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# Research capacity in nursing: a concept analysis based on a scoping review

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## Article Summary

### Strengths and limitations of this study:

◆The strengths are the use of Pragmatic Utility method based on a scoping review, the search of six major database, the data extraction based on tracking system table developed by Weaver and control for bias using two researchers and check by the third researcher.

◆This paper is not limited to simple concept anatomy description, it fully discussed the concept based on many ideas emerged from a comprehensive review of relevant literature.

◆This concept analysis did not include literature from other disciplines, so we caution against generalizing the results of this study to other discipline contexts.

◆Only studies published in English were included.

## ABSTRACT

**Objective:** Research capacity in nursing is increasingly important with the development of the nursing discipline/profession and evidence-based nursing practice. However, research capacity in nursing is still commonly used as a buzzword, without a consistent and clear definition. The purpose of this study is to make a concept analysis based on a scoping review to advance theory, research and intervention related to research capacity in nursing.

**Design:** A concept analysis based on a scoping review.

**Data sources:** PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, Scopus, Web of Science, ProQuest Dissertations & Theses (PQDT).

**Eligibility criteria:** Qualitative, quantitative, or mixed method studies and literature reviews focusing on research capacity in nursing published in English between 2009 and 2019.

**Results:** Research capacity in nursing is the ability to conduct nursing research activities in a sustainable manner in a specific context, normally used on a non-individual level. It is critical for the nursing discipline/professional development and positive patient/nurse/health care system outcomes.

**Conclusions:** This study provides not only the antecedents, attributes, boundaries, outcomes, and definition of research capacity in nursing, but also implications for instrument and intervention development of research capacity in nursing. This study could facilitate both researchers to develop instrument and intervention on research capacity in nursing and policymakers and nurse managers to propose and implement context-based policies and programs which could sustainably support nursing research capacity building.

## 1. Introduction

Research capacity has received a great deal of international attention in the nursing discipline/profession (Fullam et al., 2018, Kulage and Larson, 2018). One reason is that, with increasingly high demands and standards in nursing care, nursing has gradually become an independent scientific discipline requiring its own body of knowledge. Furthermore, with evidence-based practice spreading worldwide, nurses, as healthcare professionals, are responsible for delivering high-quality care based on the best available evidence (O'Byrne and Smith, 2011). The body of knowledge for nursing as a scientific discipline and credible evidence for evidence-based nursing practice are all based on a large number of high-quality nursing research studies, which require excellent research capacity in nursing (Polit and Beck, 2012). In the past three decades, many countries and organizations have made concerted efforts to develop and improve research capacity in nursing (Lode et al., 2015). However, research performance in nursing remains far below expectations (Fullam et al., 2018, Grossman, 2015), especially in developing countries (Tveit et al., 2015). The reasons are 1) nursing is a relatively new scientific discipline, with many areas requiring more research support, 2) the rapid development of the healthcare sciences is leading to more new areas in nursing, with emerging research needs and 3) there are many barriers and insufficient research on nursing research capacity building (McKee et al., 2017, Segrott et al., 2006).

To strengthen research capacity in nursing, related research is important in providing strong and substantial evidence for better interventions targeting research capacity in nursing. Although barriers and facilitators to improving research capacity in nursing have been identified (Segrott et al., 2006) and models for nursing research capacity building have been proposed (O'Byrne and Smith, 2011), these ideas are predominantly found in anecdotal papers, expert commentaries and case studies. Well-designed, reliable studies to evaluate the interventions implemented to improve nursing research capacity are still limited, and are

urgently required (McKee et al., 2017, O'Byrne and Smith, 2011). In order to address this need, a well validated, reliable instrument that measures research capacity in nursing is required. Before the instrument development can be undertaken, a clear definition and deep analysis of the concept are needed. Meanwhile, a better understanding of the concept would promote intervention construction and academic and policy communication on research capacity in nursing. A scoping review could help to explore the context in which the concept commonly used and improve the reliability of the concept analysis results. Therefore, the purpose of this paper is to conduct a concept analysis of research capacity in nursing based on a scoping review to explore its use and anatomy (antecedents, attributes, boundaries, outcomes, and definition).

## 2. Method

*Pragmatic Utility* is a meta-analytic technique used to synthesize literature and develop partially mature concepts by using the literature as a data source (Morse, 2016). Pragmatic Utility has its own strengths (i.e. extensive data, well-articulated criteria and procedures for concept evaluation and concept analysis, and intellectual processes of critical appraisal by asking analytical questions and synthesizing results holistically) to overcome limitations related to other concept analysis methods and to further promote concept analysis (Morse, 2016, Weaver and Mitcham, 2008).

In Pragmatic Utility, the researcher examines and appraises the definition, antecedents, attributes, outcomes and use of a partially mature concept in the literature by asking analytic questions, which could be used to deeply explore parts of authors' conceptualizations of a concept, then compare, contrast, and synthesize the data collected from the literature by answering analytical questions (Weaver and Morse, 2006). The antecedents, attributes, and outcomes of the concept could be identified and a definition could be developed through this process. Meanwhile, allied concepts related to the target concept may be found during the concept analysis, which could help to further clarify the boundaries of concepts and provide

implications for further studies (e.g. concept comparison of allied concepts). Antecedents are the conditions that always precede and give rise to the concept. Attributes are the characteristics of the concept present in all examples. Boundaries determine when a concept is or not an example of a certain concept. Outcomes are the results and consequences of the concept. Allied concepts are those concepts that closely resemble one another, and may even share some attributes, but are different and separate concepts in their own right (Morse, 2016). In order to include all relevant literature as the data source to improve the reliability of this study, we made the concept analysis using Pragmatic Utility based on a scoping review. The following procedures were used in this study to implement Pragmatic Utility based on a scoping review (Hawkins and Morse, 2014, Morse, 2016, Weaver and Morse, 2006):

**Clarification of the study purpose.** The clarification of this study's purpose is the first step in concept analysis and the premise of a literature search. The purpose of this study is to explore the concept of research capacity in a nursing context.

**Broad literature search and overview.** Based on the purpose of this study, we used "research capacity" AND "nursing OR nurse*" as key words in a literature search. Databases searched included the PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, Scopus, Web of Science, ProQuest Dissertations & Theses (PQDT). After duplicate checking, a total of 89 records remained in EndNote, which was the literature management software used in this study. Full-text available articles were read to obtain an overview of the literature on research capacity in nursing. During this process, an additional 15 papers were included through backtracking method. Through this step, we became familiar with the literature and ensured that we had enough pertinent literature to use Pragmatic Utility to conduct a concept analysis of research capacity in nursing. The specific information for this step can be found in Figure 1.

**Re-examination of the preliminary study aim in light of the literature.** After a broad

search and understanding of the literature, no clear definition or specific conceptual dimensions (antecedents, attributes and outcomes) of research capacity in nursing were found. Based on Morse's process and criteria (Morse et al., 1996) for concept maturity evaluation, research capacity in nursing was evaluated as a partially mature concept, in which case Pragmatic Utility was regarded as an appropriate method for concept analysis. Therefore, the purpose of this study was to explore the use and anatomy of research capacity in nursing using Pragmatic Utility method.

**Selection of appropriate literature.** After the literature review and study purpose determination, appropriate literature was selected for concept analysis. Inclusion criteria for the literature selection were: (1) published between 2009 and 2019 (to explore the most current use of the concept), (2) full-text accessible, (3) published in English, (4) the topic is research capacity in nursing, (5) qualitative, quantitative, or mixed method studies and literature reviews, and (6) not from the same research program as another study included in the analysis. Two researchers were responsible for literature selection. Finally, 22 articles were included for data analysis. The flowchart of the literature selection process for the concept analysis is shown as Figure 1.

**Reading the literature in detail and interpretatively.** Read selected literature in detail and interpretatively to recognize important information implicitly or explicitly showing the anatomy of the concept. The tracking system table developed by Weaver (Weaver and Morse, 2006) was used to document the information on definition, antecedents, attributes, outcomes and allied concepts of the targeted concept retrieved from the literature selected. We extracted a small part of this tracking system table as an example, shown as Appendix 1. The complete tracking system table may be acquired from the author upon request.

**Identification of analytical questions.** Analytical questions play a critical role in the analysis, which enables the comparison process to determine the conceptual dimensions of the

concept. The analytical questions emerge from an interpretative reading and a deep understanding of the major articles. The analytical questions derived by research group to elicit the nature of research capacity in nursing are shown in the "Analytical Questions" column in Table 1.

**Recording responses on a data collection sheet.** A matrix (the first two columns of Table 1) was created to organize the responses to the analytical questions across dimensions and then recognize commonalities and differences in generating overarching themes and conclusions.

**Synthesis of results.** Look at each set of responses in the matrix to summarize implicit and explicit conceptual components of the concept. The components extracted are shown in the "Components" column in Table 1. The synthesis of results emerged through research group discussion.

**Patient and public involvement**

No patient involved.

## 3. Findings

A total of 22 articles met the inclusion criteria and provided a data source for the concept analysis using the Pragmatic Utility method. Answers from the articles to the analytical questions of different conceptual dimensions are shown in the "Responses from the literature" column of Table 1. Answers were synthesized as "Components" in Table 1 to reveal the nature of research capacity in nursing. A proposed conceptual framework of research capacity in nursing is shown in Figure 2. Allied concepts were also found during the process of concept analysis.

### 3.1. The Use of Research Capacity in Nursing

In the literature, research capacity in nursing was used both in clinical nursing context (hospital, clinical institutions, clinical nurses, practice nurses) (Crozier et al., 2012, Fullam et al., 2018, Landeen et al., 2017, Lode et al., 2015) and academic nursing context (higher

education, university, department/school of nursing, research institutes) (Begley et al., 2014, Goeppinger et al., 2009, Kulage and Larson, 2018, Torres et al., 2017). In 2009, one research study pointed out that the concept of research capacity had not been well defined (Corchön, 2009). However, there is still no clear and consistent definition or deep analysis of research capacity in nursing.

### 3.2. Anatomy of Research Capacity in Nursing

#### 3.2.1. Antecedents

**Competence.** Individual competence (knowledge, skills, and experience) for nursing research is the premise for the ability to conduct nursing research activities (Corchon et al., 2011). Educational programs, training, mentorship, academic-clinical collaborations, journal clubs, seminars, workshops, academic meetings, experiential learning opportunities and research facilitators (Fullam et al., 2018, Landeen et al., 2017, McKee et al., 2017, Torres et al., 2017) were all approaches found in the literature for improving or providing research competence towards achieving research capacity in nursing.

**Motivation.** Motivation, which is the individual and contextual willingness, interest in and desire for nursing research, is a precondition for gaining research capacity (Lode et al., 2015, Martínez, 2012, McKee et al., 2017). Studies revealed different strategies for enhancing motivation, such as ensuring the research is relevant to practitioners by asking research questions that emanate from practice, disseminating research evidence, and incorporating research into practice to help nurses realize the contributions of nursing research to their practice (McKee et al., 2017, Moore et al., 2012, O'Byrne and Smith, 2011). Other factors that stimulate motivation center around building a cultural environment that appreciates the value of nursing research (Akerjordet et al., 2012a, Gullick and West, 2016, Wilkes et al., 2013). Building a culture that values nursing research and is then committed to its development requires commitment at different levels - individual, group, organizational/institutional and

national/societal (Edwards et al., 2009, Landeen et al., 2017, Lee and Metcalf, 2009, O'Byrne and Smith, 2011, Torres et al., 2017). Commitment also requires a clear understanding of what nursing research is, transparent role expectations and requirements of nurse researchers, and the creation of opportunities of career pathways of nurses who are research-active (O'Byrne and Smith, 2011). A research culture also requires encouragement and support from peers (Fullam et al., 2018) as well as a system that rewards research productivity and output (McKee et al., 2017, Moore et al., 2012).

**Infrastructure.** Infrastructure was defined as the structures and processes that are set up to enable the smooth and effective running of nursing research activities (Cooke, 2005). It includes academic support, material support, management support and research culture. Individual research competence requires long-lasting learning to improve and is insufficient in completing an entire nursing research study. Therefore, academic support (e.g. supervision, mentorship, expert consultation, educational opportunities, partnership with experienced nursing researchers) is indispensable as infrastructure in nursing research activities (Fullam et al., 2018, McKee et al., 2017, O'Byrne and Smith, 2011). Material support (e.g. time, human resources, equipment, information, funding, library resources, software for nursing research) is another necessary part of the infrastructure for nursing research activities (Corchon et al., 2011, Lode et al., 2015, Torres et al., 2017). Management support includes adequate organizational structure to enable nursing research capacity, supervision, steering groups, research facilitators, and coordinators for the management and organization of nursing research (Akerjordet et al., 2012a, Gullick and West, 2016, McKee et al., 2017, Torres et al., 2017). Research culture, which could promote motivation for nursing researches, is one part of the infrastructure that supports nursing research activities (Jamerson and Vermeersch, 2012, Lode et al., 2015, Wilkes et al., 2013).

**Collaboration.** Research is the activity of many people who are engaged in a

collaborative process in order to generate knowledge. Therefore, collaboration is a precondition for research capacity in nursing. Academic-clinical collaboration, novice-expert collaboration, multi-site collaboration, interprofessional collaboration, and multidisciplinary collaboration were different forms of collaboration found in the literature on research capacity in nursing (Corchon et al., 2011, Crozier et al., 2012, Fullam et al., 2018, Lode et al., 2015, McKee et al., 2017, Moore et al., 2012, O'Byrne and Smith, 2011).

### 3.2.2. Attributes

**Non-individual level.** Compared to research competence, which mainly refers to the individual knowledge, skills, and experience required to conduct nursing research activities, research capacity in nursing is a concept that uses a relatively macro perspective (McAllister and Brien, 2017). In the literature, research capacity is commonly used in discussions of research contexts at the group level (clinical nurses, nursing academics) (Begley et al., 2014, McKee et al., 2017), organizational/institutional level (unit, hospital, department/school, university) (Crozier et al., 2012, Kulage and Larson, 2018, McAllister and Brien, 2017), regional level (Fullam et al., 2018), national level, international level (Moore et al., 2012), and discipline/profession level (Lode et al., 2015, Martínez, 2012).

**Context-embedded.** Research capacity in nursing is embedded in a specific context. It emphasizes the ability to act "in a specific context", rather than the competence (knowledge, skills, and experience) possessed by individuals, which would not be mostly influenced by context. The context could be a unit, hospital, department/school, university, region, nation or even the international community (McKee et al., 2017). Many researchers have pointed out that the consideration of contextual factors is crucial for nursing research capacity building (Landeen et al., 2017, Lode et al., 2015, Renwick et al., 2017, Torres et al., 2017). There is no "one size fits all" approach for improving nursing research capacity, which is closely related to and influenced by context (McKee et al., 2017). The importance of research culture

construction in antecedents of the concept also supports the assertion that nursing research capacity is context-embedded (Lode et al., 2015).

