



# **Cognitive Behaviour and Relaxation Techniques: A Comparative Study among University Students in Nigeria with Primary Insomnia**

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## **Authors' contributions**

*This work was carried out in collaboration between all authors. Author VM designed the study, performed the statistical analysis, wrote the protocol, wrote the first draft of the manuscript and managed the literature searches. Authors BM, MIA and UY reviewed the manuscript and supervised the work. All authors read and approved the final manuscript.*

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## **ABSTRACT**

The purpose of the study was to examine the comparative effectiveness of cognitive behavior and relaxation techniques among undergraduate students in Nigeria with primary insomnia. A non-randomized design involving pretest and posttest was used. A total sample of thirty-six undergraduate students with a mean age of 25.5, who were identified with primary insomnia condition were purposively selected and assigned to treatment and control group. The treatment administered lasted for six weeks. Insomnia Severity Index was used as the outcome measure and was administered at pre and post intervention stages to assess treatment outcome. The data collected was analyzed at the .05 significance level using SPSS ver. 24. After adjusting for the covariate, the results suggest statistically significant differential effects for groups,  $F_{(2,30)} = 16.775$ ,  $p < .001$ ,  $\eta^2 = .512$ , with cognitive behavior technique (CBT) producing higher within group remission of averagely 65% compared to 45% for relaxation technique (RT) and 9% for control (CTL). Sleep onset time for CBT and RT groups reduced from a within group average of 39.1 to 21.2 minutes and 40.8 to 19.5 minutes while total sleep time improves from 5.0 to 6.4 and 4.2 to 6.6hrs respectively. Sleep efficiency for CBT improves from 70 to 86% in contrast to 71 to 85% for RT.

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The study concluded that both interventions (CBT and RT) were effective but comparatively, CBT appears as a viable option and could be recommended as a first first-line behavioral intervention for psychologists and counsellors to explore it benefits to help students manage sleep difficulty in school.

*Keywords: Cognitive behavior technique; relaxation technique; primary insomnia.*

## 1. INTRODUCTION

Insomnia, a sleep condition of persistence difficulty falling or staying asleep long enough to feel refreshed the next morning is taking a worrisome proportion, particularly in this computer age and demanding 21<sup>st</sup> centuries academic environment. Higher institutions of learning are dominated in a number by young adult students transiting to a world of relative freedom, new experiences and choices, and based on the choices they make their campus and off-campus experience can contribute to a health – or disorder – promoting lifestyle and ultimately relate to their quality of life, and school activities.

National Sleep Foundation [1], reported that young adults were at greater risk than other age groups for developing first onset psychopathology (mental/behaviour disorder). The foundation also noted that majority of students due to new environment life experiences and choices at school receive significantly less sleep. Gureje, Oladeji, Abiona, Makanjuola and Esan [2], reported that more than a quarter of Nigerians aged 18 – 30 years suffer from insomnia. In US, Hicks and Pellegrini [3], find an increasing trend with 68.3% of college students reporting sleep problems in 2001, against 26.7% found in 1982. In [4], Lund, Reider, Whiting and Prichard, found 60% of college students reported poor sleep quality. Approximately 35% of students' populations with sleep problems have reported experience of insomnia during the course of a year in school [5], with 11.4% reporting their symptoms started when they were 21 to 30 years-old [6]. In a study where randomly selected young adults ages 21-30 were used, 16.6% reported experiencing insomnia and about 45% of these young adults with insomnia continued to report sleep problems at a 3.5-year follow-up [7].

Insomnia taxes its sufferers, mentally and physically, and can cause a lot of stress for individuals in their personal life and their ability to be productive members of society. Lack of or poor sleep quality has been shown to predict

psychiatric problems such as depression and substance abuse among students and hypertension [8]. Insomnia can also impair students' daytime performance; examples include falling asleep in class, lacking energy to perform academic tasks, poor concentration, and inattentiveness in the class. It is also associated with an increased risk for cognitive decline, poor academic performance and suicide ideation [9].

