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The Relationship of Self-Efficacy and Clinical Reasoning of Undergraduate Nursing Students

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A dissertation

presented to

the faculty of the College of Nursing

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Philosophy in Nursing

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by

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May 2020

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Keywords: Self-Efficacy, Clinical Reasoning, Undergraduate, Nursing, Student

ABSTRACT

The Relationship of Self-Efficacy and Clinical Reasoning of Undergraduate Nursing Students

by

Amy Holder

Aim. This investigation aimed to discover if a there is a correlation between a student's clinical reasoning self-efficacy and a student's actual clinical reasoning ability. Also, this research sought to discover the connection between an undergraduate nurse's self-efficacy of clinical reasoning and the locus of control of that student. Finally, this investigation sought to discover if perceived self-efficacy of clinical reasoning changed over time.

Background. The ability to successfully navigate the process of clinical reasoning is critical to providing safe, effective care for patients. For nurses, this process begins to develop in nursing school. Unfortunately, evidence suggests that newly graduated nurses struggle to navigate this process successfully, placing patients' safety in jeopardy. While much research has been dedicated to a student's clinical reasoning development, little is understood about the variables that impact clinical reasoning development in the student population.

Method. Partial correlation was utilized to discover the connection between students' perceived self-efficacy of clinical reasoning and the students' actual clinical reasoning ability. Also, a one-way ANOVA, to assess changes over time and reliability assessment of the Nurses' Clinical Reasoning Scale, was completed.

Results. Fifty-two undergraduate nursing students from across 35 states in the United States were included in the sample for this study. Neither a significant relationship between the students' self-efficacy of clinical reasoning and the students' actual clinical reasoning ability, nor a significant change over time in perceived self-efficacy scores was detected.

Conclusion. By understanding the impact certain factors have on the formation of clinical reasoning ability in students, educators are better equipped to identify those students that might struggle to develop clinical reasoning and intervene in the early stages of development. Additional studies need to be initiated to completely understand the influence these variables have on the development of clinical reasoning.

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DEDICATION

This is dedicated to my parents Wayne and the late Alice Golden, who taught me that no matter what I chose to do in life, do it to the best of my ability.

This is also dedicated to Dr. Ken Phillips, who never once let me doubt that I could do this.

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I would like to acknowledge and thank the four women that went along on this journey with me. They supported me, believed in me, and never let me doubt myself. Dr. Angel Collier, Dr. Jean Bernard, Dr. Shelia Hurley, Dr. Kathy Zimmerman, and Cheryl Postlewaite, thank you ladies. Your friendship and support mean more than you will ever know. Thank you to Dr. Susan Sanders, the support and guidance that you provided was much appreciated. Finally, Marian Stewart, my friend and confidant through this whole endeavor. You never let me give up or give less than my best. Thank you, my friend.

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Chapter 1. Introduction

The intent of this doctoral research was to determine if a correlation exists between a student's self-efficacy of clinical reasoning ability and a student's actual clinical reasoning ability. Also, this investigation attempted to discover if a connection was present between a student's clinical reasoning self-efficacy and the locus of control of a student. Finally, this study also sought to determine if self-efficacy of clinical reasoning changes over time. An overview of the problem, background information, a description of the research problem, purpose statement, research questions, theoretical framework, the definition of variables, assumptions, limitations, delimitations, and study significance are all presented in this chapter.

Clinical reasoning is the cognitive process by which individuals in a clinical setting gather and incorporate client data to make decisions regarding client care. The ability to successfully navigate this process is paramount to safe clinical practice in all health care disciplines. Without the ability to reason clinically, nurses are unable to integrate client observations with evidence that exists about disease conditions. This lack of integration leads to the nurse's inability to make timely and correct decisions regarding client care. When nurses are unable to make timely and accurate decisions regarding client care, the client's condition can deteriorate at a rapid rate. This rapid decline in the client condition can and has resulted in severe client compromise and even death.

Nursing education's role is to assist students in developing essential clinical reasoning ability so they can engage in safe clinical practice upon graduation. To provide evidence of competence in clinical reasoning, following graduation in the United States every student who wishes to be licensed as a registered nurse must meet passage standards for the National Council Licensure Exam (NCLEX). The candidate must have and be able to demonstrate he or she has

enough knowledge, skill, and clinical reasoning ability to pass this exam and safely execute nursing duties. The National Council of State Boards of Nursing (NCSBN) composes this nationally standardized exam, which is designed to ensure that an individual has enough skill, knowledge, and clinical reasoning to safely render care as a nurse. Clinical reasoning is integrated throughout the exam and is measured through the nursing process, which the NCSBN describes as an approach to care that is scientific and requires clinical reasoning. This approach requires the nurse to be able to: perform an assessment on a patient, take the information gathered and analyze it, create a plan of care, provide nursing care, and evaluate the care given to clients. ("NCLEX-RN test plan," 2019).

Despite successfully passing this exam, many newly licensed graduates find they are ill-equipped to care for clients. Clarke and Aiken (2003) found that the amount of a nurse's experience played a substantial role in that nurse's capability to identify a declining client and appropriately intervene. Del Bueno (2005) discovered that 35% of newly licensed graduates met employers' entry-level expectancies. Later, in 2012, Purling and King noted that new graduates were still struggling with clinical reasoning abilities.

The expectation is that newly licensed graduates will provide care to clients who are more acutely ill than ever, which challenges their clinical reasoning abilities. Clients now have more co-morbid conditions and are presenting with more severe symptoms (Purling & King, 2012). This increase in complexity and acuity creates the need for new graduates to have effective clinical reasoning ability from the very beginning of their careers.

To compound the situation even further, this increase in acuity and complexity is occurring at the same time the majority of nurses caring for clients grows ever closer to retirement age. It is estimated that over 50% of nurses practicing today are over 50 years of age

("Four Health Care Trends," 2015). When all these factors are considered, it becomes clear that the need for qualified bedside nurses will increase dramatically in the coming years. The Department of Labor is projecting the need for qualified nurses will increase by 16% in the next eight years (Bureau of Labor Statistics, U.S. Department of Labor [U.S. DOL], 2016).

The increasing acuity and complexity of patients, coupled with the decreasing number of available experienced nurses to guide new graduates in their decision-making, makes strong clinical reasoning ability even more essential for the new graduate. If the foundation of clinical reasoning is not developed during the education process, the result will be an even more significant number of new, ill-equipped graduates with limited clinical reasoning ability caring for individuals with high acuity levels and complex disease processes. These ill-equipped graduate nurses will not be able to navigate the clinical reasoning process, recognize deteriorating patient conditions, and act promptly to prevent severe patient compromise or even death. Ultimately, this inability to act will lead to an increase in the morbidity and mortality rates nationwide.

Much of the research concerning clinical reasoning focuses on how clinical reasoning occurs, what teaching strategies develop clinical reasoning, and how clinical reasoning can be measured. Much less research focuses on individual student variables that potentially shape the development of clinical reasoning, such as self-efficacy of clinical reasoning and locus of control. Without a clear understanding of the connections these factors and clinical reasoning share, identifying those at risk for inefficient clinical reasoning development and knowing how faculty can intervene becomes problematic.

Background

Nursing Process. Clinical Reasoning is the reasoning process operationalized in the nursing process. This process, which is the methodical problem-solving method used by nurses, is the problem-solving process which guides all nursing actions (Treas & Wilkinson, 2014). This problem-solving process begins with an assessment. Assessment involves the nurse collecting physiological, psychological, sociocultural, spiritual, economic, and lifestyle data about his or her client. Data are then analyzed to quickly, systemically, and sequentially determine which data are the most pertinent to the problem at hand. Once the nurse has analyzed the data, he or she then uses clinical reasoning to make a diagnosis, which is a critical judgment about the response a client has had to actual or potential health care needs. Clinical reasoning is used once again to create a plan of care that consists of measurable and achievable goals for the client. Once the plan is created, the nurse implements that plan and uses clinical reasoning to evaluate the results (American Nurses Association, n.d.).

In nursing, different theories have emerged to guide and explain the process of clinical reasoning development. Dreyfus' Skills Acquisition Theory (Benner, 1982), Schemata Theory (Greenwood, 2000), and Information Processing Theory (Levett-Jones et al., 2010) have all arisen to guide the process of clinical reasoning in nursing. While all these theories vary slightly on the exact process, the key components underlying the process remain consistent. The process of clinical reasoning involves gathering client data and comparing that data to an existing bank of knowledge. This knowledge bank is constructed of cognitive information gathered in the classroom and experiential knowledge gained through direct client care. The more data matches what is known about the disease process, the faster a nurse can decide and implement a course of action. The last step in the process involves reflection on the outcome of the action. If the

outcome achieved the expected result, that situation is incorporated into the knowledge bank. If the outcome did not achieve the expected result, the nurse reflects on how it varies from expectations and makes adjustments in the database. Reflection must occur for clinical reasoning to develop (Benner, 1982; Benner & Tanner, 1987; Greenwood, 2000; Levett-Jones et al., 2010).

Self-efficacy. Another component that must be present for clinical reasoning to develop is self-efficacy. The belief an individual has about her or his capability to execute a task or skill given a specific situation is known as self-efficacy (Bandura, 1997). According to Bandura's (1977) conceptualization, individuals learn outcome expectations through two primary methods: in response to consequences and through modeling behavior. How well an individual engages in one or both processes to develop the outcome expectation depends on the level of self-efficacy surrounding the information the individual possesses (Bandura, 1997). In other words, how well an individual engages in clinical reasoning development is a direct result of the amount of self-efficacy the person has regarding his or her ability to engage in clinical reasoning.

Self-efficacy develops through mastery experience, social interactions, emotional states, and vicarious experience. Mastery experience develops when an individual engages in a task or activity, evaluates the results of that activity, and then uses that evaluation to make judgments regarding his or her ability to execute that task or activity. Any subsequent performance of the task or activity is directly affected by the beliefs developed from those first attempts. Social persuasion is the evaluation individuals receive from others, often in the form of verbal opinions or judgments. These opinions or judgments can come from anyone the individual encounters and can enhance or undermine the development of self-efficacy. Emotional states also impact the development of self-efficacy. If the task or activity creates positive emotions for the

individual, he or she will likely engage more in the task or behavior than if negative emotions are triggered. Vicarious experience can also influence an individual's self-efficacy, particularly when the individual's experience in the task or activity is limited. When there is limited or no experience with a task or activity, then observation of another individual demonstrating the task or modeling the appropriate behavior, along with the reactions the individual obtains from others, can be a powerful influence (Resnick, 2017).

All of these learning experiences are observed in nursing education when clinical reasoning develops in students. Mastery experience is employed when students go to the clinical setting and engage in the nursing process by participating in direct patient care or when students engage in the care of a simulated patient. Feelings of success would increase a student's self-efficacy. Feelings of failure would decrease a student's self-efficacy. Social persuasion occurs through the feedback a student receives throughout the program from instructors, peers, and even family members. Positive feedback would increase self-efficacy, negative feedback would decrease self-efficacy. Emotional states are elicited when student behavior or knowledge is evaluated through written exams or skills evaluations. Success in these stressful times would increase self-efficacy, failures would lower self-efficacy. Vicarious learning can occur during a variety of different experiences, such as watching a student practice a skill in the lab to observing a nurse at work. If students feel that, after witnessing this event, they could perform the same task, self-efficacy is increased. If they feel that they could not perform the same task, self-efficacy is decreased.

Locus of Control. A major factor impacting self-efficacy is the locus of control. Resnick (2017) states that when an individual has limited or no knowledge of a particular behavior, observation and reaction to others performing the task or engaging in the behavior has

a profound effect on the observing person's self-efficacy of that behavior. This process ties directly to Rotter (1966), who states that when an individual is unfamiliar with a situation or behavior, his or her generalized locus of control is more predictive of behavior than if the situation or behavior is familiar.

Since nursing students enter nursing school with limited or no experience in health care, observation, behavior modeling, and mastery experiences become important avenues of learning. Therefore, locus of control is an additional component that should be considered in the formation of self-efficacy of clinical reasoning in the student. Locus of control is a construct of Social Learning Theory (Rotter, 1954). Social Learning Theory states that individuals gain knowledge by watching others and the events around them; these observations, in turn, affect behavior. The possibility of a behavior occurring in each circumstance is a direct result of the expectation the individual has that the behavior will result in a desired reinforcement. The origin of this reinforcement is the locus of control. If individuals are convinced that their behavior is what determines reinforcement, then they are internally controlled. If individuals believe that their behavior does not determine reinforcement, the reinforcement is determined by some external force, the they are externally controlled (Rotter, 1954; Rotter, 1966; Rotter, 1975). Internally controlled students are more prone to learn and remember information that affects future goals and are more concerned with their ability (Rotter and Mulry, 1965). This concern with ability would have a direct impact on the self-efficacy of students', thus locus of control would indirectly affect the ability of students to develop clinical reasoning by its direct influence on self-efficacy.

