

Cognitive-behavioural reflective training for improving critical thinking disposition of nursing students

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Abstract

Background/Objective: The importance of critical thinking in improving treatment practices in, for instance, the nursing profession, cannot be overemphasized. Despite this importance, empirical studies have shown that helping strategies to train learners on critical thinking disposition are needed. Given this knowledge gap, this study investigated the impacts of cognitive-behavioral reflective training for improving the critical thinking disposition of nursing students.

Method: Of all the students screened, a total of 167 participants were assigned to the treatment group and waitlisted control group. A researchers-developed training program aimed at improving critical thinking disposition was delivered in English language by therapists.

Results: Repeated-measures ANOVA showed that there was no significant difference between the critical thinking disposition of nursing students in the treatment and control groups as measured by CTDI-M at the posttest. At the posttreatment and follow-up measures, there were consistently improved impacts of CBRT on the critical thinking disposition of nursing students in Nigeria as measured by CTDI-M.

Conclusion: Following the results, we concluded that cognitive-behavioral reflective training was beneficial and had sustained improvement in enhancing the critical thinking disposition of nursing students.

Abbreviations: CBRT = Cognitive-behavioral reflective training, CBRTTP = Cognitive Behavioral Reflective Training Program, CBT = Cognitive behavioral therapy, CI = confidence interval, degree of freedom, CCTDI = California Critical Thinking Disposition Inventory, CT = Critical thinking, CTDI-M = Critical Thinking Disposition Inventory for Chinese medical college students, F = value from ANOVA test, Mean (SD) = Mean (Standard Deviation), ΔR^2 = adjusted R^2 , Sig. = Significance, UMIN-CTR = UMIN Clinical Trials Registry, χ^2 = chi-square; t-test.

Keywords: critical thinking, cognitive-behavioral reflective training, critical thinking disposition, nursing students, cognitive behavioral therapy, Nigeria

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1. Introduction

Critical thinking disposition is a constituent of critical thinking skills that improves cognition, knowledge, and mental ability.^[1,2] Early conceptualization of critical thinking by ancient philosophers such as Socrates, Plato, Marx, and Aristotle established the term^[3-5] as a deductive ability which allows children to understand the objectivity of knowledge.^[3-5] If an individual is critical, it means that the person is able to establish value judgment on things by analyzing the characteristics of the thing using thinking processes^[6] by acknowledging the characterological aspect that brings about a disposition. Disposition is the specific ways an individual justifies and proves the characterological elements of an object, a person, and a thing.^[7] The disposition toward critical thinking is characterized by the steady intrinsic motivation to utilize critical abilities to decide on what to believe and what to do.^[8-10]

One of the factors that enable students to be disposed to engaging in critical thinking is the innate desire or passion to discover new knowledge.^[11] Great discoveries were made due to passionate behavior towards critical thinking.^[9] Meanwhile, the passionate behavior expressed by an individual to engage in critical inquiries could be as a result of either a harmonious passion or obsessive passion.^[9] Other factors that determine the disposition of an individual to think critically include analyticity, open-mindedness, inquisitiveness, CT self-confidence, truth seeking, systematicity and maturity.

Evidence from scholarly literature in Nigeria showed that secondary school students do not have problem-solving skills.^[12] This evidence is consistent with evidence from elsewhere which suggests a general poor reasoning skills among certain categories of students.^[13-15] A study by Oluwaseun^[16] showed that a high proportion of Nigerian students at all levels have deficiency solving critical and difficult questions. This inhibits their ability to engage in higher Mathematics, solve arithmetic processes and engage in higher critical thinking. Looking at their learning difficulties in understanding thought-processes and skills, the evidence suggests that contemporary Nigerian youths require immediate intervention.^[17] Meanwhile, many of these students are required to make use of their critical thinking ability which many of them have not been able to develop.^[18] The problem remains that many students lack the required basic education on the importance of critical thinking and how to improve it.^[19] A good number of students in Nigeria erroneously believe that since teachers do not teach how to think critically, they are justified in remaining passive recipients of information.^[20]

Considering the different dimensions of new knowledge, pedagogical practices, and technologies which demand for thought process among students,^[20,21] the need to step up to face current demands with a better disposition call for serious attention. Professionals have been called to give attention to how students can be taught to think systematically and critically to derive meaning and problem-solve in any given situation.^[22,23] The trends are very crucial in that students cannot cope when the person finds it difficult to reason critically. For example, a student with knowledge of digital technologies may understand the new knowledge in the pedagogical practice of a teacher. Therefore, it is imperative for every student, regardless of faculty, to think critically when faced with a complex situation. Redirecting students to various ways through which their cognitive abilities, level of judgments and reasoning could be improved, is the focus of the current study. Our position is not that critical thinking does

not exist in Nigerian schools, our position is that students do not apply independent step-by-step efforts to consciously appropriate critical thinking. The students attribute this problem to teachers and school environments instead of engaging in higher-order questions, brainstorming and group discussion that allows them to infer new knowledge, analyze written dialogue and ambiguous information.

2. Critical thinking and nursing students

Understanding the significance of critical thinking disposition for nursing students has been highlighted in a number of research studies.^[24-26] Most essentially, it will be uneasy for nurses to complete educational course requirements effectively without critical thinking disposition as a basic.^[27,28] As it is seriously required in schools, educators and researchers see the development of critical thinking for nursing students to be challenging and complex^[29] in that they must prepare nurses to think critically.^[30] Critical thinking disposition becomes demanding and challenging considering the complex nature of clinical settings. Currently, critical thinking disposition is a requisite and expected educational outcome for nursing students.^[30] This is why it is considered in nursing schools as a basic requirement for accreditation.

