Original Research

Development and Validation of a Knowledge Checklist of Cognitive Therapy for Nurses(KCCTN)

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Abstract

This study aimed to develop a Knowledge Checklist of Cognitive Therapy for Nurses (KCCTN) to assess the effectiveness of cognitive-behavioral therapy-based training. Sixteen items were collected from the provisional KCCTN; four response choices were created for each item with one correct response. The reliability and validity study results showed that Cronbach's alpha was 0.63. The intra-class correlation was calculated using the data on the number of correct answers before and after the training of nursing college students, and the reliability was confirmed at $r=0.65$ ($p<0.01$). The uncorrelatedness of KCCTN and KBPAC helped establish discriminatory validity. Two-way analysis of variance with the dependent variable being the KCCTN score of the intervention group (nurses, N=30) and control group (nursing students, N=76) implementing cognitive-behavioral therapy, and pre-and post-intervention factors were calculated for hospital nurses. The results showed a significant interaction with a significant improvement in the intervention group.

Keywords: Nurses, Mental health, Cognitive behavioral therapy, Cognitive therapy Checklist

Introduction

Generally, nurses are reported to have a greater quantitative workload and workload variability than other professions[1], and are considered a high-risk group. In Japan, nurses' mental health measures are an urgent issue;however, according to a fact-finding survey conducted by the Japanese Nursing Association[2] on the dissemination of the "Guidelines for Night and Shift Work of Nurses," 63.3%of 3,213 responding hospitals were working on mental health measures, indicating a lack of adequate care in the nursing environment [2].

The study by Ohue et al.[3] on the effectiveness of group cognitive-behavioral therapy (CBT) offers a viable approach to address mental health issues among nurses, revealing that group CBT lowered burnout and intention to leave among nurses[4]. The social significance of this study is the reduced intention to leave the profession. Also, turnover behavior facilitates a decrease in organizational commitment and an increase in burnout among nurses who continue to work, leading to additional turnover[5]. Therefore, developing an effective program to curtail occupational stress may improve the mental health of nurses and decrease turnover.

The dissemination of information and ease of implementation of an effective program should be investigated. Accordingly, Ohue and Menta[6]

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proposeCBT coupled with a mentoring system as a new support system for nurses. Mentoring refers to individualized support offered by senior nurses (i.e., mentors) with abundant knowledge and professional experience to junior nurses (i.e., mentees) in hospitals. As described by Ohue et al.[6], training mentors in CBT prevents burnout and turnover. Thus, a measure to determine the efficacy of nurses'CBT, together with the effectiveness of the overall program, is required.

The Knowledge of Behavioral Principles Applied to Children (KBPAC) was employed in previous studies as an indicator to measure the effectiveness of training conducted in CBT[7][8]. Primarily, this checklist was based on applied behavior analysis to evaluate the knowledge of therapists involved in behavioral therapy for children with autism. The KBPAC is a 50-itemtest wherein participants select the correct answer from four choices given for each item. Koda et al.[9] prepared a Japanese version of the KBPAC, while Shiga [10] developed a simplified version with 25 items. The KBPAC has been used to examine the guidance provided to teachers [11] and parents of children with developmental disabilities[12]. Additionally, Koseki et al. [13] drafteda checklist for teachers to explore applied behavior, which has been used as an indicator of the training's effectiveness based on applied behavior analysis and behavior therapy in special needs education. These scales gauge knowledge of behavioral aspects of CBT. Alternatively, the Japanese version of the Cognitive Therapy Awareness Scale (CTAS-J)[14]is a checklist marking the cognitive aspect of CBT. Developed by Wright et al.[15], this scale assesses knowledge with regards to depression. The higher the score, the more knowledgeable the therapist about CBT for depression. Although the CTAS-J is employed as a measure of knowledge, its reliability and accuracy have not been well-established since the reliability of retesting remains unaffirmed. Furthermore, no significant differences between pre-and post-training have been reported[16]. In addition, this scale is aimed at professionals, making it difficult to evaluate nurses' cognitive therapy for mental health.

Therefore, in Study 1, items related to possible human relationships and cognition in nursing situations were collected to create a cognitive therapy checklist targeting "cognition" as an indicator of the training's effectiveness. The purpose of Study 2 was to verify the reliability and validity of this checklist.

Study 1

Purpose

The study intends to develop a cognitive therapy checklist (i.e., Knowledge Checklist of Cognitive Therapy for Nurses: KCCTN), which could serve as an indicator for the effectiveness of nurses' knowledge on CBT.

