

Critical thinking intervention for stress reduction among undergraduates in the Nigerian Universities

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Abstract

Background: The stress level of undergraduates is increasing at an alarming rate. This study's objective was to determine the effect of critical thinking intervention (CTI) for stress reduction among undergraduates in Nigerian Universities.

Methods: This research used a pretest-posttest design. Participants were 103 undergraduates who had experienced a high level of stress. The Academic Stress Questionnaire (ASQ) and the Educational Stress Scale (ESSS) were the measures used for data collection in the study, while repeated measures analysis of variance was used for data analysis.

Results: Before the intervention, assessment results showed that the stress level of participants was high, with no difference between those undergraduates in the treatment group and those in the no-treatment control group. After the intervention, the assessment results indicated a significant reduction in the undergraduates' stress level in the treatment group compared to those in the no-treatment control group. Further significant reduction was observed in the undergraduates' stress level in the treatment group compared to those in the no-treatment control group after follow-up assessment.

Conclusion: The authors concluded that CTI intervention was significantly effective for stress reduction among undergraduates in Nigerian Universities. Therefore, counselors are called upon to adopt the principle of CTI intervention to help patients under stress reduce their stress levels.

Abbreviations: ASQ = Academic Stress Questionnaire, CT = critical thinking, CTI = critical thinking intervention, ESSS = Educational Stress Scale.

Keywords: critical thinking intervention, Nigerian Universities, stress reduction, undergraduates

1. Introduction

It is unfortunate that undergraduates' stress level in the Nigerian Universities is still increasing at an alarming rate. Sofola and Jeboda^[1] found that Nigerian tertiary institution undergraduates suffered from high levels of stress. Omigbodun et al^[2] investigated stressors in dentistry, medicine, physiotherapy, and nursing undergraduates at a Nigerian University and found that overcrowding, excessive schoolwork, strikes, lack of holidays, noisy

environments, lack of laboratory equipment, congested classrooms, and financial, health, and family problems were among the common stressors at the university. Abouserie^[2] identified undergraduates' stressors, which include, among others, examinations, heavy workload, high academic expectations, projects, financial problems, lack of time for personal interests, and career choices.

Carr^[3] argues that there are stresses in the philosophy of education discipline due to the inevitable manifestation of a fundamental intellectual disorder deeply rooted in the contemporary understanding of the philosophy of education. Moreover, the stress encountered by undergraduates appears to be attributed to the goal of the philosophy of education program. The philosophy of education program concerns such questions as: what are the goals of education? How can they be achieved in ways that promote dignity and help every member of society? Who is an educated person? What is the difference between educating and indoctrination? What is the difference between educating for personal development and educating for citizenship? How do we understand the tension between liberal education and conservative education? These questions lie at the intersection of educational endeavor and philosophical reflection on broader issues of justice and knowledge.^[4] In developing regions, philosophy of education undergraduates often laments about learning and mastering philosophical theories, assumptions, and postulations philosophers made in eons ago. Thus, there is a need to develop an intervention program for stress reduction among undergraduates. It is against this backdrop that the present study focuses on finding out if a critical thinking

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intervention could significantly reduce the stress level of philosophy of education undergraduates.

Critical thinking intervention (CTI) is based on the principles of critical thinking (CT). CT originates from learning and cognitive theorists, including Dewey,^[5] Glaser,^[6] Ennis,^[7] Beck,^[28] and Ellis.^[29] CT is built on the 3 more advanced parts of cognitive complexity: analyzing, evaluating, and creating.^[8] According to Beck,^[6] psychological problems, like stress, often emerge from faulty learning, unrealistic assumptions, and operating on inadequate or incorrect information. These create erroneous beliefs and assumptions that may lead to faulty thinking and self-defeating behaviors that cause stress.