**Sustainability.** As nursing research is a long-lasting and never-ending process requiring continuity and sustainability, research capacity in nursing emphasizes the ability to conduct research activities "in a sustained manner" (Condell and Begley, 2007). Therefore, research capacity in nursing requires a setting that could sustainably support the conduction of research activities and research capacity improvement (Gullick and West, 2016, Landeen et al., 2017). The characteristic of sustainability was embodied in almost all intervention studies on research capacity building.

### 3.2.3. Boundaries

Boundaries differentiating what is and is not research capacity in nursing are formed invisibly, based on antecedents and attributes of the concept (Weaver et al., 2008). Research capacity in nursing would not exist if there were no competence, motivation, infrastructure, and collaboration for nursing research. Research capacity in nursing should be used on a non-individual level. There should be the ability to conduct nursing research activities sustainably in a specific context.

### 3.2.4. Outcomes

The outcomes of research capacity in nursing are nursing researches for research achievements (e.g., publications, conference presentations, and posters, projects/grants/funding ) (Begley et al., 2014, Corchon et al., 2011, Goeppinger et al., 2009, Gullick and West, 2016, Hauck et al., 2015, Kulage and Larson, 2018, Lee and Metcalf, 2009) which build nursing knowledge for the nursing discipline and are evidence-based for nursing practice (Akerjordet et al., 2012a, Hauck et al., 2015, Lode et al., 2015, Moore et al., 2012, Torres et al., 2017, Wilkes et al., 2013). Further, the body of knowledge building and evidence-based practice can provide better nursing education and patient outcomes (Akerjordet et al.,

2012a, Edwards et al., 2009, Jamerson and Vermeersch, 2012, Lee and Metcalf, 2009, Lode et al., 2015, McKee et al., 2017, Moore et al., 2012, O'Byrne and Smith, 2011, Renwick et al., 2017) which leads to nursing discipline/profession development (Akerjordet et al., 2012a, Corchon et al., 2011, Gullick and West, 2016) and improved satisfaction for different stakeholders (nurses, patients, organization, nation/society) (Akerjordet et al., 2012a, Gullick and West, 2016, Jamerson and Vermeersch, 2012, Lee and Metcalf, 2009, Lode et al., 2015, O'Byrne and Smith, 2011).

**Table 1. Analytic Questions, Reponses from Literature, and Conceptual Components of Research Capacity in Nursing**

| Analytic Questions | Responses from Literature | Components |
|---|---|---|
| Definition | | |
| 1. Is nursing research capacity a kind of competence? | 1. No | |
| 2. Is nursing research capacity a kind of ability? | 2. Yes | |
| 3. Is motivation part of nursing research capacity? | 3. No (Except *Torres et al., 2017*) | Ability |
| 4. Does nursing research capacity completely include evidence-based nursing practice capacity? | 4. No, but related | Nursing research activities |
| Antecedents | | |
| 5. What factors are demanded for or could directly influence nursing research capacity? | 5. Nursing research<br>(1) Knowledge, Skills, Experience<br>(2) Motivation, Passion, Awareness, Incentives, Encouragement, Interest, Attitude, Value<br>(3) Infrastructure, Time, Funding, Education, Academic support, Mentorship, Supervision, Material supports, Resources, Research culture, Management, Policy<br>(4) Collaboration, Partnership, Linkage, Networks, Teamwork, Community, Multidisciplinary, Interprofessional | Nursing research<br>Competence<br>Motivation<br>Infrastructure<br>Collaboration |
| Attributes | | |
| 6. What levels is nursing research capacity used on? | 6. Group level, Organizational/Institutional level, Region level, National level, International level, Discipline/Profession level | Non-individual level |

| | | |
|---|---|---|
| 7. Is nursing research capacity reinforced internally or externally? | 7. Both<br>(Internal, External, Contextualize, Context, Local, Settings, Suitable, Tailored) | Context-embedded |
| 8. Does nursing research capacity focus on present ability or ability over the long-term? | 8. Ability over long-term<br>(Long-term, Sustainability, Sustainable, Continuity) | Sustainability |
| Outcomes | | |
| 9. How is nursing research capacity manifested? | 9. Nursing publications, Nursing conference presentations and posters, Projects, Grants, Funding | Nursing research achievements |
| 10. What are the consequences of nursing research capacity? | 10. Nursing research, Knowledge building, Evidence base development, Evidence-based practice, Maturity of nursing as a scientific discipline, Nursing care effectiveness confirmation, High-quality outcomes in the nursing academic and clinical arenas, Improved attitudes toward nursing research, Better patient care, Better patient outcomes, Enhance quality and patient safety, Professional growth, Satisfaction improvement, Decrease in nursing turnover, Cost saving | Nursing research, Nursing knowledge, Nursing evidence base<br><br>The body of nursing knowledge building, Evidence-based nursing practice, Better nursing education, Better patient outcomes, Nursing discipline development, Nursing professional development, Satisfaction improvement |

*Note:* The following articles were provide as data sources for concept analysis: Akerjordet et al., 2012b, Begley et al., 2014, Corchon et al., 2011, Crozier et al., 2012, Edwards et al., 2009, Fullam et al., 2018, Goeppinger et al., 2009, Gullick and West, 2016, Hauck et al., 2015, Jamerson and Vermeersch, 2012, Kulage and Larson, 2018, Landeen et al., 2017, Lee and Metcalf, 2009, Lode et al., 2015, Martínez, 2012, McAllister and Brien, 2017, McKee et al., 2017, Moore et al., 2012, O'Byrne and Smith, 2011, Renwick et al., 2017, Torres et al., 2017, Wilkes et al., 2013

### 3.2.5. Definition

Based on the critical analysis of the concept in literature, the following definition of research capacity in nursing was developed. Research capacity in nursing is the ability to conduct nursing research activities in a sustainable manner in a specific context, normally used on a non-individual level. It is critical for the nursing discipline/professional development and positive patient/nurse/health care system outcomes.

### 3.3. Allied Concepts

Several allied concepts of research capacity were found during the concept analysis of nursing: research competence, research capability, and evidence-based practice capacity. Research competence, which includes research knowledge, skills, and experience, was commonly used on an individual level in the literature (Goeppinger et al., 2009, Moore et al., 2012, Torres et al., 2017). However, research capability was not used consistently with the same meaning in the literature, and was used ambiguously in most articles (Corchon et al., 2011, Crozier et al., 2012, Moore et al., 2012, Torres et al., 2017). Evidence-based practice capacity focuses more on the ability to "use evidence in practice" in a specific context (Duffy et al., 2016). However, no concept analysis was found for these allied concepts.

## 4. Discussion

This study was conducted to clarify the concept research capacity in nursing by identifying its conceptual components using the Pragmatic Utility method based on relevant nursing literature. During the concept analysis, we found that more and more research in recent decades has focused on research capacity in clinical nursing settings (Lode et al., 2015). This suggests that nursing research is no longer merely the "default" responsibility for nursing academics in academic nursing settings (e.g. department/school of nursing, university, nursing research institutions), but has also become integrated into the role expectations and requirements for clinical nurses. The research engagement of clinical nurses who are the clinical users of nursing

evidence is imperative in reducing the gap between research and clinical practice to promote evidence-based practice, which contributes to positive nurse, patient, organizational, and even national/societal outcomes. Meanwhile, nursing academics also play a necessary role in clinical nursing research. This is also consistent with one antecedent of research capacity in nursing: collaboration. Academic-clinical collaboration brings research closer to clinical practice and improves research rigor (Fullam et al., 2018). Therefore, to improve nursing research capacity effectively, clinical nurses should be also equipped with sufficient supports for involving in nursing research activities and get opportunities for collaborating with nursing academics.

As antecedents are the conditions that always precede and give rise to the concept, to effectively obtain or improve research capacity in nursing, it is necessary to simultaneously provide and promote its antecedents (Morse, 2016). The evidence from intervention studies on research capacity building corroborates this (Corchon et al., 2011, Fullam et al., 2018, Gullick and West, 2016, McKee et al., 2017, Moore et al., 2012). Policymakers and nurse managers should propose and implement policies and strategies which could promote nursing research competence, motivation, infrastructure, and collaboration to provide the condition cultivating research capacity in nursing.

Research capacity in nursing is commonly used on a non-individual level suggests it is a concept used from a macro perspective (McAllister and Brien, 2017). However, because of the lack of a consistent definition of the term research capacity in nursing, a few researchers (Ekeroma et al., 2015, Tveit et al., 2015) have used research capacity to represent research knowledge, skill, and interest/attitude on an individual level, in those cases, using the term research competence and attitude may be more suitable, according to this paper's understanding of the concept research capacity. Other articles providing data sources for this concept analysis all used the concept on a non-individual level. This concept analysis recognized "context-embedded" and "sustainability" as other two attributes of research

capacity in nursing. Therefore, interventions for improving research capacity in nursing will need to incorporate an understanding of the local context as well as to plan for sustainability. As a result, these interventions must be complex, multi-level, and long-term processes (Begley et al., 2014, Lode et al., 2015, Martínez, 2012, McKee et al., 2017). This is a reason for the limitation of intervention studies on research capacity building, because this kind of intervention is impossible without an excellent research group with enough funding and the support of different levels in a specific context. Therefore, small studies focus on just one or several antecedents of nursing research capacity should be also encouraged to provide foundation of research capacity building.

Another important reason for limitation of intervention studies is a lack of consistent and appropriate measurement instrument for research capacity in nursing (O'Byrne and Smith, 2011). Research capacity in nursing is manifested through research achievements (nursing research publications, conference presentations and posters, and projects/grants/funding). Therefore, most intervention studies use research achievements as an outcome variable to evaluate the effectiveness of an intervention (Begley et al., 2014, Fullam et al., 2018, Gullick and West, 2016, Lee and Metcalf, 2009, McKee et al., 2017). These studies only reported the research achievements of intervention groups during or after the intervention implementation, because there was no comparison group in their study design, which would make the evaluation of intervention effectiveness weaker. However, it is inappropriate to find a comparison group in the same context considering contamination. Because of the “context-embedded” attribute of research capacity in nursing, it is also impractical for researchers to find a comparison group in another context, which should be the same as or similar to the context of the intervention group to ensure comparability. In this case, one group pretest-posttest design may be considered by some researchers (Martínez, 2012), but the effect of time and other external/confounding factors could not be excluded from the total effect and would lead to

weakness. In this condition, a time series design could be considered, which is suitable for quality improvement studies in which efforts randomization rarely possible and only one institution involved in the inquiry (Polit and Beck, 2012). However, if we use research achievements as the outcome variable in a time series study, the study's time span would be extremely long, since research achievements require an extended period of effort and many measurements are required with this study design. Therefore, using present research capacity as an outcome variable, which could be measured at any time and with no limitations for measurement intervals, is critical in a complex, long-term, and costly intervention and time series design study. Furthermore, rather than research achievements which is a long-term outcome, short-term outcome variable (present research capacity) would also be more appropriate for evaluating research capacity improvement intervention studies targeting research novices. However, there is no instrument found in the literature to measure present research capacity in nursing. Further studies are needed for its development. The instrument will could be used to measure the present research capacity at any time to monitor its variation tendency to show the effectiveness of intervention in a timely manner, provides evidence to refine the intervention during the long-term implementation process, and could reduce unnecessary cost waste. Furthermore, the instrument could make a baseline assessment of present research capacity. Baseline assessment could help in developing specific and pertinent intervention plans for research capacity improvement, according to the specific baseline condition and needs within a specific context (Torres et al., 2017).

Nursing research competence, nursing research capability, and evidence-based nursing practice capacity are allied concepts which were identified during this concept analysis. However, there are no clear definitions or concept analyses to describe them. In addition, the differences and relationships between them and nursing research capacity are unclear. Further studies (e.g. concept analysis, concept comparison) could be considered to explore the nature

of these allied concepts and the differences and relationships between these concepts.

## 5. Conclusions and Implications

This concept analysis used the Pragmatic Utility method based on a scoping review and defined research capacity in nursing as the ability to conduct nursing research activities in a sustainable manner in a specific context, normally used on a non-individual level. The in-depth concept analysis contributes to theory development related to research capacity in nursing. The clear definition and deeper understanding of research capacity in nursing could encourage policymakers, managers and researchers to consistently and effectively use the concept in documents, nursing literature, and academic and policy communication. The analysis of antecedents and attributes encourages policymakers, nurse managers, and researchers to further consider strategies on multi-levels to promote nursing research competence, motivation, infrastructure, and collaboration, in order to build research capacity in nursing. This concept analysis also provides a foundation for instrument development of research capacity in nursing, which could improve the methodological rigor of studies and promote the comparability, transferability, and evidence synthesis of study results. The instrument would also positively influence nursing management because it could be used to evaluate the nursing research capacity of specific non-individual objects. These impacts would contribute to nursing research capacity building, leading to the nursing discipline/professional development and positive patient/nurse/health care system outcomes.

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**Competing interests** None declared.

