

REVIEWS

Scales used to evaluate critical thinking in nursing graduation

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ABSTRACT

Objective: To analyze the scales used to measure critical thinking in undergraduate nursing students.

Methods: Scoping review guided by Joanna Briggs Institute recommendations. Search carried out in November/2021 in five databases and two libraries. Descriptive data analysis.

Results: Final sample had 57 articles. 91% (n = 53) adopted a validated scale to measure critical thinking in nursing students, and 9% (n = 4) combined two of them. California Critical Thinking Disposition Inventory, California Critical Thinking Skills Test, and Health Science Reasoning Test were the most used scales. Studies with beginners prevailed, and there were several contexts and research themes. Simulation and concept mapping were the most evaluated teaching strategies, and 59.6% (n = 34) identified an increase in critical thinking after the intervention.

Conclusions: Nursing managers and educators have 17 validated scales available to measure critical thinking, a fundamental element of clinical practice.

Key Words: Critical thinking, Nursing baccalaureate, Nursing education, Scales

1. INTRODUCTION

Nursing education has been challenged to respond to society's needs, which have been constantly changing. To obtain better results in the clinic and in health management, the cognitive, attitudinal, and instrumental development of the future professional is necessary.^[1] According to educators, the development of nursing undergraduates' critical thinking is fundamental for their clinical practice^[2-4] and it is closely related to their writing skill.^[5]

Critical thinking (CT) refers to the application of the best evidence for decision making.^[6] Developing the CT in nursing education enables the enhancement of nurses' skills, thinking and attitudes in their practice.^[7,8] The practice and engagement in the CT skills provide the intrinsic and

necessary motivation so that students actively face life issues^[9] and, consequently, professional ones. Teaching such skills entails motivating students to achieve higher levels of proficiency and independence, apart from training them to achieve the goals.^[10] Therefore, developing CT is essential in the process of professional education.

Nursing educators have struggled to identify teaching strategies to develop CT among nursing undergraduates, and also adopt validated scales for its measurement.^[3,11] There is global concern on how challenging and complex it is to assess nursing undergraduates' clinical competence.

The National League for Nursing,^[12] in its document of research priorities between 2020 and 2023 for building the Science in nursing education, points out the need to assess

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innovative teaching strategies, learning and emerging technologies, evaluation methods, better practices for clinical education, and demonstration of the relations between teaching efficiency and student's learning, among others. There is the need for systematic processes, consistent, valid and reliable instruments to assess the competence of nursing students in clinical practice.^[13]

There are validated scales to measure critical thinking, such as California Critical Thinking Disposition Inventory (CCTDI), California Critical Thinking Skills Test (CCTST), and Health Science Reasoning Test (HSRT), which use subscales and total score to measure CT. The subscales evaluate the skills and predispositions for critical thinking, while the general score quantifies the strength of such thinking. These scales are adopted worldwide, primarily abroad, as part of the hiring selective process among health institutions, selection criteria in postgraduation programs, and as a tool for undergraduates' evaluation in several areas of knowledge and curricula.

Measuring CT development is important to show the change along the time, as well as the efficiency of teaching strategies.^[14] Therefore, it is essential to know the scales adopted in nursing graduation worldwide, how they are used, what results have been achieved, in order to understand their relevance in teaching, apart from providing systematic knowledge on the theme to education managers and nursing educators.

Keeping in mind the need to develop CT among nursing students and use reliable scales for global measurement, and measurement of the related skills and behaviors, this study aimed to analyze the validated scales used to measure critical thinking among students from nursing graduation.

2. METHOD

Scoping review guided by Joanna Briggs Institute Reviewer's Manual for Scoping Reviews,^[15] registered in the Open Science Framework (OSF) and presented according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR). This method is useful to examine emerging evidence on a certain issue.^[16] It is recommended as preceding a systematic review, and to identify the types of available evidence in a certain field, to analyze knowledge gaps, to examine how research is conducted on a certain topic or field, to identify and elucidate the main traits or factors related to a concept/definition in literature.^[17]

The following steps were used to carry out the review: identification of the guiding question; identification of relevant studies; selection of studies; mapping of information; group-

ing, summary, and report of results.^[15]

The acronym PCC was used for the study design, in which P (population) stands for the nursing students; C (concept) corresponds to the validated scales for measuring critical thinking; and C (context) corresponds to nursing graduation. The research question was: What are the validated scales and how are they used to measure critical thinking among undergraduated nursing students?

