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Cognitive-behaviour intervention for critical thinking disposition of religion and social science students

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Abstract

Background: The dispositions of students towards critical thinking (CT) no doubt improve their clinical practice and performance. Hence, efforts to explore ways to help students become aware and conscious of the need for CT are imperative for their self-actualization, development, and improved professional practice. It is worrisome that in spite of the limited intervention addressing CT disposition challenges, scholars are yet to study the problem, especially in developing countries.

Methods: In view of that, we assessed how CT disposition can be improved among students enrolled in cognitive-behavioral reflective training programme (CBRT-P) using a group-randomized control study with three months follow-up. To achieve this, 163 students were allocated to different groups. The recruited participants were exposed to CBRT-P.

Results: Repeated-measures analysis performed shows that at the posttest, the mean CT disposition scores of the participants enrolled in CBRT-programme (treatment group) were significantly greater compared to the counterpart group that is the comparison group. At the third assessment, the mean score of the dependent measure consistently remained higher in favor of the experimental group.

Conclusion: Given the results, it is concluded that the treatment programme improves the CT disposition of students over time.

Abbreviations: CBRT = cognitive-behavioral reflective training, CT = critical thinking, CTDI-M = critical thinking disposition inventory for Chinese medical college students, *F* = value from analysis of variance test, M = mean, SD = standard deviation.

Keywords: cognitive-behavioral reflective training programme, cognitive-behavioral therapy, critical thinking disposition, Nigeria, religion and social science students, students

1. Introduction

Critical thinking (CT) is the evidence of cognitive and intellectual growth and development.[1] The cognitive and intellectual growth and development in human beings are as a result of the acquisition of CT skills.[2] The appropriation and application of CT skills determine the level of CT disposition one has.[3] CT skills that enhance disposition range from observation to problem-solving as well as decision making.[4] Disposition is seen as the preparedness to carry out assigned responsibility,[5,6] observation, deliberation, and analogy.[7] It refers to the readiness and critical mindedness toward certain things due to their importance.[8]

In the concept of disposition, Perkins et al[9] created a Theory of Good Thinking, where the habit of mind was suggested to be part of the three components of disposition-inclination, sensitivity to the occasion, and abilities. Hence, the habit of mind represents the state of mind to function critically and consciously due to someone's inclination. Also, habit of mind is the attitude directed to a particular task.[10] Scholars in the field of

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CT have noted seven dispositions focusing on attitudes toward life. The dispositions are Inquisitiveness, Open-mindedness, Systematicity, Truth-seeking, Analyticity, CT Self-confidence, and Maturity of Judgement.[11] According to Facione et al,[12] these dispositions are called "habits of mind." The authors further explained that the habit of mind is capable of promoting an individual's entire disposition to think critically. Thus, the habit of mind is within the frame of human disposition towards specific issues and it relates to CT disposition. This is in accordance with a deductive methodology; dispositions as propensities of Habits of Mind were identified with instructive assumptions utilizing intelligent practices as the shared factor. Consequently, it is disposition that can be grouped around Habits of Mind that are connected straightforwardly to instructive learning assumptions or theories vis-à-vis thoughtfulness, and to learning theories that support learning or mindfulness. So, CT disposition is characterized by "habit of mind" or "attribute" integrated into one's actions or beliefs. CT disposition is required in every human activity for effectiveness and efficiency in the discharge of statutory and non-statutory duties.[13]

It is pertinent to note that CT disposition is aided by descriptive analysis of issues.[14–16] CT disposition requires a lot of reasoning abilities.[17] Globally, it has been revealed that CT is not regularly applied within the scope of nursing profession.[18] In a study carried out by scholars in Nigeria, it was reported that no considerable time is allotted to improve the science of inquiry, reasoning, and thought processes among students.[19] It was reported that Nigerian students do not have a supportive work environment that can help them to achieve reasonable and commendable critical analysis of issues due to the complexities of their work.[20] It was strongly recommended that CT should be made compulsory in the nursing profession and their work environment.[21] By extension, CT disposition among students is very vital in the nursing profession as a professional career for quality assurance and enhanced career accountability.[22]