Research Problem

Clinical reasoning is a critical activity in nursing. Researchers have examined how clinical reasoning develops (Benner, 1982; Greenwood, 2000; Levett-Jones et al., 2010), what activities develop clinical reasoning within the nursing student population (Dreifuerst, 2012; Forneris et al., 2015; Lapkin et al., 2010; Rochmawati & Wiechula, 2010), and how to measure clinical reasoning (Deschenes, Charlin, Ganong, & Goudreau, 2011; Lasater, 2007). Little research has been conducted regarding variables that influence clinical reasoning development in students. Without understanding what factors affect clinical reasoning and how they affect clinical reasoning, it is difficult for educators to identify students that may struggle to develop clinical reasoning and to know what to do when students do not develop clinical reasoning as expected. This study seeks to uncover what relationships exist between clinical reasoning and outside factors such as self-efficacy.

Purpose

The purpose of this inquiry was to discover if a correlation exists between a student's perceived clinical reasoning ability and a student's actual clinical reasoning ability. Also, the investigation sought to discover if there is a connection between the locus of control of a student and his or her self-efficacy of clinical reasoning. Finally, this study sought to discover if self-efficacy scores change over time. By understanding these relationships, educators can expand their knowledge of the factors that affect clinical reasoning development in students. In turn, they can assess these factors, identify at-risk students, and intervene in students who are not developing clinical reasoning ability as expected. Moreover, by understanding the factors that develop clinical reasoning in students, educators could perhaps develop better more efficient ways of developing clinical reasoning. By finding better, more efficient ways of developing

clinical reasoning, new graduates would have stronger clinical reasoning ability when they enter the workforce.

Research Question

This study investigated the following research questions:

Research question 1: Controlling for confounding variables, is there a relationship between a student's self-efficacy of clinical reasoning score and a student's actual clinical reasoning ability?

Research question 2: Controlling for confounding variables, is there a relationship between a student's locus of control and a student's self-efficacy of clinical reasoning score?

Research question 3: Does the self-efficacy of clinical reasoning scores change from one semester of nursing school to the next?

Theoretical Framework

Social Cognitive Theory. Two theories underpin this study. Bandura's (1997) Social Cognitive Theory, and more specifically the concept of self-efficacy, serves as the first construct for the framework guiding this inquiry. Self-efficacy is based on the premise that a person must believe that he or she can achieve the desired outcome behavior with their actions to have enough incentive to perform the action. Efficacy beliefs serve as the main component in determining human competence. This process explains why one individual achieves an expected outcome while another individual does not, even though the cognitive and skill levels of the individuals are the same (Bandura, 1997).

Efficacy is also context-specific, where the environment in which the individual is asked to perform is as important as the behavior or skill the individual is asked to perform. This postulate explains why the same individual may be able to meet the outcome expectation in one

situation, but not in another. The performance of skills can be undermined by self-doubt to the point that even the most capable individuals perform at subpar levels (Bandura, 1997).

Individuals with a high self-efficacy have goal-setting ability and can sustain a commitment to achieve established goals, even in the face of difficulties. When difficulties arise, these individuals increase their efforts to achieve their goal by analyzing the difficulty and finding a way to overcome it. This process allows them to remain focused on their achievement. Failures are ascribed to a lack of effort, and obstacles are viewed as situations these individuals have much control over. This type of thinking is shown to increase performance, lower stress, and decrease the incidence of depression (Bandura, 1997).

Conversely, individuals with a poor of self-efficacy have a difficult time getting and staying motivated to complete a goal. When difficulties arise, they decrease their efforts or give up altogether. These individuals focus on personal faults, task difficulty, and the negative effects of not succeeding, rather than focusing on the effort needed to succeed. This type of thinking redirects focus away from obtaining the goal and towards individual shortcomings and failure at the task. Due to this lack of faith in their abilities, these individuals lose motivation at the slightest failure and fall prey to stress and depression (Bandura, 1997).

Given that the more self-efficacy an individual has, the greater the chance that the selected goal will be achieved, measuring an individual's self-efficacy regarding a goal should predict the achievement of that goal. The higher one's sense of self-efficacy regarding a task or behavior, the higher the chance one will be able to perform the task or behavior correctly. Conversely, the lower one's sense of self-efficacy, the lower the chance one will be able to perform correctly.

Self-efficacy is established through four major processes. Enactive mastery is the process by which individuals develop self-efficacy through the performance or mastery of a skill or behavior. The individual performs a skill or behavior and then evaluates the outcome of the skill or behavior. When the skill or the behavior achieves the outcome expectation, the individual interprets this as performing the skill or behavior correctly. All future attempts at this skill or behavior will reflect this belief. Vicarious experience is another process by which self-efficacy is developed. Vicarious experience is the self-efficacy individuals acquire through the observation of others performing the desired skill or behavior. This process is primarily used when an individual is uncertain about his or her own abilities or has limited experience in performing the skill or behavior. Verbal persuasion is the verbal response one receives from others. This feedback can come from instructors, friends, family, or anyone the individual encounters. The final process by which self-efficacy is developed is through emotional states. How the behavior or skill makes the individual feel as they are performing the skill or task has a profound impact on the individual's belief about the skill or behavior. If a skill or behavior creates anxiety or stress, individuals are less likely to engage in that behavior or avoid the activity altogether. If a skill or behavior creates a feeling of satisfaction or accomplishment, then the individual is much more likely to engage in the behavior, activity, or skill (Bandura, 1997; Resnick, 2017).

Self-efficacy can be applied directly to the development of clinical reasoning. When a student begins a nursing program, he or she enters that program with some sense of self-efficacy, about academics and his or her ability to be a nurse. This feeling of beginning self-efficacy is created by the student's experience with both the education and the health care systems. Students who begin a nursing program have had experience in the education system.

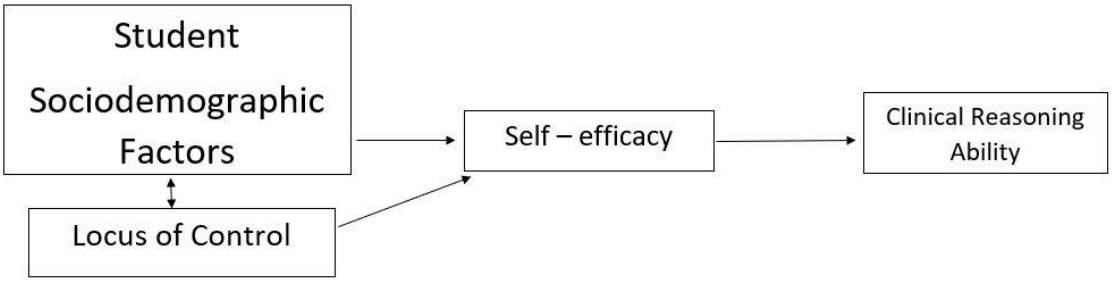
At the very minimum, they have a high school diploma, and at maximum, they have other degrees. It is this experience that creates a student's academic self-efficacy.

Experience with the health care system may differ significantly from one student to another student. Some students may have no experience at all in the health care system outside being a patient within it. Other students may hold certificates or licensures in health care. All of these experiences create the students' feelings of self-efficacy (Bandura, 1997).

Once students enter a nursing program, they are taught the nursing process. It is the step-by-step process that requires an individual to utilize clinical reasoning to assess and solve problems related to client care. The nursing process entails assessing, diagnosing, planning, intervening, and evaluating client care. From this educational experience, students build a feeling of self-efficacy related to clinical reasoning. According to Bandura (1997), before an individual can perform a skill, in this case clinical reasoning, individuals must believe they can perform the skill. This belief is self-efficacy. Once the student has developed a sense of self-efficacy, they can perform the outcome behavior, clinical reasoning.

Rotter's Social Learning Theory. The second theory that underpins this study is Rotter's Social Learning Theory and, more specifically, the construct of locus of control. Locus of control directly influences self-efficacy. An externally controlled student believes that success in school is not a direct consequence of behavior. If the student believes that success or failure is out of his or her control, then it is possible that his or her self-efficacy will be low, since this individual believes nothing, they do will impact the reinforcement received. Conversely, an internally controlled student believes that achievements are a direct consequence of his or her behavior, and will have a higher level of self-efficacy.

For this investigation, a conceptual model was created using the theoretical linkages of Bandura (1977), Rotter (1954) and Levett-Jones et al. (2010). The investigator-developed model illustrates the relationships among sociodemographic factors (such as age, prior degree, prior medical certification), locus of control, self-efficacy, and clinical reasoning, will serve as the guide this investigation. The model is shown in Figure 1. This framework is designed to demonstrate the complex interaction of sociodemographic factors, self-efficacy, and locus of control, and to better grasp and explain actual clinical reasoning ability in undergraduate students.



This model describing the relationship of socioeconomic factors, locus of control, self-efficacy, and clinical reasoning ability is based on three assumptions. 1) Students enter nursing school with life experiences and a generalized locus of control. 2) These factors form the basis of the student's self-efficacy surrounding clinical reasoning. 3) This beginning self-efficacy affects a student's ability to develop and engage in clinical reasoning.

Figure 1. Relationship model for sociodemographic factors, locus of control, self-efficacy, and clinical reasoning

Conceptual Definitions of Terms

The following is a list of conceptual definitions for this investigation:

- A student was defined as an individual registered in an undergraduate nursing program
- Development process was defined as the structural educational model that includes active participation in purposeful practice with reflection on behaviors that develop clinical reasoning abilities in students (Levett-Jones et al., 2010).

- Clinical reasoning was defined, for the purposes of this research, as the cognitive process by which health care professionals gather and incorporate information regarding the patient in order to understand the health care needs of patient, develop and put into action a plan of care based on this understanding, evaluate the outcome of the plan, and reflect on the process as a whole. (Levett- Jones et al., 2010). In this study, clinical reasoning is the outcome behavior.
- Self-efficacy was defined, for the purposes of this research, as an individual's belief as to their capability to execute a specific behavior in order to obtain a specific outcome. (Bandura, 1997). Self-efficacy, as it pertains to this study, is the perceived ability of students to effectively engage in clinical reasoning. This process includes the student's perceived ability to gather and analyze data regarding the client condition, make judgments regarding these data, select appropriate nursing actions, and evaluate the client's response to those actions.
- Locus of control was defined, for the purposes of this research, as a person's view of how much control he or she has over the situations and events that have an impact on his or her life. In educational setting, locus of control is usually thought of as how students view the causes of their educational success or failure. ("Locus of control", 2013, para 1).
- Sociodemographic data were student characteristics or past experiences that influence the self-efficacy process.

Operational Definitions of Terms

The following is a list of operational definitions for this study:

- Sociodemographic factors were age, gender, prior degree, prior medical certification, program type, educational program, number of college semesters completed, and number of semesters in nursing school completed.
- The student was an individual enrolled in an undergraduate nursing program, who has completed at least one semester of nursing school requiring a clinical course and has completed one HESI exam other than the entrance exam.
- Clinical reasoning was measured using the HESI battery of exams.
- Self-efficacy was measured using a self-efficacy of clinical reasoning instrument called the Nurses' Clinical Reasoning Scale.
- Locus of control was measured using Rotter's Internal-External Locus of Control Scale.

Assumptions

The assumptions for this investigation are as follows:

- Clinical reasoning is a critical process, in which all nurses must engage, to provide effective, competent, and safe care to their clients.
- A positive perception of personal self-efficacy is necessary to engage in effective clinical reasoning successfully.
- A student's locus of control has a direct impact of his or her self-efficacy.
- Students engage in the clinical reasoning process.
- A student's proficiency in clinical reasoning can be independently measured using standardized tests.
- Student's perceived self-efficacy regarding clinical reasoning ability can be measured using the Nurses' Clinical Reasoning Scale.

- A student's locus of control can be determined by Rotter's Internal-External Locus of Control Scale.

Limitations

This investigation was limited to undergraduate, entry-level nursing students registered in a bachelor of nursing science program (BSN) or an associate degree of nursing program (ADN), so no generalizations could be made to students enrolled in a licensed practical nurse program or diploma program or to students enrolled in an advanced practice program. As this study was not longitudinal, variance in individual students from the nation-wide sample could have presented an issue. Also, the tool being used for this study was developed in China, so applicability to a population of American students was unknown.