The search was conducted in November 2021 in the following databases: Medical Literature and Retrieval System Online (MEDLINE), via PubMed; Cumulative Index to Nursing and Allied Health Literature (CINAHL); Scopus (Elsevier); Embase (Elsevier); Web of Science (Clarivate). Supplementary search was conducted in Cochrane CENTRAL and Latin American and Caribbean Health Sciences Literature (LILACS).

The search strategy was: ("Education, Nursing, Baccalaureate" OR "Baccalaureate Nursing Education" OR "Baccalaureate Nursing Educations" OR "Education, Baccalaureate Nursing" OR "Educations, Baccalaureate Nursing" OR "External Degree Programs, Nursing" OR "Nursing Education, Baccalaureate" OR "Nursing Educations, Baccalaureate" OR "Education, Nursing, Diploma Programs" OR "Diploma Program, Nursing" OR "Diploma Programs, Nursing" OR "Nursing Diploma Program" OR "Nursing Diploma Programs" OR "Nursing Education, Diploma Programs" OR "Program, Nursing Diploma" OR "Programs, Nursing Diploma" OR "Undergraduate" OR "Baccalaureate") AND ("Nursing" OR "Nursings" OR "Education, Nursing" OR "Educations, Nursing" OR "Nursing Education" OR "Nursing Educations" OR "Students, Nursing" OR "Nurse, Pupil" OR "Nurses, Pupil" OR "Nursing Student" OR "Nursing Students" OR "Pupil Nurse" OR "Pupil Nurses" OR "Student, Nursing") AND ("Models, Educational" OR "Educational Model" OR "Educational Models" OR "Instructional Model" OR "Instructional Models" OR "Model, Educational" OR "Model, Instructional" OR "Models, Instructional" OR "Teaching Skills" OR "Skills" OR "Skill" OR "Techniques") AND ("Critical thinking skills" OR "Critical thinking skills for students" OR "Evaluative Thinking" OR "California Critical Thinking Disposition Inventory" OR "California Critical Thinking Skills Test" OR "Watson-Glaser Critical Thinking Appraisal" OR "Health Science Reasoning Test").

After conducting the search, primary studies, published in any language and full available, were included. Thus, studies with experimental and quasi-experimental design were considered, including essays on randomized and non-randomized controlled trials, before and after studies, time

series; and analytical and descriptive observational studies, prospective and retrospective cohort studies, case-control, cross-sectional studies, case series, and individual case reports.

Excluded articles were as follows: opinion articles, editorials, theoretical essays, reflective studies and reviews, theses, qualitative research studies, such as grounded theory, phenomenology or ethnography with participants' emerging theme; research studies which did not use a standardized scale or reported the elaboration or validation of a scale; studies with a population from other professional fields (dentistry, occupational therapy, psychology, medicine, physical therapy and others) or already graduated nurses. Due to the authors' incapability of understanding and difficulty in translation, publications in Arab, Chinese, Persian and Korean were excluded.

Initially, a time limit was not set. However, during the process of data extraction and analysis, methodological and theoretical inconsistencies, regarding the use of scales to measure CT, was observed in earlier studies, thus, it was decided to include in this review studies published from 2010 on.

Results from searches of the databases and libraries were exported to Mendeley reference manager for duplicate removal. The remaining bibliographical references were exported to the Rayyan application. Reviewers' blinding in the first step of the selection of the studies was considered to reduce se-

lection biases.

The studies selection was conducted by two reviewers who firstly analyzed titles and abstracts, and subsequently read the full studies to check and if they answered the guiding question, and applied the inclusion criteria. Thus, the reviewers selected the studies independently, followed by the verification of any disagreements, which should come to a consensus. Disagreements between these reviewers were solved by a third reviewer. The reviewers of all the study steps were named as the authors of this manuscript.

For data extraction, a structured instrument containing the following variables was applied: publication data (title, year, authors, journal), objective, study design, population and sample, country of origin, scale used for measuring critical thinking, time and amount of scale applications, study context, teaching strategy, result (measurement of conclusions and main findings or contributions).

The reviewers mapped the data independently, discussed the results and continuously updated the data mapping formulary in an interactive process, according to the recommendation of the JBI.^[15] Microsoft Excel flowchart was used for data tabulation, descriptively presented (n and %) in tables and charts.