In recent times, however, evidence had shown that psychological approaches like cognitive-behavioral techniques produce sustained benefits in management of insomnia without the risk for tolerance or adverse effects associated with pharmacologic approaches. In one study, Edinger, William, Wohlgemuth, Radtke, Marsh, and Quillian [10] examined Cognitive-Behavioral Therapy for Treatment of Chronic Primary Insomnia using a Randomized, double-blind, placebo-controlled clinical trial. Seventy-five adults with chronic primary sleep-maintenance insomnia were randomly assigned to receive CBT (sleep education, stimulus control, and time-in-bed restrictions), and progressive muscle relaxation training. Treatment lasted for 6 weeks, with follow-up conducted at 6 months. Insomnia Symptom Questionnaire (ISQ) was used for data collection. A result as reported by Edinger et al. [10] showed that cognitive-behavioral therapy produced larger improvements across the majority of outcome measures than did relaxation training or placebo treatment. Using sleep logs data, CBT-treated patients achieved an average 54% reduction in their sleep maintenance problem whereas RT-treated and placebo-treated patients, respectively, achieved only 16% and 12% reductions in this measure. Recipients of CBT also showed a greater normalization of sleep and subjective symptoms than did the other groups with an average sleep time of more than 6 hours, and sleep efficiency of 85.1%. In contrast, RT-treated patients continued to report sleep efficiency of 78.8%. Edinger et al. [10] concluded that CBT represents a viable intervention for primary sleep-maintenance insomnia because it leads to clinically significant sleep improvements within 6 weeks, and these

improvements appear to endure through 6 months of follow-up.

In a Systematic Review and Meta-analysis of Cognitive-Behavioral Therapy for Chronic Insomnia, Trauer, Qian, Doyle, Rajaratnam, and Cunnington [11], assessed the efficacy of CBT-I on diary measures of overnight sleep in adults with chronic insomnia. Data were collected from Searches of MEDLINE, EMBASE, PsycINFO, CINAHL, the Cochrane Library, and PubMed Clinical Queries from inception to 31 March 2015, supplemented with manual screening. Between 292 citations and 91 full-text articles reviewed, 20 studies (1162 participants [64% female; mean age, 56 years]) were included. Approaches to CBTi incorporated at least 3 of the following: cognitive therapy, stimulus control, sleep restriction, sleep hygiene, and relaxation. The output revealed that at the post-treatment time, SOL improved by 19.03 minutes, WASO improved by 26.00 minutes, TST improved by 7.61 minutes, and SE improved by 9.91% and changes seemed to be sustained at later time points. No adverse outcomes were reported. Trauer et al. [11] concluded that CBTi is an effective treatment for adults with chronic insomnia, with clinically meaningful effect sizes.

While CBT is effective in reducing insomnia among other samples, empirical studies examining the comparative effectiveness of cognitive behavior and relaxation techniques in reducing insomnia among university students living in the hostels in Nigeria are rare. In the light of the foregoing, this study aimed at finding out whether cognitive behavior techniques compared to relaxation intervention can produce a better outcomes in helping to decrease overall insomnia severity, sleep onset time, total sleep time and improve sleep efficiency among undergraduate students.

### 1.1 Objectives of the Study

The major objective of the study was to examine the comparative effectiveness of cognitive behavior and relaxation techniques among undergraduate students in Nigeria with primary insomnia. The specific objectives were to:

- i. Examine the effects of cognitive behavior and relaxation techniques on insomnia among undergraduate students

- ii. Find out the effects of cognitive behavior and relaxation technique in improving sleep onset, total sleep time and sleep efficiency among undergraduate students

### 1.2 Research Question

The study was guided by the following research questions:

- i. What is the effect of cognitive behavior and relaxation techniques in reducing insomnia among undergraduate students?
- ii. What is the effect of cognitive behavior and relaxation technique in improving sleep onset, total sleep time and sleep efficiency among undergraduate students?

### 1.3 Hypotheses

The following hypotheses were formulated and tested in the study:

- i. There is no significant differential effect of cognitive behavior and relaxation techniques on insomnia among undergraduate students.
- ii. There is no significant differential effect of cognitive behavior and relaxation techniques in improving sleep onset, total sleep time and sleep efficiency among undergraduate students.

## 2. METHODOLOGY

### 2.1 Study Design

The study used quasi-experimental design involving pretest posttest. This is because it is useful in study where intervening variables are difficult to control, and it enables the researcher to select the desired sample for the study on purpose or based on established criteria and presence of a condition of interest.