Delimitations

Since the development of self-efficacy is directly affected by past experiences, factors such as age, gender, and prior degree will be controlled for statistically. Factors such as prior learning experience, academic self-efficacy, motivation, learning styles, and problem-solving styles were not analyzed in this study. Clinical reasoning is measured using a HESI exam. While this instrument has been proven to be a valid and reliable method of measuring student ability at the time of administration, there could potentially be other valid and reliable instruments. Data were collected from baccalaureate and associate degree nursing students at different institutions from across the country, so teaching methods could be a cause for differences in score results. Also, students are self-reporting their scores, so the possibility exists that the scores may not be reported accurately. Finally, since the Nurses Clinical Reasoning Scale is not being administered at the same time as the HESI exam, there is the potential that

events occurring in the time-lapse could have affected a student's self-efficacy score either in a negative or a positive way.

Significance

Nurses perform a critical function in the administration of quality, safe health care, yet the number of nurses leaving the bedside continues to rise. The experienced nurses are, in many cases, being replaced by new graduate nurses who lack the clinical reasoning ability of their predecessors. These new nurses do not have the clinical reasoning ability to recognize a critical situation and intervene on behalf of the patient. This inability to recognize a critical situation, in turn, leads to increased morbidity and mortality in an already fragile population. Self-efficacy and locus of control provide the framework for viewing variables that could potentially affect a nursing student's ability to develop clinical reasoning. By understanding these factors and their influence on a student's clinical reasoning development, educators can better identify students who might potentially struggle to develop clinical reasoning ability and be better equipped to provide assistance to students developing clinical reasoning ability.

Summary

Clinical reasoning is the manner by which health care providers gather information and make decisions about a client's health issues. The successful development of the process is critical for safe, effective health care. Without the ability to clinically reason, nurses place their patients at risk of severe compromise and even death.

The concepts of self-efficacy, locus of control, and clinical reasoning were utilized to create the theoretical model that guides this study. Sociodemographic factors of the student and the generalized locus of control of the student impact each other as well as the individual

student's self-efficacy of clinical reasoning. This self-efficacy of clinical reasoning, in turn, impacts clinical reasoning development in that student.

By understanding how and to what degree these factors interact with one another, educators can achieve a more complete understanding of the impact and relationship they have on the clinical reasoning development in students. This knowledge will allow educators to identify individuals who may struggle to develop clinical reasoning and intervene appropriately when clinical reasoning does not develop as anticipated.

Chapter 2. Literature Review

This chapter presents the review of literature concerning the theoretical constructs found in the model guiding the study. The first section includes the methods used to search the professional literature. Following this description, the relevant literature was then reviewed and divided into the various constructs related to the study. Clinical reasoning, self-efficacy, locus of control, and the sociodemographic variables are all presented, and gaps in the literature are identified.

Method

A systematic review of the literature guided the comprehensive search of these online databases: the Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Educational Resources Information Center (ERIC), PubMed, and PsychInfo. The primary search terms clinical reasoning, locus of control, and self-efficacy were paired with "nursing" and then with the secondary terms "education," "undergraduate," "factors influencing," "meta-analysis," "synthesis," "development," "measurement," "theories," "models," "process," and "systematic review."

Publication dates for the literature ranged from 1978-2019. The studies over five years old included in this review were included because the material was pertinent, not outdated, and served to provide a clearer, richer picture of the concepts. Also, only primary sources of data were used for this review. The literature presented is organized into four major themes: clinical reasoning, self-efficacy, locus of control, and sociodemographic variables.

Clinical Reasoning

Clinical reasoning is the complex, cognitive process that requires both cognitive and metacognitive thinking. It is through this process that nurses gather information about a client

and incorporate that knowledge into their knowledge of the client, disease process, and nursing interventions to arrive at a clinical judgment and select a course of action. Nurses then reflect on the action and the outcome of the selected action and further incorporate this information into their personal knowledge (Dawson, 2012; Jensen, 2013; Lapkin, Levett-Jones, Bellchambers, & Fernandez, 2010; Pesut & Herman, 1998; Tanner, 2006).

Given that clinical reasoning is the manner through which health care providers make decisions about client care, the mastery of this process is paramount to the safe, effective delivery of care. Aiken, Clarke, Cheung, Sloane, and Silber (2003) conducted an analysis of outcome data for 232,342 surgery clients in Pennsylvania. Their analysis revealed that clients cared for by nurses with a high degree of clinical reasoning ability had a 5% less chance of dying within 30 days of admission than those who were cared for by nurses with a lower degree of clinical reasoning. Levett-Jones et al. (2010) supports this assumption by stating that even though symptoms often precede serious adverse client events, nurses with inadequate clinical reasoning skills do not always identify nor manage symptoms appropriately. Failure to identify and manage symptoms results in the client's condition worsening. These studies underscore the need to effectively develop clinical reasoning ability in students.

Clinical reasoning in nursing education. Clinical reasoning ability for nurses occurs during their nursing education. Researchers in nursing education have focused their efforts on finding ways that clinical reasoning can be developed in students. Dreifurest (2012) conducted a study examining the influence of a specific method of debriefing following simulation, called Debriefing for Meaningful Learning (DML). Clinical reasoning skills development was assessed in undergraduate nursing students by using a quasi-experimental approach to compare pretest scores to posttest score. The study consisted of 238 undergraduate nursing students at a

midwestern university. Driefurest (2012) found a significant change in pretest-posttest scores for the students ($U = 3973.5$, $W = 10759.5$, $Z = -6.059$, $p = .000$). An Analysis of covariance revealed that scores between groups were significantly different (F (1, 237) = 28.55, $p \leq .05$), and the debriefing method significantly increased in test scores (F (1, 237) = 632.91, $p \leq .05$), with a large effect size (0.84). This study demonstrates that DML is effective in increasing the clinical reasoning scores of students.

Forneris et al. (2015) replicated Driefurest's (2012) study with an additional research question. Using 153 students from four baccalaureate colleges in the Midwest, they sought to confirm Driefurest's (2012) original finding that DML significantly improved clinical reasoning in the nursing student undergraduate population. Also, Forneris et al. (2015) sought to discover if students noticed a change in the debriefing session's quality when DML was utilized rather than the traditional debriefing method. Using the same quasi-experimental, pretest-posttest approach, they found that the pretest-posttest scores for clinical reasoning increased significantly for the DML group (t (77) = -2.25, p = .03). When controlling for time, however, the DML group's score increase over the traditional group was insignificant. As far as the additional research question goes, students in the DML group voiced a positive difference in the quality of the debriefing compared to the traditional group (t (148) = 2.05, p = .04).

Lapkin et al. (2010) reviewed the literature on studies conducted between 1999 and 2009. These studies all involved the effectiveness of HPS in the development of the clinical reasoning abilities of health professionals. They found that, in the eight investigations that were utilized for this review, none of the studies sought to explore the efficacy of HPS on clinical reasoning ability. However, they did find evidence that HPS significantly improves the students' ability to acquire knowledge, to think critically, and to identify a deteriorating patient. Also, students

reported high levels of satisfaction with HPS. To date, no research has been conducted on identifying individual student factors that might potentially impact clinical reasoning development and how those factors influence clinical reasoning development.

Self-Efficacy

A key component to the formation of clinical reasoning ability in undergraduate nursing students is the student's self-efficacy of clinical reasoning. In his Social Cognitive Theory, Bandura (1989) states that knowledge structures, gained through a variety of methods, form cognitive frameworks for the creation of skill actions and internal standards. The creation of guides allows individuals to perform the same skills action under varying circumstances and to achieve the same outcome. In clinical reasoning, nurses must have a basic knowledge structure from which to operate. It is that knowledge base that allows nurses to construct guides that direct their actions. Since no individual and no situation is the same, these guides allow for the nurse to select actions under different circumstances. The dynamic interaction of behavior, individual personal factors, and environment drives this cognitive process, with the key regulator being the individual's view of their own self-efficacy (Bandura, 1989).

Self-efficacy in nursing students. Taylor and Reyes (2012) explored baccalaureate nursing students' resilience and self-efficacy. Using a quasi-experimental design, they surveyed 136 students, having them complete the General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995) and Resilience Scale (Wagnild & Young, 1993) at the start of the course and at course's end, prior to the final exam. Results showed no significant differences in resilience and self-efficacy scores over the course of a semester. Self-efficacy scores were higher, but not significantly.

Chatman (2012) examined the personal and community factors of 88 Caucasian and African American freshman and sophomore nursing students and these factors' effects on the students' self-efficacy. Personal factors examined included race, age, socioeconomic status, and personal mastery. Community factors included role models and vicarious experience. Student self-efficacy included academic self-efficacy, clinical self-efficacy, and general self-efficacy measures. Results showed differences in the two groups' clinical, academic, or general self-efficacy to be insignificant. However, Chatman (2012) found a significant difference in the types of social support required by the two groups of students, although the specific types of support needed by each group were not defined. This finding suggests that, when each group receives the social support needed, self-efficacy levels are comparable.

Rice (2013) explored the relationship among clinical performance, general self-efficacy, and emotional intelligence in 56 students attending an associate degree program. Rice's (2013) findings revealed a significant positive relationship between student perceived clinical performance and clinical self-efficacy ($r\ (54) = .514$, $p < 0.01$); however, there was no significant relationship between instructor-rated performance and clinical self-efficacy scores ($r\ (54) = .201$, $p > 0.05$). Also, there was also no significant correlation found between emotional intelligence and either student-perceived performance ($r\ (54) = .014$, $p > .05$) or instructor-rated performance ($r\ (54) = .250$, $p > .05$).

Silvestri (2010) examined non-academic, academic, and self-efficacy variables that influence NCLEX-RN passage in 183 undergraduate nursing students. Academic variables examined were SAT verbal score, college chemistry grade, nursing fundamentals course grade, medical-surgical nursing course grade, pharmacology course grade, and leadership/management course grade. Non-academic variables examined were personal and environmental factors.

Logistic regression revealed that self-efficacy expectations ($p = .011$, odds ratio of 1.176) and the grade in the medical-surgical course ($p = .021$, odds ratio of 1.258) were the variables of significance and that the medical-surgical course grade and the pharmacology grade were the best gauges of NCLEX-RN success. A positive significant correlation between all the academic variables and self-efficacy expectations, as well as, negative correlations between non-academic variables and self-efficacy expectations were also found by Silvestri (2010).

Hultquist (2014) conducted a mixed-methods study to discover bases of self-efficacy beliefs in 135 baccalaureate nursing students and the effects these sources had on clinical self-efficacy beliefs. Hultquist (2014) found that clinical performance was impacted at a moderate to high level by all sources of self-efficacy. In addition, individuals preferring mastery experience and having a low trait anxiety has significantly higher self-efficacy beliefs. Hultquist (2014) also found that individuals who preferred mastery experience, did not prefer physiological and affective sources of self-efficacy, had lower anxiety traits, and an increased view of clinical instructor effectiveness had significantly lower clinical practice anxiety. Conversely, individuals with a greater preference for verbal persuasion and a decreased perception of clinical instructor effectiveness had significantly higher clinical practice anxiety.

Self-efficacy and clinical reasoning. A few studies have explored self-efficacy and clinical reasoning as separate variables, and no studies have investigated the direct relationship connecting clinical reasoning and self-efficacy. Almeida et al. (2018) conducted an integrated review to explore the utilization of simulation in education, specifically nursing education. Of the 160 articles reviewed, 68.1% used simulation in the development of clinical reasoning in nursing students, and 91.8% reported students' self-efficacy increased following the use of simulation. These findings suggest that simulation is an efficient teaching method for clinical

reasoning and for increasing self-efficacy in students. They recommend additional research is needed on a tool to assess simulation.

Lee, Lee, Lee, and Bae (2016) explored the effects of a patient-simulation-led clinical reasoning course on undergraduate nursing students' clinical reasoning, self -efficacy, and problem-solving using a quasi-experimental design. Forty-nine senior nursing students volunteered to participate, with 23 students participating in the clinical reasoning course (intervention group) and 26 students not participating in the course (control group). They found that the clinical reasoning course significantly improved nursing competency scores ($F = 7.747$, $p = .008$) compared to the scores in the control group. In addition, the course also improved self-efficacy and problem-solving scores of the enrolled students, though not significantly.

Padilha, Machado, Riberio, Ramos, and Costa (2019) examined the influence of virtual clinical simulation on student satisfaction, clinical reasoning, self-efficacy, and knowledge retention in 42 nursing students. By utilizing a randomized controlled trial, which consisted of a pretest and two posttests, they evaluated clinical reasoning, knowledge retention, self-efficacy, and learner satisfaction before and after classes employing a case-based learning approach. The experimental group used a clinical virtual simulator, and the control group used a low-fidelity simulator and a lifelike environment. A MANOVA was then used to compare the two groups over the three time periods. The experimental group had an increased level of knowledge retention immediately following the intervention ($p = .001$) and at two months following the intervention ($p = .02$). In addition, the experimental group showed increased levels of learning satisfaction ($p = .001$); however, a significant difference in self-efficacy scores could not be detected ($p = .9$).