**Patient consent** Not requires.

**Data sharing statement** No additional data available.

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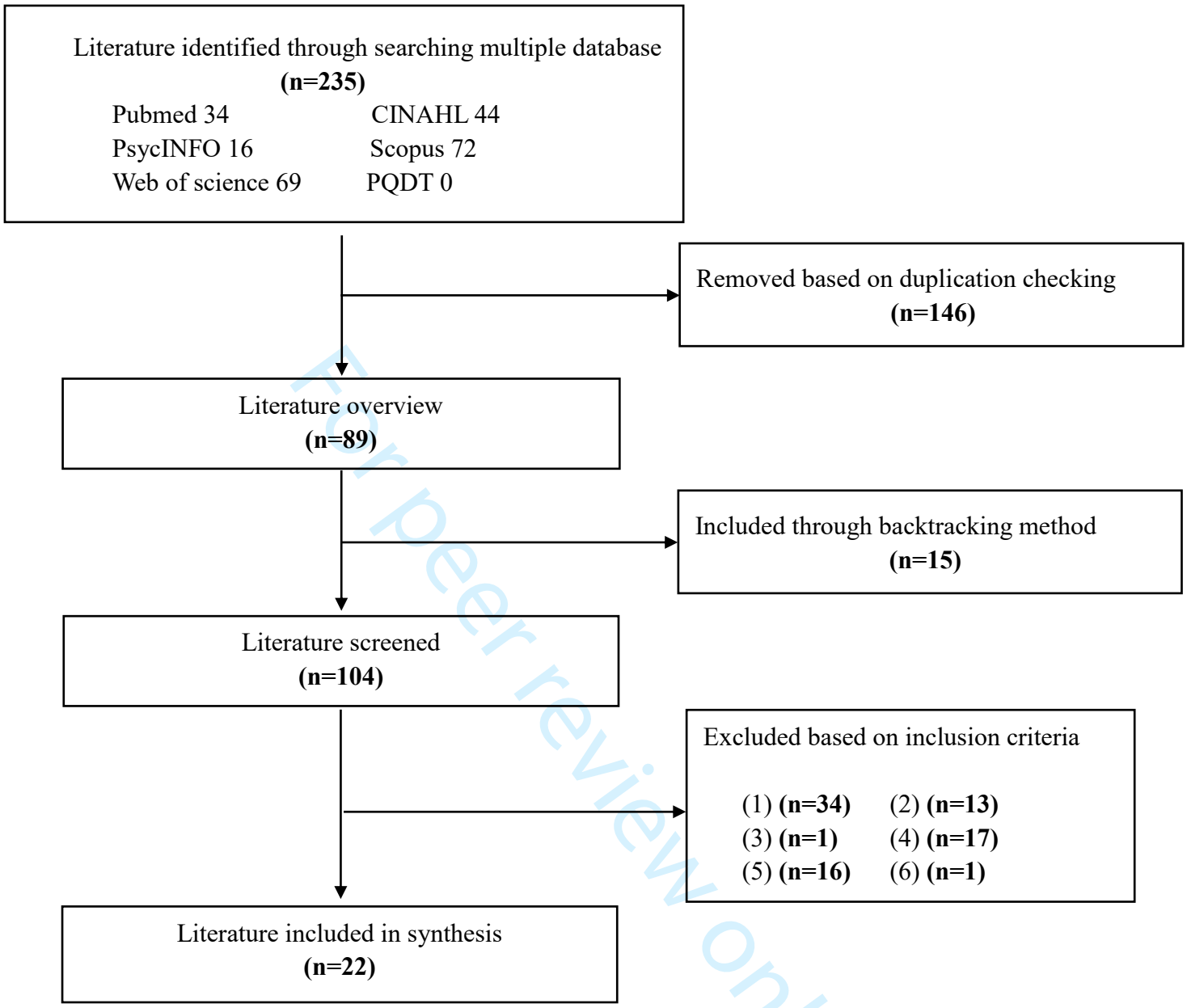


**Figure 1. Flowchart of the Literature Search and Selection Process**

***Note:***

**1. Search strategy:** (1) Pubmed: (research capacity[Title]) AND (nurisng[Title/Abstract] OR nurse*[Title/Abstract]); (2) CINAHL: TI research capacity AND AB ( nursing OR nurse* ); (3) PsycINFO: research capacity.m_titl. AND (nursing or nurse*).ab; (4) Scopus: (TITLE ("research capacity") AND TITLE-ABS-KEY (nursing OR nurse*)); (5) Web of Science: Title: ("research capacity") AND Topic: (nursing OR nurse*); (6) PQDT: title: "research capacity" AND abstract: (nursing OR nurse*).

**2. Inclusion criteria of literature selection were:** (1) published between 2009 and 2019 (to explore the most current use of the concept), (2) full-text accessible, (3) published in English, (4) the topic is research capacity in nursing, (5) qualitative, quantitative, or mixed method studies and literature reviews, (6) not from the same research program as another study included in the analysis.

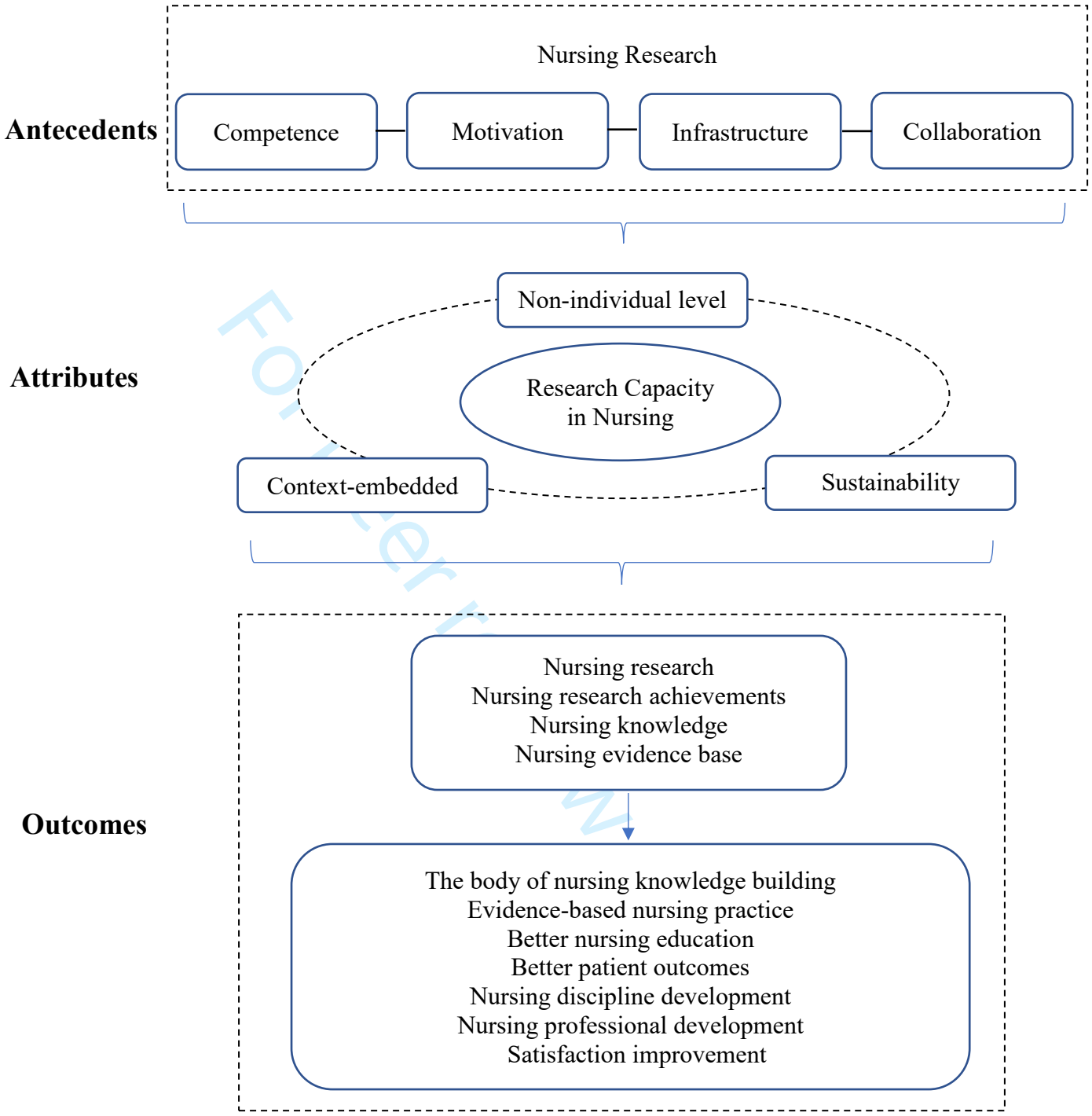


**Figure 2. Conceptual Components of Research Capacity in Nursing**

**Appendix 1. Tracking System Table - Example**

| Literature | Related information for concept analysis | Codes |
|---|---|---|
| Torres, G. C. S., Estrada, M. G., Sumile, E. F. R., Macindo, J. R. B., Maravilla, S. N., & Hendrix, C. C. (2017). Assessment of Research Capacity Among Nursing Faculty in a Clinical Intensive University in The Philippines. Nursing Forum, 52(4), 244-253. doi:10.1111/nuf.12192<br><br>Quantitative Study | "Research capacity is the **capability** to **conduct high-quality research** undertakings and is crucial toward building the knowledge base for evidence-based nursing practice." | **Definition:**<br>Capability<br>Conduct research<br>High-quality research |
| | "The actualization of research capacity is often difficult in academic settings that are clinically intensive because of **material and organizational barriers** (heavy teaching, administrative, and clinical workload; absence of research infrastructure; inadequate access to research personnel; inadequate funding or financial support; and inadequate mentoring programs)."<br>"Some barriers such as lack of **research knowledge and skills** and lack of **awareness** of the technicalities of the research process (examples are submission to ethics or institutional review boards) are transient and will disappear with the maturity of **research experience**." | **Antecedents:**<br>Material Supports<br>Organizational Supports<br>Research knowledge and skills<br>Research experience<br>Research awareness |
| | "Evidence suggests that approaches to research capacity building must be **strategic** and should be developed only after **determining research needs**."<br>"There is a clear need, therefore, to promote nursing research in Asia to enhance the **contextual relevance** of their evidence-based nursing interventions." | **Attributes:**<br>Contextual |
| | "Research capacity is the capability to conduct high-quality research undertakings and is crucial toward **building the knowledge base** for **evidence-based nursing practice**." | **Outcomes:**<br>Knowledge building<br>Evidence-based nursing practice |
| | "Research capacity is the **capability** to conduct high-quality research undertakings and is crucial toward building the knowledge base for evidence-based nursing practice."<br>"The collaboration with other institutions and researchers or mentors should be explored to gain greater **research competency**, capacity, and experience." | **Allied concepts:**<br>Research capability<br>Research competency |

**PPreferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist**

| SECTION | ITEM | PRISMA-ScR CHECKLIST ITEM | REPORTED ON PAGE # |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a scoping review. | Page 1 |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives. | Page 2 |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach. | Page 3-4 |
| Objectives | 4 | Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives. | Page 4 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number. | N/A |
| Eligibility criteria | 6 | Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale. | Page 6 |
| Information sources* | 7 | Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed. | Page 5 |
| Search | 8 | Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated. | Page 24 |
| Selection of sources of evidence† | 9 | State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review. | Page 5-6, Page 24 |
| Data charting process‡ | 10 | Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators. | Page 13-14, Page 26 |
| Data items | 11 | List and define all variables for which data were sought and any assumptions and simplifications made. | Page 13-14, Page 26 |
| Critical appraisal of individual sources of evidence§ | 12 | If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate). | N/A |

| SECTION | ITEM | PRISMA-ScR CHECKLIST ITEM | REPORTED ON PAGE # |
|---|---|---|---|
| Synthesis of results | 13 | Describe the methods of handling and summarizing the data that were charted. | Page 7 |
| **RESULTS** | | | |
| Selection of sources of evidence | 14 | Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram. | Page 7<br>Page 24 |
| Characteristics of sources of evidence | 15 | For each source of evidence, present characteristics for which data were charted and provide the citations. | Page 13-14,<br>Page 26 |
| Critical appraisal within sources of evidence | 16 | If done, present data on critical appraisal of included sources of evidence (see item 12). | N/A |
| Results of individual sources of evidence | 17 | For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives. | Page 13-14,<br>Page 26 |
| Synthesis of results | 18 | Summarize and/or present the charting results as they relate to the review questions and objectives. | Page 13-14 |
| **DISCUSSION** | | | |
| Summary of evidence | 19 | Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups. | Page 15-18 |
| Limitations | 20 | Discuss the limitations of the scoping review process. | Page 1 |
| Conclusions | 21 | Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps. | Page 19 |
| **FUNDING** | | | |
| Funding | 22 | Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review. | No funding |

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

*From:* Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

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# Research capacity in nursing: a concept analysis based on a scoping review



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| | |

# Research capacity in nursing: a concept analysis based on a scoping review

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**Word count:**4781



## ABSTRACT

**Objective:** As the discipline of nursing has advanced, research capacity in nursing has become increasingly important to the discipline's development. However, research capacity in nursing is still commonly used as a buzzword, without a consistent and clear definition. The purpose of this study is to clarify the concept of research capacity in nursing by identifying its conceptual components in the relevant nursing literature using the Pragmatic Utility method.

**Design:** A Pragmatic Utility concept analysis based on a scoping review.

**Data sources:** Academic literature retrieved from PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, Scopus, Web of Science, and ProQuest

Dissertations & Theses (PQDT).

**Eligibility criteria:** Qualitative studies, quantitative studies, mixed method studies, or literature reviews focusing on research capacity in nursing published in English between 2009 and 2019.

**Results:** Competence, motivation, infrastructure, and collaboration for nursing research are the antecedents of research capacity in nursing. The attributes of research capacity in nursing are "non-individual level", "context-embeddedness", and "sustainability". The direct outcome of research capacity in nursing is nursing research. The allied concepts identified are nursing research competency, nursing research capability, and evidence-based practice capacity in nursing.

**Conclusions:** Research capacity in nursing is the ability to conduct nursing research activities in a sustainable manner in a specific context, and it is normally used at a non-individual level. Research capacity in nursing is critical for the development of the nursing discipline, and for positive nurse, patient, and healthcare system outcomes. More studies are needed to further explore the allied concepts of research capacity in nursing, and to better understand relationships among these allied concepts.

**Strengths and limitations of this study:**

◆The use of Pragmatic Utility concept analysis method based on relevant literature collected through a scoping review contributed to a rigorous and comprehensive concept analysis.

◆The data extraction was conducted by two researchers independently and the results were checked by the third researcher.

◆Literature published before 2009 and outside the six databases were not included in this study.

◆Only studies published in English were included.

## 1. Introduction

Research capacity has received a great deal of international attention in the nursing discipline.[1, 2] One reason for this attention is that nursing has gradually become an independent scientific discipline which requires its own body of knowledge. Furthermore, with evidence-based practice spreading worldwide, nurses, as healthcare professionals, are responsible for delivering high-quality care based on the best available evidence.[3] The body of knowledge for nursing as a scientific discipline and credible evidence for evidence-based nursing practice are all based on a large number of high-quality nursing research studies, which require excellent research capacity in the nursing discipline.[4] In the past three decades, many countries and organizations have made concerted efforts to develop and improve research capacity in the discipline of nursing.[5] However, research performance in nursing remains far below expectations,[1, 6] especially in developing countries.[7] Some of the main reasons for this low research performance are as follows: 1) nursing is a relatively new scientific discipline, with many areas requiring research attention and support, 2) the rapid development of the healthcare sciences is leading to more new areas in nursing, with ever more emerging research needs and 3) there are many barriers to and insufficient research on nursing research capacity building.[8, 9]

To strengthen research capacity in nursing, research is needed to improve interventions that build research capacity in nursing. Although barriers and facilitators to improving research capacity in nursing have been identified and models for nursing research capacity building have been proposed,[3, 8] these ideas are predominantly found in anecdotal papers, expert commentaries, and case studies. Well-designed, reliable studies to evaluate the interventions implemented to improve nursing research capacity are still limited and are urgently required.[3, 9] In order to address this need for research on effective interventions for building research capacity in nursing, well-validated, reliable instruments that measure

research capacity in nursing are required. However, before the development of these instruments can be undertaken, a clear definition and deep concept analysis of research capacity in nursing are needed.