### 2.2 Participants

Thirty-six students (CBT = 12; RT = 12; CTL = 12) of Ahmadu Bello University, Zaria, Nigeria who were identified with primary insomnia condition participated in the study. The students were volunteers who have agreed to participate in the study after they were identified with the primary insomnia condition. The following flowchart shows an overview of the sample:

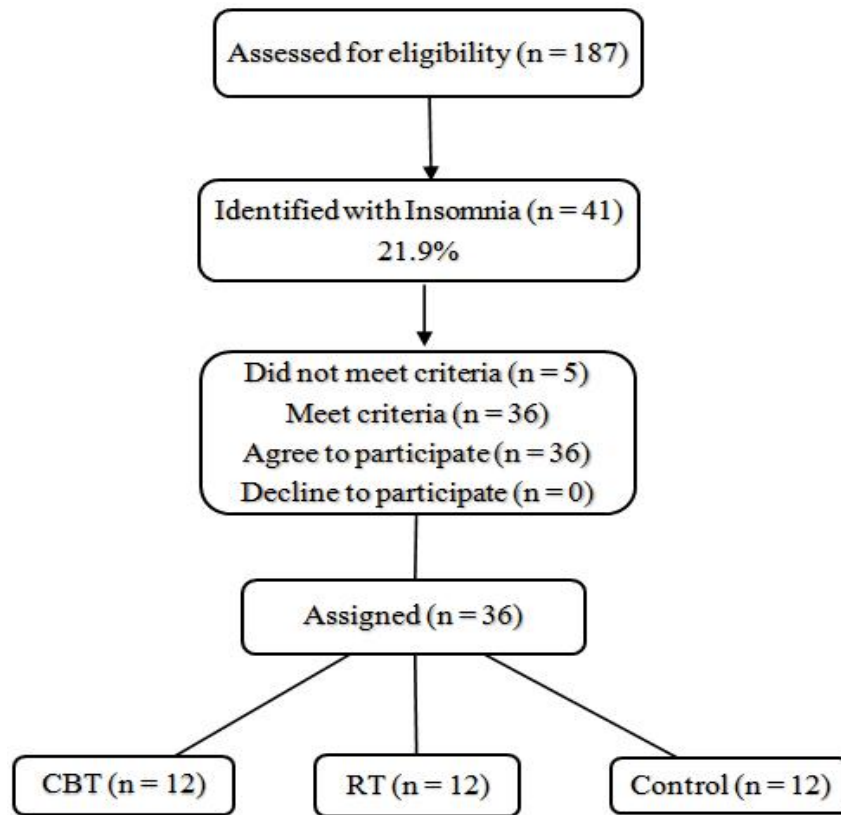


Fig. 1. Flowchart showing an overview of the sampling procedure

### 2.3 Recruitment Procedure

The thirty six volunteered students who participated in the study in order to resolve their insomnia condition were gotten via notices placed around hostels, sharing of handbills, and through one-on-one contact on campus. Carney, Harris, Moss and Edinger [12], and Vitiello, Rybarczyk, Von Korff, and Stepanski [13] used similar strategy for recruiting volunteers for insomnia research. It is a recommended recruitment technique [14]. All these procedures were undertaken after the researcher sorted and obtained permission from the Head of Department of Educational Psychology and Counselling, Ahmadu Bello University, Zaria, Nigeria to carry out the study.

### 2.4 Eligibility Criteria

Only students who scored  $\geq 8$  on the Insomnia Severity Index (ISI), and showed absence of a sleep disruptive medical/psychiatric condition, substance abuse disorder, and/or other sleep disorder participated in the study. These criteria

are consistent with elements of a Diagnostic and Statistics Manual of Mental Disorders (DSM-4 and DSM-5) diagnosis of primary insomnia [15,16,17,18].

### 2.5 Outcome Measure

The outcome measure used was Insomnia Severity Index developed by Bastien, Vallieres and Morin [19], to assess students' insomnia condition. The Insomnia Severity Index (ISI) was designed to be both an identification tool of insomnia severity and an outcome measure for use in insomnia intervention research [19]. The ISI measured subjective insomnia severity during the previous weeks, and the measure is relevant for the entire age range [20]. The measure included seven questions bothering on sleep onset, sleep maintenance, and consequences. The scores ranged from 0 to 28, and total scores are categorized into 'absence of insomnia' (0-7), 'sub threshold insomnia' (8-14), 'moderate insomnia' (15-21) and 'severe insomnia' (22-28). Consistent with Bastien et al. [19] recommendation, a cutoff of  $\geq 8$  [21] serves as a

threshold for participation in the study. Morin et al. [22] reported a reliability index of 0.90 for Insomnia severity index. ISI has also demonstrated 80% sensitivity and specificity [19]. Insomnia research experts, Buysse, Ancoli-Israel, Edinger, Lichstein, and Morin [23], recommended ISI as a tool for assessment of insomnia.