A nurse cannot assess the problem of a patient without the application of critical thinking skills. As the nurses make decisions on caring methods and interpretation of data collected, the disposition to make the quick and correct decisions is dependent on critical thinking.^[31] By indication, nurses in training require critical thinking disposition for effective professional practice. This is why a considerable number of studies have recommended critical thinking disposition in nursing education.^[32-36] Critical thinking disposition enhances reflective and logical processes about what to do, when to do it, and how to do it. One of such studies have argued that a trained nurse who lacks critical thinking skills is likely to be deficient in quality of service delivery, the efficiency in service and professionalism.^[30] Therefore, the more nurses think critically, the higher and more effective they would be in improving public health and quality of life.^[30] Based on that, clinical practitioners, researchers, and nurse educators must improve the inquiry methods, problem-solving technique, reasoning ability, and cognitive process skills of nursing students.^[37] In spite of the importance of critical thinking disposition in the nursing profession and clinical practice in general, previous studies have shown students' low capacity for critical thinking.^[37-39] More evidence suggests that nursing students need more training and education in critical thinking for clinical judgment.^[30,40]

3. Critical thinking disposition and cognition and behavioral process

There is no doubt that critical thinking disposition has been widely recognized as an integral part of the cognitive process for knowledge development and utilization,^[41] emotions and behavioral activities.^[42] A systematic review of literature indicated that distorted thinking is associated with deficits in reflective and cognitive processing and the impaired efforts to change cognitive and behavioral distortions in associative processing.^[43] At this point, the individual processes information that could be effortless on a preconscious level. However, previous study suggested that associative processing is a faulty

pattern of thinking and that cognitive processing alters dysfunctional thought, leading to associative thinking.^[44] Notably, the problems of cognitive processing and reflective thinking are likely related to limited control of emotional responses, able to change cognitive biases, and regulate behavior leading to dysfunctional feelings.^[44–46] It is thus possible to assume that cognitive factors are likely to have a predictive influence on students' thinking.^[47] Assuming a nursing student has dysfunctional thoughts about critical thinking questions, the distorted thoughts could impair the expected outcome which is the behavior/achievement. To this end, the belief or thought about the complex task or evaluation test is the cognitive agent.^[48] The direction of cognitive responses that may be erroneously perceived could affect the logical ability and behavior of the student.

In addition, documented evidence indicate that critical thinking is closely related to cognitive skills and affective disposition.^[49] The cognitive skills include reflective skill, creative skill, questioning skill, problem-solving skill, among others; while affective disposition involves behavioral disposition, feelings, affect, among others. It is expected that when a nurse engages in cognitive and reflective training, there is the likelihood that they would think critically in a specific event, make an analysis of their actions or behaviors, take up alternative actions, and put new ideas into practice.^[49] Given that the cognitive-behavioral and reflective thinking are connected with similar logical structure, the researchers crafted the cognitive behavioral reflective training for critical thinking. Cognitive behavioral reflective training is an extension of cognitive behavioral therapy which the present researchers developed using the basic principles of cognitive behavioral therapy.

4. Cognitive behavioral reflective training

Cognitive behavioral reflective training (CBRT) is an adaptation of cognitive behavioral therapy (CBT) developed by Beck^[50] to alter dysfunctional behaviors arising from negative cognitive and behavioral interpretations of an event. CBRT aims at altering distorted thinking for sound and adaptable alternative ways of information processing. CBT aims at altering the core thoughts of people that could impair their overall functioning and replace them with a realistic evaluation of the event. Like the CBT principle suggested, there are three leading mechanisms that could influence logical ability.^[50] These are cognitive triad, negative self-schemas and skews in information processing. However, the influence may be negative or positive depending on the direction. Cognitive triad is erroneous perceptions of self (self-downing), believing the world and the future are not achievable. Cognitive behavioral reflective training helps nursing students with such negative thought leading difficult critical thinking to improve on a more accurate critical thinking disposition. Self-schemas include rejection, catastrophizing, personalization, minimization, selective abstraction, arbitrary inference, overgeneralization, criticism, and overprotection. In this case, CBRT employs cognitive skills (problem-solving skills, reframing, cognitive restructuring, etc) to improve the cognitive ability of nursing students that think that they cannot make a critical analysis of expected outcomes. The training alters the erroneous belief that they cannot make a value judgment on assignments, engage inaccurate information processing or draw illogical conclusion in tasks.

Cognitive behavioral reflective training therapist assumes that knowledge, belief, and decision have a natural relationship with

the rational decision process.^[51] Therefore, cognitive skills and critical thinking dispositions facilitates accurate decision as it imbues the cognitive agent with enough information to make a logical and realistic decision.^[51] CBRT believes that the process of making a realistic and functional decision is dependent on critical thinking ability and healthy cognitive ability. This is anchored on previous views that critical thinking is a logical way of thinking which is hinged on thought processes.^[52,53] However, if the person epitomizes logical fallacy during the cognitive process or examination of cases, the individual may not be able to engage in a critical and realistic conclusion. Beck^[50] recognized logical fallacy as a cognitive distortion. A logical fallacy is an erroneous way of thinking which may lead to poor inferences.^[54] Being able to identify and keep away from making logical fallacy is one quality that characterizes a critical thinker.^[55] Therefore, cognitive dysfunctions characterize poor critical thinking ability^[56] and make a person to regularly engage in illogical thinking patterns.^[57] Since critical thinking disposition of nurses is very paramount, they are expected to be exposed to critical thinking skills that would empower them toward a realistic analysis of decisions and have problem-solving abilities.