Furthermore, the majority of Nigerian students, especially in the South-east region of Nigeria, do not appropriate sufficient time for CT and reasoning but rather invest it in social media exploration[23,24] as well as display an inability to be engaged in critical solutions to problems.[25] These unsatisfactory conditions recorded among Nigerian nursing students persist even when CT increases skills, confidence, relationship with patients, self-comfort, and understanding of the nature of the clinical practice.[26] Nursing is a professional career that cannot yield desired results devoid of critical analysis and problem-solving strategies.[27,28] A lack of CT disposition among student nurses has been reported to affect their academic achievement, psychological disposition, and social practices.[29] Repressed creativity, logical reasoning, creativity, intellectual-integrity, and inquisitiveness tend to jeopardize CT development for enhanced professional performance.[22]

CT disposition is an integral aspect of the cognitive domain that enhances knowledge, understanding, analysis, synthesis, and critical presentation of issues based on established yardstick.[30] CT disposition is an intellectually based activity and affects the academic performance of nursing students when taken for granted.[31] Low CT disposition reduces the level of precision in nursing students.[32] Lowered speed and accuracy in attending to patients among nursing depicts their variance from CT.[33] It was reported that the absence of CT disposition leads to cognitive malfunctioning.[34] Religion and social science students without developed CT disposition have problems with their outputs in social science interpretation, inquiry, thinking process, and reasoning capabilities.[35,36] Past works have revealed that CT is a function of the social disposition of an individual.[37]

Several studies have shown that impaired CT affects social intelligence.[38] Low critical analysis of social issues demeans social competence required to maintain a healthy relationship with others.[37] CT among nurses is reported to be affected by cognitive distortion of social value system.[23] Public health students who do not receive mentoring as a result of poor socialization experience low clinical reactions and reasoning.[29,39] It debars them from getting the required clinical skills and clinical performance competencies.[40] Poor social life among undergraduate nurses hinders them from being clinically inquisitive[40] and not valuing research critical skills, problem-solving skills, and reasoning abilities.[41,42]

A decrease in CT is associated with a corresponding decrease in empathy among nursing students.[43–45] More so, poor problem-solving skill is consequential upon unrealistic emotional intelligentsia.[46,47] Poor attitude to work among student nurses is common, following a slow critical procession of information on health issues.[29] Most of the student nurses are not savvy to critical and logical observation, inquisition and intuition because of the level of negative attitude toward the profession.[22,48,49] Some of them developed ill behavior and attitude towards the profession due to the frequent and inherent experiences gotten through exposure to blood and death.[50] Their attitude obviously do not show any form of reflective thoughts and abilities,[50] suggesting that they require some measure of cognitive and behavioral repositioning in their nursing career. This is paramount because as student nurses, the level of their cognitive and behavioral reflection in their studies is expected to be transmitted into their work life. For addressing some of the cognitive and behavioral conditions, the adoption of cognitive-behavioral reflection training is proposed as a functional intervention for these student nurses.

Cognitive behavioral reflective training (CBRT) is a training package targeted at addressing cognitive and behavior-related issues.[23] CBRT is proposed to serve as a corrective measure for addressing unfounded and illogical thoughts sand unacceptable behavior patterns, by suggesting alternative ways. Negative and faulty thought and behavior dispositions are successes of disorganization among students.[37] CBRT is proposed to serve as a corrective measure for addressing unfounded and illogical thoughts and unacceptable behavior patterns, by suggesting alternative ways. CBT principles are subdivided into three patterns that could impact one's logical ability.[23] They include cognitive triads, negative self-schemas, and skews in information processing.

Each of these CBT patterns could be negatively impactful based on the dimensionality. Cognitive triad is the negative perception of self and self-ability as well as not being self-evident and realistic towards tasks. It is strongly believed that cognitive processing training can be of immense help in demystifying cognitive distortion that is shredded on CT disposition among student nurses. Beck reported that self-schemas cut across inconsistent personality, crisis, selective attention, catastrophic disposition, depersonalization, awkwardness, high expectation, blame, and overprotection.[23] Such behavioral problems related to self-schemas are anticipated to be taken care of through enhanced problem-solving skills, cognitive repositioning and modification. To this end, cognitive and behavioral problems arising from low CT are expected to be exterminated with a proper application of cognitive restructuring. The use of cognitive restructuring strategy will help to reduce or eliminate unfounded beliefs and misconceptions among nursing students, hence making them to be better placed for CT and examination of issues for acceptable behavioral outputs. Greater proportion of nursing students in Nigeria is reported to be negatively skewed in their cognitive dispositions.[23] This has gone a long way to affect their thought processes and dispositions.[23]

There is a projection that CBRT can rebrand, reposition and restructure illogical, reflective, and low reasoning abilities.[51] The importance of the thought process cannot be disconnected from CT, reflection as well as logical thinking.[1] It is imperative to note that poor cognitive process is a buildup of logical fallacy. Those who experience logic fallacies are cognitively

underdeveloped by Beck as cited in Abiogu et al[23] A logical problem is a logical fallacy.[52] Going by the importance and complexity of the religion profession, CT ability, skills and strategies are inevitable in their problem-solving abilities.

