

# Developing the Researchable Problem

## Objectives

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Upon completion of this chapter, the reader should be prepared to:

1. Discuss the elements needed to formulate a research question, specifically discussing the PICOT process of developing a research question.
2. Utilize sample scenarios to formulate suitable research questions.
3. Discuss the development of a testable hypothesis.
4. Describe the different categories of hypotheses: research vs. statistical, directional vs. nondirectional.
5. Determine when it would be most appropriate to utilize a research question and when it would be most appropriate to utilize a hypothesis.
6. Discuss the difference between a directional hypothesis and a nondirectional hypothesis.
7. Discuss the difference between a research hypothesis and a statistical hypothesis.
8. Discuss the relationship of a hypothesis to the theoretical framework.

9. Distinguish between the conceptual framework and the theoretical framework.
10. Describe the different categories of nursing theories: grand, mid-range, and microrange.
11. Describe the difference between inductive reasoning and deductive reasoning.
12. Discuss the process of selecting an appropriate theoretical framework.

## Selection of the Research Problem and Development of the Research Question

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The selection of the **research problem** is arguably the most important step in the research process, for if the problem is not viable and therefore testable, the entire process may be implemented in vain, wasting valuable man-hours and financial resources while generating nothing more than frustration for the researcher. For the DNP clinician, the research problem must above all relate to some area of practice. The germ of the idea can come directly from patients or colleagues or more indirectly from the auditing process if the clinician functions in quality management or nursing administration (Fitzpatrick, 2007).

The DNP clinician must select a research problem that will contribute to evidence-based practice and to the development of either a **hypothesis** or a **research question**. The development of hypotheses and their proper usage will be discussed in the next sections. According to Stillwell, Fineout-Overhold, Melnyk, and Williamson (2010), five components will indicate that the researcher has developed a research question that is rooted in an evidence-based practice problem:

1. The patient group or patient condition is clearly identified.
2. There is an issue or intervention that is being investigated, such as a method of patient care or a specific diagnostic test.
3. There is a specified way for a baseline measurement to be made as well as a method for comparison.
4. An outcome or result is indicated.
5. There is a time frame required for the intervention to achieve the outcome.

In order for the researcher to keep these elements in mind while developing the research question, the acronym PICOT frequently is utilized:

- P = the specified patient or target population
- I = the issue or intervention being investigated
- C = the comparison being made
- O = the outcome that may be the result
- T = time frame required to achieve the outcome (Stillwell, Fineout-Overhold, Melnyk, and Williamson, 2010).

An example of an acceptable evidence-based practice question would be: Does use of a pain scale reduce the patient's experience of pain post-operatively? In this case:

- P = Patient is undergoing a surgical procedure.
- I = Patient is taught how to measure pain using a pain scale.
- C = The pain level without using a pain scale is compared to the pain level when using a pain scale.
- O = The patient has verbalized or indicated experience of postoperative pain.
- T = The time frame is the postoperative time period.

The impetus for a researchable problem frequently may arise from a clinical situation the researcher notes. In addition, the DNP clinician may make an observation in his or her daily practice and wonder whether the clinical issue is coincidental or fact based. A researchable problem may arise from reading journal articles in the DNP graduate's field of practice. Research articles typically state areas for further study that have arisen from that particular manuscript. Often an article will state that a recommendation is made for replication of the original study with a different population of patients or using a different type of methodology (Beyea, 2000). As potential researchable problems arise during the course of a typical practice-oriented day, the researcher should maintain a pocket-sized notebook specifically to jot down such thoughts. At the end of the day, additional details can be recorded, and then Internet search engines can be used to review the literature that is readily available on the topic. This will aid in the decision of whether the problem is manageable for the

researcher, practical to implement in the form of research, and of sufficient interest to the researcher to be the focus of a lengthy project (Van Cott & Smith, 2009).