Furthermore, a nurse with a dysfunctional state of mind (or cognitive distortion) is likely to be ineffective in carrying out his/her professional practice. A few instances of cognitive distortion are all-or-nothing thinking, selective abstraction, mind-reading, negative prediction, catastrophizing, overgeneralization, labeling and mislabeling, magnification or minimization, and personalization.^[58,59] Considering the paucity of intervention for reducing illogical thinking orchestrated by cognitive distortions such as logical fallacy in nursing practice, there is no documented evidence addressing the effectiveness of CBRT in this experiment scenario.

5. Motivation, research gaps, and research objective

Critical thinking has been widely regarded as an indispensable cognitive skill in the 21st century.^[60] Considering the contemporary exposure to wider knowledge and digital technologies in the 21st-century healthcare centres, we argue that without critical thinking, it is impossible for any medical student to synchronize, synthesize and analyze information that can lead to a value judgment. This trend demands that every student must be a scientific, critical thinker and possess cognitive abilities for exploring the development.^[61] To that effect, it is imperative for young adults to develop high cognitive processes as they are believed to be the most active population that needs it.^[62] To date, it is alarming that despite the importance of critical thinking disposition in clinical judgment, there are few studies addressing how critical thinking could be improved.

Some of the studies have methodological weaknesses which this present study had aimed to address. For instance, some of the studies used measures that do not have high internal consistency, and which had little construct validity.^[49] Some did not assess the condition up to follow-up stage to test the long-term effect of the intervention or training or method. Also, the psychological components (dispositions, cognition, behaviours, and self-confidence) of critical thinking were neglected in some previous studies reviewed [eg Ref. ^[63]]. In order to fill some of these gaps, we combined psychology and philosophy to acknowledge the possible roles of cognition, behavior and reflective ability on critical thinking disposition.^[63] Given the nursing students

cognitive distortions which are bottlenecks against their nursing training and practice, the existing conceptual gap among cognitive distortions, erroneous behavioral reaction and critical thinking in literature,^[64,65] we created a cognitive-behavioral psychoeducational approach (cognitive behavioral reflective training) to improve their critical thinking disposition. The aim of this study, therefore, was to investigate the effect of cognitive behavioral reflective training (CBRT) on the critical thinking disposition of nursing students in Nigeria. Based on this aim, we hypothesized that CBRT would have a significant impact on critical thinking disposition among nursing students who participated in the CBRT group when compared with those in the waitlisted group.

6. Methods

6.1. Ethics approval

Approval to conduct this study was granted by the Faculty of Education, University of Nigeria, Nsukka. We also sought for and obtained the written consent of all the participants in line with the ethical principles of using human beings for research as suggested by the American Psychological Association.^[66] The registration of this study was done after completion with the Clinical Trials Registry (UMIN-CTR). The trial number is UMIN000039643.

6.2. Study participants

Participants for this study included 167 nursing students in Nigerian universities selected from Southeastern part of Nigeria. The accuracy of the sample size was justified using Gpower statistical tool and the power (Maximum sample required=86, statistical power=0.080) showed to be adequate enough for this study. The participants were sampled from different levels of study (first year, second year, third year and fourth year). Other information on the participants that moderate critical thinking disposition such as gender, age, year of study, attitudes towards nursing, and state of origin^[67] can be seen in Table 1.

Table 1 shows that there is no significant difference in the gender, state of origin, attitude towards nursing and year of study of the intervention and the non-intervention groups, $X^2=4.32$, $p=0.087$; $X^2=7.34$, $p=0.135$; $X^2=10.42$, $p=0.063$; $X^2=8.23$, $p=0.058$.

6.3. Measure

Critical Thinking Disposition Inventory for Chinese medical college students (CTDI-M) developed by Wang, Sun, Huang, He, Hao, and Zhang^[68] is an 18-item self-report questionnaire that assesses critical thinking disposition of medical students. The scale items were put into three sub-scales, namely open-mindedness (seven items), systematicity/analyticity (six items), and truth-seeking (five items). The psychometric qualities (construct validity, internal consistency reliability) were tested and proved to be adequate. The Cronbach’s alpha (0.92) was documented, showing that the scale was reliable. However, considering the cultural significance, we also tested the reliability of the scale in the Nigerian context and the internal consistency was 0.89 α . The minimum and maximum values for CTDI-M sub-scales are 18 and 90, respectively. Also, the English version of CTDI-M has been used for this study. CTDI-M was guided by a

Table 1

Demographic characteristics of the participants.