Religious belief may be inversely connected with the ability to infer, make induction, and deduction, or think critically. Many people believe that religion is a paranormal belief. It has also been linked to mistakes in CT, though, we are not certain regarding the relationship. Religious belief could be interpreted and analyzed using a religious schema. Religious schemata are hypothetical mental models of memory and knowledge that influence cognitive functioning.

The job peculiarities and complexities of religion and social science activities cannot properly be achieved without imbuing them with CT abilities as well as ability to examine and evaluate issues. Previous studies that studied the CT disposition studies have some methodological shortcomings[23] which this current study attempted to address. Some did not assess the condition to follow-up.[51] We embarked on this study considering the few numbers of interventional studies available the available ones didn't consider the long-term impacts of the intervention. Additionally, the mental parts (attitudes, discernment, practices, and self-assurance) of basic reasoning were disregarded in some previous investigations.[53] Since the dispositions, cognition, behaviors, and self-confidence components are investigated, we propose that these components call for further research. To fill such knowledge gaps, this study tested the impactful roles of treatment strategies with psychological and philosophical underpinnings on dispositions, cognition, behaviors, and self-confidence parts of CT disposition. It was based on these gaps that we tested how the CT disposition of religion and social science students in Enugu state Nigeria could be improved using a cognitive behavioral reflective training programme. Therefore, we hypothesized that students will significantly improve when exposed to cognitive behavioral reflective training programme compared to those in the control group. also, we hypothesized that the improvement in participants that participated in the intervention group will be sustained over time.

2. Methods and materials

2.1. Ethical considerations

The affiliate institutional ethical approval committee of the researchers granted approval to the conduct of this study. The researchers sought written approval from all the participants who indicated their willingness to participate in the clinical trial as recommended by the American Psychological Association.[10]

2.2. Dependent measure

The measure for data was the Critical Thinking Disposition Inventory for Chinese medical college students (CTDI-M) designed by Wang et al[54] The CTDI-M was a structured 18-item instrument to measure the CT disposition of medical students. Samples of the items include have a fair and objective attitude, accept different views, make decisions wisely and prudently, etc. The three clusters of systematicity/analyticity (6 items), open-mindedness (7 items), and truth-seeking (5 items) were the components of CTDI-M. The internal consistency reliability index of 0.92 for CTDI-M was arrived at through Cronbach's alpha. Students with 18 scores have low CT disposition while those with 90 have high CT disposition on CTDI-M. The scale was translated into English considering that it was formerly written in Chinese. For the sake of this study, a reliability estimate was carried out using student nurses in mission hospitals in Nigeria which yielded a reliability coefficient of 0.82. The researchers deemed CTDI-M more appropriate than California Critical Thinking Disposition Inventory[55] designed to measure the CT of the older adult population and the translated version of the California Critical Thinking Disposition Inventory[56] with their various reliability indices on the various clusters (open-minding = 0.34, analyzing = 0.40, and systematic = 0.47).

2.3. Study participants and procedure

A total 163 religion and social science students in Enugu State Nigeria participated in this study. The power of the sample size was arrived at using Gpower statistical tool.[57] Gpower is a widely used software in the field of social and behavioral sciences for calculation sample estimation. That is, it gives appropriate power of given sample sizes, and levels (post hoc and a priori power analyses) for a particular study. In this study, we utilized a priori power analyses there was the specification of the size of the effect to be detected and the desired power level. Based on the fact that the researchers have given these specifications it was very likely to compute the necessary sample size N.[58] The minimum number of participants required estimated as demonstrated during computation was 82 with an alpha = 0.05 and power = 0.85. Hence, the sample size of 163 showed a high effect size meaning that the number of participants used was good enough. The attrition rate in the study was considered but we did not record dropout rate during the study.