The researcher should also consider several practical concerns while formulating the research question:

- Is the research question one that could be easily understood by readers who are not nurses? This will help ensure the research report can be formulated into an article that could be published, because the broader the audience, the more likely that publication will occur. Furthermore, the nature of the practice-oriented doctorate incorporates elements of multiple fields of study, including management, economics, finance, and psychology, to name only a few. It is important to strive to appeal to the wide audience of professionals who practice in these areas.
- Is the answer to the research question not immediately obvious? If the answer is clearly obvious, the problem has no researchable basis.
- Can the research question be answered in the time available to the researcher? If the question requires an indeterminately long period of time to be answered, it will not be practical as a researchable problem.
- Can the research question be answered using the financial and personnel resources available to the researcher? If the question would require more money and personnel than the researcher has available, it is not practical as a researchable problem (Learning Domain, 2009). The researcher must be brutally honest regarding his or her own skills and resources—if the project would require hiring additional personnel to fill in knowledge gaps, and funds for such



## TOOLBOX

Think about the current practice situation in your own facility. Can you name three factors in your own work area that would form the basis of a research question? Now think beyond your own work area into other departments. Can you name three factors that would involve collaboration with other departments and would also generate research questions?

personnel are lacking, the researcher must strongly consider either phrasing the research question in a different manner or selecting a new topic.

## Appropriate Use of a Research Question

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A research question is most often used instead of a hypothesis when an **exploratory** or **descriptive study** is being undertaken. This type of qualitative research design is frequently used when there is a lack of literature in an area of interest to the researcher. The descriptive findings that are often generated in qualitative studies can provide the basis for further research that will utilize hypotheses. As previously mentioned, the sole intention of exploratory research designs is to make the researcher more familiar with the phenomena being investigated so that additional, more precise research questions as well as hypotheses can be generated. These studies can be utilized when the researcher is working with a new phenomenon that has never been thoroughly investigated. Compare this research design to descriptive studies, which are intended to more accurately represent a phenomenon that may have already undergone some previous investigation so that additional research questions and potentially even hypotheses can be generated (Manheim, Rich, & Willnat, 2002). Recognizing that a research question should be written for an exploratory research design when the phenomenon being studied is one that has never been thoroughly investigated before, an acceptable research question could be, “Is the incidence of substance abuse greater in hospice nurses who have experienced cancer in their own families than in hospice nurses who have no firsthand experience with the disease?” Note that



### TOOLBOX

Put yourself in the position of a researcher who is contemplating a descriptive study. Think about a phenomenon that is related to your current work situation and has been already investigated but could warrant additional investigation. How could a research question be generated from this phenomenon?

there is no attempt to predict any relationship that might exist, although the question is specific enough to provide direction for the study.

## Appropriate Use of a Hypothesis

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As previously mentioned, research questions are typically used when an exploratory or descriptive research design is being undertaken. For the most part, hypotheses should be developed for all other types of research projects. A hypothesis can be considered to be a prediction that will help the researcher seek a solution to the research problem. Specifically, a hypothesis is a statement about the relationship between two or more variables, with variables being the properties the researcher is studying. Variables are designated as either the **independent variable** or the **dependent variable**. The independent variable leads to the effect produced in the dependent variable. For example, if the researcher is studying the effect of caffeine intake and test anxiety in students, caffeine intake would be the independent variable leading to the effect, which in this case would be test anxiety or the dependent variable. The dependent variable is actually the one the researcher is primarily concerned with understanding more thoroughly. It is important to understand that although the researcher recognizes that variability in the dependent variable is assumed to depend on changes in the independent variable, there is no implication that a causal relationship is occurring (LoBiondo-Wood & Haber, 2002).



### TOOLBOX

Suppose you are an investigator who is interested in studying the effect of consumption of a high-fiber diet on nursing students' performance in the clinical setting. What would you designate as the independent variable? What would be the dependent variable?