Demographics	Treatment %	Control %	X^2	P
Gender				
Male	30 (36.59)	26 (30.59)		
Female	52 (63.41)	59 (69.41)	4.32	0.087
State of origin				
Abia	10 (12.20)	11 (12.94)		
Ebonyi	11 (13.41)	12 (14.12)		
Cross-river	8 (9.76)	7 (8.24)	7.34	0.135
Enugu	18 (21.95)	16 (18.82)		
Edo	6 (7.32)	8 (9.41)		
Benue	5 (6.10)	6 (7.06)		
Delta	9 (10.98)	11 (12.94)		
Others	15 (18.29)	14 (16.47)		
Attitude towards nursing				
Dislike	27 (32.93)	14 (16.47)		
Often likes	37 (45.12)	48 (56.47)	10.42	0.063
Undecided	3 (3.66)	6 (7.06)		
Sometimes likes	15 (18.29)	17 (20.00)		
Year of study				
Yr 1	27 (52.17)	29 (50.00)		
Yr 2	21 (0.04)	20 (13.64)	8.23	0.058
Yr 3	18 (21.74)	21 (22.73)		
Yr 4	16 (13.04)	15 (13.64)		
Mean age of the participants	24.18 \pm 8.20	26.16 \pm 9.01		

%=Percentage, X^2 =Chi-square, P=Probability value.

five-point Likert-type scale (1=disagree strongly; 2=disagree somewhat; 3=neutral; 4=agree somewhat; 5=agree strongly). Higher scores obtained from sub-scales indicate higher critical thinking disposition. The total score obtained from the scale reflects critical thinking disposition. Students with 18 scores are considered to have a low level of critical thinking disposition. We considered this version of the Critical Thinking Disposition Inventory better, in comparison with other versions such as California Critical Thinking Disposition Inventory (CCTDI)^[69] which targeted older adult population, translated version of California Critical Thinking Disposition Inventory (CCTDI)^[70] with inadequate internal consistency of the clusters (open-mindedness=0.34, analyticity=0.40, and systematicity=0.47).

6.4. Procedure

From 17th to 25th February 2018, we visited the participants in their respective universities in southeast Nigeria, where they completed written informed consent forms. Of the 244 forms distributed to nursing students, 167 forms were successfully completed and returned. The potential participants were given equal opportunity to participate during the recruitment process. At the point of recruitment, the potential participants were assessed (Time 1) using CTDI-M to ascertain the problem baseline by the researchers. Prior to the screening exercise, certain criteria were considered before participants were included, namely 1) must be a nursing student, 2) students with a low level of critical thinking disposition as measured and confirmed by the scales, and 3) readily available throughout the duration of the study. However, the nursing students that met all the inclusion criteria received reflective training and critical thinking training and those that had examination were excluded from the study. We also excluded any student scheduled for clinical

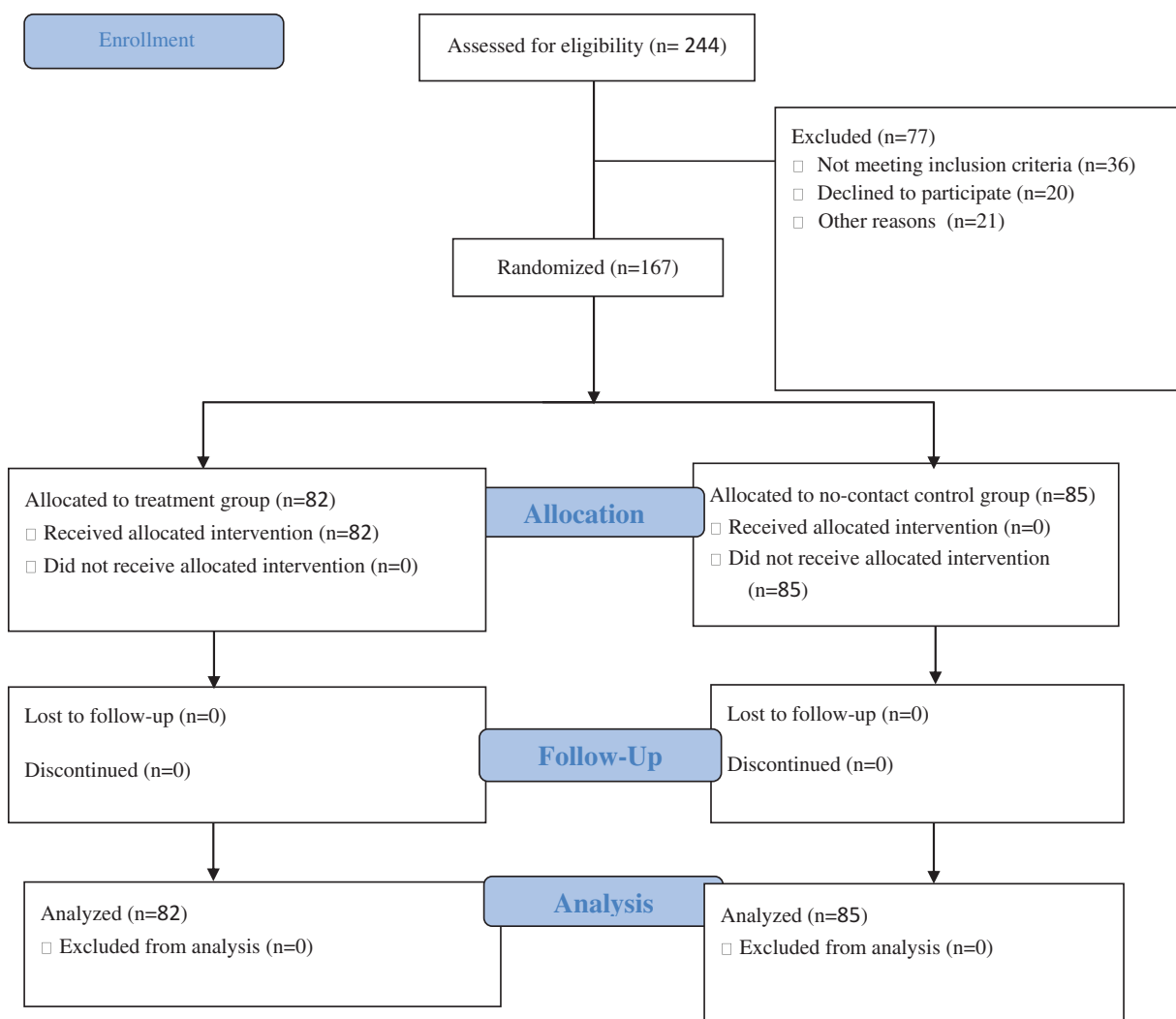


Figure 1. Participants' eligibility flow chart.