In addition to the concept analysis's potential contributions to instrument development, the concept analysis can also help nurses, nurse managers, nurse leaders, and policymakers to better understand research capacity in nursing.[10] Nursing is not only a scientific or theoretical discipline; it is also a profession with a restricted practice based on evidence. Nurses, as the end-users of the evidence in their practice, increasingly expect to participate in nursing-related research activities to bridge the gap between nursing research and nursing practice, and to improve the quality of the nursing care they provide to their patients.[3, 5] In order for more nurses to participate more in research, the research capacity of the nursing profession needs to improve.[5] To effectively improve research capacity and evidence-based practice in clinical practice settings, there is an urgent need for nurses, nurse managers and leaders, and policymakers to have a better understanding of nursing research capacity.

After a broad search and review of the literature, no clear definition or specific conceptual dimensions (antecedents, attributes and outcomes) of research capacity in nursing were found (in fact, no clear definition and concept analyses of research capacity in any health-related discipline were found).[11] Based on Morse's process and criteria for concept maturity evaluation,[12] research capacity in nursing is recognized as a partially mature concept. For partially mature concepts, the Pragmatic Utility concept analysis method is considered to be appropriate for developing the concept further.[10]

A concept analysis involves analyzing the literature relevant to the concept. Ideally, a larger sample of the relevant literature may provide a richer understanding of the concept. However, there is no specific description of demands and procedures of the literature search in the Pragmatic Utility concept analysis method.[10] Considering that comprehensive,

systematic literature search methods could provide a strong sample of papers for conducting a concept analysis, we included the scoping review method in our study to offer a rigorous and replicable literature search process to access rich sources of relevant literature.[13] A scoping review of the relevant nursing literature can also help to explore all the contexts in which the concept is used.[13] Therefore, the purpose of this study was to further develop the concept of research capacity in nursing by conducting a Pragmatic Utility concept analysis based on a scoping review.

## 2. Method

*Pragmatic Utility* is a meta-synthesis technique used to synthesize literature and advance the development of partially mature concepts by using the literature as the data source.[10] Partially mature concepts are those concepts having multiple or problematic definitions, ambiguous meanings, and confusion with use. These concepts are often used inconsistently in practice and research.[14] The strengths of the Pragmatic Utility method include its use of extensive data sources, its well-articulated criteria and procedures for concept evaluation and concept analysis, and its inclusion of intellectual processes of critical appraisal for asking analytical questions and synthesizing the results.[15] These traits of the Pragmatic Utility method may help it to overcome some of the limitations (e.g. insufficient data sources, the use of dictionary definitions and invented cases, and less emphasis on a clear definition of the concept and its boundaries with other concepts) of other concept analysis methods (such as Wilsonian-derived methods and Rodgers' evolutionary method) .[10, 15]

In Pragmatic Utility, researchers examine and appraise the definition, antecedents, attributes, outcomes, and use of a partially mature concept in the literature by asking analytical questions and answering those questions.[10] Analytical questions play an important role in Pragmatic Utility. They are the questions that researchers spontaneously ask themselves as they are reading the literature to reveal the information needed for concept

analysis. The identification of analytical questions occurs through the researchers' interpretative readings, deep understanding, and critical appraisal of the literature. For instance, these are the spontaneous questions that researchers have as they are reading, where they recognize aspects of the concept which they do not quite understand, or aspects which the researchers recognize have inconsistencies across the literature analyzed thus far. Such questions can guide researchers towards extracting more relevant data from literature and sorting these data further according to the responses the researchers developed for the analytic question they first asked.[14]

The antecedents, attributes, and outcomes of the concept can be identified and a definition can be developed through the methodical process of asking and answering analytical questions. Some allied concepts can be found during the concept analysis process.[10] Antecedents are the conditions that always precede and give rise to the concept. Attributes are the key characteristics of the concept.[10] Boundaries, which are normally formed by the antecedents and attributes of a concept, are the invisible lines between the concept and other concepts. They delineate what the concept is and what it is not.[16] Outcomes are the results or consequences of the concept. Allied concepts are those concepts that "closely resemble one another, and may even share some attributes, but are different and separate concepts in their own right".[10] Allied concepts can help to further clarify the boundaries of concepts and provide implications for further studies (e.g. a concept comparison of allied concepts).

The data source for a Pragmatic Utility concept analysis is the relevant academic literature. To improve the quality of this study, we wanted the data source to including all recent relevant academic literature rather than a small sample of the literature. Therefore, we used the comprehensive literature search guidelines of the scoping review.[17]

The researchers in our research group were three graduate students experienced in

conducting nursing research and literature reviews, as well as three professors in nursing. The following steps were followed to conduct a Pragmatic Utility concept analysis based on a scoping review:[10, 14, 18] (1) "Clarify the study purpose"; (2) "Search literature broadly and select appropriate literature"; (3) "Get inside the literature"; (4) "Read the literature interpretively and identify analytical questions"; (5) "Record responses on a data collection sheet"; (6) "Synthesize the results".

**(1) Clarify the study purpose.** The clarification of this study's purpose was the first step of the concept analysis and the premise of the literature search. The purpose of this study was to conduct a concept analysis for research capacity in nursing.

**(2) Search literature broadly and select appropriate literature.** Based on the purpose of this study, we used "research capacity" AND "nursing OR nurse*" as keywords in the literature search. Databases searched included the PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, Scopus, Web of Science, and ProQuest Dissertations & Theses (PQDT). After removing the duplicates, a total of 89 records remained in the EndNote library, which was the literature management software used in this study. The additional 15 papers, which were identified as relevant literature through the checking and screening of the reference lists of the 89 articles, were then imported into the EndNote library, as well. Appropriate articles for the concept analysis were then screened for based on the following inclusion criteria for the literature selection: (1) published between 2009 and 2019 (to explore the most current use of the concept), (2) access to the full-text, (3) published in English, (4) the topic is research capacity in nursing, (5) the articles were qualitative studies, quantitative studies, mixed method studies, or literature reviews, and (6) not from the same research program as another study already included in the analysis. Two researchers were responsible for screening the literature selection. Finally, 22 articles were included as the data source for the concept analysis. The flowchart of the literature selection

process for the concept analysis is shown in Figure 1.

**(3) Get inside the literature**. Two researchers read the selected literature in detail to extract explicit information showing the anatomy of the concept (i.e., the antecedents, attributes, boundaries, outcomes, and definition) and to get a preliminary understanding of the included literature.[10] The tracking system table developed by Weaver was used as a tool for documenting details gathered through the readings relating to the concept's definition, antecedents, attributes, outcomes, and allied concepts.[14] The data extraction was conducted by two researchers independently using the tracking system table, and the final results were checked and combined by the third researcher. The tracking system table provided a method to manage the copious data and to help make the research process transparent. We extracted a small part of this tracking system table as an example, shown in Appendix 1. The complete tracking system table can be acquired from the author upon request.

**(4) Read the literature interpretatively and identify analytical questions.** After the previous step of "get inside the literature", three researchers further read the literature interpretatively to extract implicit information showing the anatomy of the concept (these data were sorted and then added into the tracking system table), and simultaneously, to read the literature critically in order to identify analytical questions. Then, we held a meeting to discuss, debate, and determine the final analytical questions that required further exploration. The final analytical questions identified are shown in the "Analytical Questions" column in Table 1.

**(5) Record responses on a data collection sheet.** Based on the existing data in the tracking system table, two researchers further extracted additional data needed for answering analytical questions from the literature and then responded to the analytical questions based on all the data extracted. A matrix (the first two columns of Table 1) on a data collection sheet was used to organize the responses to the analytical questions. For example, the fifth

analytical question was "What factors are demanded for or could directly influence nursing research capacity?" All related data in included literature which could answer this question were extracted and used to answer the analytical question, and the answers were recorded as "responses from literature" in the data collection sheet. The answers were summarized and shown in the "Responses from Literature" column in Table 1.

**(6) Synthesize the results.** In a research group meeting, researchers used each set of responses in the matrix (the "Responses from Literature" column in Table 1) to recognize commonalities and differences for summarizing implicit and explicit conceptual components of the concept. This step was a process of comparing, contrasting, and synthesizing the data extracted from the literature. The conceptual components extracted are shown in the "Conceptual Components" column in Table 1.

**Patient and public involvement**

No patient involved.

## 3. Findings

A total of 22 articles met the inclusion criteria and provided the rich data source for our Pragmatic Utility concept analysis. The antecedents of research capacity in nursing were identified as competence, motivation, infrastructure, and collaboration for nursing research. The attributes of research capacity in nursing were identified as "non-individual level", "context-embeddedness", and "sustainability". The direct outcome of the concept of research capacity in nursing was nursing research. The allied concepts identified were nursing research competency, nursing research capability, and evidence-based practice capacity in nursing. The findings are shown in Table 1. A proposed conceptual framework of research capacity in nursing is shown in Figure 2.

### 3.1. The Use of Research Capacity in Nursing

In the literature, research capacity in nursing was used both in clinical nursing contexts

(e.g., in the context of hospitals, clinical institutions, clinical nurse settings, etc.),[1, 5, 19, 20] and academic nursing contexts (e.g., higher education, universities, departments of nursing, research institutes, etc.).[2, 21-23]

### 3.2. Anatomy of Research Capacity in Nursing

#### 3.2.1. Antecedents

**Competence.** Individual competence (knowledge, skills, and experience) for nursing research is a premise of the ability to conduct nursing research activities.[24] Educational programs, training, mentorship, academic-clinical collaborations, journal clubs, seminars, workshops, academic meetings, experiential learning opportunities, and research facilitators were all approaches found in the literature for improving or providing research competence towards achieving research capacity in nursing.[1, 9, 19, 21]

**Motivation.** Motivation - which is the individual and contextual willingness, interest in, and desire for nursing research - is a precondition for gaining research capacity.[5, 9, 25] Studies revealed different strategies for enhancing motivation, such as ensuring the research was relevant to practitioners by asking research questions that emanate from practice, disseminating research evidence, and incorporating research into practice to help nurses realize the contributions of nursing research to their practice.[3, 9, 26]

Another factor that stimulates motivation centers around building a cultural environment that appreciates the value of nursing research.[27-29] Building a culture that values nursing research and is then committed to its development requires commitment at different levels – i.e., at the individual, group, organizational/institutional, and national/societal levels.[3, 19, 21, 30, 31] Commitment also requires: a clear understanding of what nursing research is, transparent role expectations and requirements of nurse researchers, and the creation of opportunities of career pathways of nurses who are research-active.[3] A strong research culture also requires encouragement and support from peers,[1] as well as a system that rewards research

productivity and outputs.[9, 26]

**Infrastructure.** Infrastructure was defined as the structures and processes that were set up to enable the smooth and effective running of nursing research activities.[32] It includes academic support, material support, management support, and research culture. Individual research competence requires opportunities for long-term improvement. Therefore, academic support (e.g. supervision, mentorship, expert consultation, educational opportunities, and partnership with experienced nursing researchers) is indispensable as a form of infrastructure for nursing research activities.[1, 3, 9] Material support (e.g. time, human resources, equipment, information, funding, library resources, and software for nursing research) is another necessary part of the infrastructure for nursing research activities.[5, 21, 24] Management support includes adequate organizational structure to enable nursing research capacity, supervision, steering groups, research facilitators, and coordinators for the management and organization of nursing research.[9, 21, 27, 29] A research culture (which, as noted above, can promote motivation for nursing research) is another form of infrastructure that supports nursing research activities.[5, 28, 33]

**Collaboration.** Research is the activity of many people who are engaged in a collaborative process in order to generate knowledge. Therefore, collaboration is a precondition for research capacity in nursing. Academic-clinical collaboration, novice-expert collaboration, multi-site collaboration, interprofessional collaboration, and multidisciplinary collaboration were different forms of collaboration found in the literature on research capacity in nursing.[1, 3, 5, 9, 20, 24, 26]

### 3.2.2. Attributes

**Non-individual level.** Compared to nursing research *competence* - which mainly refers to the knowledge, skills, and experience required for an individual to conduct nursing research activities - research *capacity* in nursing is a concept that uses a relatively macro

perspective.[34] In the literature, research capacity in nursing is commonly a term used at the group level (clinical nurses, nursing academics),[9, 22] organizational/institutional level (unit, hospital, department/school, university),[2, 20, 34] regional level,[1] national level, international level,[26] and discipline level.[5, 25] An individual nurse's ability to conduct research is not typically referred to as their "research capacity", but rather as their "research competence".

**Context-embeddedness.** Research capacity in nursing is embedded in a specific context. It emphasizes the ability to act "in a specific context", rather than the competence (knowledge, skills, and experience) possessed by individuals, which generally are less influenced by the context. The context could be a unit, hospital, department/school, university, region, nation or even the international community.[9] Many researchers have pointed out that the consideration of contextual factors is crucial for nursing research capacity building.[5, 19, 21, 35] There is no "one size fits all" approach for improving nursing research capacity, which is closely related to and influenced by context.[9] The importance of the construction of a strong research culture in order to build nursing research capacity also supports the assertion that nursing research capacity is context-embedded.[5]

**Sustainability.** As nursing research is a long-lasting and never-ending process requiring continuity and sustainability, research capacity in nursing emphasizes the ability to conduct research activities "in a sustained manner".[36] Therefore, research capacity in nursing requires a setting that could sustainably support the conduction of research activities and research capacity improvement.[19, 27] The characteristic of sustainability was embodied in almost all intervention studies on research capacity building.

### 3.2.3. Boundaries

Boundaries differentiating what is and what is not research capacity in nursing are formed invisibly, based on the antecedents and attributes of the concept.[16] Research capacity in nursing would not exist if there were no antecedents of competence, motivation,

infrastructure, and collaboration for nursing research. The usage of research capacity in nursing also implied certain attributes. Research capacity in nursing was normally used in discussions of nursing at the non-individual level and in a specific context. Finally, references to this concept frequently implied that the research capacity in nursing was sustainable.