In using CTI, it seems that stress is principally the way undergraduates perceive, interpret, and evaluate events in their environment.^[9–12] Thus, CTI tends to make individuals think more critically towards reducing stress. This helps them to identify and correct stress-related misperceptions and to develop more adaptive attitudes that aid stress resolution^[13]. Again, CTI supports the fact that every individual has a schema in the form of a map by which they interpret their experiences. In the opinion of Auerbach^[13], the schema of an individual may be appropriate or inappropriate; it may once have been useful but now has outlived its usefulness. A CTI program is then designed to assist individuals in identifying and understanding their schema. Through the program, individuals are able, where necessary, to change their schema to choose productive behaviors consistent with their current goals and needs.^[13]

According to previous findings, CTI has been used to treat stress problems encountered by undergraduates in various universities.^[14–20]

Although Weinstein^[21] had claimed earlier that CT focused on deeply comprehensive recommendations for educational reform, little is known about CTI can be applied in reducing stress among undergraduates in the Nigerian Universities. However, it is believed that intervention that integrates a vital philosophy component such as critical thinking may have an adequate impact on undergraduates' stressors.^[22] To this end, the current study's objective was to determine the effect of critical thinking intervention for stress reduction among undergraduates in Nigerian Universities. Based on the objective, the researchers hypothesized that CTI might result in stress reduction among undergraduates who are exposed to a treatment intervention group, compared to a no-treatment control group.

2. Method

2.1. Design

The design of the study was a pretest–posttest design.

2.2. Ethical consideration

First, the authors of the current study followed the research ethics of the American Psychological Association.^[23] Again, the authors received ethical approval for the study from the Department of Educational Foundations, University of Nigeria, Nsukka. As part of ethical consideration, debriefing process was carried out. Debriefing in this study was handled, first, by making sure that all participants signed informed consent at the recruitment stage of the research. Second, the authors informed the participants about the intentions of the study. Also, the authors took reasonable steps to correct all misconceptions the participants had about the study.

2.3. Participants

The participants in the study were 103 undergraduates in public Nigerian Universities in South-South Nigeria, selected through multi-stage sampling procedure. Using volunteer sampling, the enrollment was done in the philosophy of education classrooms of the institutions visited. Each undergraduate visited in the classroom was presented with an informed consent form that stated the purpose, aim, and objective of the study. Interested undergraduates were required to fill out the form and return it to the authors before enrollment. About 280 undergraduates returned their completed form and were enrolled in the study. These undergraduates were subjected to screening to identify eligible participants using the 2 questionnaires (ASQ & ESSS). Purposive sampling was used to select the undergraduates with extremely high level of stress (n=103) as participants. The selected participants met other inclusion criteria such as: being a philosophy of education student, being in final year, currently engaging in final-year research project and course work, willingness to participate in the study, and being available for the study. Only the undergraduates that met all the criteria were considered as participants of the study. The authors randomly assigned all of the 103 eligible participants to the CTI group or the no-treatment control group. Practically, randomization followed a simple procedure that involved asking the participants to choose 1 folded piece of paper from a bowl. Each folded piece of paper contained a white card labeled with either “TG” (for treatment group) or “NTCG” (for no-treatment control group). The randomization procedure produced a total of 51 participants for the CTI group and 52 participants for the no-treatment control group. The authors of the current study used G*Power 3.1 software to determine the sample size.^[24] This software has been used to determine sample size in many clinical intervention studies.^[25,26] From previous knowledge, the authors calculated 86% power at 5% level alpha to produce sample size of 103. See Figure 1 for the graphical presentation of the sample size and CONSORT flow diagram.

The participants were selected after totaling their stress scores, which enabled the authors to identify those with a greater degree of stress symptoms. Their mean age was 24.62. Male participants constituted 65% of the total participants while female participants constituted 35%. In addition, 80.3% of participants were single; 78% had religious affiliations; and 48% were financially prosperous. All the participants were in their final year and were engaged in project writing and final year course work at the time of the study. The participants' recruitment was conducted in their lecture hall for one month and ended 2 weeks prior to the commencement of the study.

2.4. Measures

2.4.1. Academic Stress Questionnaire (ASQ). This is a 34-item questionnaire developed by Abouserie^[2] and it is used in the present study to measure how undergraduates rate their academic potential stressors. The undergraduates were required to indicate the degree of perceived stress experienced in academic stressors such as writing projects, examinations and their results, amount of things to learn, financial problems, unclear assignments, uninteresting curriculum, lack of time for study, need to do well, worry over future, boring classes, unclear course objectives, and peer pressures. Each item of the questionnaire was placed on a scale of 0 to 7, through which 0 indicated “no stress” and 7 indicated “extreme stress.” The reliability of the questionnaire

