of the grades or scores obtained in the subject Mathematics. The yardstick for measuring students' level of academic performance is by assessing them through test, examination and systematic observation by the teacher. Owing to the importance and relevance of Mathematics in the secondary school setting particularly the junior secondary school level, the researchers experience as a classroom teacher and teaching practice supervisors observed that there is growing test anxiety in Mathematics among the students which is affecting their optimal performance in the subject, this has been a source of concern to stakeholders. Literature have shown that a number of studies have been carried out in related area in other education zone in the state to the neglect of Kachia education zone. Therefore, this study examined the effect of systematic desensitisation on test anxiety in Mathematics among junior secondary school students in Kachia Education zone, Kaduna State, Nigeria.

Objectives of the Study

The objectives of the study were to:

1. Examine the effect of systematic desensitisation technique on physical dimension of test anxiety in Mathematics among junior secondary school students in Kachia Education zone, Kaduna State, Nigeria.
2. Determine the effect of systematic desensitisation technique on cognitive dimension of test anxiety in Mathematics among junior secondary school students in Kachia Education zone, Kaduna State, Nigeria.
3. Find out the effect of systematic desensitisation technique on psychological dimension of test anxiety in Mathematics among junior secondary school students in Kachia Education zone, Kaduna State, Nigeria.

Research Questions

This study answered the following questions:

1. What is the effect of systematic desensitisation technique on physical dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria?
2. What is the effect of systematic desensitisation technique on cognitive dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria?
3. What is the effect of systematic desensitisation technique on psychological dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria?

Hypotheses

1. There is no significant effect of systematic desensitisation technique on physical dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria.
2. There is no significant effect of systematic desensitisation technique on cognitive dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria.
3. There is no significant effect of systematic desensitisation technique on psychological dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria.

Methodology

This study adopted the quasi-experimental research design of pre-test, post-test non-equivalent group. The study was conducted in junior secondary schools' of Kachia education zone, Kaduna State, Nigeria. The target population for this study comprised of the entire public junior secondary schools' class three (JSS3) students with a population of 814 who were about to write their junior secondary certificate examination (JSCE) in Kachia education zone, Kaduna State, Nigeria. The researchers purposively selected one school from the urban centre and one from the remote area, these include; Government Junior Secondary School Kachia and Government Junior Secondary

school Jaban-Kogo in the education zone. The sample size for this study was ten (10), junior secondary school students with high test anxiety, five students each from the selected schools in the study area. The students were within the age range of 12-17 years.

Burns Anxiety Inventory (BAI) was used to identify students who exhibited between severe (31-50) and extreme (51-99) symptoms of test anxiety in Mathematics, consequently, the researchers for the purpose of data collection adapted the Anxiety Inventory Checklist developed by Burns (1999) and selected only those who exhibited symptoms of severe and extreme level of test anxiety in Mathematics as identified by the Checklist in the study area. The instrument was validated by one lecturer in the department of Educational Psychology and Counselling, Ahmadu Bello University, Zaria and a lecturer from the International Centre for Educational Evaluation, Institute of Education, University of Ibadan. The researchers then adapted the Burns Anxiety Inventory (BAI), measuring the physical, cognitive and psychological dimensions of test anxiety in Mathematics for the study.

The instrument was pilot tested at Government junior secondary school kwaturu within the same Kachia education zone and it yielded a reliability value of 0.78 which indicates that the instrument was reliable for the study. The treatment sessions (systematic desensitization intervention for participants) lasted for a period of six weeks which was conducted by the researchers alongside the two research assistants who were equally trained by the researchers accordingly. The pretest was conducted before intervention, while post-test was taken at the last week of the experimental treatment period. The whole exercise was carried out in different sessions. Mean and standard deviation were used to answer the research questions, while paired sampled t-test were used to test the hypotheses. All null hypotheses tested at 0.05 level of significance.

Results

Hypotheses One: There is no significant effect of systematic desensitisation technique on physical dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria.

Table 1: Paired sample t-test statistical analysis on the effect of systematic desensitisation technique on physical dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria.

Variable	Study Test Group	N	Mean	SD	df	p-value
Physical dimension of Test Anxiety in Mathematics	Pre-test	10	12.24	2.340	9	0.002
	Post-test	10	10.43	2.182		

P is significant at ≤ 0.05 (2-tailed)

Table 1 shows that the p value of 0.002 is lower than 0.05 alpha level of significance and the calculated pre-test mean score of 12.24 is higher than the post-test mean score of 10.43. The outcome of the analysis implies that the level of physical dimension of test anxiety in Mathematics significantly reduced as a result of exposure to the treatment (systematic desensitisation technique). Therefore, the null hypotheses which states that there is no significant effect of systematic desensitization technique on physical dimension of test anxiety in Mathematics among junior secondary school students in Kachia Education zone, Kaduna State, Nigeria was rejected.

Hypotheses Two: There is no significant effect of systematic desensitisation technique on cognitive dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna state, Nigeria.