3. RESULTS

A total of 2,762 publications were identified in the search, and 57 were included in this scoping review.

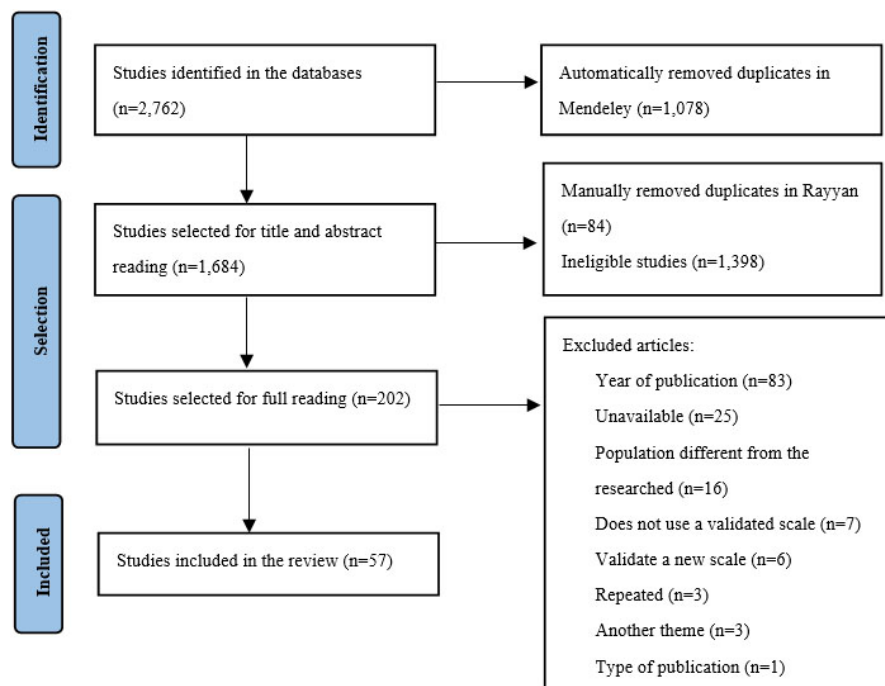


Figure 1. PRISMA-ScR (adapted) flowchart of the selection process of the studies

Recent publications prevailed, particularly from the past five years ($n = 37$; 65%), which shows the increasing interest in the theme. The Asian continent accumulated the greatest number of publications. China ($n = 9$; 15.8%), Iran ($n = 8$; 14%) and South Korea ($n = 6$; 10.5%) were the Asian countries which released more studies on the theme. Among the American countries, the United States ($n = 9$, 15.8%) and Brazil ($n = 5$; 8.8%) presented the highest number of publications. Nurse Education Today was the most selected journal by the researchers, who preferably forwarded their studies to journals of Education and Social Sciences areas ($n = 26$; 45.6%) or Nursing ($n = 23$; 40.4%).

Regarding the research method, experimental models ($n = 10$; 17.2%) and quasi-experimental models ($n = 25$; 43.1%), including the randomized clinical trials ($n = 5$; 8.6%) were the most used. Among the observational studies, cross-sectional ($n = 8$; 13.8%) and longitudinal ($n = 3$; 5.2%) designs prevailed.

From 57 reviewed studies, 52 (91%) adopted a validated scale to measure critical thinking among nursing undergraduates, and 5 (9%) combined two scales. Some studies ($n = 11$; 19.3%) assessed other cognitive or behavioral skills rather than CT, such as self-confidence, emotional intelligence, cognitive skill, metacognitive awareness, and learning style. Although they were included in this review, only the CT-related results were considered.

The most used scales in an isolated way were California Critical Thinking Disposition Inventory ($n = 15$; 28.8%), California Critical Thinking Skills Test ($n = 13$; 25%), and Health Science Reasoning Test ($n = 6$; 11.5%). The California Critical Thinking Disposition Inventory was the chosen scale in studies that combined more than one scale ($n = 5$; 100%).

Tables 1 and 2 showed the studies profile regarding number of participants, course term, study theme or context, teaching strategy used, frequency of scale application and results. Table 1 contemplates studies which applied a single scale, while Table 2 shows studies with two applied scales. The scales identified in a single study were jointly analyzed.