The selection criteria were based on pronounced low critical dispositions as identified by the researchers, teachers and scholars. The criteria included:

(1) poor attention and self-confidence[59,60]
(2) lack of habit of inquiry[61]
(3) discouragement[62]
(4) lack of open-mindedness[63–65]
(5) willingness to suspend judgment[59,63,65]
(6) lack of trust in reasoning[59,60,64]
(7) detesting the truth[60,64]
(8) negative thought, losing track of reasoning, banking on false reports, and ignorance. Others include the:
(1) students must have enrolled as a religion or social science student
(2) indicated interest to be available throughout the duration of the study.

The criteria did not include the following:

(1) those that are heavily pregnant
(2) those on suspension (3) those with internal illnesses that could affect emotion and thinking such as Ulcer, tuberculosis, asthma, pneumonia, etc.

The students who met the conditions (inclusion criteria) were included as experimental group participants, while the students who did not meet the requirement for inclusion were excluded from the study. We also excluded any students scheduled for clinical internship practice. The socio-demographic details are presented in Table 1.

Table 1 shows the demographic analysis of the participants. Particularly, a chi-square test was conducted to ensure that the distribution of the participants based on their demographics was not biased. The analysis revealed that there is no significant difference in the gender, state of origin, and attitude towards nursing and year of study of the intervention and the nonintervention groups, $\chi^2 = 8.03$, $P = .053$; $\chi^2 = 7.54$, $P = .125$; $\chi^2 = 10.12$, $P = .068$; $\chi^2 = 4.22$, $P = .082$.

The research team visited the schools and submitted a letter of introduction, explaining the aims and timeframe the study may last. In the latter, there were contact address and phone number for the school management to contact if our is approved. We obtained a permission letter from schools through their provosts. To distribute the consent forms to the students, the researchers employed the assistance of the counselors in the mission hospitals in Enugu North senatorial zone of Enugu state, Nigeria. We distributed consent forms with help of counselors to students

Table 1

Socio-demographic information of the participants.

Demographics	CBRT-P, n (%)	Waitlisted control, n (%)	X^2	*P*
Year of study				
Year 1	25 (31.2)	27 (32.5)		
Year 2	21 (26.3)	23 (27.7)	8.03	.053
Year 3	15 (18.8)	16 (19.3)		
Year 4	19 (23.8)	17 (20.5)		
State of origin				
Abia	17 (21.3)	19 (22.9)		
Anambra	14 (17.5)	13 (15.7)		
Ebonyi	18 (22.5)	20 (24.1)	7.54	.125
Enugu	16 (20.0)	18 (21.7)		
Imo	15 (18.8)	13 (15.7)		
Attitude towards nursing				
Dislike	5 (6.3)	3 (3.6)		
Often likes	27 (33.8)	30 (36.1)		
Undecided	17 (21.3)	12 (14.5)		
Sometimes likes	31 (38.8)	38 (45.8)	10.12	.068
Gender				
Male	30 (37.5)	26 (31.3)		
Female	50 (62.5)	57 (68.7)	4.22	.082
Mean age of the participants	24.58 ± 8.60	26.76 ± 9.81		

nurses in school premises which we met using the accidental sampling technique. In doing this, the researchers shared 260 consent forms but only retrieved 163 forms successfully filled out by religion and social science students. This was managed with no type of inclination and bias. The initial assessment was given to the students to find out their entrance information on CT disposition using CTDI-M. The participants were assembled into two: the experimental group (CBRT-programme) and the waitlist control group (Fig. 1). The allocation into groups was done randomly with the help of software used in Saghaei.[66] The names of the participants were folded in pieces of paper to allow the equal representation of the participants in the groups. This enabled the researchers to conveniently assign 80 students to CBRT group and 83 of them to waitlisted groups, respectively.

The participants in the experimental group were exposed the CBRT-programme while the participants in the control group did not get any sort of treatment within the time of the study although were provided treatment upon the completion of the intervention; however, they were simply evaluated at three-time points. The CBRT-programme was led by psychotherapists in English Language who had been using cognitive behavioral techniques to treat patients. The researchers and facilitators (psychotherapists) had contacts with the participants every meeting of each week for one hour, for a total of 12 weeks of meetings. Each of the participants in the treatment and control groups was fed every day with $10 dollars which is equivalent to #3600 ($1 is equivalent to #360). That is to say, a total of $10 was spent on each participant irrespective of group affiliation. Each of the sessions was closed with an evaluation of the subjects. In the first session, there was an exchange of pleasantries, introduction by names, state of origin, name of the school, and area of specialization. The analysts and psychological conduct specialists read out the guidelines for the instructional courses to the participants for optimum participation. The details of the training manual can be seen in Table 2.