Studies have examined clinical reasoning's and self-efficacy's effect on a third variable, and, additionally, studies have investigated the impact of variables on clinical reasoning and self-efficacy. However, no studies have examined the relationship between clinical reasoning and self-efficacy.

Locus of Control

Rotter's (1954) Social Learning Theory states that people learn by observing events around them. These observed events then influence their behavior. During this process, individuals come to expect that certain behaviors will result in certain reinforcements. In addition to these expectancies, individuals also develop beliefs regarding the causal relationships between their behaviors and the source of the reinforcements. This causal relationship connecting the individual's behavior and the source of the reinforcement is what is known as locus of control. Individuals who believe that their behavior is the cause of the reinforcement are said to be internally controlled. Individuals who believe that external forces cause the reinforcements are considered to be externally controlled (Rotter, 1966).

Locus of control has been linked to several variables, including academic achievement. In a study of 322 undergraduate students, Aspelmeier et al. (2012) examined the possibility of a student's generational status acting as a mediator in the correlation between psychosocial factors, including college outcomes and locus of control. In addition, they explored whether first-generation or continuing generation status functions as a sensitizing factor or a risk factor. Students completed online measures for locus of control, academic adjustment, self-esteem, as well as to self-report their grade point average (GPA). They discovered that an internal locus of control had a positive correlation with college adjustment; however, they found no significant association with GPA.

Hall, Smith, and Chia (2008) conducted a study with 158 freshmen over a six-year period. They investigated the effect cognitive and affective factors had on students completing undergraduate requirements as well as on cumulative GPA. Variables included in their study were GPA, SAT score, personal self-efficacy, academic self-efficacy, course grades, locus of control, academic engagement, and an Executive Process Questionnaire. They discovered that an internal locus of control was responsible for a significant proportion of the graduation variance (R^2 change = .05, F (1,87) = 4.44, p = .05). In addition, there was a positive correlation between year of graduation and receiving assistance in adjustment (r = .211, p = .05).

Carden, Bryant, and Moss (2004) studied 114 undergraduate students. They compared the academic procrastination, academic student achievement, and test anxiety, based on their locus of control. Rotter's Internal-External Locus of Control Scale, Achievement Anxiety Test, and Procrastination Scale, were the measures used for this study. They reported that internally controlled students had lower test anxiety (M = 32.16, SD = 7.43), less academic procrastination (M = 80.0, SD = 14.3), and higher academic achievement (M = 3.4, SD = 0.5) than externally controlled students.

Nordstrom and Segrist (2009) explored factors that increase the likelihood of a student going to graduate school. Ninety-five undergraduate students in a large midwestern university made up the sample for this study. Measures for this study included full- or part-time status, gender, age, GPA, matriculation level, and academic goals. In addition to the demographic data, a locus of control survey and a consumerism scale were completed. Results showed that students that are less consumer-oriented, with a stronger internal academic locus of control and a higher GPA have a higher probability of submitted an application to graduate school. In addition, they

found that having an internal locus of control was a more accurate indicator of students going on to graduate school than GPA or consumer orientation ($\beta = -.29$, $t = -2.16$, $p = .03$).

In addition to being linked to academic achievement, there many instruments designed to measure both generalized locus of control and context-specific locus of control. Since students enter nursing school with a wide range of experience with nursing and health care, a generalized locus of control measure, Rotter's Internal-External Locus of Control Scale, was chosen for this study.

Locus of control in nursing students. Locus of control has been connected with many variables in nursing education. Neaves (1989) examined the association between independent decision-making and locus of control. One hundred undergraduate nursing students participated in the research. Decision-making was assessed using a forced-choice scale entitled "Medication Administration Questionnaire." Locus of control was assessed by using Rotter's Internal-External Locus of Control scale. Results showed that an internal locus of control significantly correlated with independent decision-making ($r_s = .21$, $p = .05$).

Tschikota (1993) explored the decision-making process of 19 nursing students using the Think Aloud technique and Rotter's Internal-External Locus of Control Scale. Participants were given an exercise and were instructed read a situation out loud and to "think aloud", while creating a plan of care. Also, students were asked to "think aloud" while writing their conclusions on a blank sheet. All the students in the study used novice decision-making skills and processes that supported Information Processing Theory. In addition, internally controlled students engaged in complex-decision-making processes a significantly higher portion of the time than externally controlled students ($z = 3.48$, $p < .01$).

Ofori and Charlton (2002) created a model of variables that influenced academic performance in the nursing student population. The model hypothesized that age and entry requirements had a direct influence on academic motivation (self-efficacy, academic worries, locus of control, and expectations), which in turn had an influence on support-seeking and, ultimately, academic performance. Analysis of the path model was performed using data gathered from 315 students enrolled in nursing courses, at the preregistration diploma level, at a university in England. They discovered that their model made up 24% of the variance in student performance and that seeking support was more indicative of performance than requirements for entry. In addition, internal locus of control and academic worries were found to have a positive impact on support-seeking.

Woods, Saylor, and Cohen (2009) performed a descriptive study among baccalaureate nursing students, who were ethnically diverse, to determine their perceptions of academic success and locus of control. Locus of control was assessed using the Review of Personal Effectiveness with Locus of Control (ROPELOC). Academic success was assessed by medical-surgical theory grades, GPA averages, and medical-surgical test scores from a standardized medical-surgical exam. In a sample of 106 students, they discovered that an external locus of control was correlated with a low theory grade in the medical-surgical nursing course ($r = -.21$, $p = .03$). In addition, externally controlled students had an increased likelihood of being from Filipino or Asian descent and have English as their second language (F (4,100) = 3.43, $p = .011$).

Arkan, Avdal, and Sari (2016) conducted a descriptive study to explore the connection between nursing students' readiness for self-directed learning and their locus of control. The sample of 171 students completed self-directed learning and locus of control scales. Dag's Locus of Control Scale was utilized as the measure for locus of control. Fisher's Self-Directed

Learning Skill Scale was utilized as a measure of self-directed learning readiness. They discovered that internally controlled students were more equipped for self-directed learning than externally controlled students. In addition, the study also found that no relationship existed between self-directed learning and locus of control by year of study.

Locus of control and self-efficacy. Locus of control and self-efficacy have been linked in a variety of studies with mixed results. Several studies have not found a significant connection between these concepts; however, one study did find a relationship. Marr and Wilcox (2015) examined whether social support and self-efficacy moderated the relationship between college students' the health behavior of physical activity, health locus of control, fat intake, and fruit and vegetable intake. They surveyed 844 United States college students at two public universities. The online information gathered included physical activity, health locus of control, dietary fat intake, fruit and vegetable intake, self-efficacy, and social support. They found that social support and self-efficacy moderated the relationship among physical activity, health locus of control, and fruit and vegetable intake. Self-efficacy alone mediated the effect of fat intake. They determined that an internal health locus of control exerts an influence, at least partly, through social support and self-efficacy.

Warnecke, Baum, Peer, and Goreczny (2014), on the other hand, examined the intercorrelations between anxiety and personality factors in 113 graduate students from three different graduate programs using the Satisfaction with Life scale, General Self-Efficacy Scale, Depression Anxiety Stress Scale, Life-Orientated Test-Revised, Rotter's Internal-External Locus of Control Scale, and the Subjective Happiness Scale. They found that self-efficacy, optimism, depression, and life satisfaction could account for 64% of the variance in the happiness measure, and that optimism, self-efficacy, depression, locus of control, and happiness, could account for

57% of the life satisfaction measure, with locus of control contributing a significant amount to the variance. However, there was not a significant, direct relationship between generalized self-efficacy and generalized locus of control ($r = .18$).

Suphi and Yaratan (2011) also correlated locus of control and self-efficacy in their examination of the impacts of self-efficacy, locus of control, learning approaches, and socio-economic status on undergraduate students. Four questionnaires, the Revised Study Process Questionnaire, the Turkish version of the Self-efficacy Scale, Turkish version of Dag's Locus of Control Scale, and a demographic survey, were given to 99 students. High cumulative GPA and self-efficacy were found to be indicators of academic success. In addition, they found that increased self-efficacy was connected to the utilization of a deep approach to learning, and individuals whose mothers had decreased education levels were also indicative of success. However, a significant correlation between deep learning and academic success was not found, and locus of control and self-efficacy were not significantly related ($r = -.191$). In addition, they found that, for their sample, there was a positive correlation between females and being externally controlled.

Stewart and De George-Walker (2014) investigated a model connecting external locus of control and maladaptive perfectionism to self-handicapping through their mediated effect on self-efficacy. Seventy-nine students participated in an online survey that included measures for locus of control, perfectionism, self-handicapping, and general self-efficacy. Locus of control and perfectionism were found to predict self-handicapping; however, only perfectionism predicted low self-efficacy. In addition, self-efficacy was not found moderate the relationship between self-handicapping, locus of control, and perfectionism.

Sociodemographic Variables

The sociodemographic variables that will act as control variables for the study include age, the program of study, prior college degree, previous licensure or certification in the medical field, number of semesters in college completed, number of semesters in nursing school completed, and number of standardized tests taken. While no studies directly explore the effects that these variables may have on students' self-efficacy, locus of control, or clinical reasoning, Bandura (1997) states that everything a person has encountered, successes or failures, contributes to the person's self-efficacy. Therefore, age could potentially be a confounding variable. The longer a person is alive, the more situations he or she encounters, and those situations would contribute to that individual's self-efficacy. Age could also affect locus of control. Rotter (1966) states that, while locus of control is somewhat stable, the more encounters an individual has with a specific situation, the more likely expectations regarding that situation will change, thus changing locus of control, which, in turn, would affect the student's self-efficacy. Clinical reasoning could also be affected by age. Levett-Jones' et al. (2010) Clinical Reasoning Cycle features reflection as its final step. After an action is performed by the individual, the individual reflects on the process. This experience is processed into the existing knowledge, and the bank of knowledge grows. The older an individual is, the more experiences that individual has had and the larger the knowledge bank.

Educational preparedness could be a confounding variable as well. In 2003, Aiken, Clarke, Cheung, Sloane, and Silber conducted a cross-sectional analysis of 232,342 general, vascular surgery, and orthopedic patients discharged from Pennsylvania hospitals. After adjusting for hospital structural characteristics, patient characteristics, nurse experience, nurse staffing, and certification of the surgeon, their analysis showed that, for every 10% increase in

the number of baccalaureate prepared, there was a 5% decrease in the probability of failure to recognize symptoms of decline and the patient dying within 30 days of admission. These findings sparked multiple discussions regarding educational preparedness of the bedside nurse, but little else.

In the HESI validity studies, there is no direct comparison of scores between BSN, ADN, and diploma students (Adamson & Britt, 2009; Langford & Young, 2013; Morrison, Adamson, Nibert, & Hsia, 2004; Newman et al., 2000; Nibert & Young, 2001; Nibert et al., 2002; Zweighaft, 2013). There is no research on the differences in locus of control or self-efficacy among ADN and BSN students; however, due to the differences in education, one could exist. Liou et al. (2016) did not report the mean scores for each of the population groups tested, making secondary analysis for differences impossible.

Students with a prior degree, licensure, or certification in the medical field should be internally controlled and a greater sense of self-efficacy than those who do not. These individuals have experienced mastery of some academic material and skills, which should carry forward into any future endeavors. Also, students with licensure or certification would have had the opportunity to learn vicariously through their work setting, thus potentially affecting their entry clinical reasoning. Observing fellow co-workers at the desired position should increase the self-efficacy of those individuals.

Using the principles Bandura (1997) and Rotter (1954) set forth as a guide, some additional confounding variables one might consider include the number of semesters completed and the number of standardized tests taken. The more semesters of experience a student has, the higher the expected score should be. The more standardized tests that are taken, the better the results should be. It is reasonable to assume that students who are farther along in their

prospective programs should have higher scores than those with less experience. Moreover, students who take a standardized test every semester should score higher than their counterparts who only test at the beginning of the program and then at the end.

Gaps in the literature

Several gaps were noted during the review of the literature. First, a few studies have explored the development and measurement of clinical reasoning; however, no research is available on individual factors that could impact clinical reasoning development. Second, there have been a number of studies on self-efficacy in nursing, with positive relationships being reported between self-efficacy and NCLEX-RN passage and clinical performance; however, studies that have incorporated self-efficacy and clinical reasoning have examined them as dependent variables alongside one another, rather than exploring any direct relationship that might exist between the two.