To assess sleep onset latency, total sleep time and sleep efficiency, participants were asked to write the time they usually go to bed at night, how long it takes them to fall asleep, and the time they woke up from sleep the following morning, and hours of actual sleep per night. Sleep efficiency is calculated by dividing total sleep time by the total time in bed and multiplied by hundred (TST/TIB x 100). Sleep efficiency of 85% is recommended.

## **2.6 Intervention Procedure**

The treatment procedure was discussed in three phases:

### **2.6.1 Pretreatment phase (week 1)**

Before administering the instrument to collect baseline data, the researcher introduced himself to the research participants and exchange pleasantries to create good understanding and pleasant atmosphere. All participants from each group were also given time to introduce themselves to the researcher. This was done at separate location and different time to prevent familiarity or interaction between members of the two intervention groups. After introduction, the students were briefed on the essence of the study. Consent was obtained from them after which they filled questionnaire that was used to assess their insomnia severity. Insomnia Screening Questionnaire [24] was used to assess for absence or presence of a medical/psychiatric condition, substance abuse disorder, and other sleep disorder. These criteria are consistent with Diagnostic and Statistics Manual of Mental Disorders (DSM-IV & DSM-5) algorithm for diagnosis of primary insomnia [16,17,18]. The data collected at this point served as baseline or pretest data, and bases for inclusion/exclusion from the study. Participants were taught how to fill the instruments, after which arrangements were made regarding further meetings.

### **2.6.2 Treatment phase (week 2-5)**

During this period, two different intervention procedures were applied to the two comparison

groups at a varied time during the day. The treatments were delivered on Saturday with those receiving CBT and RE undergoing six-week intervention sessions. The CBT intervention used was based on recommendations of Morin and Espie [17], and Perlis et al. [25], while the Relaxation techniques used were based on Ethan [26], and National Sleep Foundation [27], recommendations for reducing insomnia respectively.

After each week of intervention, participants were given handout containing treatment recommendations, to serve as a guide during practice. All treatment's instructions were delivered around the participants' hostel at an agreed time and sometimes at a serene location for convenience. The interventions were offered with the help of a female research assistant who was briefed on the study protocol. From table 1, it can be seen that each intervention differs in specific content, but all sessions center around the following main activities: (1) finding out about progress (2) ascertaining problems in home practice (3) encouraging level of adherence and (4) introducing new intervention. The interventions used are those that have been shown efficacious in prior researches and have been recommended by the American Academy of Sleep Medicine for the treatment of insomnia [28].

### **2.6.3 Post-treatment Phase (week 6)**

During this phase, post intervention test using Insomnia Severity Index was administered. This was used to compare with pretest data to examine changes that have occurred over the course of the intervention. Before termination, the researcher informed the treated participants on what to do when there is a relapse. Finally, the participants were made to understand that longitudinal data suggests that treatment gains are extremely durable with time. They are most often maintained or improved over time, and that relapse rates will be small provided, they continue good habits (abstain from things that precipitate and perpetuate the condition in the first place).

## **2.7 Ethical Consideration**

Participation in this research was voluntary. Only participants identified with the condition of interest (primary insomnia) and have agreed to participate after signing a consent form took part

**Table 1. Brief description of intervention**

<b>Time</b>	<b>Cognitive behaviour techniques</b>	<b>Brief description of intervention administered</b>
Wk 2	Stimulus control	Participants were given instructions designed to associate the bed/bedroom with sleep and to reestablish a consistent sleep-wake schedule.
Wk 3	Sleep restriction	A strict schedule of bed times and wake times with no midday naps which results in more consolidated and more efficient sleep was instructed
Wk 4	Sleep hygiene	Participants were given general guidelines about health practices and education, environmental factors that may affect sleep
Wk 5	Cognitive technique	Participants were given psychological method which helped to counter negative intrusive thoughts at bedtime and belief about sleep
Wk 6	Posttest	Posttest, revision & termination
<b>Relaxation techniques</b>		
Wk 2	Deep breathing exercise	Participants were encouraged to use this method so as to help in achieving controlled breath that can release tension, worries and control heart rate
Wk 3	Progressive muscle relaxation techniques	Participants received instruction on progressive muscle relaxation to help induce a state of deep muscular relaxation as well as helping one to learn the difference between tension and relaxation
Wk 4	Guided visualization meditation	GVM was introduced to help encourage positive feelings of peacefulness. The idea in this exercise is to focus attention on a pleasant image or story, so that the mind can let go of worries or thoughts that keep one awake.
Wk 5	Mindfulness technique	Mindfulness was instructed to the participants to discourage thinking too much once on bed, and to learn to calm the mind and do away with racing thoughts and worries.
Wk 6	Posttest	Posttest, revision & termination