It is worthy to note that posttest (Time 2) was administered to the two groups at the end of the training session. After three consecutive months, a follow-up test (Time 3) was administered to the two groups in order to ascertain their retention capacity. The CTDI-M was the measure used to assess CT disposition at each time point. However, items were reshuffled after each assessment point. This made the participants not to recognize and memorize previous items. Also, this was to avoid the influence of simply administering the same instrument to students multiple times. Based on this, participants were not allowed to see their CTDI-M scores after each assessment. The period of follow-up lasted for three months. During the follow-up meeting, the psychotherapists reviewed the programme starting from session 2. Activities in these sessions were more exercises based. After the follow-up sessions, the psychotherapists administered CBRT-programme to the waitlist control group in order to develop their reflective thing king and reasoning abilities that will help them in the nursing practice. Data collected from Times 1, 2, and 3 were blinded and assigned to the analysts for analysis.[67–72] To ensure the integrity of the treatment was protected and enhanced, four observers were employed to monitor the treatment activities.

We minimized response bias by not using emotive language in our study. So, we made sure that neutrality is in effect. The measurement scales didn't have any "yes" or "no" questions; instead, open-ended responses.

2.4. Intervention

Cognitive Behavioral Reflective Training Program[23] was used to improve the CT disposition of nursing students. This package was designed to last for 12 sessions over 12 weeks. During each of the sessions in a week, the cognitive experts had contacts with the participants for a period of one hour (60-minute). The programme that was administered in English and pidgin was to demystify erroneous and self-defeating illogical thoughts, beliefs, reasoning, reflection, analysis, calculation, and poor assumption. Table 2 is an excerpt of the CBRT-Programme.

2.5. Psychotherapists

The invited psychotherapists who delivered the CBRT-programme were specialists who had their major training in cognitive behavior therapy. The psychotherapists were four in number and were assigned to a different treatment center. They had a Ph.D. in Guidance and Counselling from the University of Nigeria and had practiced for over seven years. During the delivery of the treatment package, they were monitored by four research teams.

2.6. Study design and data analysis

The study was anchored on a randomized controlled trial design. The demographic information of the respondents was analyzed with the help of frequency and percentages while the hypotheses were tested using χ^2. The repeated measure 2-way analysis of variance was used to determine the impact of CBRT on CT disposition among religion and social science students in Enugu state Nigeria. The effect of the CBRT on CT disposition was ascertained through Cohen's *d* and adjusted R^2 values through SPSS version 18.0.

Table 3 shows that the mean CT disposition score of the experimental group at the pretest (M = 37.40, SD = 4.73) was not significantly different from that of the control group (M = 37.25, SD = 4.48), $F(1, 161) = 0.35$, $P = .55$, $d = 0.03$. However, at the posttest, the mean CT disposition score of the experimental group (M = 77.95, SD = 8.27) was significantly higher than that of the control group (M = 42.22, SD = 3.88), $F(1, 161) = 39.33$, $P < .05$, $d = 5.57$. Similarly, at the follow-up, the mean CT disposition score of the experimental group (M = 77.20, SD = 8.64) was significantly lesser than that of the control group (M = 42.27, SD = 3.82), $F(1, 161) = 63.64$, $P < .05$, $d = 5.26$. The effect sizes of 5.57 and 5.26 at the posttest and follow-up measures showed a high effect of Cognitive-Behavioural Reflective Training Programme on CT disposition of student