Methods

Collection of Items

To develop relevant items for a cognitive therapy checklist, having a comprehensive collection of specific data on cognitive therapy is necessary. The cognitive model, which is the basis of cognitive therapy, assumes that schemas are influenced by negative life events and cognitive distortions, resulting in automatic thoughts, maladjustment, depression, and anxiety. Thus, cognitive therapy concentrates on cognitive transformation[17]. A cognitive distortion should be clearly distinguished from automatic thoughts and schemas and is considered to be an "erroneous way of processing information, "including errors in cognition and reasoning, and distorted reality [18]. Ohno [19] designated "cognition," "automatic thoughts," and "schemas" as constructs of cognition, and "unfounded judgments," "black-and-white thinking," "partial focusing," "overestimation and underestimation," "ought-thinking," "extreme generalization," "self-association," "emotional reasoning," and "self-fulfilling prophecy" as constructs of cognitive distortion. Cognitive therapy techniques can be divided into cognitive and behavioral techniques [17]. Cognitive techniques include "cognitive restructuring" and behavioral techniques include "problem-solving" and "brainstorming." Furthermore, listening to clients' words and actions is integral for collaborative empiricism. After establishing the 16 constructs (refer to Table 1), we selected specific questions for each concept. First, based onthe KBPAC [7]and literaturedepicting cognitive characteristics of nursing professionals [3] [20], two CBT researchers specializing in nursing and parent training collected questions related to possible

human relationships and cognition in interpersonal support situations. As a collection policy, the items were formed into cards to increase their face validity as much as possible. Consequently, 20 items were collected on cards, after which we proceeded to name the cards and repeated the conceptual examination. For the 16 items selected during collection, questions regarding possible stressful situations and cognition in nursing situations were determined, presenting four choices, including one correct answer, and the subjects were asked to choose one that was closer to their beliefs.

Results and Discussion

Altogether, 16 items were chosen for the KCCTN. Study 1 aimed to create a cognitive therapy checklist that could serve as an indicator of effectiveness when conducting training for nurses based on CBT. As demonstrated in Table 1, this checklist comprehensively ascertained knowledge on "cognition" in CBT relevant to the nursing profession. Constructs as sociated with cognitive therapy were clarified during development. Besides, two experts repeatedly reviewed items assembled into cards, ensuring that they had as much surface validity as possible.

The KCCTN can be used as an indicator of effectiveness because the questions are designed to be answered by nurses and examples comprise problems that may appear during interpersonal support situations.

Table 1 Chosen item contents

No	Item contents
1	Cognition
2	Automatic thoughts
3	Schemas
4	Cognitive restructuring
5	Unfounded judgments
6	Black-and-white thinking
7	Partial focusing
8	Overestimation and underestimation
9	Ought-thinking
10	Extreme generalization
11	Self-association
12	Emotional reasoning
13	Self-fulfilling prophecy
14	Listening to clients
15	Problem-solving
16	Brainstorming

Study 2

Purpose

This study attempts to examine the reliability and validity of the KCCTN developed in Study 1, which can serve as an indicator for the effectiveness of knowledge regarding CBT for nursing professionals.

Methods

Subjects

In this study, 300students were included from a nursing college, and 100 randomly selected students were re-examined four weeks later. Additionally, 50 nurses working in hospitals were selected as the intervention group and trained in CBT. Furthermore, 100 undergraduate students who had not received training in CBT comprised the control group, and the KCCTN scores of each group were compared.

Although nurses should be used as controls, it has proven to be difficult given their busy schedules. Conversely, undergraduate students have been selected because basic education on CBTis rarely provided in nursing education programs.

Presumably, no difference in knowledge of CBT exists between nurses and nursing college students; hence, nurses were assigned to the intervention group, and nursing college students were assigned to the control group.

Data Collection Period

The data was collected from April 1, 2015, to August 31, 2016.

Data Collection Method

Study Procedure. Nursing college students located in the Kansai area were enrolled in this study, which was conducted during breaks between lectures. The nurses in the intervention group were recruited from 10 hospitals that were randomly selected from acute care hospitals situated in the Kansai area with more than 400 beds. At the three hospitals where consent was obtained, we went to a training session for nurses hosted by the hospitals and asked mid-career nurses with five or more years of clinical experience to participate in the study. Afterward, nurses in the intervention group were subjected to a group session

of CBT once a week for a total of three sessions and were evaluated before and after the intervention. The data were anonymously processed and matched before and after the intervention through an Identity Document (ID).

Evaluation Indicators.

***A: Personal Attributes*.** Nursing college students were asked about their ID, age, and gender, whereas nurses were inquired about their ID, age, gender, department, education, and years of experience.