## Developing a Testable Hypothesis

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Once the researcher has formulated a researchable problem and has determined that a hypothesis is more appropriate for the research project than a research question, the next step in the research process for the

DNP clinician involves developing the testable hypothesis. According to LoBiondo-Wood and Haber (2002), hypotheses serve three purposes for the researcher:

1. To provide a connection between theory and the real world of the patient
2. To advance knowledge of the researcher through potential new discoveries
3. To provide direction for a research project by identifying a possible anticipated outcome of the research

Hypotheses are generated by either **dependent variable** or **deductive reasoning**. If trial and error is used to construct a theory, the hypotheses may be produced by inductive generalization. Hypotheses generated inductively can be prominent in exploratory research, which can be used to construct theories, but they do not help explain phenomena. Once a theory has been stated relating variables in a logical system, hypotheses can be derived from the theory by deductive reasoning (Manheim et al., 2002).

Several characteristics make an acceptable hypothesis, one of which is a relationship statement, which identifies the predicted relationship between the variables. For example, a possible hypothesis for a research project could be “High school students who do not drink caffeinated sodas have a lesser degree of test anxiety in comparison to high school students who drink at least two caffeinated sodas daily.” This is an acceptable hypothesis because it makes a predictive statement about the variables, specifically, that caffeine use in high school students has an effect on their level of test anxiety. Note that the direction of the predicted relationship is also specified, in this case, using the phrase *lesser degree* (LoBiondo-Wood & Haber, 2002). Furthermore, an appropriate hypothesis should specify the variables being investigated, the population being studied, and the predicted outcome.

Perhaps the most important characteristic of an acceptable hypothesis is its testability by the researcher. This means that the variables of the hypothesis can be observed, measured, and analyzed. Specifically, this indicates that once the data are collected and analyzed accurately, the hypothesis will be either supported or not supported. Once the hypothesis is tested, the outcome proposed by the hypothesis either will be congruent with the actual outcome that occurs or will be different. A hypothesis

can fail to achieve testability if the researcher has not predicted the anticipated outcome, has not utilized observable or measurable variables, or has failed to use objective phrases in wording the hypothesis (LoBiondo-Wood & Haber, 2002).

If a research problem was proposed at the beginning of the research report, the hypothesis should directly respond to that problem. The variables of the hypothesis should be understandable to the reader. A criterion that is related to testability is the idea of the hypothesis being stated in such a way as to be clearly supported or not supported. Although the more evidence that is provided, the more likely it is for a hypothesis to be accepted, but hypotheses are ultimately never proven (LoBiondo-Wood & Haber, 2002).

A hypothesis can be formulated in such a way as to be directional or nondirectional. A **directional hypothesis** specifies the predicted direction of the relationship between the independent and dependent variables. Some proponents of directional hypotheses argue that researchers naturally have expectations about the outcomes of their research, and thus may be potentially biased. An example of a directional hypothesis would be, “An oncology floor staffed with at least 75 percent registered nurses is positively related to patients verbalizing a decreased level of pain and nausea.” A hypothesis that is deductive and is derived from a **theoretical framework** is usually directional. This means that the theory will provide the rationale for proposing that a relationship between variables will have a particular outcome. If there is no theoretical framework to provide rationale, a **nondirectional hypothesis** may be more appropriately utilized. Even if a theoretical framework is used as a base for a nondirectional hypothesis, it usually is not as fully developed as a directional hypothesis would be. A nondirectional hypothesis indicates the existence of a relationship between variables but does not specify the predicted direction. An example would be, “There will be a difference in the level of anxiety reported by nursing faculty who participate in a weekly focus group on current research.” Researchers who favor the nondirectional hypothesis believe that this format is more objective and impartial than the directional hypothesis (LoBiondo-Wood & Haber, 2002).

Just as a hypothesis can be categorized as directional or nondirectional, it can also be categorized as a **statistical hypothesis** or a **research hypothesis**. A research hypothesis is also called a **scientific hypothesis**. The research hypothesis consists of a statement about the expected relationship among the variables and indicates what the outcome of the



study is expected to be. If statistically significant findings are obtained for a research hypothesis, the hypothesis is supported. The statistical hypothesis is also called the **null hypothesis**, and it states that there is no relationship between the independent and dependent variables. If a statistically significant relationship emerges between the variables at a specific level of significance, the null hypothesis is rejected, and consequently the research hypothesis is accepted. An example of a null hypothesis would be, “There will be no difference in the level of anxiety reported by nursing faculty who participate in a weekly focus group on current research and those nursing faculty who do not participate in such a focus group” (LoBiondo-Wood & Haber, 2002).