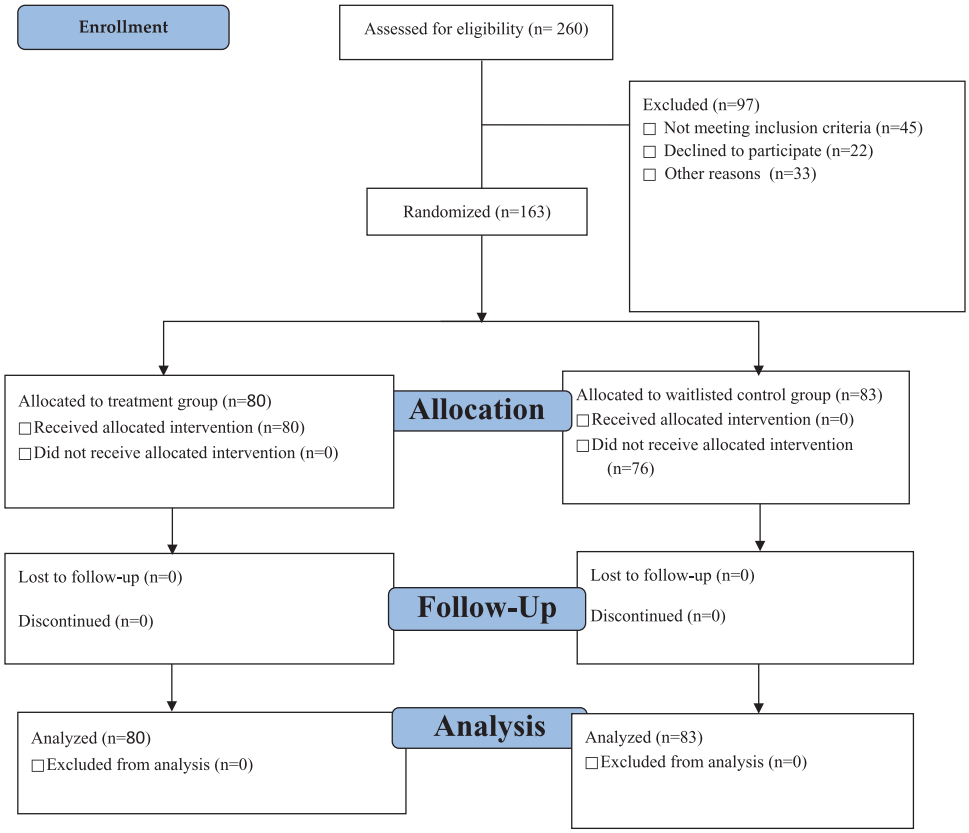

Figure 1. Participants' eligibility flow chart.

nurses. Conventionally, Cohen's *d* values of 5.57 and 5.26 are equivalent of effect size of 1.00, implying that 100% variation in the CT disposition of the experimental group is attributed to the Cognitive-Behavioural Reflective Training Programme. However, the low standard deviations of the control group compared to that of the experimental group may be attributed to the fact that the individual students of the control group did not vary much in their CT dispositions when compared to those of the experimental group. Besides, Figure 2 shows that there is a significant interaction effect of time and treatment on the CT disposition of the students.

Table 4 showed that at the pretest, the difference between the mean of the experimental group and that of the control group was not significant, $P = .093$. However, at the posttest and follow-up measures, the difference between the mean of the experimental group and that of the control group was significant, $P = .000$. The positive mean difference between the experimental and control groups, unlike the negative difference between the control and experimental groups at both posttest and follow-up measures revealed that the CT disposition of the experimental group improved more than that of the control group after exposure to the treatment.

3. Discussion

The study revealed that CBRT is significant in the reduction of CT disposition among religion and social science students in Enugu state Nigeria. It was established that at the initial testing Time 1 (pretest), the treatment group and control group did not differ significantly in terms of CT disposition as measured with CTDI-M. Furthermore, the result obtained from the Time 2 (posttest) indicated that there is a significant difference in the CT disposition of students exposed to the treatment and those on the waitlisted control group. The result at Time 2 further revealed that the CT disposition of students increased significantly as against their counterparts in the waitlisted control group. Finally, the Time 3 (post-treatment) at the follow-up session revealed that the effect of CBRT on CT disposition can be sustained for a longer period of time among the participants. These results proved the advocacy call on the use of CBRT for the reduction of erroneous cognitive and behavioral dispositions. This present study has authenticated the effectiveness of CBRT in the management and improvement of low CT among a sample of students in Nigeria. Empirically, buttressing this finding is the fact that cognitive and behavioral reflective packages are especially effective for enhancing CT disposition of students.[73] It was based on this foreseen clinical importance that CBRT was recommended for students who wish to improve on their reflective thinking ability.[73]

The role of emotion in the development of CT cannot be taken for granted. In tandem with the finding of this study was the fact that emotion and conscience are very significant in the enhancement of CT.[44,61,74] Similarly, earlier findings also showed that cognitive skill and behavioral disposition components influence CT.[59] Exposing students to CBRT provides the opportunity to utilize CT and psychological assumptions in their professional practice.[44,75] Like this study, studies argue that CBRT develops emotional response and impacts CT ability.[76] Collaboratively, CBRT captures the development of emotional intelligence and as such enhances problem-solving skills.[46,47] Attitudinal correction as a component of CBRT was proven to be productive in the development of CT. This is buttressed in a report that positive attitudinal disposition is tangential to CT application among students.[22,29,48,77] Cognitive, psychological and social dimension are the vital considerations of CBRT in the enhancement of CT among students.