In all, 7,608 participants were added up in this scoping review, mean of 133 and median of 102 participants per study. Regarding the course term, 26.3% ($n = 15$) were beginners, 14% ($n = 8$) were intermediate, and 15.8% ($n = 9$) were concluding their course. Some studies assessed all students ($n = 9$, 15.8%), or mixed groups, that is, groups of beginners and final year students ($n = 2$, 3.5%), beginners and intermediate students ($n = 3$, 5.3%), intermediate and final year students

($n = 3$, 5.3%).

There was a diversity in the study theme and context. In 21.1% ($n = 12$) of the studies, a general assessment of the course or a certain academic term was performed; 12.3% ($n = 7$) of the studies applied the scale during the internship, 3.5% ($n = 2$) assessed the course curriculum or the laboratory classes. Other publications assessed the CT development with the application of a teaching strategy ($n = 10$, 17.5%), or in a specific discipline or study theme, such as urgency and emergency ($n = 7$, 12.3%), adult health ($n = 4$, 7%), surgical nursing ($n = 2$, 3.5%), pediatrics ($n = 2$, 3.5%), maternal and child nursing ($n = 2$, 3.5%).

About 73.7% ($n = 42$) of the studies assessed the influence of the application of a certain teaching strategy on the CT development. Simulation ($n = 13$, 22.8%), concept mapping ($n = 9$, 15.8%), case-based learning ($n = 5$, 8.8%), and problem-based learning (PBL) ($n = 4$, 7%) were the most frequent strategies. 77.2% ($n = 44$) of the studies applied the scale before and after the intervention (teaching strategy).

Concerning the study result, 59.6% ($n = 34$) evidenced increase in CT after the intervention; 12.3% ($n = 7$) did not verify any significant differences before and after the intervention; 10.5% ($n = 6$) associated CT to other skills, such as clinical judgement, emotional intelligence, mental self-support, moral sensitiveness, cognitive skill, and motivation. In 5.3% ($n = 3$), CT was considered poor; in 5.3% ($n = 3$), there was positive correlation between CT and academic performance or in the exam approval for registered nurse; in 3.5% ($n = 2$), no correlation was verified between CT and other skills; in 1.8% ($n = 1$), there was statistical difference in CT between the compared groups (undergraduates from the 1st and 3rd years), and in 1.8% ($n = 1$), CT varied according to the intervention exposure (teaching strategy).

4. DISCUSSION

This scoping review identified seventeen validated scales to measure critical thinking in Nursing teaching in fifty-seven studies. From those, ten scales (17.54%) were applied to a single study, as follows: Critical Thinking Questionnaire;^[60] InterEd Critical Thinking Nursing Instrument;^[61] Critical Thinking Scale (CTS);^[62] Critical Thinking Self-Assessment Scale (CTSAS);^[63] Critical-Thinking Scale (CTS) from MacMaster University;^[64] Ennis-Weir Critical Thinking Test;^[65] Critical Thinking Motivational Scale;^[66] Critical Thinking of Clinical Nurses;^[67] Instrument to Measure Critical Thinking Skills (Instrumento para Medir Destrezas de Pensamiento Crítico);^[68] Cambridge Thinking Skills Assessment (TSA).^[69]

Table 1. Studies that used a scale to measure critical thinking regarding number of participants, course term, research context or theme, teaching strategy, frequency in the application of the scale and results by type of scale, Brazil, 2022