### 3.2.4. Outcomes

The direct outcome of research capacity in nursing is nursing research for research achievements (e.g., publications, conference presentations and posters, projects/grants/funding)[2, 22-24, 27, 30, 37] which build nursing knowledge for the nursing discipline and the evidence base for nursing practice.[5, 21, 26, 28, 29, 37] Furthermore, the body of knowledge building and evidence-based practice can provide better nursing education and patient outcomes,[3, 5, 9, 26, 29-31, 33, 35] which lead to nursing discipline development and improved satisfaction for various stakeholders (i.e., nurses, patients, organization, and the nation/society).[3, 5, 24, 27, 29, 30, 33]

**Table 1. Analytical Questions, Responses from Literature, and Conceptual Components of Research Capacity in Nursing**

| Analytical Questions | Responses from Literature | Conceptual Components |
|---|---|---|
| Definition | | |
| 1. Is nursing research capacity a kind of competence? | 1. No | |
| 2. Is nursing research capacity a kind of ability? | 2. Yes | |
| 3. Is motivation a part of nursing research capacity? | 3. No (Except *Torres et al., 2017*) | Ability |
| 4. Does nursing research capacity completely include evidence-based nursing practice capacity? | 4. No, but related | Nursing research activities |
| Antecedents | | |
| 5. What factors are demanded for or could directly influence nursing research capacity? | 5. Nursing research<br>(1) Knowledge, Skills, Experience<br>(2) Motivation, Passion, Awareness, Incentives, Encouragement, Interest, Attitude, Value<br>(3) Infrastructure, Time, Funding, Education, Academic support, Mentorship, Supervision, Material supports, Resources, Research culture, Management, Policy<br>(4) Collaboration, Partnership, Linkage, Networks, Teamwork, Community, Multidisciplinary, Interprofessional | Nursing research<br>Competence<br>Motivation<br>Infrastructure<br>Collaboration |
| Attributes | | |
| 6. On what level(s) is nursing research capacity used on? | 6. Group level, Organizational/Institutional level, Region level, National level, International level, Discipline level | Non-individual level |
| 7. Is nursing research capacity reinforced | 7. Both | Context-embeddedness |

| | | |
|---|---|---|
| internally or externally? | (Internal, External, Contextualize, Context, Local, Settings, Suitable, Tailored) | |
| 8. Does nursing research capacity focus on present ability or ability over the long-term? | 8. Ability over long-term (Long-term, Sustainability, Sustainable, Continuity) | Sustainability |
| Outcomes | | |
| 9. How is nursing research capacity manifested? | 9. Nursing publications, Nursing conference presentations and posters, Projects, Grants, Funding | Nursing research achievements |
| 10. What are the consequences of nursing research capacity? | 10. Nursing research, Knowledge building, Evidence base development, Evidence-based practice, Maturity of nursing as a scientific discipline, improvement of the quality of nursing care, High-quality outcomes in nursing academic and clinical arenas, Improved attitudes toward nursing research, Better patient care, Better patient outcomes, Enhance quality and patient safety, Professional growth, Improvement in nurses' satisfaction, Decrease in nursing turnover, Cost saving | Nursing research, Nursing knowledge, Nursing evidence base<br><br>The body of nursing knowledge building, Evidence-based nursing practice, Better nursing education, Better patient outcomes, Nursing discipline development, Nursing professional development, Satisfaction improvement |

*Note:* The following articles provided data sources for concept analysis: Akerjordet et al., 2012b, Begley et al., 2014, Corchon et al., 2011, Crozier et al., 2012, Edwards et al., 2009, Fullam et al., 2018, Goeppinger et al., 2009, Gullick and West, 2016, Hauck et al., 2015, Jamerson and Vermeersch, 2012, Kulage and Larson, 2018, Landeen et al., 2017, Lee and Metcalf, 2009, Lode et al., 2015, Martínez, 2012, McAllister and Brien, 2017, McKee et al., 2017, Moore et al., 2012, O'Byrne and Smith, 2011, Renwick et al., 2017, Torres et al., 2017, Wilkes et al., 2013.

### 3.2.5. Definition

Based on our critical analysis of the concept in the relevant literature, the following definition of research capacity in nursing was developed. Research capacity in nursing is the ability to conduct nursing research activities in a sustainable manner in a specific context, and it is normally used at a non-individual level. It is critical for the development of the nursing discipline, as well as for positive patient, nurse, and health care system outcomes.

### 3.3. Allied Concepts

Several allied concepts of research capacity in nursing were found during the concept analysis: nursing research competency, nursing research capability, and evidence-based practice capacity in nursing. Nursing research competency and nursing research capability were not used consistently with the same meaning in the literature. They were used ambiguously in most articles without a clear definition.[20, 21, 24, 26] Evidence-based practice capacity focused more on the ability to "use evidence in practice" in a specific context.[38] However, no concept analyses were found for these allied concepts.

## 4. Discussion

This study was conducted to clarify the concept of research capacity in nursing by identifying its conceptual components using the Pragmatic Utility method based on a scoping review. During the broad literature search in this study, we identified some studies which focused specifically on research capacity in *clinical* nursing settings.[1, 5, 19, 20] This suggests that nursing research is no longer merely the "default" responsibility for nursing academics in *academic* nursing settings (e.g. departments/schools of nursing, universities, nursing research institutions), but has also become integrated into the role expectations and requirements for clinical nurses. The research engagement of clinical nurses who are the end-users of nursing evidence is imperative in reducing the gap between research and clinical practice in order to promote evidence-based practice, which contributes to positive nurse, patient, organizational,

and even national/societal outcomes.[23] Nursing academics also play a necessary role in clinical nursing research as they are crucial for improving research rigor. Therefore, the collaboration of clinical nurses and nursing academics is important for high-quality nursing studies that are directly relevant to nursing practice. This is also consistent with one antecedent of research capacity in nursing: collaboration.

As antecedents are the conditions that always precede and give rise to the concept, to effectively attain or improve research capacity in nursing, it is necessary to simultaneously provide and promote its antecedents.[10] The evidence from intervention studies on nursing research capacity building corroborates this conclusion.[1, 9, 24, 26, 27] Policymakers and nurse managers should propose and implement policies and strategies which promote nursing research competence, motivation, infrastructure, and collaboration, to provide the necessary conditions for cultivating research capacity in nursing.

Research capacity in nursing is commonly used at a non-individual level (one of the attributes we noted), suggesting that it is a concept used more with a macro perspective.[34] However, because of the lack of a consistent definition of research capacity in nursing, a few researchers used research capacity in reference to research knowledge, skill, and interest/attitude on the individual level.[7, 39] In those cases, using the term "research competence and attitude" might have been more suitable, based on the findings of this study which found that generally, research capacity in nursing was used at a non-individual level.

This concept analysis recognized "context-embeddedness" and "sustainability" as the other two attributes of research capacity in nursing. Therefore, in interventions for improving research capacity in nursing, an understanding of the local context as well as a plan for sustainability should be all included. It is suggested that rigorous interventions for improving nursing research capacity will be complex, multi-level, and long-term processes.[5, 9, 22, 25] These rigorous requirements may point to a reason for the paucity of intervention studies on

research capacity building: this kind of intervention is impossible to implement without an excellent research group with adequate funding, the sustained support of various levels of related social/managerial groups, and an understanding of the specific context being targeted by the intervention. In this context, smaller, more feasible studies focusing on improving just one or several antecedents of nursing research capacity should also be encouraged to progressively add to the foundational knowledge of research capacity building.

Another important reason for the limitation of intervention studies is a lack of appropriate measurement instruments for research capacity in nursing.[3] This concept analysis could provide a foundation for further studies on the development of instruments measuring research capacity in nursing. These instruments could be used to measure nursing research capacity at a certain point of time, to monitor variation tendencies of nursing research capacity which could show the effectiveness of an intervention, and to provide evidence to refine the intervention. Furthermore, the instruments could provide a baseline assessment of research capacity. Baseline assessments can help to develop specific and pertinent intervention plans for research capacity improvement, according to the specific baseline condition and needs within a specific context.[21]

Nursing research competency, nursing research capability, and evidence-based practice capacity in nursing were allied concepts identified during this concept analysis. However, there are no consistent definitions or concept analyses of these concepts. Additionally, the differences and relationships between these allied concepts and nursing research capacity are not entirely clear. Further studies (e.g. concept analysis, concept comparison) could be considered to explore the nature of these allied concepts, and to identify differences and relationships between these concepts.

*Limitations*

There are two main limitations of this study. Firstly, our study only included literature

written in English. Therefore, language-specific nuances in the concept may be missed, which could have deepened our understanding of this concept. Secondly, literature published before 2009 and outside the six databases were not included in this study. Our rationale for excluding literature before 2009 in this concept analysis was that we wanted to focus on more recent uses of the concept. However, these restrictions may have led to the omission of some relevant studies.

## 5. Conclusions and Implications

This concept analysis used the Pragmatic Utility method based on a scoping review to further develop the partially mature concept of research capacity in nursing. Through this concept analysis, we have defined research capacity in nursing as the ability to conduct nursing research activities in a sustainable manner in a specific context, normally at the non-individual level. This in-depth concept analysis contributes to theory development related to research capacity in nursing. The clearer definition and deeper understanding of research capacity in nursing could encourage policymakers, managers, and researchers to consistently and effectively use the concept in documents, nursing literature, and academic and policy communications. The analysis of antecedents and attributes encourages policymakers, nurse managers, and researchers to further consider strategies on multiple levels to promote nursing research competence, motivation, infrastructure, and collaboration, in order to build research capacity in nursing. This concept analysis also provides a foundation for instruments development of research capacity in nursing, which could improve the methodological rigor of studies and promote the comparability, transferability, and evidence synthesis of related study results. Such instruments would also positively influence nursing management because they could be used to evaluate the nursing research capacity of specific nursing groups (not of individuals). These developments would contribute further to nursing research capacity building, leading to the progressive development of the nursing

discipline and positive patient, nurse, and health care system outcomes.

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**Patient consent** Not required.

**Data sharing statement** No additional data available.

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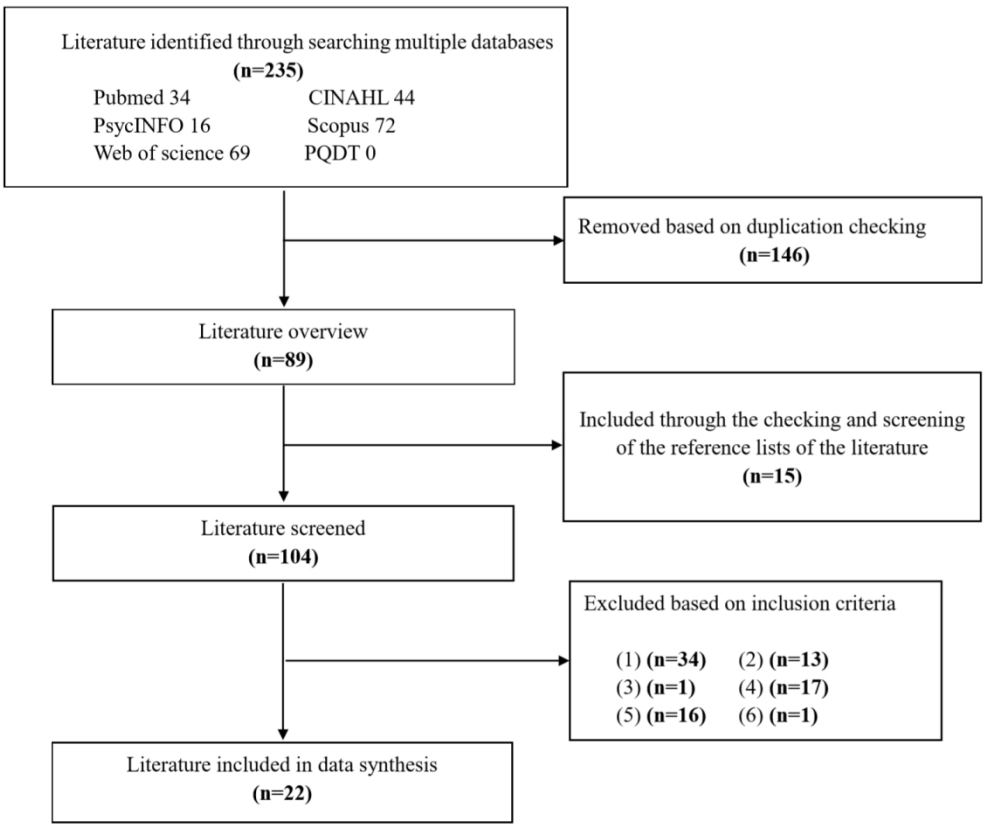


Figure 1. Flowchart of the Literature Search and Selection Process Note:1. Search strategy: (1) Pubmed: (research capacity[Title]) AND (nurisng[Title/Abstract] OR nurse*[Title/Abstract]); (2) CINAHL: TI research capacity AND AB ( nursing OR nurse* ); (3) PsycINFO: research capacity.m_titl. AND (nursing or nurse*).ab; (4) Scopus: (TITLE ("research capacity") AND TITLE-ABS-KEY (nursing OR nurse*)); (5) Web of Science: Title: ("research capacity") AND Topic: (nursing OR nurse*); (6) PQDT: title: "research capacity" AND abstract: (nursing OR nurse*). 2. Inclusion criteria of literature selection were: (1) published between 2009 and 2019 (to explore the most current use of the concept), (2) access to the full-text, (3) published in English, (4) the topic is research capacity in nursing, (5) the articles were qualitative studies, quantitative studies, mixed method studies, or literature reviews, and (6) not from the same research program as another study already included in the analysis.