LoBiondo-Wood and Haber (2002) have provided specific steps that would indicate whether a research question or a hypothesis should be developed, and if a hypothesis is most appropriate, the type of hypothesis to formulate:

1. The literature review and theoretical framework are examined to determine the concepts to be studied.
2. The primary purpose of the study and the research problem are determined.
3. If the primary purpose is exploratory, descriptive, or hypothesis generating, then research questions should be generated.
4. If the primary purpose is to test causal or associative relationships, then hypotheses should be generated.

An additional characteristic of a sound hypothesis is its consistency with an existing body of knowledge and its basis on sound scientific rationale. The reader of the research study should be able to trace the flow of an idea from the researchable problem to the research question or hypothesis, which also has a direct route to the literature review and the theoretical framework (LoBiondo-Wood & Haber, 2002). The **theoretical or conceptual framework** will be discussed in more detail later in this chapter, and the literature review that will generate the theoretical framework will be discussed elsewhere in this text. To reiterate, at this point in the research process, the DNP clinician should have:

- Selected a researchable problem that is realistic based on available resources, both financial and personnel, and on the accessible patient population.

- Sketched out a rough enough outline of what is being investigated so as to determine if an exploratory or descriptive research design is needed.
- Determined whether a research question or a hypothesis is more appropriate for the project.

The next step in the process will be to determine a theoretical framework for the project, and that will guide the wording of the hypothesis, assuming that a hypothesis is more appropriate for the project than a research question. The theoretical framework will assist the DNP clinician in determining whether the hypothesis should be directional or nondirectional, statistical, or research in nature.



## TOOLBOX

A significant part of having a realistic researchable problem is the determination of available resources and an accessible patient population. Think about a current situation existing in your work environment that would generate a potential research question. Are there resources that would help fuel an investigation of this question? If so, what type of resources exist? Financial? Personnel? Knowledge and expertise? Do you have access to a patient population to utilize in your investigation?

## Use of a Theoretical or Conceptual Framework

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It is important to recognize the link that exists among nursing theory, practice, and research. Just as nursing theory guides nursing practice, it is practice that tends to generate the questions that will ultimately form research questions or hypotheses, and it is research that will aid in the development of guidelines for practice. The terms *conceptual framework* and *theoretical framework* are frequently used interchangeably, although it is important to remember that whereas a concept is a mental image of an idea, theories are made up of interrelated concepts. For example, anxiety is a concept, and a theory could use the concepts of testing and

anxiety to attempt to predict how test anxiety can fluctuate in junior year nursing students. The different categories of nursing theories will be discussed briefly in the following paragraphs prior to discussing the process of selecting a theoretical framework to guide the research project.

Nursing literature frequently uses the terms *grand theory*, *midrange theory*, and *microrange theory* to categorize nursing theories. A **grand theory** is the most abstract level of theory that establishes a knowledge base for nursing. Such a theory tends to include concepts such as *person*, *health*, and *environment*. Grand theories include those proposed by the great nursing theorists such as Dorothea Orem, Martha Rogers, and Imogene King, to name only a few (LoBiondo-Wood & Haber, 2002). In comparison, **midrange theories** incorporate nursing practice and research into ideas that are integral to the discipline. Finally, a low-level **microrange theory** could actually be synonymous with a hypothesis. It contains concrete concepts that are linked to form a statement that will be examined in practice and research. The beauty of the microrange theory is that DNP clinicians, because of their unique relationship to both practice and research due to the nature of the practice doctorate, are in a position every day to generate such low-level theories (LoBiondo-Wood & Haber, 2002).