in the study. The consent form as attached to the instrument is as follows;

The essence of the study has been explained to me, and I have been given the opportunity to ask questions about this research. I understand the aims, duration of the intervention and have agreed to participate. I was also assured of confidentiality of any information I gave. I understand that my participation is voluntary, so I can withdraw from the study at any time.

\_\_\_\_\_  
Sign

\_\_\_\_\_  
date

At the end of the study, the control group was given a copy of the treatment handout and was duly briefed on how to use it.

### 3. RESULTS

In analyzing the data collected, mean and standard deviation was used to answer research

questions while one-way between group analysis of covariance and multiple analysis of covariance was used to test hypotheses one and two respectively.

Table 2 shows the pre-intervention and post interventions mean scores of participants exposed to CBT and those exposed to RT. It reveals that at pretreatment stage, students assigned to receive CBT for insomnia had a higher mean score ( $M = 14.75$ ,  $SD = 4.18$ ) when compared to students in the RT group ( $M = 12.42$ ,  $SD = 2.64$ ) and CTL ( $M = 10.91$ ,  $SD = 2.02$ ). However, after treatment, students exposed to CBT had a mean score lower ( $M = 5.08$ ,  $SD = .79$ ) than those exposed to RT ( $M = 6.75$ ,  $SD = 1.37$ ) and CTL ( $M = 9.91$ ,  $SD = 2.84$ ). Although both treatment group showed normalization after intervention, different decrease level was observed with a higher average remission of 65% for CBT group

compared to 45% for those exposed to RT and 9% for CTL group.

the covariate to control for initial differences. The result is presented in Table 3.

To test null hypothesis, whether cognitive behaviour techniques is significantly effective when compared to relaxation technique in reducing insomnia condition of students, a one-way between-group analysis of covariance was carried out and pretest mean scores of participants in both interventions were used as

Table 3 shows a one-way between group analysis of covariance (ANCOVA) which was used to test null hypothesis one and the essence was to examine the differential effects of cognitive behaviour technique against a relaxation technique designed to reduce participants' insomnia condition. The test was

**Table 2. Means and standard deviation of pretest and posttest insomnia condition of subjects exposed to cognitive behavior and relaxation technique**

Treatment	Baseline		Post treatment	
	Mean	SD	Mean	SD
CBT	14.75	4.18	5.08	.79
RT	12.42	2.64	6.75	1.37
CTL	10.91	2.02	9.91	2.84

*n per group = 12; total n = 36; CBT = cognitive behaviour techniques for insomnia; RT = relaxation technique for insomnia, CTL = control group*

**Table 3. One-way between group analysis of covariance on the differential effect of cognitive behaviour and relaxation technique on Insomnia among undergraduate students**

Source	Type III sum of squares	Df	Mean square	F	Sig.	Partial eta squared
Corrected Model	145.260 <sup>a</sup>	3	48.420	13.416	.000	.557
Intercept	78.619	1	78.619	21.784	.000	.405
Pre_Insomnia	.594	1	.594	.164	.688	.005
Group	121.085	2	60.542	16.775	.000	.512
Error	115.490	32	3.609			
Total	2153.000	36				
Corrected Total	260.750	35				

*a. R Squared = .557 (Adjusted R Squared = .516)*

**Table 4. Mean and standard deviation of pretest and posttest SOL, TST and SE of subjects exposed to cognitive behaviour and those exposed to relaxation technique**