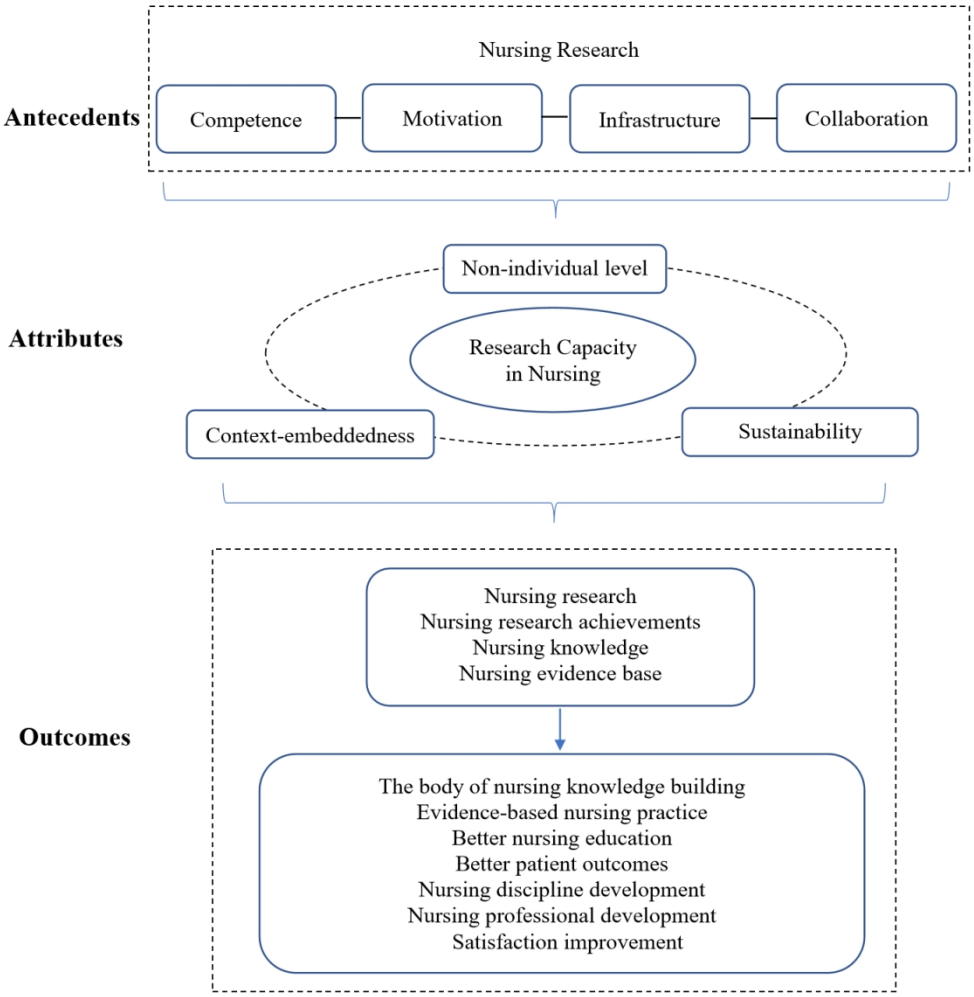


Figure 2. Conceptual Components of Research Capacity in Nursing

**Appendix 1. Tracking System Table - Example**

| Literature | Related information for concept analysis | Codes |
|---|---|---|
| Torres, G. C. S., Estrada, M. G., Sumile, E. F. R., Macindo, J. R. B., Maravilla, S. N., & Hendrix, C. C. (2017). Assessment of Research Capacity Among Nursing Faculty in a Clinical Intensive University in The Philippines. Nursing Forum, 52(4), 244-253. doi:10.1111/nuf.12192<br><br>Quantitative Study | "Research capacity is the **capability** to **conduct high-quality research** undertakings and is crucial toward building the knowledge base for evidence-based nursing practice." | **Definition:**<br>Capability<br>Conduct research<br>High-quality research |
| | "The actualization of research capacity is often difficult in academic settings that are clinically intensive because of **material and organizational barriers** (heavy teaching, administrative, and clinical workload; absence of research infrastructure; inadequate access to research personnel; inadequate funding or financial support; and inadequate mentoring programs)."<br>"Some barriers such as lack of **research knowledge and skills** and lack of **awareness** of the technicalities of the research process (examples are submission to ethics or institutional review boards) are transient and will disappear with the maturity of **research experience**." | **Antecedents:**<br>Material Supports<br>Organizational Supports<br>Research knowledge and skills<br>Research experience<br>Research awareness |
| | "Evidence suggests that approaches to research capacity building must be **strategic** and should be developed only after **determining research needs**."<br>"There is a clear need, therefore, to promote nursing research in Asia to enhance the **contextual relevance** of their evidence-based nursing interventions." | **Attributes:**<br>Contextual |
| | "Research capacity is the capability to conduct high-quality research undertakings and is crucial toward **building the knowledge base** for **evidence-based nursing practice**." | **Outcomes:**<br>Knowledge building<br>Evidence-based nursing practice |
| | "Research capacity is the **capability** to conduct high-quality research undertakings and is crucial toward building the knowledge base for evidence-based nursing practice."<br>"The collaboration with other institutions and researchers or mentors should be explored to gain greater **research competency**, capacity, and experience." | **Allied concepts:**<br>Research capability<br>Research competency |

**PPreferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist**

| SECTION | ITEM | PRISMA-ScR CHECKLIST ITEM | REPORTED ON PAGE # |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a scoping review. | Page 1 |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives. | Page 1-2 |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach. | Page 3-5 |
| Objectives | 4 | Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives. | Page 5 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number. | N/A |
| Eligibility criteria | 6 | Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale. | Page 7 |
| Information sources* | 7 | Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed. | Page 7 |
| Search | 8 | Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated. | Figure 1 |
| Selection of sources of evidence† | 9 | State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review. | Page 7<br>Figure 1 |
| Data charting process‡ | 10 | Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators. | Page 8,<br>Appendix 1 |
| Data items | 11 | List and define all variables for which data were sought and any assumptions and simplifications made. | Page 8-9,<br>Table1<br>Appendix 1 |
| Critical appraisal of individual sources of evidence§ | 12 | If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate). | N/A |

| SECTION | ITEM | PRISMA-ScR CHECKLIST ITEM | REPORTED ON PAGE # |
|---|---|---|---|
| Synthesis of results | 13 | Describe the methods of handling and summarizing the data that were charted. | Page 9 |
| **RESULTS** | | | |
| Selection of sources of evidence | 14 | Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram. | Figure1 |
| Characteristics of sources of evidence | 15 | For each source of evidence, present characteristics for which data were charted and provide the citations. | Table1 Appendix 1 |
| Critical appraisal within sources of evidence | 16 | If done, present data on critical appraisal of included sources of evidence (see item 12). | N/A |
| Results of individual sources of evidence | 17 | For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives. | Table1 Appendix 1 |
| Synthesis of results | 18 | Summarize and/or present the charting results as they relate to the review questions and objectives. | Table1 |
| **DISCUSSION** | | | |
| Summary of evidence | 19 | Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups. | Page 16-19 |
| Limitations | 20 | Discuss the limitations of the scoping review process. | Page 18-19 |
| Conclusions | 21 | Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps. | Page 19 |
| **FUNDING** | | | |
| Funding | 22 | Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review. | No funding |

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

*From:* Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

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# Research capacity in nursing: a concept analysis based on a scoping review



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# Research capacity in nursing: A concept analysis based on a scoping review

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**Keywords:** Research capacity, Nursing, Concept analysis, Scoping review



## ABSTRACT

**Objective:** As the discipline of nursing has advanced, research capacity in nursing has become increasingly important to the discipline's development. However, research capacity in nursing is still commonly used as a buzzword, without a consistent and clear definition. The purpose of this study is to clarify the concept of research capacity in nursing by identifying its conceptual components in the relevant nursing literature using the Pragmatic Utility method.

**Design:** A Pragmatic Utility concept analysis based on a scoping review.

**Data sources:** Academic literature retrieved from PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, Scopus, Web of Science, and ProQuest Dissertations & Theses (PQDT).

**Eligibility criteria:** Qualitative studies, quantitative studies, mixed method studies, or literature reviews focusing on research capacity in nursing published in English between 2009 and 2019.

**Results:** Competence, motivation, infrastructure, and collaboration for nursing research are the antecedents of research capacity in nursing. The attributes of research capacity in nursing are "non-individual level", "context-embeddedness", and "sustainability". The direct outcome of research capacity in nursing is nursing research. The allied concepts identified are nursing research competency, nursing research capability, and evidence-based practice capacity in nursing.

**Conclusions:** Research capacity in nursing is the ability to conduct nursing research activities in a sustainable manner in a specific context, and it is normally used at a non-individual level. Research capacity in nursing is critical for the development of the nursing discipline, and for positive nurse, patient, and healthcare system outcomes. More studies are needed to further explore the allied concepts of research capacity in nursing, and to better understand relationships among these allied concepts.

**Strengths and limitations of this study:**

◆The use of Pragmatic Utility concept analysis method based on relevant literature collected through a scoping review contributed to a rigorous and comprehensive concept analysis.

◆The data extraction was conducted by two researchers independently and the results were checked by the third researcher.

◆Literature published before 2009 and outside the six databases were not included in this study.

◆Only studies published in English were included.

## 1. Introduction

Research capacity has received a great deal of international attention in the nursing discipline.[1, 2] One reason for this attention is that nursing has gradually become an independent scientific discipline which requires its own body of knowledge. Furthermore, with evidence-based practice spreading worldwide, nurses, as healthcare professionals, are responsible for delivering high-quality care based on the best available evidence.[3] The bodies of knowledge for nursing as a scientific discipline and for credible evidence for evidence-based nursing practice should be based on high-quality nursing research studies. Such studies can only be conducted if excellent research capacity exists in the nursing discipline.[4]

In the past three decades, many countries and organizations have made concerted efforts to develop and improve research capacity in the discipline of nursing.[5] However, these policy-level supports provided by countries and organizations are insufficient for significantly improving the limited research capacity in nursing;[6, 7] interventions to strengthen research capacity in nursing must be informed by scientific research. Therefore, more studies focusing on how to improve nursing research capacity are needed in order to provide evidence for policymakers, as well as to develop and refine interventions for improving research capacity in nursing.[3, 5] However, before evidence-based interventions can be developed to improve research capacity in nursing, researchers and policymakers must have a clear and common understanding of what is meant by "research capacity in nursing". Based on over review of the literature, there is not an established understanding of this concept.

A concept analysis of research capacity in nursing can produce a rigorous definition and understanding of the concept, which will allow for more relevant high-quality studies to be conducted.[8] In addition to the concept analysis's potential contributions to future studies on

research capacity in nursing, this concept analysis could also help nurses, nurse managers, nurse leaders to better understand research capacity in nursing.[8] Nursing is not only a scientific or theoretical discipline; it is also a profession whose practice should be based on evidence. Nurses, as the end-users of the evidence in their practice, are increasingly expected to participate in nursing-related research activities, to bridge the gap between nursing research and nursing practice, and to improve the quality of the nursing care they provide to their patients.[3, 5] In order to facilitate the participation of more nurses in nursing research - and thus to help improve research capacity and evidence-based practice in clinical practice settings - there is an urgent need for nurses, nurse managers and leaders, and healthcare policymakers to first have a better understanding of research capacity in nursing.

A concept analysis involves analyzing the literature relevant to the concept, to form a better understanding of the concept's meaning and the contexts in which it is used.[8] After a broad search and review of the literature, no clear definition or specific conceptual dimensions (antecedents, attributes and outcomes) of research capacity in nursing were found (in fact, no clear definition and concept analyses of research capacity in any health-related discipline were found).[9] Based on Morse's process and criteria for concept maturity evaluation,[10] research capacity in nursing is recognized as a partially mature concept. Partially mature concepts are those concepts having multiple or problematic definitions, ambiguous meanings, and confusion with use. These concepts are often used inconsistently in practice and research.[11] For partially mature concepts, the Pragmatic Utility concept analysis method is considered to be appropriate for developing the concept further.[8] Therefore, the purpose of this study was to further develop the concept of research capacity in nursing by conducting a Pragmatic Utility concept analysis based on relevant literature.

## 2. Method

*Pragmatic Utility* is a meta-synthesis technique used to synthesize literature and advance

the development of partially mature concepts by using the literature as the data source.[8] The strengths of the Pragmatic Utility method include its use of extensive data sources, its well-articulated criteria and procedures for concept evaluation and concept analysis, and its inclusion of intellectual processes of critical appraisal for asking analytical questions (i.e., the questions that researchers spontaneously ask themselves as they are reading the literature, to reveal the information needed for concept analysis) and synthesizing the results.[12] These traits of the Pragmatic Utility method may help it to overcome some of the limitations (e.g., insufficient data sources, the use of dictionary definitions and invented cases, and less emphasis on a clear definition of the concept and its boundaries with other concepts) of other concept analysis methods, such as Wilsonian-derived methods and Rodgers' evolutionary method.[8, 12]

In Pragmatic Utility, researchers examine and appraise the definition, antecedents, attributes, outcomes, and use of a partially mature concept in the literature by asking analytical questions and answering those questions.[8] Analytical questions play an important role in Pragmatic Utility. The identification of analytical questions occurs through the researchers' interpretative readings, deep understanding, and critical appraisal of the literature. For instance, these are the spontaneous questions that researchers have as they are reading, where they recognize aspects of the concept which they do not quite understand, or aspects which the researchers recognize have inconsistencies across the literature analyzed thus far. Such questions can guide researchers towards extracting ever more relevant data from the literature, and sorting these data further according to the responses the researchers developed for the analytic questions they first asked.[11]

The antecedents, attributes, boundaries, and outcomes of the concept can be identified and a definition can be developed through the methodical process of asking and answering analytical questions. Additionally, allied concepts may be found during the concept analysis

process.[8] Antecedents are the conditions that always precede and give rise to the concept. Attributes are the key characteristics of the concept.[8] Boundaries, which are normally formed by the antecedents and attributes of a concept, are the invisible lines between the concept and other concepts; they delineate what the concept is and what it is not.[13] Outcomes are the results or consequences of the concept. Allied concepts are those concepts that "closely resemble one another, and may even share some attributes, but are different and separate concepts in their own right".[8] Allied concepts can help to further clarify the boundaries of concepts and provide implications for further studies (e.g. a concept comparison of allied concepts).

The data source for a Pragmatic Utility concept analysis is the literature related to the concept. Ideally, a larger sample of the relevant literature may provide a more comprehensive understanding of the concept. However, the Pragmatic Utility concept analysis method does not provide a detailed description of the procedures for retrieving relevant literature.[8] The scoping review method is "an ideal tool to determine the scope or coverage of a body of literature on a given topic and give clear indication of the volume of literature and studies available as well as an overview (broad or detailed) of its focus".[14] The scoping review method offers a rigorous and replicable literature search process for collecting rich sources of secondary data.[14] Considering that systematic literature search method used by scoping reviews can provide a large sample of papers for conducting a concept analysis, we used the literature search method of scoping review to retrieve all relevant literature for our study.[15] A scoping review of the nursing literature on research capacity in nursing can also help to explore all the contexts in which the concept is used.

The researchers in our research group were three graduate students experienced in conducting nursing research and literature reviews, as well as three professors in nursing. The following steps were followed to conduct a Pragmatic Utility concept analysis based on a

scoping review:[8, 11, 16] (1) "Clarify the study purpose"; (2) "Search literature broadly and select appropriate literature"; (3) "Get inside the literature"; (4) "Read the literature interpretively and identify analytical questions"; (5) "Record responses on a data collection sheet"; (6) "Synthesize the results".

**(1) Clarify the study purpose.** The clarification of this study's purpose was the first step of the concept analysis and the premise of the literature search. The purpose of this study was to conduct a concept analysis for research capacity in nursing.

**(2) Search literature broadly and select appropriate literature.** Based on the purpose of this study, we used "research capacity" AND "nursing OR nurse*" as keywords in the literature search (a search strategy example is shown in Figure 1). Databases searched included the PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, Scopus, Web of Science, and ProQuest Dissertations & Theses (PQDT). After removing the duplicates, a total of 89 records remained in the EndNote library, which was the literature management software used in this study. The additional 15 papers, which were identified as relevant literature through the checking and screening of the reference lists of the 89 articles, were then imported into the EndNote library, as well. Appropriate articles for the concept analysis were then screened for based on the following inclusion criteria for the literature selection: (1) published between 2009 and 2019 (to explore the most current use of the concept), (2) access to the full-text, (3) published in English, (4) the topic is research capacity in nursing, (5) the articles were qualitative studies, quantitative studies, mixed method studies, or literature reviews, and (6) not from the same research program as another study already included in the analysis. Two researchers were responsible for screening the literature selection. Finally, 22 articles were included as the data source for the concept analysis. The flowchart of the literature selection process for the concept analysis is shown in Figure 1.