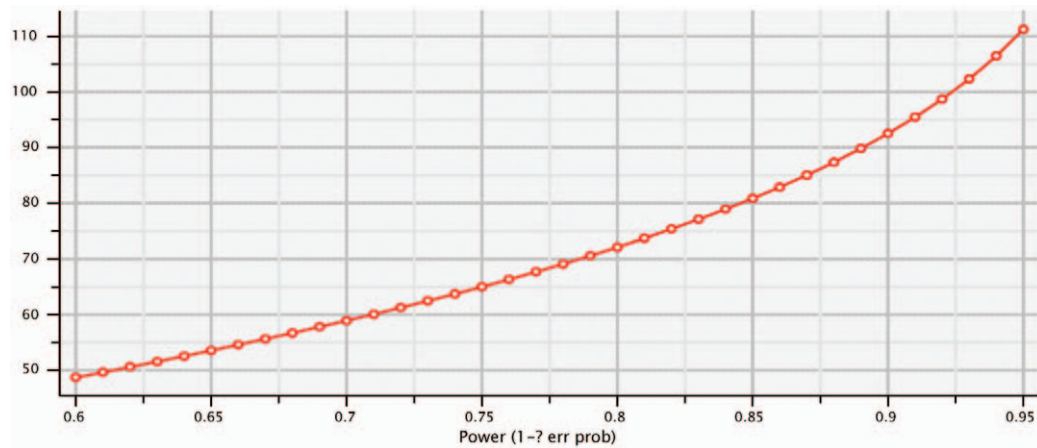


Figure 1. Graphical presentation of sample size. This legend shows the results of the sample size determination based on statistical power (1- β err prob.) of 0.93. Flow diagram: this legend shows the distribution of participants into the treatment and control groups.

was determined by Abouserie^[2] using alpha coefficient and split-half methods. The value obtained was .915 and .746 respectively. This was considered high enough to justify the use of the instrument in the current study.

2.4.2. Educational Stress Scale (ESSS) for undergraduates.

The researchers of the current study created ESSS based on Educational Stress Scale for Adolescents, developed by Sun, Dunne.^[27] The instrument has 16 items measured in a 4-point scale, from strongly agree to strongly disagree. As in the previous study [42], higher scores on the ESSS designate high levels of stress associated with education. The authors of the present study followed the same procedure used in previous study to determine the highest score [42]. The questionnaire was subjected to construct and content validity by experts. Using a sample of 30 philosophy of education undergraduates, an overall reliability coefficient of .89 was determined through Cronbach alpha.

2.5. Procedure

The authors recruited 4 ad-hoc research assistants to assist in the implementation of the study. The research assistants were philosophy of education teachers serving in Nigerian Universities in South-South Nigeria. The authors and the research assistants visited the Nigerian Universities to enroll study participants twice per week, for 1 month. A pretest was conducted before the CTI program (“Time 1”) to acquire baseline data. The undergraduates with extremely high levels of stress ($n = 103$) who were selected as participants were randomized into CTI group ($n = 51$) or no treatment group ($n = 52$).

The researchers developed the CTI program used for the treatment process. All participants in the CTI group took part in the treatment, which was spread over 24 sessions for 12 weeks (twice per week) that lasted for 60 minutes each. A post-test was administered at the end of the intervention to both groups (“Time 2”). Two follow-up meetings that all the participants attended were conducted 3 months after the treatment. The focus of the meetings was terminating the intervention and conducting a final assessment (“Time 3”). Accordingly, the CTI intervention

covered a 14-week controlled trial. The CTI sessions were conducted in English and delivered by the authors. The questionnaires were returned to the authors directly after each assessment.

2.6. Critical thinking intervention (CTI)

The CTI was developed to assist the study participants in acquiring critical thinking skills for stress reduction. The manual contains a 12-week period of 24 therapeutic sessions and 2-week follow-up, conducted after 3 months. Following similar procedures used in previous studies, therapeutic techniques included logical reasoning, problem-solving skills, argumentation, recognition, unbiased analysis, evaluation of factual evidence, synthesizing, observation, and explanation.