internship practice. The selected participants were assigned to two groups (intervention and waitlisted control groups) using random allocation software as in Saghaei.^[71] There was also adequate concealment of allocation sequence, as the research assistants and participants were also not allowed to know the content of sealed opaque envelopes. The researchers utilized sealed opaque envelopes, assisted by the research assistants, indicating if a participant was assigned to the intervention group or waitlisted group. This method facilitated the randomization of the final 82 participants into the intervention group and 85 participants into the waitlisted-control group. Figure 1 further demonstrated randomization procedure. The entire process lasted between March and May 2018.

Participants allocated to the intervention group were exposed to cognitive behavioral reflective training (CBRT) while the waitlisted control group did not receive treatment immediately; rather, participants were assessed at points. CBRT developed by the researchers aimed at improving the critical thinking disposition of nursing students. The CBRT is group training that lasted for 12 weeks, with one session (60 min) per week. The intervention was delivered in English by the cognitive behavioral therapists with wide experience and critical thinking skills. Each

session comprised a specific topic covered by the therapists. Session one focused on the introduction of names, place, institution, and area of specialization, a weekly schedule, set of rules, and confidentiality as well as familiarization of participants with the objectives of the study. Session two addressed the significance of reflective training and critical thinking disposition in nursing practice. Session three recapped the importance of critical thinking disposition and discussed the meaning and process of critical thinking practice. Session four and five addressed how to master the skills, patterns and procedures (problem-solving skills, open-minded, flexible in evaluation, honest in facing personal biases, prudent in drawing conclusions, willingness to reconsider, clear about issues, logical in complex issues, persistent in searching relevant information, and thoughtful in the selection of criteria) leading to reflective thinking. Session six and seven addressed how to identify illogical thinking, distorted assumptions about patients, illogical evaluation of decision (behavior) associated with knowledge synthesis and analysis of facts in nursing practice. Session eight and nine emphasized the relationship among thought/belief, knowledge and critical thinking disposition, how to gain control over faulty thoughts that often trigger poor judgment and manipulation of

cognitive skills to become reflective and creative thinkers in nursing practice. Session ten and eleven addressed the collection of clinical learning experiences, critiquing learning activities, leading students to discover clinical nursing problems, and practice exercise, talking with them face-to-face about their progress, and deficiencies. Finally, the sessions were terminated. The sessions held every Friday taking account their academic activities.

At the end of the training, participants in the intervention group and waitlisted control groups completed a posttest (Time 2). After three months, the researchers organized follow-meetings with the participants. This lasted for one month and culminated in a third assessment (Time 3) after a 6-month period in both arms. The assessed participants completed and returned the assessment tool at various time points (Time 1, Time 2, and Time 3). The researchers utilized “at a spot and direct delivery approach” for the data collection. Outcome analysts and participants were blinded to the allocation sequence as in past studies.^[58,72] Participants were motivated with \$10 to cover for transportation and snacks for each session.

6.5. Intervention

Cognitive Behavioral Reflective Training Program (CBRTP) developed by the researchers taught the participants how to improve the critical thinking disposition of nursing students. CBRTP has 12 session series, written and delivered in English, to the group of nursing students. The 12 session-CBRTP contained programs with specific objectives drawn from the general goal of the intervention. Each session lasted for 60-minutes per week. The program manual extensively exposed participants to the relevance of cognitive and reflective training in critical thinking disposition nurses. How to master the skills and procedures and identification of illogical thinking, faulty assumptions about patients, illogical evaluation of decision were aspects that were covered. CBRTP emphasized the use of the problem-solving technique in enhancing logical reasoning, cognitive restructuring for identifying, challenging and modifying illogical thinking of participants. In this CBRTP, behavioral disputation was also utilized to make the participants believe that their negative attitudes towards nursing practice could be changed. Participants were exposed to the connection between an activated decision and school events that could reflect in reasoning in learning critical thinking skills. Thought/belief, knowledge and critical thinking disposition were utilized to create local synthesis and how poor conclusion triggers malfunctioning. The participants' thinking procedures and behavioral responses about each created proposition that is expected to answer critical thinking questions, were included in the CBRTP. To this end, the cognitive agent and the propositional attitude were shown to be responsible for their selected answers. Series of homework assignments were included in the manual to enhance compliance. See Table 2 for additional information on CBRTP.

6.6. Study design and data analysis

This is a randomized controlled trial design. The effect of CBRT on the critical thinking disposition of nursing students in southeastern part of Nigeria was established statistically using repeated measures 2-way analysis of variance (ANOVA). Cohen's *d* and adjusted R^2 values were used to report the effect

size of the intervention on the critical thinking disposition of nursing students. Post hoc was utilized since the result of the ANOVA showed significantly. The assumption of the sphericity of the test statistic was tested using Mauchly test of sphericity which was not significant (Mauchly $W=0.801$, $p=0.742$), implying that the assumption was not violated and that the variances of the differences between all combinations of the related measures are equal. The analysis was done using Statistical Package for Social Sciences (SPSS) version 18.0 (IBM Corp., Armonk, NY).