**(3) Get inside the literature**. Two researchers read the selected literature in detail to extract explicit information showing the anatomy (i.e., the antecedents, attributes, boundaries, outcomes, and definition) and allied concepts of the concept and to get a preliminary understanding of the included literature.[8] The tracking system table developed by Weaver was used as a tool for documenting details gathered through the readings relating to the concept's definition, antecedents, attributes, outcomes, and allied concepts.[11] The data extraction was conducted by two researchers independently using the tracking system table, and the final results were checked and combined by the third researcher. The tracking system table provided a method to manage the copious data and to help make the research process transparent. We extracted a small part of this tracking system table as an example, shown in Appendix 1. The complete tracking system table can be acquired from the corresponding author upon request.

**(4) Read the literature interpretatively and identify analytical questions.** After the previous step of "get inside the literature", three researchers further read the literature interpretatively to extract implicit information showing the anatomy of the concept (these data were sorted and then added into the tracking system table), and simultaneously, to read the literature critically in order to identify analytical questions. Then, we held a meeting to discuss, debate, and determine the final analytical questions that required further exploration. The final analytical questions identified are shown in the "Analytical Questions" column in Table 1.

**(5) Record responses on a data collection sheet.** Based on the existing data in the tracking system table, two researchers further extracted additional data needed for answering analytical questions from the literature and then responded to the analytical questions based on all the data extracted. A matrix (the first two columns of Table 1) on a data collection sheet was used to organize the responses to the analytical questions. For example, the fifth

analytical question was "What factors are demanded for or could directly influence nursing research capacity?" All related data in included literature which could answer this question were extracted and used to answer the analytical question, and the answers were recorded as "responses from literature" in the data collection sheet. The answers were summarized and shown in the "Responses from Literature" column in Table 1.

**(6) Synthesize the results.** In a research group meeting, researchers used each set of responses in the matrix (the "Responses from Literature" column in Table 1) to recognize commonalities and differences for summarizing implicit and explicit conceptual components of the concept. This step was a process of comparing, contrasting, and synthesizing the data extracted from the literature. The conceptual components extracted are shown in the "Conceptual Components" column in Table 1.

**Patient and public involvement**

No patients were or members of the public were involved.

## 3. Findings

A total of 22 articles met the inclusion criteria and provided the rich data source for our Pragmatic Utility concept analysis. The antecedents of research capacity in nursing were identified as competence, motivation, infrastructure, and collaboration for nursing research. The attributes of research capacity in nursing were identified as "non-individual level", "context-embeddedness", and "sustainability". The direct outcome of the concept of research capacity in nursing was nursing research. The allied concepts identified were nursing research competency, nursing research capability, and evidence-based practice capacity in nursing. The findings are shown in Table 1. A proposed conceptual framework of research capacity in nursing is shown in Figure 2.

### 3.1. The Contextual Use of Research Capacity in Nursing

In the literature, research capacity in nursing was used both in clinical nursing contexts

(e.g., in the context of hospitals, clinical institutions, clinical nurse settings, etc.),[1, 5, 17, 18] and academic nursing contexts (e.g., higher education, universities, departments of nursing, research institutes, etc.).[2, 19-21]

### 3.2. Anatomy of Research Capacity in Nursing

#### 3.2.1. Antecedents

**Competence.** Individual competence (knowledge, skills, and experience) for nursing research is a premise of the ability to conduct nursing research activities.[22] Educational programs, training, mentorship, academic-clinical collaborations, journal clubs, seminars, workshops, academic meetings, experiential learning opportunities, and research facilitators were all approaches found in the literature for improving or providing the research competence of individual nurses towards achieving research capacity in nursing.[1, 7, 17, 19]

**Motivation.** Motivation - which is the individual and contextual willingness, interest in, and desire for nursing research - is a precondition for gaining research capacity.[5, 7, 23] Studies revealed different strategies for enhancing motivation, such as ensuring that the research was relevant to practitioners by asking research questions that emanate from practice, disseminating research evidence, and incorporating research into practice to help nurses realize the contributions of nursing research to their practice.[3, 7, 24]

Another factor that stimulates motivation centers around building a cultural environment that appreciates the value of nursing research.[25-27] Building a culture that values nursing research and is then committed to its development requires commitment at different levels – i.e., at the individual, group, organizational/institutional, and national/societal levels.[3, 17, 19, 28, 29] Commitment also requires: a clear understanding of what nursing research is, transparent role expectations and requirements of nurse researchers, and the creation of opportunities of career pathways of nurses who are research-active.[3] A strong research culture also requires encouragement and support from peers,[1] as well as a system that rewards research

productivity and outputs.[7, 24]

**Infrastructure.** Infrastructure was defined as the structures and processes that were set up to enable the smooth and effective running of nursing research activities.[30] It includes academic support, material support, management support, and research culture. Individual research competence requires opportunities for long-term improvement. Therefore, academic support (e.g. supervision, mentorship, expert consultation, educational opportunities, and partnership with experienced nursing researchers) is indispensable as a form of infrastructure for nursing research activities.[1, 3, 7] Material support (e.g. time, human resources, equipment, information, funding, library resources, and software for nursing research) is another necessary part of the infrastructure for nursing research activities.[5, 19, 22] Management support includes adequate organizational structure to enable nursing research capacity, supervision, steering groups, research facilitators, and coordinators for the management and organization of nursing research.[7, 19, 25, 27] A research culture (which, as noted above, can promote motivation for nursing research) is another form of infrastructure that supports nursing research activities.[5, 26, 31]

**Collaboration.** Research is the activity of many people who are engaged in a collaborative process in order to generate knowledge. Therefore, collaboration is a precondition for research capacity in nursing. Academic-clinical collaboration, novice-expert collaboration, multi-site collaboration, interprofessional collaboration, and multidisciplinary collaboration were different forms of collaboration found in the literature on research capacity in nursing.[1, 3, 5, 7, 18, 22, 24]

### 3.2.2. Attributes

**Non-individual level.** Compared to nursing research *competence* - which mainly refers to the knowledge, skills, and experience required for an individual to conduct nursing research activities - research *capacity* in nursing is a concept that uses a relatively macro

perspective.[32] In the literature, research capacity in nursing is commonly a term used at the group level (clinical nurses, nursing academics),[7, 20] organizational/institutional level (unit, hospital, department/school, university),[2, 18, 32] regional level,[1] national level, international level,[24] and discipline level.[5, 23] An individual nurse's ability to conduct research is not typically referred to as their "research capacity", but rather as their "research competence".

**Context-embeddedness.** Research capacity in nursing is embedded in a specific context. It emphasizes the ability to act "in a specific context", rather than the competence (knowledge, skills, and experience) possessed by individuals, which generally are less influenced by the context. The context could be a unit, hospital, department/school, university, region, nation or even the international community.[7] Many researchers have pointed out that the consideration of contextual factors is crucial for nursing research capacity building.[5, 17, 19, 33] There is no "one size fits all" approach for improving nursing research capacity, which is closely related to and influenced by context.[7] The importance of the construction of a strong research culture in order to build nursing research capacity also supports the assertion that nursing research capacity is context-embedded.[5]

**Sustainability.** As nursing research is a long-lasting and never-ending process requiring continuity and sustainability, research capacity in nursing emphasizes the ability to conduct research activities "in a sustained manner".[34] Therefore, research capacity in nursing requires a setting that could sustainably support the conduction of research activities and research capacity improvement.[17, 25] The characteristic of sustainability was embodied in almost all intervention studies on research capacity building.

### 3.2.3. Boundaries

Boundaries differentiating what is and what is not research capacity in nursing are formed invisibly, based on the antecedents and attributes of the concept.[13] Research capacity in nursing would not exist if there were no antecedents of competence, motivation,

infrastructure, and collaboration for nursing research. The usage of research capacity in nursing also implied certain attributes. Research capacity in nursing was normally used in discussions of nursing at the non-individual level and in a specific context. Finally, references to this concept frequently implied that the research capacity in nursing was sustainable.

### 3.2.4. Outcomes

The direct outcome of research capacity in nursing is nursing research for research achievements (e.g., publications, conference presentations and posters, projects/grants/funding)[2, 20-22, 25, 28, 35] which build nursing knowledge for the nursing discipline and the evidence base for nursing practice.[5, 19, 24, 26, 27, 35] Furthermore, the body of knowledge building and evidence-based practice can provide better nursing education and patient outcomes,[3, 5, 7, 24, 27-29, 31, 33] which lead to nursing discipline development and improved satisfaction for various stakeholders (i.e., nurses, patients, organization, and the nation/society).[3, 5, 22, 25, 27, 28, 31]

**Table 1. Analytical Questions, Responses from Literature, and Conceptual Components of Research Capacity in Nursing**

| Analytical Questions | Responses from Literature | Conceptual Components |
|---|---|---|
| Definition | | |
| 1. Is nursing research capacity a kind of competence? | 1. No | |
| 2. Is nursing research capacity a kind of ability? | 2. Yes | |
| 3. Is motivation a part of nursing research capacity? | 3. No (Except *Torres et al., 2017*) | Ability |
| 4. Does nursing research capacity completely include evidence-based nursing practice capacity? | 4. No, but related | Nursing research activities |
| Antecedents | | |
| 5. What factors are demanded for or could directly influence nursing research capacity? | 5. Nursing research<br>(1) Knowledge, Skills, Experience<br>(2) Motivation, Passion, Awareness, Incentives, Encouragement, Interest, Attitude, Value<br>(3) Infrastructure, Time, Funding, Education, Academic support, Mentorship, Supervision, Material supports, Resources, Research culture, Management, Policy<br>(4) Collaboration, Partnership, Linkage, Networks, Teamwork, Community, Multidisciplinary, Interprofessional | Nursing research<br>Competence<br>Motivation<br>Infrastructure<br>Collaboration |
| Attributes | | |
| 6. On what level(s) is nursing research capacity used on? | 6. Group level, Organizational/Institutional level, Region level, National level, International level, Discipline level | Non-individual level |
| 7. Is nursing research capacity reinforced | 7. Both | Context-embeddedness |

| | | |
|---|---|---|
| internally or externally? | (Internal, External, Contextualize, Context, Local, Settings, Suitable, Tailored) | |
| 8. Does nursing research capacity focus on present ability or ability over the long-term? | 8. Ability over long-term (Long-term, Sustainability, Sustainable, Continuity) | Sustainability |
| Outcomes | | |
| 9. How is nursing research capacity manifested? | 9. Nursing publications, Nursing conference presentations and posters, Projects, Grants, Funding | Nursing research achievements |
| 10. What are the consequences of nursing research capacity? | 10. Nursing research, Knowledge building, Evidence base development, Evidence-based practice, Maturity of nursing as a scientific discipline, improvement of the quality of nursing care, High-quality outcomes in nursing academic and clinical arenas, Improved attitudes toward nursing research, Better patient care, Better patient outcomes, Enhance quality and patient safety, Professional growth, Improvement in nurses' satisfaction, Decrease in nursing turnover, Cost saving | Nursing research, Nursing knowledge, Nursing evidence base<br><br>The body of nursing knowledge building, Evidence-based nursing practice, Better nursing education, Better patient outcomes, Nursing discipline development, Nursing professional development, Satisfaction improvement |

*Note:* The following articles provided data sources for concept analysis: Akerjordet et al., 2012b, Begley et al., 2014, Corchon et al., 2011, Crozier et al., 2012, Edwards et al., 2009, Fullam et al., 2018, Goeppinger et al., 2009, Gullick and West, 2016, Hauck et al., 2015, Jamerson and Vermeersch, 2012, Kulage and Larson, 2018, Landeen et al., 2017, Lee and Metcalf, 2009, Lode et al., 2015, Martínez, 2012, McAllister and Brien, 2017, McKee et al., 2017, Moore et al., 2012, O'Byrne and Smith, 2011, Renwick et al., 2017, Torres et al., 2017, Wilkes et al., 2013.

### 3.2.5. Definition

Based on our critical analysis of the concept in the relevant literature, the following definition of research capacity in nursing was developed. Research capacity in nursing is the ability to conduct nursing research activities in a sustainable manner in a specific context, and it is normally used at a non-individual level. It is critical for the development of the nursing discipline, as well as for positive patient, nurse, and health care system outcomes.

### 3.3. Allied Concepts

Several allied concepts of research capacity in nursing were found during the concept analysis: nursing research competency, nursing research capability, and evidence-based practice capacity in nursing. Nursing research competency and nursing research capability were both not used consistently with the same meaning in the literature. They were used ambiguously in most articles without a clear definition.[18, 19, 22, 24] Evidence-based practice capacity focused more on the ability to "use evidence in practice" in a specific context.[36] However, no concept analyses were found for these allied concepts.

## 4. Discussion

This study was conducted to clarify the concept of research capacity in nursing by identifying its conceptual components using the Pragmatic Utility method based on a scoping review. During the broad literature search in this study, we identified some studies which focused specifically on research capacity in *clinical* nursing settings.[1, 5, 17, 18] This suggests that nursing research is no longer merely the "default" responsibility for nursing academics in *academic* nursing settings (e.g. departments/schools of nursing, universities, nursing research institutions), but has also become integrated into the role expectations and requirements for clinical nurses. The research engagement of clinical nurses who are the end-users of nursing evidence is imperative in reducing the gap between research and clinical practice in order to promote evidence-based practice, which contributes to positive nurse, patient, organizational,

and even national/societal outcomes.[21] Nursing academics also play a necessary role in clinical nursing research as they are crucial for improving research rigor. Therefore, the collaboration of clinical nurses and nursing academics is important for high-quality nursing studies that are directly relevant to nursing practice. This is also consistent with one antecedent of research capacity in nursing: collaboration.

As antecedents are the conditions that always precede and give rise to the concept, to effectively attain or improve research capacity in nursing, it is necessary to simultaneously provide and promote its antecedents.[8] The evidence from intervention studies on nursing research capacity building corroborates this conclusion.[1, 7, 22, 24, 25] Policymakers and nurse managers should propose and implement policies and strategies which promote competence, motivation, infrastructure, and collaboration for nursing research, to provide the necessary conditions for cultivating research capacity in nursing. By promoting these antecedents, policymakers and nurse managers can facilitate the improvement of research capacity in nursing. However, if these antecedents are ignored, they may act as barriers to the improvement of research capacity in nursing. For instance, a lack of appropriate research infrastructure (e.g., funding, material support) is a barrier to improving research capacity in nursing.