Population	f	%	Context/theme	%	Teaching strategy	f	%	Result	f	%	
California Critical Thinking Disposition Inventory (CCTDI)^[18-32] (n = 15 studies; 3145 participants)											
Beginners	3	20.0	Course evaluation	7	46.7	Case-based learning	5	33.3	Increase in CT post-intervention	9	60.0
Intermediates	5	33.3	Internship	3	20.0	Simulation	2	13.3	Association between CT and other skills	2	13.3
Final year students	1	6.7	Teaching strategy	3	20.0	Practical collaborative learning	1	6.7	There was difference in CT between the compared groups	1	6.7
Beginners and intermediates	1	6.7	Maternal nursing	1	6.7	Reflective training	1	6.7	There was no correlation between CT and other skills	1	6.7
All students	3	20.0	Urgency/emergency	1	6.7	Do not use or evaluate	6	40.0	There was no significant difference before and after intervention or between the compared groups	1	6.7
Not specified	2	13.3						CT considered weak	1	6.7	
	15	100		15	100		15	100	15	100	
California Critical Thinking Skills Test (CCTST)^[33-45] (n = 13 studies; 928 participants)											
Beginners	1	7.7	Course evaluation	3	23.1	Concept mapping	4	30.8	Increase in CT post intervention	8	61.5
Intermediates	3	23.1	Urgency/emergency	4	30.8	Problem-based learning (PBL)	2	15.4	There was no significant difference before and after the intervention or between the compared groups	2	15.4
Final year students	2	15.4	Internship	2	15.4	Simulation	2	15.4	CT considered weak	2	15.4
Beginners and Intermediates	1	7.7	Teaching strategy	2	15.4	Portfolio	1	7.7	CT association to other skills	1	7.7
Beginners and final year students	1	7.7	Intensive care	1	7.7	Social problem-solving skills	1	7.7			
Intermediates and final year students	3	23.1	Pediatrics	1	7.7	Do not use or evaluate	3	23.1			
All students	1	7.7									
Not specified	1	7.7									
	13	100		13	100		13	100	13	100	
Health Science Reasoning Test (HSRT)^[46-51] (n = 6 studies; 827 participants)											
Beginners	3	50.0	Course evaluation	2	33.3	Simulation	3	50.0	Increase in CT post-intervention	2	33.3
Beginners and final year students	1	16.7	Teaching strategy	2	33.3	Problem-based learning (PBL)	1	16.7	Positive correlation between CT and academic performance	2	33.3
All students	1	16.7	Pediatrics	1	16.7	Objective Structured Clinical Evaluation – (OSCE)	1	16.7	Association between CT and other skills	1	16.7
Not specified	1	16.7	Laboratory classes	1	16.7	Do not use or evaluate	1	16.7	There was no significant difference before and after the intervention or between the compared groups	1	16.7
Mixed groups	6	100		6	100		6	100		6	100
Yoon's Critical Thinking Disposition Inventory (YCTDI)^[52-55] (n = 4 studies; 555 participants)											
Beginners	1	25.0	Internship	2	50.0	Simulation	2	50.0	Increase in CT post-intervention	2	50.0
Final year students	3	75.0	Urgency/emergency	1	25.0	Mental mapping	1	25.0	Association between CT and other skills	1	25.0
			Teaching strategy	1	25.0	Do not use or evaluate	1	25.0	Varianbility in the CT according to the intervention exposure	1	25.0
	4	100		4	100		4	100	4	100	
Health Education Systems, Incorporated (HESI) test (HESI CT)^[56-57] (n = 2 studies, 193 participants)											
Beginners	1	50.0	Exam for Registered Nurses (NCLEX-RN)	1	50.0	Concept Mapping	1	50.0	Increase in CT post-intervention	1	50.0
All students	1	50.0	Physiopathology and Pharmacology classes	1	50.0	Do not use or evaluate	1	50.0	Positive correlation between CT and approval in the NCLEX-RN exam	1	50.0
	2	100		2	100		2	100	2	100	
Critical Thinking Disposition Scale (Kwon et al., 2006)^[58-59] (n = 2 studies; 236 participants)											
Beginners	1	50.0	Adult health	1	50.0	Flipped classroom	1	50.0	Increase in CT post-intervention	1	50.0
Not specified	1	50.0	Learning behavior	1	50.0	Do not use or evaluate	1	50.0	Association between CT and other skills	1	50.0
	2	100		2	100		2	100	2	100	
Other scales^[60-69] (n = 10 studies; 1278 participants)											
Beginners	3	30.0	Surgical nursing	2	20.0	Concept mapping	4	40.0	Increase in CT post-intervention	9	90.0
Final year students	2	20.0	Teaching strategy	2	20.0	Combined strategies	2	20.0	There was no significant difference before and after intervention or between the compared groups	1	10.0
All students	2	20.0	Fundamentals of Nursing	1	10.0	Simulation	2	20.0			
Not specified	3	30.0	Obstetrics	1	10.0	Training	1	10.0			
			Mental health	1	10.0	Do not use or evaluate	1	10.0			
			Nursing curriculum	1	10.0						
			Chronic diseases	1	10.0						
			Adult health	1	10.0						
	10	100		10	100		10	100	10	100	

Legend: CT = critical thinking

The most applied scales, in a single or combined way were California Critical Thinking Disposition Inventory (CCTDI) (n = 18; 31.57%), California Critical Thinking Skills Test (CCTST) (n = 15; 26.31%) and Health Science Reasoning

Test (HSRT) (n = 7; 12.28%). Systematic review^[14] corroborates the finding, in which 57% of the CT assessments applied the CCTDI, CCTST and HSRT scales.