Locus of control is another variable that has been connected to several concepts, particularly academic success. Within nursing, locus of control has been connected to clinical decision-making, academic performance, and academic success. Studies that have incorporated self-efficacy and locus of control, however, have shown inconsistent findings. Some research has suggested that a connection between locus of control and self-efficacy exists, while others have not. These inconsistent findings make determining the exact relationship between the two difficult to identify. Finally, there have been no studies conducted on the effects certain sociodemographic variables have on self-efficacy and locus of control.

Summary

Clinical reasoning is the mental process a nurse uses to gather information about a client, analyze the information, make clinical decisions based upon this analysis, implement

interventions, and then subsequently evaluate and reflect on those interventions. Much of the research has been focused on understanding how nurses use this process and how to develop the process in students.

Less is known about variables that impact clinical reasoning development. Sociodemographic factors, the student's self-efficacy, and locus of control could potentially impact a student's development of clinical reasoning ability. While researchers have incorporated these variables in several studies, in most cases, the variables are examined as dependent variables in the study and not examined in relation to one another. Research should focus on examining how and what factors influence clinical reasoning development in students. By knowing this, educators would be better equipped to recognize students who are at risk for struggling to develop clinical reasoning and intervene in cases where clinical reasoning is not developing as expected in a student.

Chapter 3. Methods

This chapter provides a description of the research design, sample, setting, recruitment plan, participant consent, and method of measurement for this study. The purpose of this research was to discover if there is a relationship between a student's perceived clinical reasoning ability and a student's actual clinical reasoning ability, as well as to discover any differences in clinical reasoning and self-efficacy within the Associate Degree Nursing (ADN) and Bachelor of Science Nursing (BSN) undergraduate nursing student population. A descriptive correlational design was employed. Also, the instruments utilized for this study, along with their validity and reliability data, are described. The chapter concludes with the ethical considerations pertaining to this study.

Research Design

A descriptive correlational design was used to examine the relationship between a student's self-efficacy in clinical reasoning score and a student's actual clinical reasoning ability. A partial correlational design was chosen as the aim of the study was to discover if a relationship existed between students' self-efficacy in clinical reasoning score and students' actual clinical reasoning ability, while controlling for the confounding variables (Creswell, 2012).

Students at both the associate degree level (ADN) and the baccalaureate degree level (BSN) were included in the sample. Since clinical reasoning and utilization of the nursing process to plan care for clients is required in the clinical setting, it was reasonable to choose participants that had completed at least one nursing course with a clinical component. Based on the review of the literature, summarized in Chapter Two, there is enough evidence to support the suggestion that a connection exists between student's self-efficacy and a student's actual ability

to execute a specific task or behavior. Students were asked to complete the Nurses Clinical Reasoning Scale (NCRS) (Liou et al., 2016) and Rotter's (1966) Locus of Control Scale and to self-report the number of semesters completed, which specialty exams had been completed (HESI or ATI), the date of completion, and competency results. Permission was obtained in writing to use the NCRS (Appendix A). The Locus of Control Scale is freely available online and an effort was made to contact the person responsible for the scale following Dr. Rotter's death, without success (Appendix B, C, & D).

Sample and Setting

Sample. The participants were students enrolled in an ADN or BSN program in the United States of America (USA). The participants were at varying levels of completion, but to meet criteria for inclusion, students must have completed at least one nursing course with a clinical component. Students are required to use clinical reasoning to assess, diagnose, plan, implement, and evaluate care given to the client during their clinical experience; therefore, only students who had completed at least one clinical experience were used for the study. All participants were greater than 18 years of age. No one was excluded based on race, ethnicity, or gender. To sufficiently power the study, a sample size of 150 was needed. This sample size would allow enough power both to validity test the NCRS and to meet the estimated needed sample of 85 using Cohen's (1992) guidelines with an α-level of .05, a power of .8, and a medium effect size. Validity testing in this study is important since the 15-item scale was developed in the Chinese language and has yet to be utilized on English-speaking participants (Newton & Rudestam, 1999).

Setting. The setting for this study was an online survey sent to 60,000 students enrolled in nursing schools from across the USA. The survey consisted of Rotter's Internal-External

Locus of Control scale, the Nurses' Clinical Reasoning Scale, and demographic questions. Demographic questions included: age, state of residence, gender, program type, number of college semesters completed, number of semesters completed in nursing school, prior degree, prior medical certification, and HESI results. Following IRB approval and approval from the National Student Nurses' Association (NSNA), the NSNA distributed the survey to its members nationwide via email. By sending out an electronic survey, students were able to choose the time and location where they responded to the survey. To be considered for participation in the study, students must have completed at least one clinical nursing course and have completed the HESI Fundamentals Exam or the HESI Exit Exam within the last six months.

Recruitment Strategy

Once IRB approval was secured, the consent waiver, introduction letter, survey, IRB approval documentation, and committee approval documentation were sent to the National Student Nurses Association (NSNA). The documentation was reviewed by the President of NSNA and, once approved, an electronic survey link, i.e., Check Box, was sent to Diane Mancino at NSNA, who then distributed the survey via email to the members of NSNA.

Since the survey was distributed by a third party, and only de-identified data were returned to the researcher, the researcher will not have access to any personally identifiable information, such as name, date of birth, school attended, etc. Even so, all SPSS files pertaining to this research will be kept on a secured, password-protected external storage device. This device is maintained in a locked safe at the researcher's residence. Also, the raw data will be kept on East Tennessee State University's secured drive, per University policy.

Procedure

Before the recruitment of participants for this study, a Checkbox electronic survey was created. The survey consisted of Rotter's Internal-External Locus of Control scale, the NCRS, demographic questions of interest (age and state), any medical licensure/certification held, number of semesters completed in the nursing program, number of nursing courses taken that included a clinical component completed, last HESI exam taken, and competency results. Students were able to skip questions by clicking "next" and proceeding through the survey. Students were also able to save their survey and return to it later by choosing the "save and return" option. No questions requiring personally identifiable information were included in this survey. This survey (Appendix E), along with an introduction letter, waiver of written consent, and proof of IRB approval, were sent to the National Student Nurses Association (NSNA) for approval, per NSNA policy (Appendix F).

Once the proposal was approved, a representative from the NSNA emailed the introduction letter, waiver of written consent, and survey link to the members of the NSNA to ensure confidentiality. As an incentive, the researcher offered participants two $50 Amazon gift cards by random drawing. There was a separate area for those wishing to take advantage of the incentive by leaving an email address not connected to their specific survey results. If a student wished to take advantage of the incentive, there was a link on the submission screen that took them out of the survey completely to another webpage, where they could leave their name and email address. The data results were then uploaded into SPSS for analysis.

Measures

Self-efficacy. To measure the participants' self-efficacy in clinical reasoning, the NCRS was administered to participants who had completed at least one clinical nursing course. This

tool, developed in 2016, is a 15-item, Likert-type scale that measures the student's perception of his or her capability to complete the steps of the Clinical Reasoning Cycle (Liou et al., 2016). Each item is a statement, such as, "I know how to collect an admitted patient's health information quickly" or "I can provide appropriate nursing intervention for the identified patient problems." The participant scores each statement from one to five, with 1 being strongly disagree, 2 being disagree, 3 being neutral, 4 being agree, and 5 being strongly agree. Participants can score from 15-75. The higher the score, the greater the self-efficacy of clinical reasoning. Since the tool measures an individual's self-perception of his or her clinical reasoning ability, it is a measure of self-efficacy (Bandura, 1997).

***Reliability and validity*.** The NCRS is a brand-new tool; therefore, the only reliability and validity data to date are found in the original study. The original study consisted of a pilot study, with a two-week test-retest reliability of known-group differences in nursing students. The primary study followed the pilot study and consisted of 151 nursing students, none of whom were in the pilot study, and 100 clinical nurses (Liou et al., 2016).

The content validity index (CVI) for both the items (I-CVI) and the scale (S-CVI) were both reported as 1.0, which indicates content adequacy. The Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity were used to confirm factor analysis. The KMO was reported at 0.94 and the Bartlett's test of sphericity was significant for the entire scale (Liou et al., 2016).

Internal consistency reliability was confirmed using Cronbach's alpha. The Cronbach's alpha for the entire scale was 0.93 for the pilot study and 0.94 for the main study. The inter-item correlation was 0.5 with a range of 0.3-0.7, and the corrected item-total correlations for each item ranged from 0.6-0.7, with a mean of 0.7 (Liou et al., 2016). The test-retest reliability was calculated using intra-class correlation (ICC). The ICC for the pilot study was 0.87, $p<.001$ and

0.85, p<.001 for the main study, indicating the test-retest reliability of the instrument (Liou et al., 2016).

The known-groups validity in the pilot study was determined by comparing the scores of students in the fundamentals course to students in the final semester. In the main study, the scores of students were compared to the scores of practicing nurses. There were statistically significant differences in scores in both groups, indicating that the scale can differentiate between groups. Cronbach's alpha for the current study was calculated during the analysis.

Clinical reasoning. Clinical reasoning was measured using the most recent HESI score in a self-report format. HESI is a battery of standardized exams that have both general and specialized content. They are designed to benchmark a student's progress throughout a program and determine a student's readiness for the NCLEX-RN (HESI Website, 2020). The HESI battery of exams includes 18 specialty exams covering all areas of nursing education and an Exit exam, which offers a readiness prediction for the NCLEX-RN. Sample questions from the HESI include items such as:

> "The nurse is caring for a client who received four liters of intravenous fluid during an orthopedic surgical procedure yesterday and has continuous intravenous fluids running. Upon assessment, the client is confused, lethargic, and keeps asking for water or ice chips. Based on the client's presentation, what action should the nurse take?
>
> A. Measure orthostatic vital signs.
>
> B. Obtain order for Cortisol level.
>
> C. Initiate workup for diabetes insipidus.
>
> D. Review most recent serum sodium level." (yourbestgrade.com, 2020).

Participants who take the HESI reported their numeric composite score on the HESI exams completed, along with the date of completion. Composite scores for the HESI range from 0 to 1500. A composite score of 850 is considered competent for the material tested; however, a score of 900 is a recommended score. HESI also gives a conversion score; however, students were requested to self-report their composite score.

***Reliability and validity*.** Health Education Systems, Inc. (HESI) began offering an exit exam in the early 1990s. This test was intended to provide students with a measure of how they will perform on the NCLEX-RN exam and provide students concepts for remediation based on their test score (Nibert & Morrison, 2013). Since that time, the HESI battery has expanded from one test to a battery of exams that include an entrance exam, an exit exam, and major specialty exams as well (Evolve, n.d.).

Beginning in 1999, nine validity studies have been completed of the HESI exit exam. It should be noted that all these studies were conducted by the parent company of HESI. Accuracy at predicting NCLEX-RN success reported in these studies ranges from 96.36% to 99.16% (Adamson & Britt, 2009; Langford & Young, 2013; Lauchner, Newman, & Britt, 1999; Lewis, 2005; Newman, Britt, & Lauchner, 2000; Nibert & Young, 2001; Nibert, Young, & Adamson, 2002; Young & Wilson, 2012; Zweighaft, 2013).

All the above validity studies examined the aptitude of the HESI exit exam to predict NCLEX-RN success. Only one study, Zweighaft (2013), also examined the HESI specialty exams as well. Zweighaft (2013) analyzed the scores of 3,790 students, all of whom sat for the HESI exit exam. Of the 3,790 students, 2,332 of them also took the HESI specialty exams as part of their curriculum. Zweighaft (2013) reported that 96.61% of students scoring 900 or higher on the HESI exit exam passed the NCLEX-RN on their first attempt. In addition,

Zweighaft (2013) also reported that all eight HESI specialty exams were able to significantly predict ($p = .0001$ to $.0034$) of NCLEX-RN success, with the most predictive specialties being Critical Care, Pediatrics, and Medical-Surgical nursing.

Despite this evidence, some researchers have called into question, not the aptitude of the HESI exit exam to predict NCLEX-RN success, but its ability to predict NCLEX-RN failure. Spurlock and Hanks (2004) reevaluated the data reported in the Nibert, Young, and Adamson (2002) study and found that 81% of students predicted to be unsuccessful on the NCLEX-RN exam, in all actuality, passed the exam. These findings reveal that the ability of the HESI exit exam to successfully predict those who fail the NCLEX-RN exam is about 19%. They also found that, overall, the HESI exit exam was able to correctly predict students as either passing or failing NCLEX-RN 47% of the time. The majority of the 53% who were predicted incorrectly were predicted to be unsuccessful, yet passed the NCLEX-RN exam (Spurlock & Hanks, 2004).

Nibert et al. (2006) take issue with Spurlock and Hanks (2004) findings, calling into question the utilization of a disease detection model as the framework for data analysis. They claim that, because the disease detection model forces a two-choice outcome of predicted passage or predicted failure, it is inappropriate for this type of analysis since it does not allow for a third category: indeterminate.