The CTI involves a learning program that showed participants how to think critically amid stressors and enables participants to acquire higher-order thinking that consciously controlled their reflective stress-related irrational thoughts. The intervention also helped the participants dispute their stress-related unhelpful, self-defeating, and emotionally disturbing beliefs and thoughts that usually result in stress. It helped participants understand the stress-reduction process from a deductive logic point of view and develop skills to analyze reasons for their stressors. Thus, the participants were taught skills for analyzing arguments, making inferences using inductive or deductive reasoning, judging or evaluating, and making decisions or solving problems regarding stress symptoms.

A central point of the intervention is that CTI revolves around stress-related, illogical beliefs such as—I must have constant approval from fellow undergraduates, lecturers, parents, and nonacademic staff; events in my school should always go exactly the way I want them to; schools should be fair; undergraduates should not be frustrated; I must be a perfect undergraduate and never make mistakes; and It is easier to avoid problems at school than to face them. To this end, CTI provides active processes where the participants generate questions, thoughts, relevant information, and solutions concerning their stress-related illogical beliefs rather than passively absorb information from someone else.

Table 1
Results of repeated measures ANOVA showing the effect of CTI for stress reduction by ASQ and ESSS.

Outcome	Treatment group (n=51)			No-treatment control group (n=52)			Df	F	Sig.	η_p^2	95% Confidence interval	
	Time 1 M (SD)	Time 2 M (SD)	Time 3 M (SD)	Time 1 M (SD)	Time 2 M (SD)	Time 3 M (SD)					Lower bound	Upper bound
ASQ	126.42 (4.81)			127.3 (5.20)			1,102	.031	.861	.000	118.91	135.91
		12.5 (1.21)			126.8 (8.90)		1,102	776.43	.001	.885	121.10	132.60
			10.7 (1.52)			139.7 (5.31)	1,102	977.77	.001	.906	133.92	145.42
ESSS	58.62 (5.70)			57.3 (1.62)			1,102	.028	.867	.000	55.90	60.61
		8.23 (1.91)			57.80 (2.80)		1,102	1647.5	.001	.942	56.13	59.50
			6.72 (3.61)			56.73 (1.79)	1,102	1754.5	.001	.946	55.08	58.41

CBT = cognitive behaviour therapy, ASQ = Academic Stress Questionnaire, ESSS = Educational Stress Scale for Students, M = mean, SD = standard deviation, η_p^2 = effect size.

2.7. Data analysis

The data collected in the study were analyzed using a repeated-measures analysis of variance. Time was used as the within-subjects factor while group was used as the between-subjects factor. The researchers presented the results of baseline assessment (Time 1), end of intervention assessment (Time 2), and follow-up assessment (Time 3) of ASQ and ESSS in one table. In each case, mean (M), standard deviation (SD), ANOVA (F), and Partial eta squared (η_p^2) were reported. Decisions were taken at .05 levels of significant (Sig.) and 95% confidence interval (CI). All the analysis was done in SPSS 22 (IBM Corp, Armonk, NY).

3. Result

The results of the assessment of participants in the CTI treatment group and those in the no-treatment control group are presented in Table 1. Before the intervention (Time 1), assessment results showed that the ratings regarding academic stressors measured by ASQ was high, with no difference between those in the treatment group and those in no-treatment control group, $F(1,102)=.031, P=.861$.

However, after the CTI intervention, the assessment (Time 2) indicated a significant reduction in the academic stressors rating of the participants in the treatment group when compared to those in the no-treatment control group, $F(1,102)=776.43, P=.001, \eta_p^2=.885$. The Time 3 (follow-up assessment) further showed additional significant reduction in the academic stressors

rating of the participants in the treatment group when compared to those in the no-treatment control group, $F(1,102)=977.77, P>.001, \eta_p^2=.906$. Graphical representation of this result is shown in Figure 2. Also, error bars of this result is shown in Figure 4.

Correspondingly, Table 1 also shown that before the intervention (Time 1), assessment results showed that stress level of participants measured by ESSS was high, with no difference between those in the treatment group and those in the no-treatment control group, $F(1, 102)=.028, P=.867, =.000$. The Time 2 (assessment after the CTI intervention program) indicated a significant reduction in level of stress of the participants in the treatment group when compared to those in the no-treatment control group, $F(1, 102)=1647.5, P>.001, =.942$. Furthermore, the follow-up assessment (Time 3) specified that there was further significant reduction in stress level measured of the participants in the treatment group, compared to those in the no-treatment control group, $F(1,102)=1754.5, P>.001, =.946$. The results mean that CTI was effective in reducing the level of stress among undergraduates in the Nigerian Universities. Thus, the hypothesis that CTI will result in stress reduction among undergraduates who are exposed to a treatment intervention group, compared to a no-treatment control group, was accepted. Graphical representation of this result is shown in Figure 3. Also, error bar of this result is shown in Figure 5.