Table 2: Paired sample t-test statistical analysis on the effect of systematic desensitization technique on cognitive dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria.

Variable	Study Test Group	N	Mean	SD	df	p-value
Cognitive dimension of Test Anxiety in Mathematics	Pre-test	10	14.11	2.320	9	0.000
	Post-test	10	12.20	2.120		

P is significant at 0.05 (2-tailed)

Table 2 shows that the p value of 0.000 is lower than 0.05 alpha level of significance and the calculated pre-test mean score of 14.11 is higher than the post-test mean score of 12.20. The outcome of the analysis implies that the level of cognitive dimension of test anxiety in Mathematics

significantly reduced as a result of exposure to systematic desensitization technique. Therefore, the null hypotheses which states that there is no significant effect of systematic desensitisation technique on cognitive dimension of test anxiety in Mathematics among junior secondary school students in Kachia Education zone, Kaduna State, Nigeria was rejected.

Hypotheses Three: There is no significant effect of systematic desensitisation technique on psychological dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria.

Table 3: Paired sample t-test statistical analysis on the effect of systematic desensitization technique on psychological dimension of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna state, Nigeria.

Variable	Study Test Group	N	Mean	SD	df	p-value
Psychological dimension of Test Anxiety in Mathematics	Pre-test		10	14.10	2.300	9
	Post-test		10	12.40	2.100	0.010

P is significant at 0.05 (2-tailed)

Table 3 shows that the p value of 0.010 is lower than 0.05 alpha level of significance and the calculated pre-test mean score of 14.10 is higher than the post-test mean score of 12.40. The outcome of the analysis implies that the level of psychological dimension of test anxiety in Mathematics significantly reduced as a result of exposure to systematic desensitisation technique. Therefore, the null hypotheses which states that there is no significant effect of systematic desensitisation technique on psychological dimension of test anxiety in Mathematics among junior secondary school students in Kachia Education zone, Kaduna State, Nigeria was rejected.

Discussion of Findings

The findings of this study based on hypotheses one revealed that significant effect of systematic desensitization technique exists on physical dimension of test anxiety in Mathematics among junior secondary school students that were exposed to treatment. This finding is in line with the findings of Obi & Oguzie (2018) that investigated the effect of Systematic Desensitisation Technique (SDT) on generalized anxiety among secondary school adolescents in Enugu East Local Government of Enugu State Nigeria and concluded that systematic desensitisation technique is effective in reducing physical dimension of test anxiety among secondary school students. This finding is consistent with the finding

of prior researches Larson, El Ramahi, Conn, Estes and Ghibellini (2010); Bokanola (2014) that systematic desensitisation technique is effective on test anxiety among secondary school students.

The findings of hypothesis two revealed that significant effect of systematic desensitisation technique exists on cognitive dimension of test anxiety in Mathematics among junior secondary school students that were exposed to treatment. This finding is in line with the findings of Ifeanyi, Anyamene and Nwokolo (2015) who indicated that systematic desensitisation technique is effective in reducing test anxiety among secondary school students. The finding from the study also is in line with the finding of Cherry (2012) who indicated that systematic desensitisation is effective in treating test anxiety and other forms of phobias.

The findings of hypothesis three revealed that significant effect of systematic desensitisation technique exists on psychological dimension of test anxiety in Mathematics among junior secondary school students that were exposed to treatment. The finding of this study is in agreement with the finding of Rajiah & Saravanan (2014) who reported in their study that students who received psychoeducation and systematic desensitisation for test anxiety experienced significant reduction in scores on test anxiety, psychological distress, and motivation compared to students who did not receive psychological interventions. The finding of this study were consistent with the previous findings of Vitasari, Wahab, Othman and Awang (2010), who stated that relaxation therapy, psychoeducation and systematic desensitisation were effective in reducing test anxiety in students.

Conclusion

Based on the findings of the study, systematic desensitisation technique was effective in reducing physical, cognitive and psychological dimensions of test anxiety in Mathematics among junior secondary school students in Kachia education zone, Kaduna State, Nigeria. This implies that the three dimensions of test anxiety in Mathematics for the study cannot be combined for a single measure of test anxiety in Mathematics.

Recommendations

Based on the findings, the following recommendations were proffered:

1. Counsellors, psychologists and teachers should be exposed to training on the effective use of systematic desensitisation technique so as to help students who are suffering from test anxiety in Mathematics to adjust and cope better for optimal performance in school.

2. School principals, Mathematics teachers and parents should be adequately educated on how to effectively apply systematic desensitisation technique on junior secondary school students identified with the symptoms of test anxiety in Mathematics with better ways of managing for enhanced performance.
3. Seminars, workshops, symposia and campaign programmes should be organised for parents, head of schools and potential scholars to properly educate them on the dangers and implications of test anxiety in Mathematics on performance with a view to reducing and if possible eradicating test anxiety among junior secondary school students.

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