ASSESSMENT OF STUDENTS TEST ANXIETY AND THE IMPACT OF COGNITIVE RESTRUCTURING COUNSELLING THERAPIES IN STATISTICS EDUCATION COURSES

AJOGBEJE, O. JAMES [1], MAKINDE, V. IBITOLA [2], AKEREDOLU, S. AYODELE [3], and BABATUNDE, C. ADEKEMI [4]

[1,2,3,4] Department of Counselling Psychology, Bamidele Olumilua University of Education, Science & Technology, Ikere Ekiti, Ekiti State.
ORCID ID: [1]https:// 0000-0003-4266-3657, [2]https:// 0000-0003-3802-1328, [3]https:// 0000-0002-4448-0507, [4]https:// 0000-0001-7492-2209
Email: [1]ajogbeje.oke@bouesti.edu.ng, ojajogbeje@gmail.com (*Corresponding Author),
[2]makinde.veronica@bouesti.edu.ng, [3]akeredolu.samuel@bouesti.edu.ng, [4]babatunde.christianah@bouesti.edu.ng,

Abstract

This study investigates the effects of cognitive-restructuring therapies on students' performance in statistics education courses (Tests and Measurement (T&M)), as well as how test anxiety is measured. Participants were randomly assigned to either an experimental group or a control group in this quasi-experimental pre-test/post-test factorial design study. The experimental group received treatment, while the control group received no treatment. Among the 206 individuals that enrolled in T&M, 122 participants were chosen at random to make up the study's sample. Within eight weeks of beginning therapy, a group treatment approach was implemented, and therapies were given. Everyone who took part in the study had to take a pre-test and post-test. To gather information from the students, the T&M Anxiety Rating Scale (T&MARS) was utilized. The standardized Beck Anxiety Inventory (BAI) a self-reported inventory, which consists of 21 items was adopted for the research. Using a 0.05 significance level for both the dependent and independent samples, the researchers computed t-tests to verify the hypotheses generated. Students suffering from anxiety associated with T&M can find statistically significant relief through cognitive restructuring counselling, according to this study's results. Those who had cognitive restructuring treatment and those who did not did not differ significantly in terms of their test anxiety levels. These results suggest that undergraduates suffering from anxiety connected to T&M may benefit from cognitive-restructuring treatment, which counsellors can offer.

Keywords: Test Anxiety, Statistics-Related Education Course, Cognitive Restructuring Counselling, Group Therapy.

INTRODUCTION

Prominent among the cognitive therapeutic approaches are Cognitive Behavioural Therapy (CBT) developed by Aaron Beck and Rational Emotive Behaviour Therapy (REBT) by Albert Ellis (in Ishaka & Nasiru, 2023). The basic assumption of cognitive restructuring is to assist clients or students in recognizing and altering unhelpful ways of thinking. Problems and bad emotions are universal; everyone goes through them. These difficulties can have an impact on ones thoughts, feelings, and actions. Having negative thoughts every now and then is natural, but when they become habitual, they can harm a person's emotional and physical health. Alternate names for cognitive restructuring include re-appraisal, re-labelling, cognitive reframing, and attitude modification (Adesemowo, 2015). Reframing one's thinking in order to

recognize, question, and ultimately overcome dysfunctional or illogical beliefs is known as cognitive restructuring (Penner, 2013). Using this method, one can learn how to recognize when his/her ideas and beliefs are causing them distress and then work towards changing them.

Several therapeutic approaches make use of cognitive restructuring techniques, for example, CBT and REBT (Hong, Sas & Sas, 2016). Lack of proper motivation to study for exams can result from students making false assumptions, such as thinking that someone is against them or that they cannot pass an exam without cheating or seeking assistance from colleagues and others. Once students have made false assumptions, they often act as if the assumptions were true (Morgenstern, 2012). Irrational thoughts and actions like these are crucial in the development of anxiety, according to Hopper (2015). Cognitive restructuring, as used in this research, is the act of identifying and replacing unproductive thoughts or habits (irrational thinking) with more productive ones (rational thinking). As part of her research on CBT, Omirin (2015) examined the efficacy of CBT, learning effective study practices, and a mixed-method approach in alleviating test anxiety. Results demonstrated that all three groups significantly reduced anxiety when compared to the control group; however, students' statistics education courses anxiety was significantly reduced when cognitive-behavioral therapy and study skills training were applied simultaneously as opposed to separately.