Variable	Baseline		Post treatment	
	Mean	SD	Mean	SD
<b>Sleep onset latency</b>				
CBT	39.167	14.434	21.250	10.472
RT	40.833	14.434	19.583	7.821
CTL	47.500	25.090	40.833	5.967
<b>Total sleep time</b>				
CBT	5.000	.853	6.416	.557
RT	4.250	1.305	6.625	1.089
CTL	4.333	.984	5.125	1.170
<b>Sleep efficiency</b>				
CBT	70.651	8.981	85.995	4.493
RT	71.553	13.615	84.596	10.075
CTL	69.800	10.766	73.655	7.777

*N per group = 12; total n = 36; CBT = cognitive behaviour techniques; RT = relaxation technique, CTL = control group; SOL = sleep onset, SD = standard deviation*

conducted using participants' scores on the pre-intervention administration of the Insomnia Severity Index as the covariate. After adjusting for the covariate, the study finds a statistically significant differential effect of cognitive behaviour technique in reducing insomnia when compared to relaxation technique,  $F_{(2,32)} = 16.775, p < .001, \eta^2 = .512$ . The R Squared value indicates that 55.7% of the variance in post intervention scores as measured by the insomnia severity index can be explained by the intervention after adjusting for covariate. Therefore, the null hypothesis, which states that there is no significant differential effect of cognitive behaviour and relaxation techniques on insomnia among students of Ahmadu Bello University, Zaria, Nigeria is rejected.

Table 4 reveals that at pretreatment stage, students assigned to receive cognitive behaviour technique for insomnia had a mean pre SOL score ( $M = 39.164, SD = 14.434$ ) when compared to Pre SOL of students in the relaxation technique ( $M = 40.833, SD = 14.434$ ) and CTL ( $M = 47.500, SD = 25.090$ ). However, after treatment, students exposed to cognitive behaviour technique had a mean SOL score higher ( $M = 21.250, SD = 10.472$ ) than those exposed to relaxation technique ( $M = 19.583, SD = 7.821$ ) but better than CTL ( $M = 40.833, SD = 5.967$ ). This outcome suggests different treatment effect with an average within group improvement in sleep onset time of about 18 minutes (45.7% reduction) for cognitive behaviour technique group compared to 21 minutes (52% reduction) for those exposed to relaxation technique and 6.67 minutes for CTL

(14% reduction). TST at pre intervention stage for CBT ( $M = 5.000, SD = .853$ ) was higher than RT ( $M = 4.250, SD = 1.305$ ) and CTL ( $M = 4.333, SD = .984$ ). After intervention, however, mean TST for CBT ( $M = 6.416, SD = .557$ ) increased by 1.42hrs (22%) compared to mean TST for RT ( $M = 6.625, SD = 1.089$ ), 2.37hrs (35.8%) increase and CTL ( $M = 5.125, SD = 1.170$ ), which increased by .79hrs (15%). Furthermore, mean SE ( $M = 70.651, SD = 8.981$ ) of subjects exposed to CBT was lower when compared to those exposed to relaxation technique ( $M = 71.553, SD = 13.615$ ), but higher than CTL ( $M = 69.800, SD = 10.766$ ). After intervention, mean SE for participants exposed to CBT improved to 85.99% compared to 84.59% for relaxation technique and 73.65% for CTL.

To test null hypothesis two, whether cognitive behaviour technique is significantly effective when compared to relaxation technique in improving SOL, TST and SE among undergraduate students, a multiple analysis of covariance was carried out and pretest mean SOL, TST and SE of participants in both interventions was used as the covariate to control for initial differences. The result is presented in Table 5.

Table 5 shows a multiple analysis of covariance (MANCOVA) which was used to test null hypothesis two and the essence was to assess the comparative effectiveness of cognitive behaviour against a relaxation technique interventions designed to reduce participants' sleep onset time, total sleep time and improve sleep efficiency. After adjusting for the covariate,

**Table 5. Multiple analysis of covariance on the differential effects of cognitive behaviour and relaxation technique in reducing SOL and improving TST and SE among undergraduate students**