7. Results

Table 3 reveals that there was no significant difference between the treatment and waitlisted control groups in critical thinking disposition of nursing students as measured by CTDI-M at the posttest, $F(1,165)=0.008$, $p<0.930$, $d=0.030$. At the post-treatment and follow-up measures, there was consistent effect of CBRT on critical thinking disposition of nursing students in Nigeria as measured by CTDI-M, $F(1,165)=126.402$, $p<0.001$, $d=5.28$; $F(1,165)=112.226$, $p<0.001$, $d=5.25$. In addition, Charts in Figures 2 and 3 showed the status of the intervention group and waitlisted control group at pretest, posttreatment and follow-up respectively.

7.1. Gender as a possible moderator

Table 3 reveals that gender does not have significant moderating influence on the effect of CBRT on critical thinking disposition of nursing students in Nigeria at both the posttest and follow-up measures, $F(1,165)=0.004$, $p<0.950$ and $F(1,165)=0.003$, $p<0.958$. Thus, CBRT is not gendered since it favored both male and female students equally.

Table 4 shows the level of significance for differences between the individual time points. It shows that there were significant differences in critical thinking scores of nursing students between pretreatment and follow-up ($p=0.001$) and between posttreatment and pretreatment ($p=0.001$). This implies that the critical thinking scores of the nursing students were greatly enhanced after the intervention program and at the follow-up measure. Results also showed that there was a significant interaction effect of time and treatment on the critical thinking disposition of nursing students in Nigeria, $F(2,160)=32.765$, $p<0.001$. Figure 4 shows the graph of the interaction effect of time and treatment.

8. Discussion

This study examined the effect of CBRT on the critical thinking disposition of nursing students. The result showed that there was no significant difference between the treatment group and waitlisted control group with regards to the critical thinking disposition of nursing students as measured by CTDI-M at the posttest. At the posttreatment and follow-up assessments, the effect of CBRT on the critical thinking disposition of nursing students in Nigeria as measured by CTDI-M is effectively significant. These results corroborated Zhang, Fan, Xia, Guo, Jiang, and Yan's study^[49] which found that reflective training program not only improves nursing students' critical thinking disposition, it also promotes students' keen interest to face demands in clinical practices. Our findings also were consistent with Zhang, et al's study^[49] which suggested for specific

Table 2**Summary of cognitive behavioral reflective training programme.**

Time frame	Session	Session goal	Activities	Techniques employed
Wk 1	Session 1: Introduction, cognitive alliance	To introduce the participants and therapists' names, place, and fixing the treatment programme	Familiarization and building cognitive alliance with the CBRT participants. Introduction of names, place, institution and area of specialization of each participant. Arranging for the programme activities in terms of time and days. Setting rules and regulations. Emphasizing the needs for confidentiality. Familiarizing participants with the objectives of the study.	Building therapeutic relationship, Assertiveness
Wk 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	Addressing the clinical significance of CBRT in enhancing critical thinking disposition in nursing practice Assigning practice exercises.	Explanation Cognitive disputation Coping skills
Wk 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 and processes of critical thinking were discussed.	Explanation Reinforcement
Wks 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	Addressing how to master the skills, patterns and procedures (problem solving skills, open-minded, flexible in evaluation, honest in facing personal biases, prudent in drawing conclusions, willing to reconsider, clear about issues, logical in complex issues, persistent in searching relevant information, and thoughtful in the selection of criteria) leading to reflective thinking	Behavioural disputation Cognitive restructuring Reframing technique Practice exercise
Wks 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	Addressing how to identify illogical thinking, distorted assumptions about patients, illogical evaluation of decision (behaviour) associated with knowledge synthesis and analysis of facts in nursing practice. Replacing the automatic thoughts with realistic ones using CBRT principles. Dealing with clinical practice and versus perception. Addressing each participant's problem using CBRT.	Behavioural disputation Cognitive restructuring Reinforcement Reframing technique Practice exercise
Wks 8 and 9	Sessions 8 and 9: How distorted behaviours can trigger inaccurate judgment and conclusion	To establish relationship between unrealistic thought and poor judgment and manipulation of cognitive skills	Emphasizing the relationship among thought/belief, knowledge and critical thinking disposition, how to gain control over faulty thoughts that often trigger poor judgment and manipulation of cognitive skills to become a reflective and creative thinkers nursing practice How poor critical thinking could affect clinical practice of a nurse.	Reframing technique Relaxation techniques Meditation and yoga Skill Coping skills Practice exercise
Wks 10 and 11	Sessions 10 and 11		Addressing the collection of clinical learning experiences, and critiquing learning activities. Leading students to discover clinical nursing problems, and practice exercise talking with them face to face about their progress, and deficiencies. 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
Wk 12	Termination	To terminate the treatment sessions	Revision, review of review of home exercise and termination	

CBRT developed by the researchers.

reflection training to be given to nursing students. Furthermore, the outcome of this present study remains consistent with Dewey's^[73] who proposed that reflective thinking is associated with personal conscious belief. Dewey stressed that the association is based on conscious and voluntary efforts to build

realistic assumptions upon evidence and rationality.^[73] Dewey considered these efforts to be critical thinking ability. Also, in line with this study's findings, previous studies have reported the effectiveness of cognitive behavioral approaches in improving cognitive skills of different populations.^[49,58,74,75] Similarly,

Table 3
Repeated measures analysis of variance.