When it comes to the training of in-service teachers in college of education/faculty of education in the colleges or universities, statistics education courses (tests and measurement) are required courses. In a similar vein, student outcomes show that issues related to poor performance have long plagued subjects like mathematics, statistics and chemistry. These issues include, but are not limited to, students' inherent animosity towards the subject, bad classroom environments, and bad teaching methods. If the teacher is unsure of the future of his idea, he may start to feel anxious. Therefore, it is crucial in any endeavor since it influences one's endurance, concentration, and perception. Many students are terrified of mathematics as well as statistics, and this fear is associated with a general disillusionment with the subject. Parents, educators, and school administrators are understandably worried about their children's mathematics and statistics concerns. Mathematics and statistics are vital field of study because of the many ways it impacts our daily lives. Therefore, it is hardly an overstatement to say that mathematics and statistics are now a crucial component in Nigeria's progress to technological development and transformation. Although mathematics and statistics are very important subjects, it is disappointing that students' results on external exams such as WAEC, NECO, and NABTEB have been consistently poor for several years in a row (Jegede 2013). When students succeed, they feel a happy emotional state; when they fail, they feel a negative emotional state. After any test, students experience a range of emotions. It is necessary to reorganize the students' cognition orientation in order to change their illogical views and concerns about statistics education courses. According to Wines (2015), the fear of memorizing formulae, comprehending, solving mathematical problems statistics education courses, which is at the very core of all scientific disciplines, is what causes students' disinterest. Students continue to avoid mathematics and statistics related courses and classes despite the subject's importance and government initiatives to promote its study (Adebule, 2014). Researchers in the Tambuwal local government have paid scant attention to the fundamental psychological elements that may

give rise to this long-standing fear and its impacts on the patient. Many students find statistics education courses challenging, and Ashcraft and Moore (2009) acknowledge this. In addition, students frequently carry over their bad experiences from previous mathematics and statistics classes and at home into their current statistics education courses studies, which leads to a lack of comprehension (Frost, 2014).

Identifying test-anxiety or test-apprehensive students in statistics education courses and providing them with support to alleviate their anxiety is necessary because statistics education courses are foundational subject for career and training as a professional teacher. Also, it's important to note that various research has shown that cognitive-restructuring techniques are effective in lowering anxiety and related problems, as well as antisocial behaviors. That is why the study's author set out to learn more about cognitive restructuring and its potential applications in helping undergraduate statistics education courses students overcome their worries about the courses. The study's goals are as follows: 1. to determine, among other things, how students in statistics education courses classes fared after receiving cognitive restructuring counselling. 2. The anxiety levels of students in the control group and the groups that were exposed to cognitive restructuring counselling treatment for statistics education courses anxiety were compared.

Research Questions

1. Where do undergraduate students in statistics education courses stand on the anxiety scale after receiving cognitive restructuring counselling?

2. How much anxiety do students in the control group and the cognitive restructuring group experience when it comes to statistics education courses?

Research Hypotheses

Throughout the investigation, the researchers investigated the following null hypotheses:

1. Students do not show statistically significant differences in their anxiety levels when it comes to statistics education courses when they undergo cognitive restructuring counselling.

2. Students who suffer from statistics education courses anxiety did not significantly differ in their anxiety levels between the two groups when administered the cognitive restructuring counselling technique and the control group.

MATERIALS AND METHODS

Research Design

The research design for the study is a quasi-experimental pre-test/post-test factorial design. There were pre- and post-tests administered to both the experimental and control groups as part of the quasi-experimental research design. Quasi-experimental research design allows researchers to manipulate one or more independent variables without randomly assigning subjects to groups. So, the researchers randomly allocated students who were worried about statistics education courses to either an experimental group or a control group.