In an independent study, Spurlock and Hunt (2008) found a statistically significant relationship between NCLEX-RN outcomes and first time HESI exit scores, although when logistic regression was performed on the sample, the HESI exit exam was only a "fair" indicator of NCLEX-RN failure.

Locus of control. Locus of control was measured using Rotter's (1966) Internal-External Locus of Control Scale. This instrument contains 29 items, consisting of 23 scored

items and six filler items. Participants select the statement which they most agree with from a choice of two statements. For example, participants would be asked to choose which of the two following statements they most agree with:

"___a. Many of the unhappy things in people's lives are partly due to bad luck.

___b. People's misfortunes result from the mistakes they make."

Items are scored either a 0 or a 1, depending on which statement is chosen. In the above example, participants would be awarded a score of 1 if they chose "option a". and a 0 if they chose "option b." Filler questions are scored 0 regardless of the option chosen. Scores range from 0 to 23, with a low score indicating an internal locus of control and a high score indicating an external locus of control.

***Reliability and validity*.** Rotter (1966) reported a test-retest reliability coefficient of .49 to .83 over a one to two-month interval for various samples. Since that time, the instrument has been used in multiple studies and is widely considered a valid and reliable measure of locus of control.

Confounding Variables. The confounding variables were controlled for using partial correlation. They included age, locus of control, number of semesters completed, number of standardized tests taken, prior degree, program type (ADN vs. BSN), and prior health care certification. All these variables were measured by students self-reporting this information in the demographics section of the electronic survey.

Data Analysis Plan

Data were imported into SPSS and checked for accuracy. Once accuracy had been checked, the data were screened for outliers, missing data, normality, linearity, and homoscedasticity. Dichotomous variables were screened for outliers using SPSS

FREQUENCIES. Continuous variables were identified by calculating z scores. Cases with standard scores greater than 3.29 were considered outliers. Identified outliers were then transformed to minimize their impact. Missing data cases were identified, and the mean was substituted for the missing cases. Data were screened for normality by analyzing the shape of the distribution. Tabachnick and Fidell (2007) recommend using this method of screening for normality in large sample size (100 or more) because variables with skewness that is statistically significant do not deviate far enough from normality to make an impact on the analysis.

With screening complete, descriptive statistics on the data were performed. Once descriptive statistics were obtained, linear relationships were assessed using Pearson's r and non-linear relationships through bivariate scatterplots. Finally, data were screened for multicollinearity and singularity.

The HESI composite score and the students' scores on the Nurses Clinical Reasoning Scale were correlated. The HESI composite score was reported by the student as a continuous numerical variable. Control variables included age, locus of control, number of college semesters completed, number of semesters in nursing school completed, number of standardized tests taken, type of program, prior degree, and prior medical licensure or certification. Results were considered significant at the .05 level. R^2 and its confidence limits were calculated for each control variable to determine the amount of variance in the correlated variables attributable to the control variables.

Students were grouped according to the number of semesters completed and an analysis of variance (ANOVA) was completed to determine changes in the self-efficacy scores over time. Results were considered significant at the .05 level. Finally, since the instrument was originally developed and tested in the Chinese language, Cronbach's alpha was performed on the

data to assess the reliability of the tool on English-speaking students. Cronbach's alpha was considered significant at the 0.7 level.

Threats to Internal Validity

There are some internal validity threats. First, since the sample for the study was taken from the students' professional organization, it is possible that the characteristics displayed by students who typically participate in a professional organization could potentially skew the data. Second, the time elapsed between the last standardized test and the completing of the survey could have allowed for events to occur that might have impacted a student's self-efficacy, making the correlation questionable. The time lapse was addressed by only looking at the most recent HESI results in the correlation. Finally, there is a chance that students might potentially inaccurately report their competency level on the survey. Anonymity should help combat any self-confidence issues with competency scores.

Chapter 4. Results

This partial correlational design study assessed for a relationship between the students' scores on the NCRS and the students' scores on a standardized HESI exam while controlling for certain confounding variables. The confounding variables controlled for in this study were age, number of semesters in college completed, number of semesters completed in nursing school, number of standardized tests taken, program type, gender, prior degree, and prior medical certification. In addition to the partial correlation, this study also examined the change in NCRS scores over time. Since the NCRS was developed in the Chinese language initially, Cronbach's alpha was also conducted on the NCRS to test the reliability of the scale in English. This chapter describes the sample and the results of the partial correlation, the one-way ANOVA performed on the data, and the Cronbach's alpha.

This study's population consisted of members of the National Student Nurses' Association (NSNA). An electronic survey was sent via email to the over 60,000 members of the NSNA organization. To meet inclusion criteria, students had to be a least 18 years of age, currently enrolled in a nursing program, have completed one clinical nursing course, and have taken one HESI exam other than the HESI A2 (entrance) exam. Six hundred and fifty-three participants responded to the survey. After screening for eligibility, 169 participants met initial eligibility. Of the 169 participants that met eligibility criteria, 50 provided no HESI scores or exam dates, 28 provided invalid scores, 21 provided exam dates but no exam scores, and eight provided scores but no exam dates. These results were excluded from the study. Of the remaining 62 participants, ten failed to complete any of the Nurses Clinical Reasoning Scale (NCRS), and three participants failed to answer one question on the scale. The ten participants who failed to complete the NCRS were excluded from the study. In the case of the three

participants who did not complete one question, the mean for those questions was substituted, and the responses were included in the study.

Once the eligibility screening was complete, data were uploaded into SPSS, and categorical data were coded. Gender was coded as 1 for female and 2 for male. Nursing program type was coded as 1 for ADN and 2 for BSN. Both prior degree and medical certification were coded as 1 for no and 2 for yes. Medical certification was further coded as a separate variable with 1 for none, 2 for LPN, 3 for CNA, 4 for EMT, 5 for phlebotomy, 6 for pharmacy technician, 7 for medical assistant, and 8 for paramedic. HESI test type was coded as 1 for medical-surgical, 2 for fundamentals, 3 for exit exam, 4 for obstetrics, 5 for pharmacology, 6 for mental health, and 7 for pediatrics. The most recent HESI score reported was the HESI score utilized. All HESI scores used were reported to have been taken within the previous six months of the collection date. States were also coded from 1 to 35 in alphabetical order, beginning with Alabama as 1 and ending with Wyoming as 35.

Frequency statistics were generated for all categorical data. Continuous variables were screened for outliers using z score calculations, and no outliers were identified. Descriptive statistics and histograms were generated for all continuous data. NCRS scores and HESI test scores were further analyzed with tests for normality, stem-and-leaf plots, and normal Q-Q plots. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests were used to determine normality along with an examination of the Q-Q plots. The Kolomogorov-Smirnov was not significant ($D(52) = .093$, $p = .200$) for the NCRS score; however, it was significant ($D(52) = .124$, $p = .044$) for the HESI test score. The Shapiro-Wilk test was not significant for either the NCRS score ($W(52) = .973$, $p = .282$) or the HESI test score ($W(52) = .969$, $p = .183$). These findings, in addition to examining the Q-Q plots, indicate a normal distribution of data. Homogeneity of

variance was screened for by conducting a Levene's Test. The Levene's test was not significant for either the NCRS score (F (5,45) = .637, p = .673) or HESI test score (F (5,45) = .881, p = .502). Linearity and homoscedasticity were assessed using bivariate scatterplots. With screening complete, statistical evaluation of data began.

Description of the Sample

The final sample consisted of 52 students enrolled in nursing schools in 35 states across the country. Of the 52 participants, 49 (94.2%) were female, and 3 (5.8%) were male; 21 (40.4%) were enrolled in an ADN program, and 31 (59.6%) were enrolled in a BSN program; 25 (48.1%) did not have a prior college degree, and 27 (51.9%) did have a prior college degree; 36 (69.2%) did not have any type of medical certification, and 16 (30.8%) did have some type of medical certification. Age for the complete sample ranged from 20-64 (M = 29.02, *SD* = 9.64). The number of college semesters completed for the whole sample ranged from 1-10 (M = 7.19, *SD* = 2.56). The number of semesters in nursing school for the complete sample ranged from 1-9 (M = 3.00, *SD* = 1.86). The number of standardized tests taken for the entire sample ranged from 1-6 (M = 3.21, *SD* = 1.91). Since 94.2% of the sample was female and only 5.8% of the sample male, any generalization regarding gender was difficult to make. This gender distribution is not representative of the nursing population, which in 2019 was reported by the U.S. Labor Bureau to be 88.9% female and 11.1% male.

Data Analysis

A partial correlation of NCRS scores and HESI test scores was completed, controlling for age, gender, program type, number of college semesters completed, number of semesters in nursing school completed, prior college degree, medical certification, and number of

standardized tests taken. The partial correlation controlled for each variable individually and then as a group. Table 1 shows the results of these correlations.

Table 1.

Partial Correlation of Nurses' Clinical Reasoning Scale Score and HESI Test Score

Variable controlled for	**Pearson's r**	**R^2**	**p-value**
No control variable	-.230	.053	.101
Age	-.259	.067	.066
Gender	-.216	.047	.127
Program Type	-.121	.015	.396
College semesters completed	-.241	.058	.089
Nursing semesters completed	-.288	.083	.041
Prior Degree	-.215	.047	.129
Medical Certification	-.143	.020	.316
Number of tests taken	-.266	.070	.059
All variables	-.186	.035	.220

Confidence intervals were calculated for the continuous variables. Table 2 shows the results of these calculations.

Table 2.

Confidence Intervals for Continuous Control Variables

Variable	**M**	**SE**	**upper confidence level**	**lower confidence level**
Age	29.02	1.34	31.65	26.39
College semesters completed	7.19	.36	7.90	6.48
Nursing semesters completed	3	.26	3.51	2.49
Number of tests taken	3.21	.27	4.9	1.52

Participants were grouped into the number of semesters in nursing school completed, as well as the number of college semesters completed. An ANOVA test evaluated for changes to the NCRS scores over time. The analysis of variance revealed that there was not a significant change in NCRS score over either the number of semesters in nursing school [$F(2,49) = 1.256$, $p = .294$] or the number of college semesters [$F(2,49) = .502$, $p = .608$].

Finally, a Cronbach's alpha test was used to determine the reliability of the NCRS instrument for this sample. The Cronbach's alpha was .921, indicating that the instrument was a reliable measure for this group.

Locus of control data were separated from the rest of the variables because of a technical problem within the survey that was not discovered until after data collection was completed. As a result, locus of control data were analyzed separately. Since it was impossible to connect the locus of control data to participant data in the NCRS survey, the entire sample was screened and analyzed. Six hundred and fifty-nine participants responded to the locus of control portion of the

survey. These responses were screened for missing data, and surveys with greater than 25% of the data missing were excluded from the analysis. The mean answer score for each question was substituted for responses missing less than 25% of the data. Of the 659 responses, 577 met inclusion criteria and were subsequently analyzed. A histogram of the data revealed normally distributed data. Scores in the sample ranged from 2-23. The mean score was 11.68 with a standard deviation of 3.75.

Chapter 5. Discussion

This research study had two purposes. First, to determine if a relationship exists between a student's self-efficacy of clinical reasoning and a student's actual clinical reasoning ability, while controlling for potentially confounding variables. Second, to determine if a student's self-efficacy of clinical reasoning changed over time. A student's self-efficacy of clinical reasoning was assessed using the Nurses' Clinical Reasoning Scale (NCRS), and the actual clinical reasoning score was measured using the student's most recent HESI exam. Control variables for the study were age, gender, program type, number of college semesters completed, number of nursing school semesters completed, prior degree, medical certification, and number of standardized tests taken. Partial correlation was used to determine if a relationship exists, and ANOVA was used to determine if NCRS scores changed significantly over time. Locus of control data were screened separately, and a Cronbach's alpha was conducted on the NCRS instrument. In this chapter, results from Chapter Four are interpreted, possible reasons for findings are discussed, strengths and limitations of the study are described, and recommendations for future research are made.

Research Findings for Question One

The first question this study sought to answer was, while controlling for confounding variables, was there a relationship between a student's self-efficacy of clinical reasoning score and a student's actual clinical reasoning ability? This relationship was ascertained by using partial correlation. The students' NCRS scores and the students' HESI scores were first correlated by controlling for each control variable individually. The only individual variable that was significant at the .05 level was the number of semesters in nursing school, which supports Bandura's (1977) theory that the more exposure one has to a behavior, the more self-efficacy one

has regarding that behavior, either positive or negative. When all the control variables were controlled for at the same time, a significant correlation did not exist between NCRS scores and HESI scores. This finding supports the finding of Rice (2013), who also found no significant correlation between a student's perceived clinical self-efficacy scores and instructor-rated clinical performance of the student.