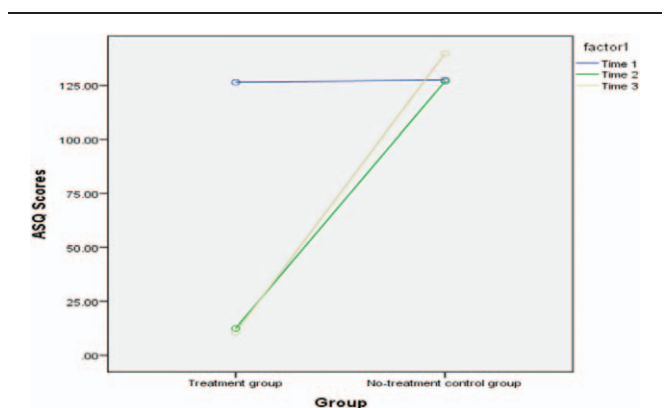


Figure 2. Graphical presentation of effect of CTI for stress reduction by ASQ. This legend shows graphical presentation of effect of CTI intervention for stress reduction by ASQ.

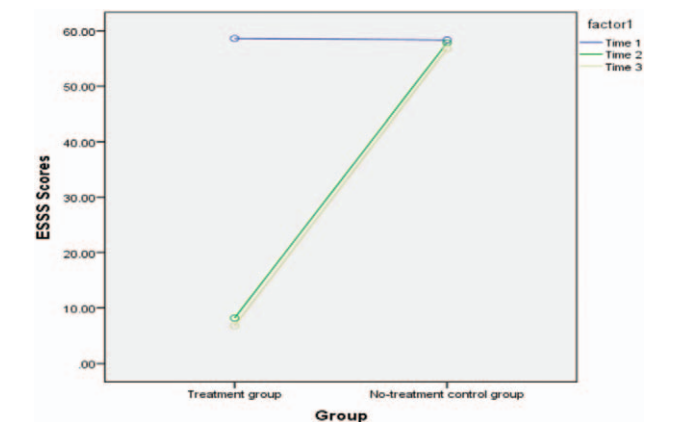


Figure 3. Graphical presentation of effect of CTI for stress reduction by ESSS. This legend shows graphical presentation of effect of CTI intervention for stress reduction by ESSS.

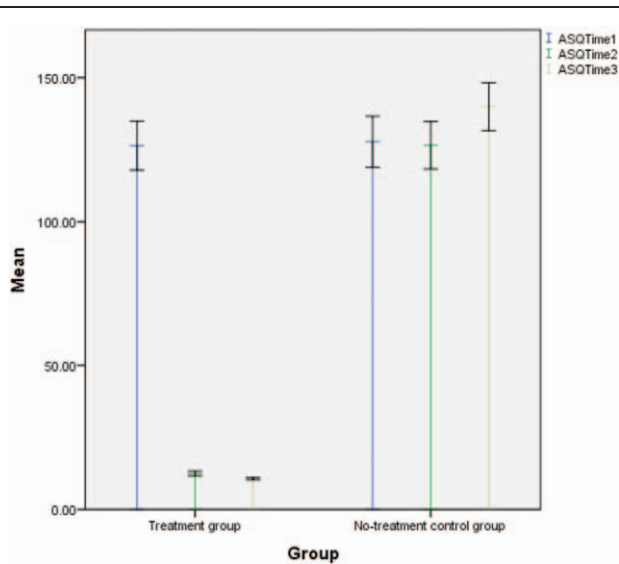


Figure 4. Error bar of CTI for stress reduction by ASQ.