Once the DNP clinician understands the types of nursing theories that make up theoretical frameworks, the next step in the research process involves selection of a framework that is appropriate for the research project and will provide direction and organization for the study. In order to select the appropriate framework, the researcher must determine whether inductive or deductive reasoning will be used throughout the process. It is the choice of inductive or deductive reasoning that will determine whether a conceptual framework or a more structured theoretical framework should be used to guide the project. If the DNP clinician chooses to use **inductive reasoning** when developing his or her research project, he or she will need to start with the details of experience with nursing practice and move toward a general picture. In comparison, deductive reasoning can also be used to develop the project. This involves starting with the general picture or theory and moving toward a direction for nursing practice (LoBiondo-Wood & Haber, 2002).

LoBiondo-Wood and Haber (2002) developed a decision tree that can be broken down to provide direction for the novice researcher on how to

decide whether a conceptual or theoretical framework is more appropriate for the research project:

1. The researcher must initially decide whether deductive or inductive reasoning will be used to guide and organize the project:
  - Is the goal to create a structure that will guide the research? If so, deductive reasoning is being used, and a conceptual framework should be utilized.
  - Is the goal to identify a structure that will guide the research? If so, deductive reasoning is still being used, but a theoretical framework should be utilized instead.
  - Is the goal to begin to collect data to address a research question or hypothesis? If so, inductive reasoning is being used, and a framework does not have to be specified at this point because it will be based on the data collected and the literature review.
2. If a theoretical framework is judged to be most appropriate for this project, then the researcher must select the type of theory that will serve as the basis of the framework: grand, midrange, or microrange.

Once the type of reasoning that will guide the project has been determined, the researcher needs to specify a framework and determine whether a conceptual or theoretical framework will be used. If he or she decides that inductive reasoning will be used and there is not a need to specify the type of framework to be used at this point, then the researcher should proceed with the literature review, which will be the focus of another chapter.

## **Learning Enhancement Tools**

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1. Suppose you are a DNP graduate who is functioning in a management position. You want to find out if using 8-hour shifts rather than 12-hour shifts in an intensive care unit will lead to a decreased number of medication errors. Formulate a research question for this inquiry, specifying each element of the PICOT acronym.
2. Imagine you are a DNP graduate who is functioning in a nurse manager position. You want to find out if using a differently designed medication cart will lead to a decreased number of medication

- errors on a medical-surgical floor. Formulate a research question for this inquiry, specifying each element of the PICOT acronym.
3. Assume you are a DNP student who is interested in performing a research project on nurses' perceptions of nurse coworkers who continue to function in their current job role while undergoing treatment for cancer.
    - a. Do you think that a research question or a hypothesis would be more appropriate for this study? Give the rationale for your answer.
    - b. Write either a research question or a hypothesis for this project based on your answer.
    - c. As the researcher, suppose you opt to use a hypothesis for this research project. Write both a directional and a nondirectional hypothesis for the project.
    - d. Write a statistical hypothesis for the research project.
  4. Suppose you are a DNP student who is interested in performing a research project on whether cancer patients' level of pain is affected by being cared for by nurses who use prayer as their primary coping method.
    - a. Do you think that a research question or a hypothesis would be more appropriate for this study? Give the rationale for your answer.
    - b. Write either a research question or a hypothesis for this project based on your answer.
    - c. As the researcher, suppose you opt to use a hypothesis for this research project. Write both a directional and a nondirectional hypothesis for the project.
    - d. Write a statistical hypothesis for the research project.
  5. Imagine you are a DNP student who is interested in performing a research project on whether the children of hospice nurses tend to engage in substance abuse to a greater extent than the children of nurses who work in other areas of patient care.
    - a. Do you think that a research question or a hypothesis would be more appropriate for this study? Give the rationale for your answer.
    - b. Write either a research question or a hypothesis for this project based on your answer.

- c. Write both a directional and a nondirectional hypothesis for the project in the event that as the researcher, you opt to use a hypothesis for this research project.
  - d. Write a statistical hypothesis for the research project.
6. Read the passage in the box that follows and determine if research questions or hypotheses are embedded in the material.
- a. Do you think that they were appropriate for the selection?
  - b. If not, explain your answer and write new ones for the material, writing both directional and nondirectional hypotheses, as well as research and statistical hypotheses.
  - c. Can you determine if inductive or deductive reasoning was the basis for the study's organization? Examine your answer.
  - d. Can you identify a conceptual or theoretical framework that was utilized?
  - e. If you can identify a framework, do you think that the conceptual or theoretical framework that was used was appropriate for the type of study performed? Explain your answer.