***B: KCCTN*.** The KCCTN developed in Study 1 was used, which is a 16-item questionnaire constituting questions concerning possible human relationships and cognition in interpersonal support situations.

***C: KBPAC*.** Although the shortened version was used in this study[10], the KBPAC was originally invented which consists of 50 questions[7]. The shortened version, however, comprises 25 questions.

Analytical Assumptions

To examine the reliability and validity of the KCCTN, the following analytical assumptions were made. For reliability, the alpha coefficient should be 0.70 or greater[21], and the intraclass correlation coefficient (ICC) should be between 0.81 and 1.00, appearing in the range of "almost perfect"[22]. As for validity, we attempted to demonstrate that there was no correlation between the KBPAC and the KCCTN since the acquisition of knowledge concerning both cognitive change and behavioral change are assumed to be independent. Besides, there was a connection between the intervention group that underwent cognitive-behavioral therapy and the control group, highlighting a significant increase of correct answers in the intervention group.

Method of Analysis

A cross-sectional study on nursing college students was performed for items A through C. For A and B, a second survey was conducted four weeks after the first survey to ensurere test reliability. Also, the nurses at the hospitals were evaluated using A and B before and after the CBT intervention.

Examining Reliability. Cronbach's alpha were estimated to validate each question's internal consistency, and Cronbach's alpha were checked when items were deleted from each question to scrutinize items and enhance the holistic reliability of the test. To ascertain reproducibility, a second survey was implemented four weeks after the first survey to determine the ICC employing the data regarding the number of correct answers before and after the KCCTN of the successfully matched nursing college students.

Examining Validity. The correlation coefficient between the KCCTN and KBPAC was calculated to check the validity of the constructs of the KCCTN. Since these constructs appertain to different knowledge systems, we presumed that discriminant validity could be confirmed. Also, to ensure interaction between the CBT intervention group and the control group and if an improvement in the percentage of correct answers in the intervention group was evident, we utilized a two-factor analysis of variance with timing and group as the independent variables and the KCCTN score as the dependent variable. For the intervention group, the percentage of correct answers for each question was compared using the chi-square test before and after the intervention.

Results and Discussion

The questionnaire was administered to 300 students from a nursing college, and 260 students (28 males and 232 females, mean age 19.74±2.64 years) responded to the questionnaire (i.e., response rate: 86.7%). The questionnaire was circulated again four weeks later among 100 students from the initial 260 respondents, and 88 students (8 males and 80 females) responded to the questionnaire. Altogether, 76 students who were matched before and after the questionnaire were included in the analysis. Besides, we asked 50 nurses working at the hospital and obtained consent from 30 nurses (2 males and 28 females) for participation in the CBT training. The mean age of the nurses was 30.53±5.35 years, Furthermore,22 nurses reported having vocational school qualifications, two nurses had an associate's degree, five nurses had a bachelor's degree, and one nurse was a postgraduate. The mean years of clinical experience were 6.70±3.92 years, with nine nurses in medical wards, 10 nurses in surgical wards, three nurses in outpatient departments, three nurses in operating rooms, four nurses in obstetrics and gynecology, and a single nurse in pediatrics.

Cronbach's alpha was calculated to check the reliability of the KCCTN, and 0.63. We also measured Cronbach's alpha when items were removed from each question, discovering a range between 0.61 to 0.64 for all questions (refer to Table 2). Generally, Cronbach's alpha of 0.70, or higher, signifya high degree of internal consistency, and scales below 0.50 should be reviewed[21].Thus, we believe that reasonably high levels of reliability were obtained, even though they were not perfectly satisfactory. The ICC was calculated using the data of the number of correct answers before and after the KCCTN among successfully matched nursing college students (r=0.65, p<0.01). According to Landis and Koch's[22] grading criteria for the ICC, a range of 0.61 to 0.80 is considered "substantial." Although not perfectly satisfactory, we were able to affirm a reasonably high level of reliability (refer to Table 3).

To inspect the validity of the constructs, we calculated the correlation coefficient between the KCCTN and KBPAC and found no correlation(r = 0.05; not significant) (refer to Table 4). Accordingly, the knowledge of cognitive therapy measured by the KCCTN, and the knowledge of learning theory gauged by the KBPAC refer to different constructs, and therefore, the discriminant validity of the two tests was confirmed.