In as much as socialization leads to mentorship, it plays a very prominent role in stabilizing frayed nerves for effective thinking and reasoning. CBRT leads to proper social life enhancement through functional social skills, intelligence,

Table 2

Summary of cognitive behavioral reflective training programme.

Time frame	Session	Session goal	Activities	Techniques employed
Week 1	Session 1: Introduction, cognitive alliance	To introduce the participants and therapists' names, place, and fixing the treatment programme	The participants were assured of high confidentiality in every bit of information divulged in course of this training. The participants were introduced to the objectives of the training	Building therapeutic relationship Assertiveness
Week 2	Session 2: Clinical Significance of CBRT in developing critical thinking disposition	To address the significance of CBRT and critical thinking disposition in nursing practice	The experts asked the participants to briefly explain what they understand by CT disposition. The participants were also asked to narrate their experiences in low critical thinking disposition and their chances of survival as a student	Explanation Cognitive disputation Coping skills
Week 3	Session 3: Meaning, importance and process of critical thinking disposition	To discuss give importance and process of the critical thinking in nursing practice	The meaning, importance of critical thinking in nursing The processes that facilitates critical thinking were discussed	Explanation Reinforcement
Weeks 4 and 5	Sessions 4 and 5: Skills, patterns and procedures for critical and reflective thinking	To assist the students to master the skills, patterns and procedures for critical and reflective thinking	Dealing with reasoning skills and mastery leading to reflective thinking	Behavioural disputation Cognitive restructuring Reframing technique Practice exercise
Weeks 6 and 7	Sessions 6 and 7: Identification of dysfunctional thoughts linked to poor evaluation decisions	To identify dysfunctional thoughts linked to poor evaluation decisions	Rooted in the identification of illogical reasoning, negative thinking, distorted feelings, poor assumptions, inconsistent evaluation and decision-making process	Behavioural disputation Cognitive restructuring Reinforcement Reframing technique Practice exercise
Weeks 8 and 9	Sessions 8 and 9: How distorted behaviors can trigger inaccurate judgment and conclusion	To establish relationship between unrealistic thought and poor judgment and manipulation of cognitive skills	addressed distorted, incoherent and inconsistent threatening thought/belief, knowledge and critical thinking disposition as well as their management strategies	Reframing technique Relaxation techniques Meditation and yoga Skill Coping skills Practice exercise
Weeks 10 and 11	Sessions 10 and 11		Helping the participants to frontally and positively present logical understanding, knowledge and analysis of nursing practices Addressing how student-to-students relationship could influence critical thinking disposition Learning to identify, challenging dysfunctional thinking that could affect clinical experience and practice Reinforcing improved efforts recorded	Mood monitoring techniques Cognitive restructuring Problem-solving technique Practice exercise
Week 12	Termination	To terminate the treatment sessions	Revision, review of review of home exercise and termination	

Table 3

Repeated measures analysis of variance.

		Pretest (1)					Posttest (2)					Follow-up (3)				
Group	**n**	**Mean**	**SD**	***F***	***P***	***d***	**Mean**	**SD**	***F***	***P***	***d***	**Mean**	**SD**	***F***	***P***	***d***
Experimental	80	37.40	4.73	0.35	.55	0.03	77.95	8.27	39.33	.00	5.57	77.20	8.64	63.64	.00	5.26
Control	83	37.25	4.48				42.22	3.88				42.27	3.82			

d = Cohen's *d* (effect size), SD = standard deviation.

and competence which are effective in developing CT.[29,37,38,78] Logical reasoning abilities are easily promoted through CBRT social enlightenment and adjustment strategies.[22] Furthermore, flexibility, tolerance, and open-mindedness among student nurses have a direct effect on CT.[22,40,79–81] Good social life among undergraduate nurses determines the level of their clinical inquisitiveness.[40–42]

3.1. Implications for practitioners

The result from this study will contribute to equipping cognitive therapists and experts to assist students in Nigeria to outgrow their low CT disposition through the proper application of CBRT. The findings would be useful for enabling school counseling psychologists and religious mentors to carry out their counseling services effectively. They will be able to use the various treatment sessions to address the seeming problems of low CT among students. Short and concise counseling time will make for an efficient practice for counseling psychologists because these are supported by the findings of this study. Practicing nurses would be very much at home with their in discharging their duties because of measuring and desiring attained level of CT disposition. The National Universities Commission should strive to integrate CBRT into the nursing programme in order to develop a quality reflective and reliance spirit of inquiry, reasoning, thinking, analysis, examination, understanding, and evaluation of issues during and after graduation. Using cognitive-behavior and rational-emotive intervention will enhance students' critical ability in understanding the roles of cognition, behavior, and emotions in schools.[82–86]