Table 2. Studies that used two scales to measure critical thinking regarding number of participants, course term, research context or theme, teaching strategy, frequency of application of the scale and results, Brazil, 2022

Population	f	%	Context/ theme	f	%	Teaching strategy	f	%	Result	f	%
California Critical Thinking Dispositions Inventory (CCTDI), California Critical Thinking Skills Test (CCTST) ^[70-72] (n = 3 studies; 214 participants)											
California Critical Thinking Disposition Inventory (CCTDI), Holistic Critical Thinking Scoring Rubric (HCTSR) ^[73] (n = 1 study; 132 participants)											
California Critical Thinking Disposition Inventory (CCTDI), Health Science Reasoning Test (HSRT) ^[74] (n = 1 study; 100 participants)											
Beginners	2	40	Adult health	2	40	Simulation	2	40	Increase in CT post-intervention	2	40
Beginners and intermediates	1	20	Urgency/emergency	1	20	Problem-based learning (PBL)	1	20	There was no significant difference before and after the intervention or between the compared groups	1	20
Final year students	1	20	Simulation performance	1	20	Reflective writing	1	20	There was no correlation between CT and other skills	1	20
Not specified	1	20	Nursing diagnoses	1	20	Do not use or evaluate	1	20	There was no significant difference before and after the intervention or between the compared groups	1	20
	5	100		5	100		5	100		5	100

Legend: CT = critical thinking

There was prevalence of recent publications on CT assessment. The assessment of nursing students' competence in clinical practice was researched by Immonen et al.^[13] in a systematic review of reviews. The authors pointed out that the tools used to assess students' nursing competence focus on critical thinking and other domains of professional attributes, as ethical practices, communication, and interpersonal relationships.^[13]

Recent research,^[75,76] as well as this one, indicate a predominance of experimental or quasi-experimental studies. In this scoping review, only five randomized clinical trials were identified. Bensley and Murtagh^[77] proposed guidelines on the best study designs to evaluate CT. These guidelines established methods for planning, conducting, and using a scientific approach to critical thinking assessment, as they presented practical examples.

Most studies chose for internationally renowned validated scales, primarily applied to beginners (n = 15 studies). Apart from CT, other cognitive skills were assessed. Among the teaching strategies, simulation and concept map-

ing stood out. Nine out of thirteen studies, which assessed simulation, concluded that it favored CT development.^[18,20,44,46,50,53,63,68,73] Similar result was also found in other studies.^[78,79] Two studies did not find any significant differences before and after simulation.^[47,70] Similarly, investigations report no evidence to state that it fosters CT development, despite the frequency that simulation is adopted.^[80,81] Eight out of ten studies, which evaluated concept mapping, evidenced increase in critical thinking after the intervention.^[40,42,52,57,62,65,66,69] In a similar way, other articles^[7,82] showed positive results regarding the use of concept mapping in CT development, including meta-analysis of systematic review.

The scales were applied in varied contexts, from the evaluation of a course or term, disciplines, and themes (adult health, pediatrics, obstetrics, mental health, emergency, intensive care, among others) to the evaluation of some teaching strategies. This result corroborates research conducted in eight countries (Bolivia, Brazil, Colombia, Ecuador, Spain, Mexico, Peru and Venezuela), which assessed CT in nursing

curricula, and concluded that it is addressed, under various nominations, in most curricula.^[83] In addition, another study, which assessed nursing programs in the Andes region, identified that CT is considered a cognitive, communicative and personal skill.^[4] There are other investigations on CT in mental health,^[84] in intensive and medical-surgical,^[85] and in surgical nursing.^[86,87]

The Critical Thinking Disposition Inventory (CCTDI), California Critical Thinking Skills Test (CCTST) and Health Science Reasoning Test (HSRT) are the scales most renowned worldwide, commercialized by the same company (Insight Assessment), and have in common their origin in the Delphy report. This report, published in 1990, is the synthesis of an agreement among experts led by Peter Facione, CT philosopher and scholar. The team created the CT concept, aiming to guide curriculum, instruction, and assessment development.^[88] This document is classical, even currently cited and used by experts on the theme. CCTDI and CCTST scales were elaborated by Facione, individually or in partnership with another author, aiming to apply them to nursing teaching

and research.^[89] Regarding the HSRT Scale, it was designed to assess CT skills among students and professionals^[90,91] within the health area.