The researchers conducted a Post-hoc analyses with the help of Bonferroni corrections for *P* values because of the significant differences detected between the treatment group and no-treatment control group at Time 2 and Time 3. The Post-hoc analyses results indicated that there was no significant difference in the mean of both groups at Time 1 as assessed using ASQ ($P=.861$, 95% CI=-13.936, 16.075, SE=6.16), and ESSS ($P=.872$, 95%CI=-3.860, 4.421, SE=1.702), respectively. At Time 2, we observed significant mean differences between the treatment and control group participants in favor of those in the treatment group in ASQ ($P=.000$, 95%CI=104.370, 124.342, SE=4.105), and ESSS ($P=.000$, 95%CI=46.630, 52.710, SE=1.250) respectively. At Time 3, we observed significant mean differences in ASQ ($P=.000$, 95%CI=118.593, 139.496, SE=4.296), and ESSS ($P=.000$, 95%CI=47.083, 52.848,

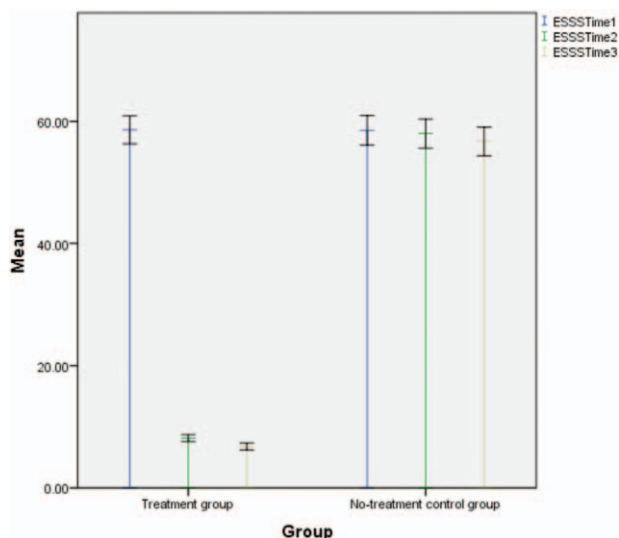


Figure 5. Error bar of CTI for stress reduction by ESSS.

SE=1.185) were also observed between the treatment and control group participants in favor of those in the treatment group (See Table 2)

4. Discussion

The current study was designed to determine the effect of CTI on stress reduction among undergraduates in Nigerian Universities. Before the intervention, the assessment results indicated that undergraduates in the Nigerian Universities were experiencing high levels of stress. This initial finding supported that of Abouserie [2] who postulated that undergraduates experience many stressors. The finding also supported other researchers who found that higher education undergraduates experienced high levels of stress.^[1,28-32]

After the CTI intervention, the assessment results indicated a significant reduction in the stress level of participants in the treatment group, shown by a decrease in ASQ and ESSS scores in the treatment group compared to the no-treatment control group. In addition, follow-up assessment results showed further reduction in the stress level of the participants in the CTI treatment group when compared to those in the no-treatment control group. This implies that CTI intervention was effective for stress reduction among undergraduates in the Nigerian Universities. The findings lend credence to that of Grossman, Niemann,^[33] Koszycki, Benger,^[34] Shapiro, Astin^[35] who pointed out that a stress intervention program involving the use of the mind could be effective in reducing stress levels among individuals. The findings further support Okide findings that CTI is a valuable strategy for stress reduction in a university environment.^[14] Therefore, there is need for adoption of CTI intervention for stress reduction in the Universities.

CTI offers an explanation of how undergraduates' inability to think critically and their irrational beliefs could result in stressful experiences,^[12,36,37] and how practitioners could handle such situations to enable the undergraduates reduce their stress levels. The program also offered diverse processes and techniques. Therefore, CTI practitioners must recognize that an undergraduate's response to a stress event, with a set of uncritical thoughts, might play a vital role in developing stress symptoms and as such, helps indicate if a CTI intervention process is suitable in that situation. On the whole, the program must enable the participants to acquire a higher-order thinking that consciously controls their reflective stress-related uncritical thoughts.

4.1. Implications for research and policy

The CTI program is a likely treatment modality for stress reduction in the university environment. Future CTI interventions could focus on examining the nature of the stress response among other stakeholders of the discipline. Also, it will be of immense important for future CTI intervention to observe and explore the influence educator-undergraduates relations could have on undergraduates' stress. Also, the influence of the classroom climate on undergraduates stress during a CTI intervention may need to be established in future research.