Another finding was that the correlation, while not significant, was in a negative direction. Meaning that, as the score on the NCRS went up, the score on the HESI went down and vice versa. This inverse relationship could be attributed to students, as they progress in their program, realizing how much they do not know. It could also be a matter of timing. There is not a standardized, nationwide curriculum for nursing schools. The lack of a standardized curriculum implies that students take courses, and subsequently HESI exams, at different times in their nursing school careers. The only HESI exams in which positioning within a curriculum can be assumed are the HESI fundamental exam, taken during or after the student's first semester, and the HESI exit exam, taken during or immediately following the student's final semester. With only 56.7% of the respondents taking either the fundamentals or the exit HESI in the last six months, this timing could be a contributing factor to the non-significance and the negative results.

Another potential factor that should be considered, which could have possibly affected the results, would be readmission. According to Bandura (1997), successes and failures have a direct impact on an individual's self-efficacy. A failure could negatively impact a student's perception of being able to succeed. Students for this study were not screened for the number of attempts at a nursing program. Students who have previously been unsuccessful in a nursing program may potentially have a lower self-efficacy of clinical reasoning than their counterparts

who have not suffered a failure. This situation, in turn, could have students ranking themselves low on the self-efficacy scale while they score high on the HESI exam, resulting in the negative correlation seen.

A third potential factor that could have caused the negative correlation was the time lapse between the HESI exam and the completion of the NCRS. Some of the students reported a HESI score within days or weeks of taking the HESI; however, some scores were from six months before the data collection and completion of the NCRS. Bandura (1989) states that everything a person experiences regarding a behavior, either positive or negative, effects that individual's self-efficacy of that behavior. Although most schools are structured so that the six-month window before the data being collected actually encompassed the end of one semester and the beginning of another, the potential does exist that some event could have occurred that either increased or decreased the self-efficacy of clinical reasoning score for the student, but the HESI score remained unchanged.

Finally, the sample size could be a potential factor in the non-significant finding. The 52 participants included in this study fell short of the estimated 85 needed for the power calculation at the α-level of .05, with a power of .8 and medium effect size, as suggested by Cohen (1992). An insufficient sample size not only prevents generalization beyond the collected sample, but also will often result in a type II error.

Research Findings for Question Two

The second question this study sought to answer was, while controlling for confounding variables, is there a relationship between a student' locus of control and a student's self-efficacy of clinical reasoning score? As mentioned in Chapter Four, due to a technical error in the set-up of the electronic survey, locus of control data were unable to be linked to the other variables in

the survey. As a result, it was impossible to answer research question two. Also, it was also impossible to determine which participants met the inclusion criteria. Therefore, the locus of control data were screened and analyzed separately.

Rotter's (1966) locus of control instrument is a 29-question survey with six filler questions. This set-up makes a potential score range of 1-23. While Rotter (1966) does not give specific ranges for internal and external locus of control, the lower the score, the more internal the locus of control and the higher the score, the more external the locus of control. The mean score for this sample set was 11.68 with a standard deviation of 3.75. A single-sample *t* test that compared the mean score of the sample to a population value of 11.5 was conducted. No significant difference was found [t (576) = 1.132, p = .258). In addition, using the other half of the survey results, it can be estimated that 91% of respondents were female and 9% were male. This score distribution creates an interesting finding since Rotter (1966) and Suphi & Yaratan (2012) have found females to be more externally controlled than their male counterparts. One would expect that the mean score would be negatively skewed in this case since an estimated 91% of the sample was female; however, these scores were not skewed. It would appear that nursing students, in general, are not different from the general population.

One explanation for the normal distribution could be the changes in society that have occurred in the United States since 1966. Significant changes have occurred to the perception of females and female roles since that time. In the case of Suphi & Yaratan, another explanation could be that their study took place in Turkey and, therefore, could reflect cultural differences in the study sample population and the Turkish population.

Research Findings for Question Three

The third question this study sought to answer was, do self-efficacy of clinical reasoning scores change from one semester of nursing school to the next? To determine if self-efficacy scores improved over time, ANOVAs were completed on the NCRS with first the number of college semesters completed as the factor, then the number of nursing semesters completed as the factor. Neither ANOVA yielded any significant results. These nonsignificant results could be due to readmission, as well. As described above, failure in a nursing program once could lead to lower self-efficacy scores. It would also lead to additional semesters in both college and nursing school, which could lead to a nonsignificant result.

Another possible explanation for the nonsignificant findings could be with some of the control variables. With 51.9% of participants having a prior degree and 30.8% of participants holding some form of medical certification, prior degree, medical certification or even program type could have potentially affected the scores to create this finding. Finally, another factor to be considered is that the NCRS scores were not from the same students. Since the scores were a cross-section of the population, it is impossible to know what each individual student's self-efficacy score was for each semester attended. It is entirely possible that longitudinal results of the same students might reveal significant findings.

Cronbach's Alpha of the NCRS

A Cronbach's alpha was completed for the NCRS because the instrument was developed in China and tested on Chinese-speaking students and nurses. Although the sample size fell short of the 150 participants needed, the Cronbach's alpha on the NCRS was .921. This finding indicates that, at least for this sample of English-speaking students, the instrument was a reliable measure of self-efficacy of clinical reasoning.

Strengths and Limitations

This study did have some strengths. First, the survey was sent out electronically, via email, which greatly increased the ease and convenience in which participants could respond to the survey. Also, participants were able to exit and save their survey and return to later. While this option may have prevented survey fatigue, it did result in some incomplete surveys being captured after the cutoff date had passed. Also, the study was able to gain access to a large population of potential participants through the NSNA. The NSNA has over 60,000 members in their database, and by working through this organization, the survey was sent out to a potentially large participant pool.

In addition to the strengths, the study had several limitations. First, the sample size did not reach the number needed to adequate power the study. Although the survey was sent out to a large group of potential participants, the actual number of participants who met the qualifications for inclusion and completed the survey fell below the 85 needed to power the correlation and the 150 needed to power the Cronbach's alpha. When the sample size is not large enough to meet the power requirements of the study, generalization beyond the immediate sample cannot be made, and there is an increase in type II error occurring.

A second limitation was the disconnect of the locus of control data to the remaining variables in the study. While not intentional, the technical glitch did prevent the data from being used as a control variable in the study. Correlating the locus of control data with the other variables could have potentially led to some insightful findings.

A third limitation was the timing of the data collection. Data were collected beginning at the end of a fall semester and ending at the beginning of the spring semester. This process was in place to decrease the impact of extraneous variables might have on the NCRS

scores. However, the timing may have led to a decreased number of exit HESI responses, since the more common semester to complete a college program is in the spring semester.

A fourth limitation was the time-lapse of six months between some of the HESI and NCRS score pairs. While six months is an acceptable time frame, and measures were taken to limit extraneous variable that could have impacted the scores, the time-lapse is still operating in some of the scores.

A fifth limitation was the fact that this study analyzed the most recent HESI exam, as long as it was taken within six months of the collection window, regardless of the HESI test completed. The use of exam results other than the fundamentals or the exit potentially caused issues because, since curriculum is not standardized across the United States, scores other than fundamentals of nursing and exit could be obtained at any point during the program. This lack of standardization makes it impossible to know if the medical-surgical score of one student is comparable to the medical-surgical score of another student in regards to placement in a program of study.

A sixth limitation was the failure to consider readmission. Students who readmit to a program may score well on the HESI but may still have a low NCRS score. Without knowing which, if any, of the students were readmitted, it is impossible to account and control for any effect that readmission might have on the scores.

A seventh limitation was that age, gender, prior degree, prior medical certification, program type, number of college semesters completed, number of semesters in nursing school completed, and number of standardized tests taken were the variables controlled for. There are other variables that could be examined in relation to clinical reasoning. Cappelletti, Engel, and Prentice (2014) completed a review of clinical reasoning and judgment in nursing. Their main

findings were: clinical judgments are more affected by what the nurse brings to the circumstances than the facts of the circumstances at hand, proper judgment depends to a certain degree on knowing that individual's typical responses, judgements are affected by the context of the circumstances and the culture of the nursing unit, various patterns of reasoning are used, and reflection is often set into motion by a breakdown of clinical reasoning. These findings indicate that other factors could influence clinical reasoning and should be investigated. If clinical reasoning is reliant on the knowledge the nurse brings to a situation, then factors that affect learning, i.e. learning styles or motivation, could affect clinical reasoning. If knowing the patient is a factor, then emotional intelligence could be a potential factor. If context and culture affect clinical reasoning, then nursing unit culture should be explored. Reasoning patterns, thinking styles, and reflection ability should be considered as well.

Finally, logistic regression and multilinear regression could have been used instead of an ANOVA to determine differences over time, and factor analysis could have been completed on the sample to decrease the number of factors being correlated. By using regression rather than the ANOVA, more specific results might have been obtained, and by utilizing factor analysis to reduce the number of factors, significant results could have been revealed.

Recommendations for Future Research

Despite the lack of significant findings, the study did have some strengths and, despite to the low sample size, cannot be completely discounted. There are several recommendations for future research. First, include locus of control as a control variable in future research of clinical reasoning. Research supports locus of control influencing both HESI scores and NCRS scores. Locus of control is a concept closely linked to self-efficacy and learning. Examining locus of control as a control variable could potentially provide insight into students' clinical

reasoning ability and how it develops. In addition, further exploration of locus of control as it relates to females, culture, and nursing is very much needed in order to understand the role that each of these aspects plays in an individual's locus of control.

Second, have multiple survey collection times. By collecting data at different points during the school year, a better, more representative sample of students can be collected, as well as a sample large enough to meet power and decrease type II error. The downside would be the fact that additional identifying data would have to be collected to ensure that the scores obtained were of participants who had not already submitted data.

Third, conducting a longitudinal study would give some insight as to how and when clinical reasoning develops in students. Also, it could provide information regarding what activities or events develop clinical reasoning and self-efficacy of clinical reasoning in the undergraduate nursing student. Some research has been done in the area of what develops clinical reasoning in nursing students, but more needs to be completed.

Fourth, collect both the HESI data and the NCRS data at the same time. This procedure would give the most precise picture of the student's self-efficacy of clinical reasoning and his or her actual clinical reasoning ability. It would also minimize the impact of extraneous variables on the NCRS score.

Fifth, either examine only the fundamentals and exit data or examine all HESI data at schools with a common curriculum. Some states now have a standard curriculum for all undergraduate nursing schools. While not all schools use standardized testing and not all schools use the same exam, by drawing a sample from schools with students taking the same courses at the same time, the results of these exams will be much more meaningful. By using schools of nursing, the sample size could potentially be larger, the data more complete, and the risk of

students reporting the incorrect score decreased. Also, it could possibly result in a higher number of males included in the sample. By having a larger sample size that contains more complete data, other statistics, such as factor analysis, could be used, resulting in a higher likelihood of finding significant results.

Sixth, taking into consideration the readmission factor, testing repetition tends to better the scores of the taker. Students who are repeating a course in a program should, at the very least, be identified so that the effect their scores have on the overall sample can be controlled for. Also, using regression in future research may provide more sensitive results.

Finally, many other questions regarding clinical reasoning and self-efficacy remain. Research on these topics has begun in nursing, but questions, such as how they develop, what factors influence their development, do they develop differently in different individuals, and what is the exact connection between self-efficacy of clinical reasoning and actual clinical reasoning ability, remain unanswered. Without understanding the answers to these questions, educators are left without a way to screen and perhaps identify early students who might struggle in the development of clinical reasoning. If educators were able to identify those at risk and intervene early, those students could achieve the same level of clinical reasoning ability as their non-struggling counterparts. Also, if educators understood how exactly clinical reasoning develops and what factors influence its development, they could develop activities around these factors to develop stronger clinical reasoning skills in a more efficient manner.

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APPENDICES

Appendix A: Permission to use Nurses' Clinical Reasoning Scale

Re: The Nurses Clinical Reasoning Scale

ChingYu <chingyuus@gmail.com>

Mon 11/21/2016 1:05 AM

To:Holder, Amy M. <HOLDERA@mail.etsu.edu>;

Dear Amy,
It is great to know that you are interested in using the NCRS in your study. You have our permission to use the scale in your study. Information about the NCRS can be found in the article (DOI: 10.1111/jan.12831). Please do remember to cite the article whenever you publish your studies.