Group gender	Pretest		F	P	d	Posttest		F	P	d	Follow-up		F	P	d
	Mean	SD				Mean	SD				Mean	SD			
Treatment	38.00	4.54	0.008	0.930	0.03	76.10	8.45	126.402	<0.001	5.28	76.16	8.46	112.226	<0.001	5.25
Control	37.86	4.52				42.78	2.87				42.62	3.15			
Treatment Male	38.13	4.66				76.21	8.48				76.38	8.49			
Female	37.92	4.52	0.191	0.663		76.04	8.51	0.004	0.950		76.04	8.51	0.003	0.958	
Control Male	38.13	4.76				42.75	2.91				42.34	3.58			
Female	37.70	4.41				42.79	2.87				42.79	2.87			

SD=Standard Deviation, P=probability value, d=Cohen's d (effect size).

earlier findings also showed that cognitive skill and behavioral disposition components influence critical thinking.^[1] Exposing nursing students to critical thinking training gives an opportunity to utilize psychological assumptions in their professional practice.^[30] Clinical related critical thinking skills enhance and use technical know-how involved in nursing practice in making rational informed decisions, solve problems, and think logically.^[76] In line with our findings, Hatcher, Brown, and Garglietti^[77] recommended for inclusion of cognitive behavioral approaches into critical thinking curriculum. Cognitive behavioral strategy is recommended, possibly because it enables students to take up the cognitive ability to engage, become

professionals, and reflect skill, ethical principles, and standards in their practice.^[78] We support this view and so argue that critical thinking disposition is associated with the cognitive and emotional process.^[64]

Previous studies have also established how cognitive and behavioral function could influence critical thinking ability. For example, an earlier study^[79] found that distorted behavioral responses and critical thinking ability were not significantly related. The author reported that the functional behavioral disposition of an individual enhances critical thinking performance. The assumption that the individual harbors distorted beliefs, causes dysfunctional behavioral and emotional reactions

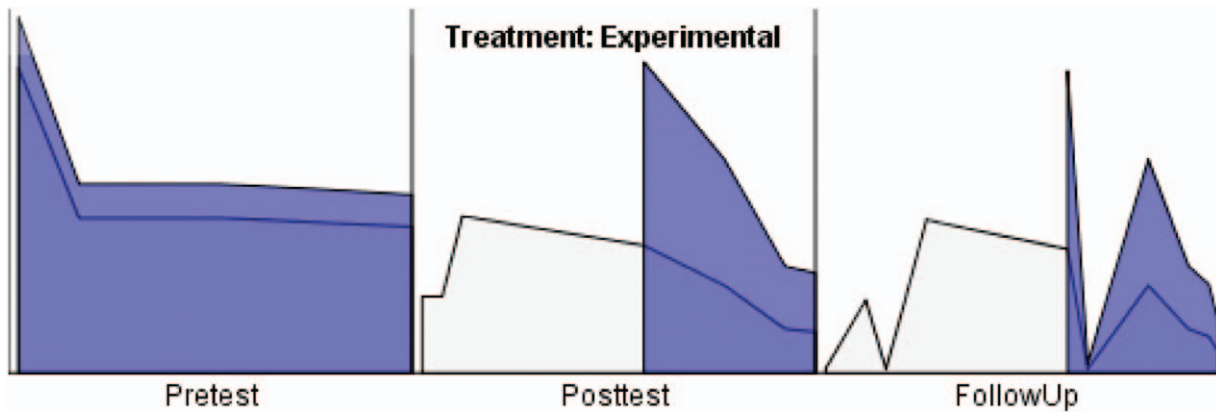


Figure 2. Charts showing the status of the intervention group at pretest, posttest and follow-up.

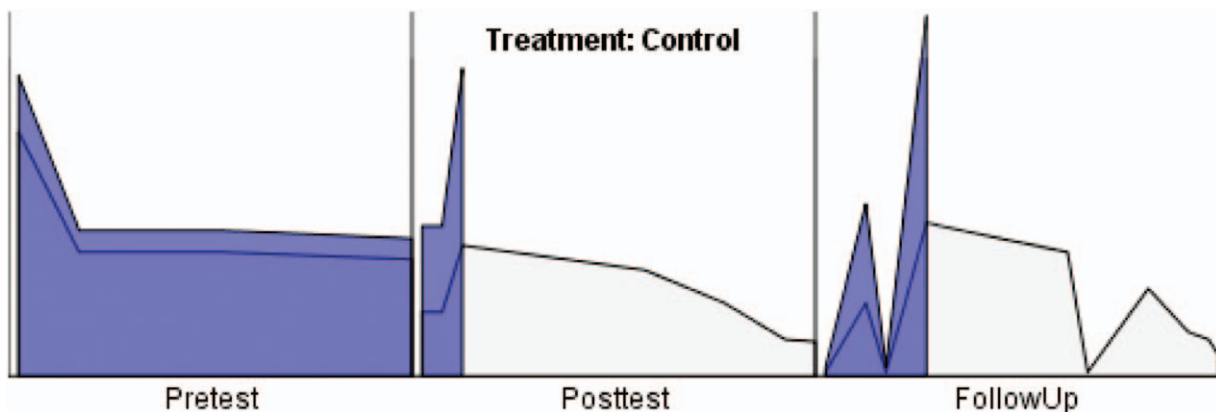


Figure 3. Charts showing the status of the non-intervention group at pretest, posttest and follow-up.