Given that undergraduates experienced high level of stress^[3,4] and that CTI program was effective in reducing stress among undergraduates, there might be a need for philosophy of education policymakers and stakeholders to establish a policy governing integration of CTI principles into the universities curriculum. On this note, additional future studies are needed on

Table 2
Post-hoc analyses with Bonferroni corrections for *P* values based on estimated marginal means.

Dependent Variable	(I) Group	(J) Group	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval for difference	
						Lower bound	Upper bound
ASQ Time1	Treatment group	No-treatment control group	-1.069	6.168	1.000	-16.075	13.936
	No-treatment control group	Treatment group	1.069	6.168	1.000	-13.936	16.075
ASQ Time2	Treatment group	No-treatment control group	-114.356*	4.105	.000	-124.342	-104.370
	No-treatment control group	Treatment group	114.356*	4.105	.000	104.370	124.342
ASQ Time3	Treatment group	No-treatment control group	-129.044*	4.296	.000	-139.496	-118.593
	No-treatment control group	Treatment group	129.044*	4.296	.000	118.593	139.496
ESSS Time1	Treatment group	No-treatment control group	.281	1.702	1.000	-3.860	4.421
	No-treatment control group	Treatment group	-.281	1.702	1.000	-4.421	3.860
ESSS Time2	Treatment group	No-treatment control group	-49.670*	1.250	.000	-52.710	-46.630
	No-treatment control group	Treatment group	49.670*	1.250	.000	46.630	52.710
	Treatment group	No-treatment control group	-49.966*	1.185	.000	-52.848	-47.083
		Treatment group	49.966*	1.185	.000	47.083	52.848

Based on estimated marginal means.

* The mean difference is significant at the .05 level.

CTI program for stress reduction among other stakeholders to further ascertain the effectiveness of the intervention.

Professionals in the medical field should not ignore the therapeutic benefits of CTI for stress reduction. Literature shows that medical undergraduates experience high degrees of stress.^[38] Therefore, exposing medical undergraduates to a CTI program for stress reduction would be a welcome development.

4.2. Limitations of the study

Despite the significant results obtained in the study, we observed some limitations. First, though the sample size we used in the study was large enough, we encourage future studies to use larger samples of undergraduates from several fields to determine whether the findings could be adequately generalized. Second, we did not take the moderating effect of various demographic variables into consideration. Therefore, future studies should endeavor to determine whether demographic variables such as gender, age, socio-economy, level of study, could moderate the effect of CTI. Third, we performed only quantitative assessment and analysis of data and we suggest that subsequent studies perform both quantitative and qualitative assessment and analysis of data to see if CTI could still be effective when a qualitative method is used. Fourth, we are not sure if the impact of CTI could be sustained for a long term. Although follow-up meetings were conducted in the present study, we still suggest that future studies follow a long-term design to establish whether CTI for stress reduction could still be effective.

Last, we used a no-treatment control condition that denied the participants in the control group the opportunity to receive the intervention. We therefore suggest that future studies adopt a waitlist control group that will enable participants in the control group to receive intervention at the end of the study.

5. Conclusion

The effect of a 24 therapeutic sessions of CTI program for stress reduction plus 2-week follow-up was investigated in the present study. The conclusion reached was that CTI program was significantly effective for stress reduction among undergraduates in Nigerian Universities. Thus, the study contributed to

knowledge by adding the findings to the existing literature in the areas of critical thinking, and stress reduction. Further investigation by CTI practitioners for stress management among undergraduates is needed. Counselors also are called upon to adopt the principle of CTI intervention to help their stressed patients reduce their stress levels.

Author contributions

Conceptualization: Mkpoikanke Otu.

Data curation: Mkpoikanke Otu.

Formal analysis: Mkpoikanke Otu.

Funding acquisition: Felix Okechukwu Ugwuozor.

Investigation: Felix Okechukwu Ugwuozor, Mkpoikanke Otu.

Methodology: Mkpoikanke Otu.

Resources: Isaac Nnamdi Mbaji.

Software: Felix Okechukwu Ugwuozor.

Supervision: Felix Okechukwu Ugwuozor.

Validation: Isaac Nnamdi Mbaji.

Writing – original draft: Mkpoikanke Otu, Isaac Nnamdi Mbaji.

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