Research capacity in nursing is commonly used at a non-individual level (one of the attributes we noted), suggesting that it is a concept used more with a macro perspective.[32] However, because of the lack of a consistent definition of research capacity in nursing, a few researchers used research capacity in reference to research knowledge, skill, and interest/attitude on the individual level.[37, 38] In those few cases, using the term "research competence and attitude" might have been more suitable, based on the findings of this study which found that generally, research capacity in nursing was used at a non-individual level.

This concept analysis recognized "context-embeddedness" and "sustainability" as the

other two attributes of research capacity in nursing. Therefore, in interventions for improving research capacity in nursing, an understanding of the local context as well as a plan for sustainability should be all included. It is suggested that rigorous interventions for improving nursing research capacity will be complex, multi-level, and long-term processes.[5, 7, 20, 23] These rigorous requirements may point to a reason for the paucity of intervention studies on research capacity building: this kind of intervention is impossible to implement without an excellent research group with adequate funding, the sustained support of various levels of related social/managerial groups, and an understanding of the specific context being targeted by the intervention. In this context, smaller, more feasible studies focusing on improving just one or several antecedents of nursing research capacity should also be encouraged to progressively add to the foundational knowledge of research capacity building.

Another important reason for the limitation of intervention studies is a lack of appropriate measurement instruments for research capacity in nursing.[3] This concept analysis could provide a foundation for further studies on the development of instruments measuring research capacity in nursing. These instruments could be used to measure nursing research capacity at a certain point of time, to monitor variation tendencies of nursing research capacity which could show the effectiveness of an intervention, and to provide evidence to refine the intervention. Furthermore, such instruments could provide a baseline assessment of research capacity. Baseline assessments can help to develop specific and pertinent intervention plans for research capacity improvement, according to the specific baseline condition and needs within a specific context.[19]

Nursing research competency, nursing research capability, and evidence-based practice capacity in nursing were allied concepts identified during this concept analysis. However, there are no consistent definitions or concept analyses of these concepts. Additionally, the differences and relationships between these allied concepts and nursing research capacity are

not entirely clear. Further studies (e.g. concept analysis, concept comparison) could be considered to explore the nature of these allied concepts, and to identify differences and relationships between these concepts.

*Limitations*

There are two main limitations of this study. Firstly, our study only included literature written in English. Therefore, language-specific nuances in the concept may be missed, which could have deepened our understanding of this concept. Secondly, literature published before 2009 and outside the six databases were not included in this study. These restrictions may have led to the omission of some relevant studies that could have revealed the earlier development of the concept. Our rationale for including literature after 2009 in this concept analysis was that we found a study pointed out that the concept of research capacity had not been well defined before 2009, [9] and our purpose is to develop a definition and provide a better understanding of the meaning of the concept for present-day policy making and research programming rather than to provide the whole development history of the concept.

## 5. Conclusions and Implications

This concept analysis used the Pragmatic Utility method based on a scoping review to further develop the partially mature concept of research capacity in nursing. Through this concept analysis, we have defined research capacity in nursing as the ability to conduct nursing research activities in a sustainable manner in a specific context, normally at the non-individual level. This in-depth concept analysis contributes to theory development related to research capacity in nursing. The clearer definition and deeper understanding of research capacity in nursing could encourage policymakers, managers, nursing philosophers, and researchers to consistently and effectively use the concept in documents, nursing literature, and academic and policy communications. The analysis of antecedents and attributes encourages policymakers, nurse managers, and researchers to further consider

strategies on multiple levels to promote nursing research competence, motivation, infrastructure, and collaboration, in order to build research capacity in nursing. This concept analysis also provides a foundation for the development of instruments measuring for research capacity in nursing, which could improve the methodological rigor of studies and promote the comparability, transferability, and evidence synthesis of related study results. Such instruments would also positively influence nursing management because they could be used to evaluate the nursing research capacity of specific nursing groups (not of individuals). These developments would contribute further to nursing research capacity building, leading to the progressive development of the nursing discipline and positive patient, nurse, and health care system outcomes.

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**Author contributions** Study design: QC, ST; Data collection: QC, AC; Data analysis: QC, MS, ST; Study supervision: ST, MS; Manuscript writing: QC, AC; Critical revisions for important intellectual content: ST, MS, AC.

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**Competing interests** None declared.

**Patient consent** Not required.

**Data sharing statement** No additional data available.

**Figure 1. Flowchart of the Literature Search and Selection Process Note:1. Example: search strategy in Pubmed: (research capacity[Title]) AND (nurisng[Title/Abstract] OR nurse*[Title/Abstract]) 2.Inclusion criteria of literature selection were: (1) published between 2009 and 2019 (to explore the most current use of**

**the concept), (2) access to the full-text, (3) published in English, (4) the topic is research capacity in nursing, (5) the articles were qualitative studies, quantitative studies, mixed method studies, or literature reviews, and (6) not from the same research program as another study already included in the analysis.**

**Figure 2. Conceptual Components of Research Capacity in Nursing**

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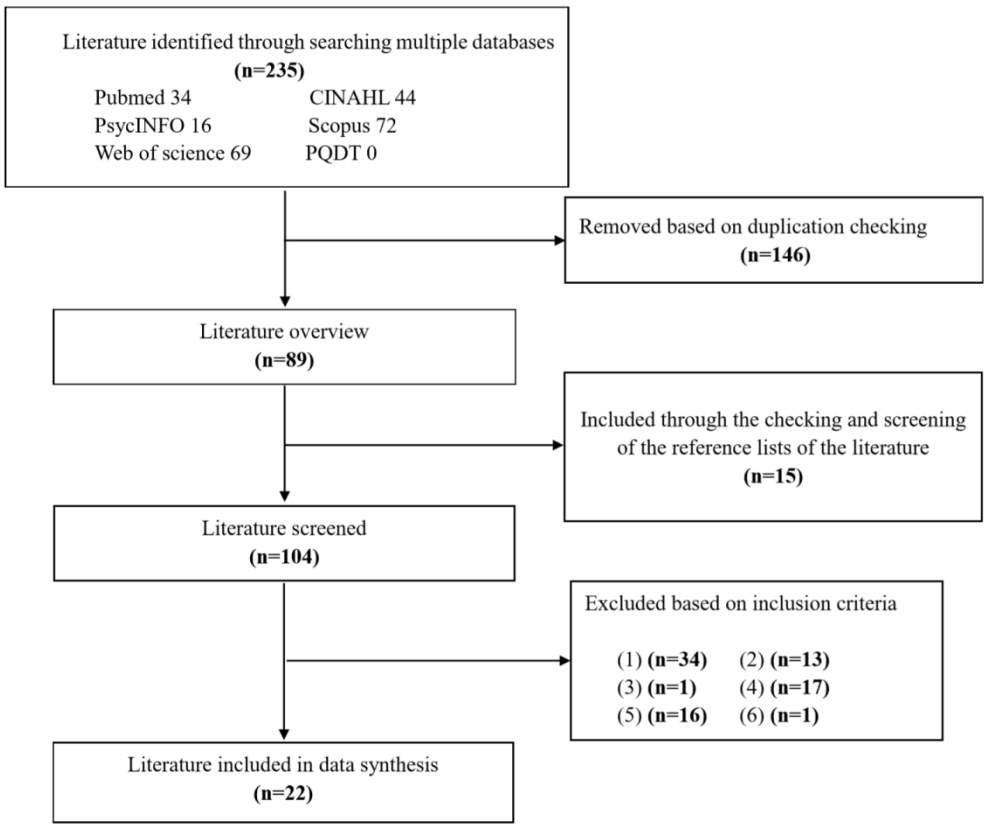


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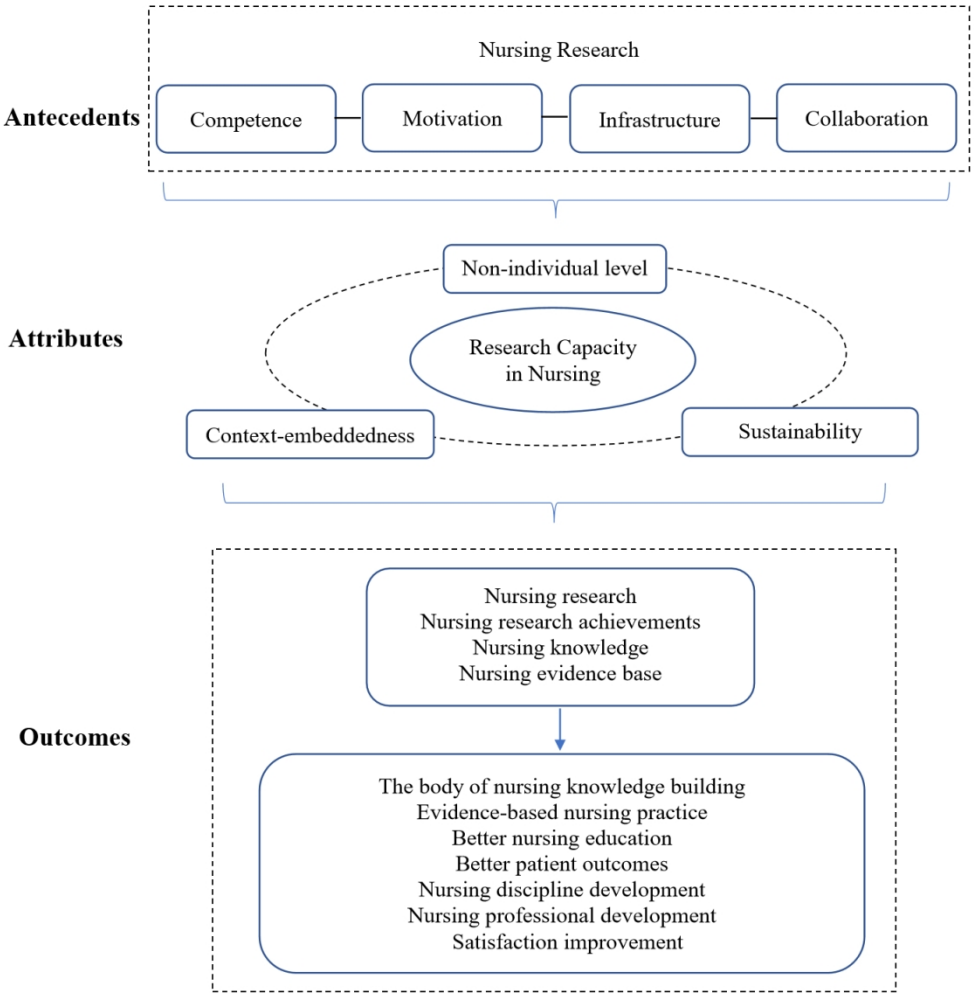


Figure 2. Conceptual Components of Research Capacity in Nursing

**Appendix 1. Tracking System Table - Example**

| Literature | Related information for concept analysis | Codes |
|---|---|---|
| Torres, G. C. S., Estrada, M. G., Sumile, E. F. R., Macindo, J. R. B., Maravilla, S. N., & Hendrix, C. C. (2017). Assessment of Research Capacity Among Nursing Faculty in a Clinical Intensive University in The Philippines. Nursing Forum, 52(4), 244-253. doi:10.1111/nuf.12192<br><br>Quantitative Study | "Research capacity is the **capability** to **conduct high-quality research** undertakings and is crucial toward building the knowledge base for evidence-based nursing practice." | **Definition:**<br>Capability<br>Conduct research<br>High-quality research |
| | "The actualization of research capacity is often difficult in academic settings that are clinically intensive because of **material and organizational barriers** (heavy teaching, administrative, and clinical workload; absence of research infrastructure; inadequate access to research personnel; inadequate funding or financial support; and inadequate mentoring programs)."<br>"Some barriers such as lack of **research knowledge and skills** and lack of **awareness** of the technicalities of the research process (examples are submission to ethics or institutional review boards) are transient and will disappear with the maturity of **research experience**." | **Antecedents:**<br>Material Supports<br>Organizational Supports<br>Research knowledge and skills<br>Research experience<br>Research awareness |
| | "Evidence suggests that approaches to research capacity building must be **strategic** and should be developed only after **determining research needs**."<br>"There is a clear need, therefore, to promote nursing research in Asia to enhance the **contextual relevance** of their evidence-based nursing interventions." | **Attributes:**<br>Contextual |
| | "Research capacity is the capability to conduct high-quality research undertakings and is crucial toward **building the knowledge base** for **evidence-based nursing practice**." | **Outcomes:**<br>Knowledge building<br>Evidence-based nursing practice |
| | "Research capacity is the **capability** to conduct high-quality research undertakings and is crucial toward building the knowledge base for evidence-based nursing practice."<br>"The collaboration with other institutions and researchers or mentors should be explored to gain greater **research competency**, capacity, and experience." | **Allied concepts:**<br>Research capability<br>Research competency |

**PPreferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist**

| SECTION | ITEM | PRISMA-ScR CHECKLIST ITEM | REPORTED ON PAGE # |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a scoping review. | Page 1 |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives. | Page 1-2 |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach. | Page 3-4 |
| Objectives | 4 | Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives. | Page 4 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number. | N/A |
| Eligibility criteria | 6 | Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale. | Page 7 |
| Information sources* | 7 | Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed. | Page 7 |
| Search | 8 | Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated. | Figure 1 |
| Selection of sources of evidence† | 9 | State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review. | Page 7 Figure 1 |
| Data charting process‡ | 10 | Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators. | Page 8, Appendix 1 |
| Data items | 11 | List and define all variables for which data were sought and any assumptions and simplifications made. | Page 8-9, Table1 Appendix 1 |
| Critical appraisal of individual sources of evidence§ | 12 | If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate). | N/A |

| SECTION | ITEM | PRISMA-ScR CHECKLIST ITEM | REPORTED ON PAGE # |
|---|---|---|---|
| Synthesis of results | 13 | Describe the methods of handling and summarizing the data that were charted. | Page 9 |
| **RESULTS** | | | |
| Selection of sources of evidence | 14 | Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram. | Figure1 |
| Characteristics of sources of evidence | 15 | For each source of evidence, present characteristics for which data were charted and provide the citations. | Table1 Appendix 1 |
| Critical appraisal within sources of evidence | 16 | If done, present data on critical appraisal of included sources of evidence (see item 12). | N/A |
| Results of individual sources of evidence | 17 | For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives. | Table1 Appendix 1 |
| Synthesis of results | 18 | Summarize and/or present the charting results as they relate to the review questions and objectives. | Table1 |
| **DISCUSSION** | | | |
| Summary of evidence | 19 | Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups. | Page 16-19 |
| Limitations | 20 | Discuss the limitations of the scoping review process. | Page 19 |
| Conclusions | 21 | Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps. | Page 19-20 |
| **FUNDING** | | | |
| Funding | 22 | Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review. | No funding |

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

*From:* Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850