Source	Dependent variable	Type III sum of squares	Df	Mean square	F	Sig.	Partial eta <sup>2</sup>
Intercept	SOL	653.051	1	653.051	8.826	.006	.227
	TST	17.505	1	17.505	17.256	.000	.365
	SE	2574.568	1	2574.568	42.348	.000	.585
Group	SOL	3321.874	2	1660.937	22.447	.000	.599
	TST	15.546	2	7.773	7.662	.002	.338
	SE	1069.250	2	534.625	8.794	.001	.370
Error	SOL	2219.777	30	73.993			
	TST	30.433	30	1.014			
	SE	1823.869	30	60.796			
Total	SOL	32300.000	36				
	TST	1367.500	36				
	SE	241724.002	36				

a. R Squared = .605 (Adjusted R Squared = .539); b. R Squared = .358 (Adjusted R Squared = .251)

c. R Squared = .412 (Adjusted R Squared = .314)



result of the analysis suggests significant differential effect of cognitive behaviour and relaxation technique in reducing SOL,  $F_{(2,30)} = 22.447$ ,  $p < .001$ ,  $\eta^2 = .599$ , and improving TST,  $F_{(2,30)} = 7.662$ ,  $p = .002$ ,  $\eta^2 = .338$  and SE,  $F_{(2,30)} = 8.794$ ,  $p = .001$ ,  $\eta^2 = .370$  among students of Ahmadu Bello University, Zaria. The R Squared value indicates that 60.5%, 35.8% and 41.2% of the variability in post intervention SOL, TST and SE can be accounted for by the independent variable after adjusting for covariate. Therefore, the null hypothesis, which states that there is no significant differential effect of cognitive behaviour and relaxation technique in improving SOL, TST and SE among undergraduate students, is rejected.

#### 4. DISCUSSION

The finding from this study reveals the comparative effectiveness of cognitive behavior and relaxation techniques in reducing insomnia among undergraduate students. When compared to RT group, results suggested that subjects exposed to CBT showed better improvement in their post-intervention score as measured by insomnia severity index. This finding was corroborated by the initial results of Edinger et al. [10], which shows that cognitive-behavioral therapy produced larger improvements across the majority of outcome measures than did Relaxation Training. In addition, Kaldo et al. [29] result provides that ICBT-I is more effective than an active control treatment in reducing insomnia severity and treatment gains remained stable one year after treatment. Ahmed and Younis [30] who experimented using relaxation technique recommended that periodic clinical assessment of sleep complaints should become routine. In addition, Ahmed and Younis [30] stated that non-pharmacological methods such as effective relaxation techniques should be used in the treatment of sleep problems in hemodialysis patients.

The study finds significant differential effects of cognitive behavior and relaxation techniques in improving sleep onset time, total sleep time and sleep efficiency among university students. Both CBT and RT groups reported meaningful within group improvement in sleep onset time in minutes from 39.16 to 21.2 and 40.83 to 19.5 minutes, total sleep time of 5.00 to 6.41hrs and 4.25 to 6.62. Sleep efficiency for CBT improved to 86% in contrast to 84.5% for RT when compared to CTL. This finding was also

corroborated by the initial report of Edinger et al. [10], which shows that CBT-treated patients achieved sleep efficiency of 85.1% in contrast to 78.8% for RT-treated patient. Trauer, Qian, Doyle, Rajaratnam, and Cunnington [11], in a meta-analysis also reported similar findings, which showed that SOL improved by 19.03 minutes, and SE improved by 9.91%. In previous research, Cognitive Behaviour Technique, a psychoeducational intervention, was found to produce reliable gains on several sleep and insomnia parameters. Studies [31-34] show an average symptom reduction of 50% to 60% on the main outcomes of sleep latency (measured in minutes until sleep onset) and wake-after-sleep onset (measured in minutes awake after sleep onset). After CBT, sleep-onset latency and wake-after-sleep onsets generally reduced below or near 30 minutes, the criterion typically used for defining sleep onset and sleep maintenance insomnia. These studies [31-34] have also shown that total sleep time after behavioral treatment increases by an average of 30 to 45 minutes, and sleep efficiency improves to approximately 85% [34].

#### 5. CONCLUSION

Insomnia affects about one in four university age students in Nigeria. Based on the prevalence rate, if this condition is not mitigated, it could affect students' academic activities, and give way to the development of other comorbid conditions. The findings from this study provide promising results as it suggested that six weeks cognitive behavior and relaxation techniques were both successful and effective intervention in treatment of the insomnia conditions among undergraduate students in Nigeria. While both interventions improved sleep onset latency, total sleep time, and sleep efficiency, relaxation technique produces higher benefits on sleep onset among students. Generally, though, CBT significantly outperformed RT in reducing insomnia condition. Therefore, school psychologists and counsellors should explore the benefits of CBT as more viable option, and relaxation techniques to help students improve sleep onset, total sleep time and sleep efficiency, and consequently, reduce their general insomnia condition.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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