Research Instrument

In order to identify students who have statistics education courses anxiety as well as to gather information from the students, the T&M Anxiety Rating Scale (T&MARS) was utilized. The anxiety inventory measures three different degrees of statistics education courses anxiety (low, medium, and high). For this study, the researcher only used individuals who scored medium or high. The standardized Beck Anxiety Inventory (BAI) a self-reported inventory, which consists of 21 items was adopted for the research. It is one of the most popular tools for measuring anxiety levels, and its items each characterize a distinct anxiety-related activity. According to Beck, the original developer, BAI was found to be reliable with a reliability coefficient (α) of 0.96 and a test-retest reliability of 0.86, both calculated using Cronbach's Coefficient Alpha and $p<0.01$. Additionally, after two weeks of testing, the test's reliability index was found to be high (Pearson r = 0.93).

Participants

Two hundred and six undergraduate students from one of the universities in Ekiti State who suffer from statistics education courses anxiety made up the population of this study. A total of 122 test anxiety statistics education courses students were selected for the study. This study's respondent pool was selected using proportional sampling methods. The reason being, nobody else's statistics education courses-averse students were included in the study. The cognitive restructuring group received 72 samples out of 122. The control group, on the other hand, consisted of 50 anxious statistics education courses students.

Data Analysis

Mean and standard deviation was used answered the questions raised while hypotheses were tested at 0.05 level of significance using dependent sample t-test and independent t-test analysis.

RESULT

Part I: Students' Anxiety Levels Before and After Receiving Cognitive Restructuring Counselling

In order to answer the first research question, the researchers used the groups' means and standard deviations. Table 1 displays the pre- and post-test results in relation to cognitive restructuring's effects on treatment-exposed individuals' anxiety levels. The experimental group's mean pre- and post-test scores were 35.82 and 25.41, respectively.

Table 1: Cognitive Restructuring's Impact on Statistics Education Courses Anxiety Sufferers' Anxiety Levels When Exposed to Different Treatment

Groups	Treatments	N	Mean	Standard Deviation
Pre-Test Anxiety	Cognitive Restructuring	72	35.82	9.64
Post-Test Anxiety	Cognitive Restructuring	72	25.41	7.26

Treatment efficacy was considered to be the cause of the observed disparities in the anxiety level mean scores. This suggests that students' anxiety about chemistry can be managed with the use of cognitive restructuring counselling.

Part II: Levels of Anxiety in the Control Group and the Experimental Group that Underwent Cognitive Restructuring Therapy

In order to answer the first research question, the researchers used the groups' means and standard deviations.

Table 2: Levels of anxiety in the control group and groups that underwent cognitive restructuring

Groups	Treatments	N	Mean	Standard Deviation
Post-Test Anxiety	Cognitive Restructuring	72	25.41	7.26
Post-Test Control Group	Control Group	50	26.78	8.61

Table 2 reveals that compared to the control group, cognitive restructuring counselling technique participants had a reduced mean anxiety level score. Students' anxiety levels were shown to be much lower in the cognitive restructuring counselling group compared to the control group when it came to statistics education courses. When comparing the control group, who received no therapy whatsoever, to the experimental group, cognitive restructuring was found to have a significant impact on anxiety scores?

Part III: Effect of Cognitive Restructuring counselling Therapy on Pre-test and Post-test Means Scores on Anxiety Level

The first null hypothesis generated states that there was no statistically significant change in the pre- and post-test mean scores on test anxiety level after exposure to cognitive restructuring as a counselling strategy.

Table 3: Cognitive Restructuring Technique Exposure and Respondent Anxiety Levels.

Variables	N	Mean	Standard Deviation	t-Cal	p-Value	Decision
Pre-test	72	35.82	9.64	7.009	.000	Not accepted
Post-test	72	25.41	7.26			

In order to evaluate this hypothesis, t-test analysis was used on the respondents' pre- and post-test scores, as shown in Table 3. Cognitive restructuring had a substantial reducing effect on the participants, as the realized p-value was lower than the .05 level of significance. It was evident that the intervention strategy had a considerable impact on reducing the respondents' anxiety levels. Thus, the null hypothesis, which claimed that students with statistics education courses anxiety did not have a statistically significant change in their test anxiety levels between the pre- and post-tests rejected.

Part IV: The Difference in Anxiety Levels between the Control Group and the Group that Underwent Cognitive Restructuring.