The hospital nurses were assigned to the intervention group (nurses N=30), wherein CBT was implemented, and nursing students were placed in the control group (nursing students N=76) that was devoid of intervention. A two-factor ANOVA was implemented, with timing and group as the independent variables and the KCCTN score as the dependent variable. The results revealed a significant interaction between the timing of the intervention and the group (F [1, 210] = 9.29, p < 0.01) (refer to Table 5). The simple main effect analysis also specified a significant difference between the pre- and post-intervention periods in the "intervention group" (F [1, 210] = 14.53, p < 0.01).

Moreover, to explicate the changes in the specific questions of the KCCTN due to the CBT intervention, a chi-square test examined the percentage of correct answers before and after the intervention. The findings displayed significant improvements in "partial focusing" (χ^2[1]=3.75, p<0.05), "overestimation/ underestimation" (χ^2[1]=15.56, p<0.01), "extreme generalization" (χ^2[1]=6.67, p<0.10), "listening" (χ^2[1]=5.19, p<0.05), and "brainstorming" (χ^2[1]=8.52, p<0.05) (refer to Table 6). No significant difference was determined in other questions, but an overall improvement in the percentage of correct answers was confirmed. Therefore, CBT increased the percentage of correct answers, establishing the validity of the constructs.

Table2 Cronbach's alpha when items were removed from each question

No	Item contents	Cronbach's alpha coefficient
1	Cognition	.64
2	Automatic thoughts	.63
3	Schemas	.64
4	Cognitive restructuring	.62
5	Unfounded judgments	.62
6	Black-and-white thinking	.61
7	Partial focusing	.63
8	Overestimation and underestimation	.62
9	Ought-thinking	.61
10	Extreme generalization	.62
11	Self-association	.61
12	Emotional reasoning	.63
13	Self-fulfilling prophecy	.62
14	Listening to clients	.61
15	Problem-solving	.63
16	Brainstorming	.63

Table 3 Intraclass correlation coefficient (ICC)

	95% Confidence interval	
Intraclass correlation	Lower	Upper
0.61**	0.45	0.74

** p<.001

Table 4 Correlation coefficient of KCCTN and KBPAC

	KCTN	KBPAC
KCCTN	1	0.05 n.s
KBPAC	0.05 n.s	1

n.s:nonsignificant

Table5 Changes in KCCTN due to cognitive behavioral therapy

	Intervention group (N=30)				Control group (N=78)					
	Pre		Post		Pre		Post		Interaction	Time
	M	SD	M	SD	M	SD	M	SD	F	F
KCCTN score	10.17	2.18	12.40	2.16	7.85	2.40	7.97	2.21	9.29**	11.68**

** p<.001

Table 6 Changes in the specific questions of the KCCTN due to the CBT intervention

NO	Pre	Post	χ^2	P
1	15%	17%	1.65	0.78
2	8%	8%	1.34	1.00
3	22%	28%	0.02	0.30
4	42%	42%	0.00	1.00
5	47%	48%	1.34	1.00
6	50%	50%	0.00	1.00
7	35%	45%	0.50	0.05
8	23%	47%	0.14	0.00
9	47%	48%	2.06	0.55
10	33%	47%	2.59	0.01
11	38%	45%	0.05	0.17
12	23%	32%	0.47	0.19
13	38%	40%	1.31	0.75
14	38%	48%	1.28	0.02
15	20%	30%	4.67	0.12
16	28%	45%	0.02	0.00

Overall Discussion

The KCCTN was highlighted as an effective checklist to measure knowledge of the cognitive aspects of CBT, and hence can be used to indicate the effectiveness of relevant training sessions. The purpose of Study 1 was to develop a cognitive therapy checklist used as an indicator of the effectiveness of the nurses' CBT training. Subsequently, 16 items were selected to devise the cognitive therapy checklist. Meanwhile, Study 2 addressed the reliability and validity of the KCCTN as an indicator of the effectiveness of the respective training for nurses. Based on the results of Study 2, Cronbach's alpha were calculated to check the reliability of the KCCTN. Cronbach's alpha was checked when items were deleted from each question to appraise the items and enhance the overall reliability of the test. The results proved that the alpha for all questions ranged between 0.61-0.64. Using the number of correct answers before and after the KCCTN among the successfully matched nursing college students, the ICC was calculated and indicated a reasonably high level of reliability, although not perfectly satisfactory. Contrarily, the validity of the constructs was confirmed by the fact that the KCCTN and the KBPAC were uncorrelated and that the number of correct answers improved in the intervention group that received training in CBT as opposed to the control group. Hence, it is reasonable to assume that the reliability and validity of the KCCTN were confirmed.

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Ethical clearance : This study was conducted after obtaining approval from the Ethics Review Committee of the author-affiliated university.

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