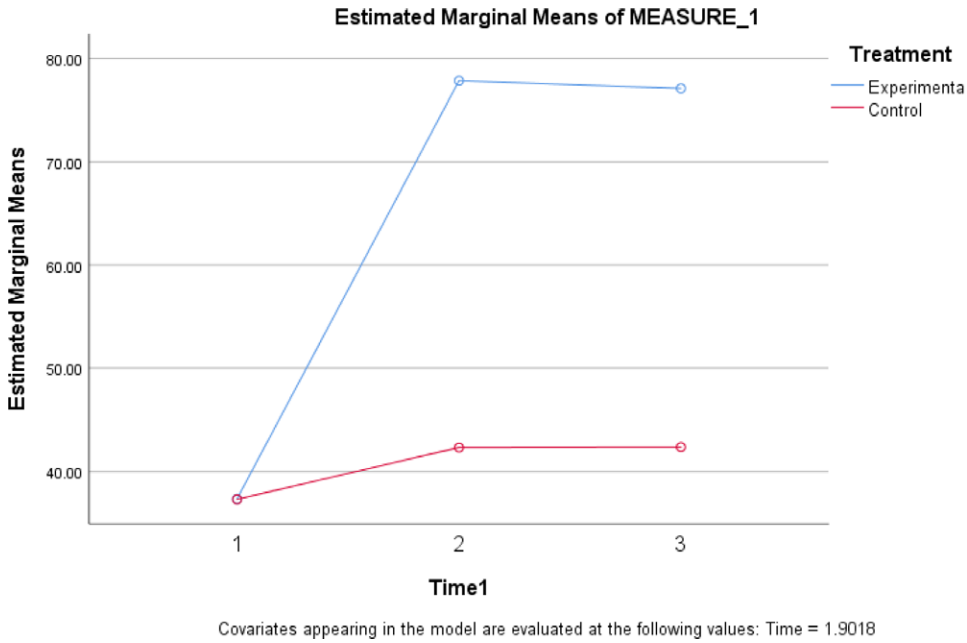

Figure 2. Interaction plot of time and treatment.

Table 4

Post hoc test for the significant effect of time.

			Mean difference		
Time	**(I) Treatment**	**(J) Treatment**	**(I-J)**	**Std. Error**	**Sig.***
Pretest	Experimental	Control	−3.601	2.128	.093
	Control	Experimental	3.601	2.128	.093
Posttest	Experimental	Control	35.691†	0.999	.000
	Control	Experimental	−35.691†	0.999	.000
Follow-up	Experimental	Control	34.899†	1.038	.000
	Control	Experimental	−34.899†	1.038	.000

3.2. Strengths and limitations

This study is a revalidation of the effectiveness of CBRT on the reduction of CT disposition among students in Nigeria. The programme proves to be very effective for improving and enhancing CT retention ability among students.

Despite being meticulous about the programme and being experts in CBRT, this study faced some limitations. Equal treatment was not given to participants in the treatment and waitlisted control groups making them less developed when compared to their counterparts in the experimental group. Based on this, the researchers suggested that a programme package that is close to solving the problem of low CT abilities can be placed side by side CBRT in the two groups. Since the participants were only those in social sciences and religion disciplines were recruited, caution should be taken in generalizing the findings.

4. Conclusion

Based on the fact that CBRT has been proven to be functional in lowering CT in the South Eastern part of Nigeria as identified by Abiogu et al, it becomes very demanding and imperative to determine the effect of CBRT in other parts of the country which was one of the shortcomings of his study. Therefore, the researchers have consistently observed that the majority of religion and social science students in Enugu state battle with CT disabilities, and decided to ascertain whether CBRT can as well be effective. Interestingly, CBRT was found to be valid, reliable, and indispensable in addressing low CT dispositions among these students. Furthermore, the follow-up result revealed that CBRT has a long-lasting impact on the retention ability of CT among students covered in this study. On a general note, CBRT has a significant impact on CT in a sample of students in Enugu State, Nigeria.

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