The second null hypothesis generated states that the participants in the cognitive restructuring counselling group did not significantly vary in statistics education courses anxiety levels from

those in the control group. This hypothesis was also tested by subjecting the post-test scores of the respondents to t-test analysis as presented in Table 4.

Table 4: shows the results of a t-test conducted on the respondents' post-test mean scores

Variables	N	Mean	Std. Deviation	t-Cal	p-Value	Decision
Cognitive restructuring	72	25.41	7.26	0.852	.411	Not Rejected
Control Group	50	26.78	8.61			

Table 4 demonstrates that the cognitive restructuring group's scores were lower than the control group's scores. Despite a greater reduction in anxiety among the respondents who underwent cognitive restructuring compared to those in the control group, the difference between the two groups was not statistically significant, as the realized p-value exceeded the .05 level of significance. Therefore, we accept the null hypothesis.

DISCUSSION

The findings of the study showed a significant difference between the counselling therapy's impact from the cognitive restructuring approach and that of the control group, which did not get any counselling treatment. The results showed that the experimental group and the control group did not differ in the incidence of anxiety levels. Passer and Smith (2013) found that implementing cognitive restructuring interventions significantly reduced students' anxiety compared to a control group. This result is consistent with Wade's (2010) findings regarding the psychological disorders related to chemistry anxiety that certain students may encounter. They stated that several students all across the world view their anxiety related to chemistry as a challenging condition. The report also mentioned the wide range of negative effects of chemistry anxiety, including emotional reactions like distress, a loss of control, and low self-esteem. Wade's (2010) research demonstrated the effectiveness of psychological interventions such as stress management and coping skills training for these students. The current study's findings suggest that cognitive restructuring can benefit students experiencing statistics education courses-related anxiety.

Additionally, a study that compared students with statistics education courses anxiety who received cognitive restructuring counselling to those in the control group showed no discernible change in anxiety levels. The experimental group's anxiety level decreased more than the control group, yet there was no discernible difference between the two groups. This finding is consistent with Tobias (2013) findings, which showed that students exposed to the cognitive restructuring counselling technique had significantly different effects from those of the control group, who did not receive any cognitive restructuring counselling therapy. The results showed that the experimental group and the control group did not differ in the incidence of anxiety levels. However, the results contradict Jegede (2003) findings, which showed that the implementation of cognitive restructuring interventions significantly reduced the anxiety levels of secondary school pupils compared to the control group. This also supports the findings of Akinsola and Tella (2017) about the psychological problems experienced by students who suffer from chemistry test anxiety. Their research indicates that some students worldwide regard chemistry, mathematics and statistics as challenging subjects.

The study further revealed that students find themselves in stressful situations when faced with chemistry, mathematics and statistics phobia. According to the paper, there are numerous negative effects of chemistry and other subject anxiety, are extensive and include emotional reactions like anguish, hopelessness, low self-esteem, and lack of confidence, as well as detrimental societal repercussions and personal suffering. According to Hassan and Okatahi (2019), psychological therapies, such as stress management and coping skills training, can dramatically lower chemo anxiety.

According to the results of the current study, students who managed their statistics education courses anxiety through cognitive restructuring therapy showed a notable improvement. Furthermore, there was no statistically significant difference between the anxiety levels of the students receiving cognitive restructuring counselling for statistics education courses anxiety and the control group. The experimental group experienced a greater decrease in anxiety than the control group, but the two groups did not differ statistically. This result is consistent with Gire (2018) findings, which showed that there is a significant difference in the impact of cognitive restructuring therapy on students.

CONCLUSION

In light of the study's findings, the introduction of the cognitive restructuring counselling therapy significantly reduced the anxiety level of the respondents. Consequently, the cognitive restructuring counselling strategy proved to be efficacious and warrants implementation in the management of students' test anxiety levels.

Additionally, students exposed to cognitive restructuring reported lower anxiety levels than those in the control group, suggesting that students in the control group should also benefit from cognitive restructuring therapy. It was recommended that students experiencing statistics education courses-related anxiety or other related anxiety should receive cognitive restructuring counselling therapies. Undergraduate students suffering from test anxiety connected to T&M or any other courses may benefit from cognitive-restructuring treatment, which counsellors can offer

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