Another scale used in the studies was the Yoon’s Critical Thinking Disposition Inventory (YCTD). This scale was developed by Yoon^[52] to measure CT among nursing undergraduates. It consists of 27 items and assesses seven CT domains: self-confidence, intellectual curiosity, intellectual fairness, objectivity, prudence, healthy skepticism, systematically. The scale reliability was tested by using Cronbach α coefficient among Korean nursing students and evidenced high reliability in several studies. The statements are presented in Likert scale, variability from one to five points, in which one means strong disagreement and five strong agreement. Scoring is calculated as the median and standard deviation to each subscale and in total; higher scores point to greater CT skill.^[52,53,55]

Table 3 shows the main characteristics of the four most used scales in the studies.

Table 3. Characteristics of the most used scales to measure critical thinking found in this study

NAME AND ACRONYM	SUBSCALES/DOMAINS	NUMBER OF QUESTIONS	RESULT	LICENSE
California Critical Thinking Disposition Inventory (CCTDI)	Truth-seeking, open-mindedness, analicity, systematicity, self-confidence, inquisitiveness and maturity	75	Strong positive, positive, inconsistent, negative and strong negative	All rights reserved
California Critical Thinking Skills Test (CCTST)	Analysis, interpretation, evaluation, inference, explanation, deduction, and induction	34	Superior, strong, moderate, weak, not manifested	All rights reserved
Health Science Reasoning Test (HSRT)	Inference, induction, deduction, analysis and evaluation.	33	Superior, strong, moderate, not manifested	All rights reserved
Yoon's Critical Thinking Disposition Inventory (YCTD)	Self-confidence, intellectual curiosity, intellectual fairness, objectivity, prudence, healthy skepticism and sistematicity.	27	Likert Scale ranging from 1 to 5 (1- strongly disagree, 5 – strongly agree)	All rights reserved

Most scales have rights reserved, that is, they are author’s ownership and authorship (Yoon) or an institution (Insight Assessment) distributes, commercializes, and updates them. In case of the YCTD, a study^[53] mentioned that its use was requested to the author. No evidence was found on its commercialization. It is basically used in nursing research.

CCTDI, CCTST and HSRT scales are broadly used for different purposes. Whenever they are used in a selection process, applicants usually pay to undergo the tests and present them to the recruiting institutions. On the other hand, teaching institutions and researchers buy the access to the instruments to apply them in their local reality. Charging is usually per-

formed by the number of tests, and price is unitary. The company releases printed or online versions and provides the results (global and subscales scores). Their price is different for the use in academic research.

Critical thinking and clinical reasoning underpin clinical judgement or decision-making, and are essential in clinical practice, having to be identified by validated methods among novice nurses.^[92] As CT subsidizes the different steps of the nursing process, it is relevant that Higher Education fosters its development to support nurses’ professional practice. Critical thinking is recommended to integrate nursing curriculum.^[4]

In addition, the CT contributes to autonomy and enables the prediction and provision of actions, materials and working conditions that contribute to optimization of assistance and care management.^[93] Thus, the evaluation of the CT is also important for managers, especially on the selection of professionals for the health team, who must be decision makers and seek to results.

5. CONCLUSION

It is essential for managers and nursing graduation institutions to be concerned with future healthcare professionals' competence. The assessment of nurses' clinical competence is a theme of global interest, and critical thinking evaluation is one of the fundamental elements for accurate decision-making.

This review contributed to a group of publications regarding critical thinking scales in nursing and to describe how they have been used in the area. Simulation and concept mapping stand out as relevant strategies in critical thinking development.

Nursing managers and educators have several scales available to measure critical thinking. However, there is a need to request funding for research or pay for the use in selection processes, due to their reserved rights. Critical thinking significance is pointed out in professionals' education for clinical practice.

CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest.

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