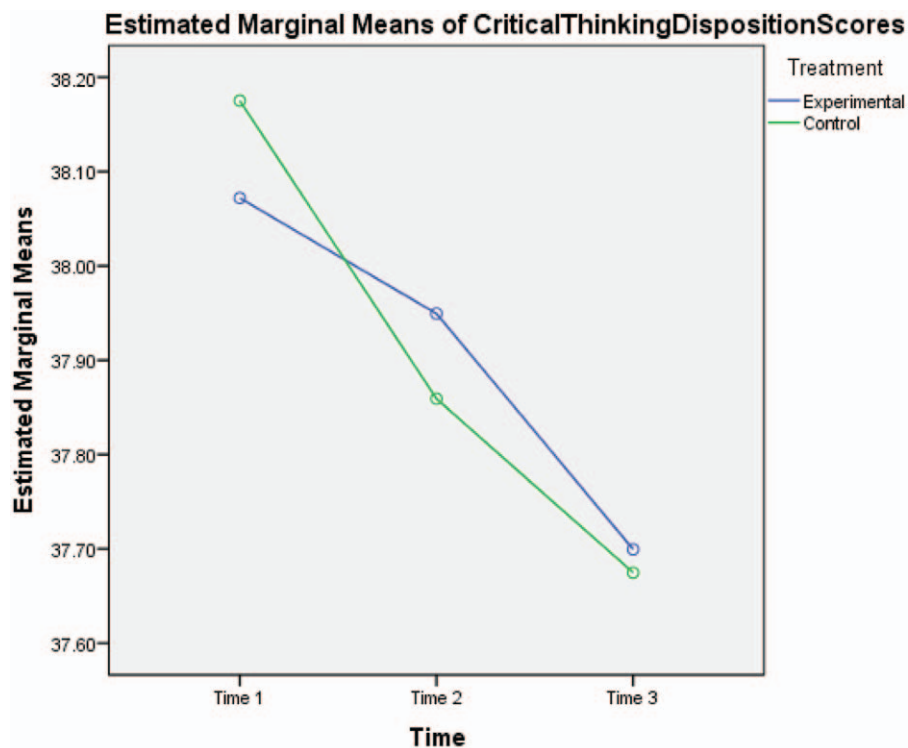
Table 4
Post hoc test for the significant effect of time.

(I) Time	(J) Time	Mean difference (I-J)	Std. error	Sig. ^b
Pretreatment	Posttreatment	12.182*	1.485	0.000
	Follow-up	13.000*	1.517	0.000
Posttreatment	Pretreatment	-12.182*	1.485	0.000
	Follow-up	0.818*	0.319	0.042
Follow-Up	Pretreatment	-13.000*	1.517	0.000
	Posttreatment	-0.818*	0.319	0.042

that could decline critical thinking ability. It is the dysfunctional reasoning and interpretation of the object of the belief that leads to poor approach to problem-solving, illogical conclusion and distorted decision.^[54] Indeed, it is the ability to identify a logical pattern of drawing conclusion that is the bane of critical thinking.^[55] Therefore, cognitive and reflective training tends to improve functional thought and emotional response that influence critical thinking ability.^[65] However, if students have illogicality of cognitive distortions, negative assumptions and beliefs could lead to low critical thinking.^[65] Beck^[80] argues that cognitive distortions demonstrate the rigidity of people’s judgment and unrealistic evaluation of themselves and the world. To this end, we think that the only way to challenge the unrealistic evaluation of complex nursing practice is through cognitive behavioral reflective training just as we have done in this study.

8.1. Implications for practitioners

As evident from the results of this study, cognitive therapists practicing in nursing schools are encouraged to apply cognitive behavioral reflective criteria in the course of their professional practice. In the same vein, practicing psychologists must mentor their students’ perception of critical thinking by establishing the link between cognitive-behavioral skills and higher-order thinking. Considering that a good number of qualified nursing mentors in developing nations are not cognitive behavioral experts, professional health counsellors and psychologists must aim to implement cognitive behavioral reflective training programs in schools, especially nursing schools. In line with our study’s recommendation, previous studies have proposed that more reflective-trained nursing professionals are critical and that efforts to provide such educational programs in nursing schools at various levels need to be stepped up.^[49]



Covariates appearing in the model are evaluated at the following values: Posttest = 59.1377

Figure 4. Graph of time × group interaction effect using CBRT.

8.2. Strengths and limitations

The strength of this study lies in the possibility that it fills an important gap which is the investigation into the impact of cognitive behavioral reflective training in improving the critical thinking disposition of nursing students in Nigeria. In this study, we utilized a randomized controlled design considering that it is a sophisticated procedure for scientific research.^[81] We also considered the significance of a follow-up evaluation of the measure. These are significant contributions to knowledge as corroborated by previous studies.^[82,83]

The scholarly contributions notwithstanding, this study recorded a number of limitations. The participants in the comparison group were not studied and treated. The participants were only assessed at pretest, posttest and follow-up assessment. This made the participants in the waitlisted control group inactive. By their inactiveness during the intervention, we consider this one of the major shortcomings of the present study. Given this weakness, it is strongly suggested that future studies attempt a comparative analysis of the time, intervention and efforts of all participants, irrespective of the group they are assigned.

9. Conclusion

We recognized that there are a few studies that have tested the effectiveness of reflective training on critical thinking but neglected the role of behavioral disposition in enhancing the critical thinking disposition of nursing students. To this end, we took a different paradigm by creating a cognitive behavioral reflective training program that could improve the critical thinking ability of nursing students in Nigeria. And the promising impacts of this training were tested and we found that cognitive behavioral reflective training program has long-term impacts on critical thinking ability among nursing students in developing nations like Nigeria.

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