## TOOLBOX

The recent paradigm shift in higher education has directly impacted nursing academia. The shift from teacher-centered teaching to learner-centered learning has resulted in a nursing educational environment that is student driven “where the faculty guides the individual development of students as needed” (Billings & Halstead, 2005, p. xiii). Nurse educators must consider the unique needs of the individual student and the theoretical constructs of self-directed learning, self-regulation, and learning motivation and the use of educational strategies and support methods to promote and enhance student integration of content value and progression toward intrinsic motivation. Academic learning activities focus on the development of critical thinking skills, autonomous decision making, clinical competence, case management skills, and teaching strategies focused on health promotion and disease management (Billings & Halstead, 2005; Ahern & Wink, 2010; Allen & Seaman, 2011; American Association of Colleges of Nursing, 2012; Jones & Wolf, 2010).

Multiple studies on academic self-regulation have been conducted in nursing education (Ali, Carlton, & Ryan, 2004; Ausburn, 2004; Beitz & Snarponis, 2006; Billings & Halstead, 2005; Fearing & Riley, 2005; Forrest, 2004; Knapp, 2004; Parker, Riza, Tierney, & Barrett, 2005; Peterson & Berns, 2005; Phillips, 2006; Ryan, Carlton, & Ali, 2005); however, a review of the literature revealed that no study has been conducted in nursing education to determine the presence or absence of academic motivation differences between groups of nursing students.

## Resources

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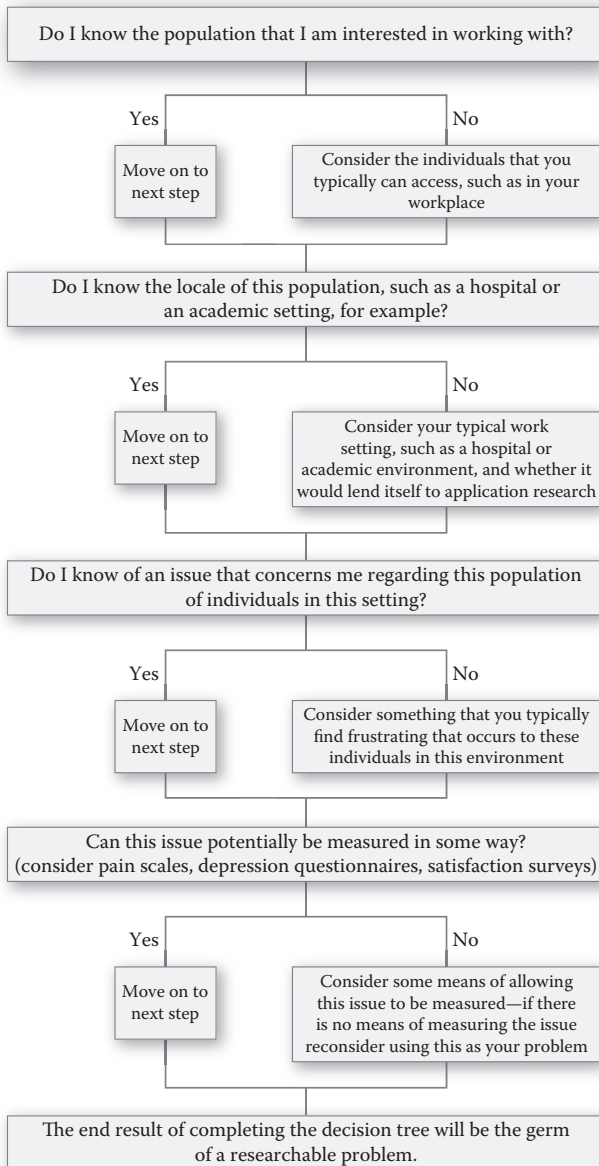
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## TOOLBOX

A decision tree can be utilized when determining your researchable problem.



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