Good luck to your study. Chingyu

Ching-Yu Cheng, PhD, RN
Professor
Chang Gung University of Science and Technology
email: chingyuus@gmail.com

On Fri, Nov 18, 2016 at 9:26 AM, Holder, Amy M. <HOLDERA@mail.etsu.edu> wrote:
> Dear C. Y. Cheng,
>
>
> My name is Amy Holder and I am a PhD student in nursing at East Tennessee
> State University. I recently read your article entitled "The development
> and psychometric testing of a theory-based instrument to evaluate nurses'
> perceptions of clinical reasoning competence" published in the Journal of
> Advanced Nursing. I found the article extremely interesting, since the
> focus of my research is clinical reasoning in undergraduate nursing
> students. I am writing ask permission to use the tool in my doctoral
> research. Thank you for your time and consideration.
>
>
> Sincerely,
>
>
> Amy Holder
>
>

Appendix B: Request for permission to use Rotter Locus of Control Scale

Rotter Internal-External Locus of Control Scale

Holder, Amy M. <HOLDERA@mail.etsu.edu>
Fri 9/28/2018 12:12 PM
To: lindy.coldwell@uconn.edu <lindy.coldwell@uconn.edu>

Dr. Coldwell,

My name is Amy Holder and I am a PhD student at East Tennessee State University. I am interested in using Dr. Rotter's Internal-External Locus of Control Scale in my doctoral research. A booklet I have by Halpert and Hill (2011) gave this email address and your name as the person to contact to gain permission to utilize the scale. What is the process for gaining permission to use Dr. Rotter's scale? Any assistance you could provide would be appreciated.

Thank you for your time,

Amy Holder

Appendix C: Returned email

Undeliverable: Rotter Internal-External Locus of Control Scale

Mail Delivery System <MAILER-DAEMON@mta3.uits.uconn.edu>
Fri 9/28/2018 12:12 PM
To: lindy.coldwell@uconn.edu <lindy.coldwell@uconn.edu>

1 attachments (52 KB)
Undelivered Message;

This is the mail system at host mta3.uits.uconn.edu.

I'm sorry to have to inform you that your message could not
be delivered to one or more recipients. It's attached below.

For further assistance, please send mail to postmaster.

If you do so, please include this problem report. You can
delete your own text from the attached returned message.

The mail system

<elc03004@uconn.mail.onmicrosoft.com> (expanded from
<lindy.coldwell@uconn.edu>): host
https://linkprotect.cudasvc.com/url?a=https%3a%2f%2fuconn-mail-onmicrosoft-com.mail.protection.outlook.com&c=E,1,0Kh71FfckD4kCJELG8Bi4CTZIqMb6JczZHXW4oO9XXGBXrrD_txsPgsuJXeJw9_ozLGmHrnQME8ihws5HacLayQ-e4h7G5juZPzpWdT-C6GEBKiXZb0WFiNK&typo=1[216.32.181.170]
said: 550 5.4.1 [elc03004@uconn.mail.onmicrosoft.com]: Recipient address
rejected: Access denied
[https://linkprotect.cudasvc.com/url?a=https%3a%2f%2fBY2NAM01FT004.eop-nam01.prod.protection.outlook.com&c=E,1,vhv6tXRWb41gfGtto-XflQ6v8zAM4w5fok43AHwsjFvMGWm-cRjXAt1qfhbT9uMP0qyUE3mXfp4gwb2kpGUORLM9UCc7s5HySmSGDucYOIWc6TsY&typo=1] (in reply to RCPT TO
command)

Appendix D: Reference librarian response to request for aid

FW: Rotter Scale

Phillips, Kenneth Doyle <PHILLIPSKD@mail.etsu.edu>
Fri 9/28/2018 12:50 PM
To: Holder, Amy M. <HOLDERA@mail.etsu.edu>

Amy,
Please attach this to your dissertation.

Ken.

From: Anderson, Joanna Marie
Sent: Friday, September 28, 2018 1:48 PM
To: Phillips, Kenneth Doyle <PHILLIPSKD@mail.etsu.edu>
Subject: Rotter Scale

Ken,

There are two parts to being able to use this scale:

1. Since Dr. Rotter has passed away and you have tried to find the person whom to contact mentioned in the book, it should be believed that you have taken reasonable steps to obtain permission.
2. The scale is freely available online.

http://shodhganga.inflibnet.ac.in/jspui/bitstream/10603/176927/17/17_appendix%205.pdf

http://www.mccc.edu/~jenningh/Courses/documents/Rotter-locusofcontrolhandout.pdf

https://faculty.darden.virginia.edu/clawsonj/General/SELF_ASSESSMENT_TOOLS/OB-786_Locus_of_Control.pdf

Best,

Joanna

Joanna M. Anderson, MLIS
Associate Professor
Distance Education Librarian
East Tennessee State University
Phone: 423-439-4714
Email: andersonjm@etsu.edu

Genius might be the ability to say a profound thing in a simple way. -Charles Bukowski

Appendix E: Hard copy of electronic survey

Rotter's Locus of Control Scale

Directions: Please select either answer "a" or "b" which you personally believe to be most true. There are no right or wrong answers. Thank you for your participation.

I more strongly believe that:

1.___a. Children get into trouble because their parents punish them too much.

___b. The trouble with most children nowadays is that their parents are too easy with them.

2. ___a Many of the unhappy things in people's lives are partly due to bad luck.

___b. People's misfortunes result from the mistakes they make.

3. ___a One of the major reasons why we have wars is because people don't take enough interest in politics.

___b There will always be wars, no matter how hard people try to prevent them.

4. ___a. In the long run people get the respect they deserve in this world

___ b. Unfortunately, an individual's worth often passes unrecognized no matter hard he tries

5. ___a The idea that teachers are unfair to students is non-sense

___ b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. __ a. Without the right breaks one cannot be an effective leader.

___b. Capable people who fail to become leaders have not taken advantage of opportunities.

7. ___a No matter how hard you try some people just don't like you

___b. People who cannot get others to like them don't understand how to get along with others.

8. ___a. Heredity plays the major role in determining one's personality.

___b. It is one's experiences in life which determine what they are like.

9. ___ a. I have often found that what is going to happen will happen

___ b Trusting to fate has never turned out as well for me as making a decision to take a definite course of action

10. ___a. In case of the well-prepared students there is rarely if ever such a thing as an unfair test.

___b many times exam question tend to be so unrelated to course work that studying is really useless.

11. ___a Becoming a success is a matter of hard work, luck has little or nothing to do with it.

___b Getting a good job depends mainly on being in the right place at the right time.

12. ___a. The average citizen can have an influence in Government decisions

___b. The world is run by the few people in power, and there is not much the little guy can do about it.

13. ___a When I make plans, I am almost certain that I can make them work

___ b It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. ___a. There are certain people who are just no good.

___b. There is some good in everybody.

15. ___a. in my case getting what I want has little or nothing to do with luck.

___b. Many times, we might just as well decide what to do by flipping a coin

16. ___a Who gets to be the boss often depends on who was lucky enough to be in The right place first

__ b Getting people to do the right thing depends upon ability; luck has little or nothing to do with it.

17. ___a. As far as world affairs are concerned, most of us are victims of forces we can neither understand nor control

___b. By taking an active part in politics and social affairs the people can control the world events.

18. __ a Most people can't realize the extent to which their lives are controlled by accidental happenings

___ b There really is no such thing as "luck"

19. ___a. One should always be willing to admit his mistakes.

___b. It is usually best to cover one's mistakes.

20. ___ a. It is hard to know whether or not a person really likes you.

___b. How many friends you have depends upon how nice a person you are

21. __ a. In the long run the bad things that happen to us are balanced by the good ones.

___b. Most misfortunes are the result of lack of ability, ignorance, laziness or all three.

22. ___a. With enough effort we can wipe out political corruption.

___b. It is difficult for people to have much control over the things

23. __ a. Sometimes I can't understand how teachers arrive at grades they give.

___b. There is a direct connection between how hard I study and the grades I get.

24. ___a. A good teacher expects people to decide for themselves what they should do

___b. a good teacher makes it clear to everybody what their jobs are.

25. __ a. Many times, I feel that I have little influence over the things that happen to me

___ b. It is impossible for me to believe that chance or luck plays an important role in my life

26. ___a People are lonely because they don't try to be friendly.

___ b. There is not much use of trying too hard to please people, if they like, they like you

27. ___a there is too much emphasis on athletics in high school.

__b Team sports are an excellent way to build character.

28. ___a What happens to me is my own doing.

___b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. ___a. Most of the time I can't understand why politicians behave the way they do

__ b. In the long run the people are responsible for bad government on a national as well as on a local level

Rotter's Locus of Control Scale found online and used after attempts to locate the author or author's representative were unsuccessful. Rotter, J. (1966). Generalized expectancies for internal versus external control of reinforcement, *Psychological Monographs*, 80 (1), 1 – 28.

Nurses Clinical Reasoning Scale (NCRS)

Directions: Please read each item and circle the number that best describes your current performance. There is no right or wrong answer. Please do not place your name on this survey. Thank you for your participation.

5 = Strongly agree, 4 = agree, 3 = neutral, 2 = Disagree, 1 = Strongly disagree

Item	SA	A	N	D	SD
I know how to collect an admitted patient's health information quickly.	5	4	3	2	1
I can apply proper assessment skills to collect a patient's current health information.	5	4	3	2	1
I can identify abnormalities from the collected patient information.	5	4	3	2	1
I can identify a patient's health problems from the abnormal information collected.	5	4	3	2	1
I can recognize possible early signs or symptoms when a patient's health deteriorates.	5	4	3	2	1
I can explain the mechanism and development associated with the early signs or symptoms when a patient's health deteriorates.	5	4	3	2	1
I can accurately prioritize and manage any identifiable patient problems.	5	4	3	2	1
I can correctly explain the mechanism behind a patient's problems.	5	4	3	2	1
I can set nursing goals properly for the identified patient problems.	5	4	3	2	1

I can provide appropriate nursing intervention for the identified patient problems.	5	4	3	2	1
I am knowledgeable of each nursing intervention provided.	5	4	3	2	1
I can identify and communicate vital information clearly to the doctors based on the patient's current condition.	5	4	3	2	1
I can anticipate the prescription ordered by the doctor according to the patient information provided.	5	4	3	2	1
I can accurately evaluate and identify whether a patient's condition is improved.	5	4	3	2	1
I know the follow-up steps to take if the patient's condition does not improve.	5	4	3	2	1

Nurses Clinical Reasoning Scale used with permission of authors
Liou, S., Liu, H., Tsai, H., Tsai, Y., Lin, Y., Chang, C., & Cheng, C. (2015). The development and psychometric testing of a theory-based instrument to evaluate nurses' perception of clinical reasoning competence. *Journal of Advanced Nursing.* 72(3), 707 – 717, doi:10.1111/jan.12831.

Demographic Data

Please complete the following questions. Please do not place your name on this survey.

1. What is your age? _____
2. What is your gender? _____
3. In what state do you reside? _____
4. What type of nursing program are you currently enrolled in? ADN/BSN
5. How many semesters of college/university courses have you completed? _____
6. How many semesters of nursing school have you completed? _____
7. Does your program currently engage in standardized testing such as HESI or ATI?
8. If HESI, which standardized test(s) have you taken and what was your score?

Test	Date	Score
Fundamentals		
Medical Surgical		
Obstetrics		

Pediatrics		
Mental Health		
Pharmacology		
Exit		

9. Do you have a prior degree in any field of study? _____

10. Do you hold a medical certification, if yes, which type? _____

Appendix F: NSNA policy

National Student Nurses' Association, Inc.

Research Request Requirements

The following are required prior to approval of sending a research survey to NSNA's email list for members. Note that NSNA does not release email addresses: we will send the survey for you via an email with the link to the survey. The survey will go to all NSNA members for whom we have email addresses (approximately 60,000 email addresses).

1. IRB approval letter (scan and attach to an email message).
2. Documentation that proposal has been approved by your dissertation committee (letter from the chairperson of your committee).
3. The actual survey and short introduction that will be used to explain the survey, confidentiality, etc.
4. Once approved, a check for $350.00 (this amount is required prior to survey going out to all members). If you want the broadcast resent, it is an additional $250 (a total of $600 for two broadcasts) is required. Note that most researchers get ample responses from one broadcast.

Once I have the survey and IRB approval letter, I will seek approval from the NSNA president. Once approved, we require payment prior to the survey being sent. You will need to send me the link to the survey website (i.e. Survey Monkey).

Regarding an incentive, you can add a page to your survey where you request their email address if they want to be entered into a drawing for a gift. Once you close the survey, separate this page and download the email addresses (keep separate from the data to ensure confidentiality.) Then you can select the email address for your winner(s) and contact the person at the email address. This is how we have done this. An incentive definitely does help with survey response.

Please let me know if you have any questions. I can be reached at 718-210-0705 Ext 103.

VITA

AMY HOLDER

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