COMPARING THE CAUSAL IMPLICATIONS OF CLINICAL UNIT PLACEMENTS ON SENIOR BACHELOR OF SCIENCE IN NURSING STUDENTS' COGNITIVE DECISION-MAKING PROCESSES

by

Shelley Layne Blackwood

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

Evidence suggests that new nursing graduates entering the workforce struggle with decision making. Poor clinical decisions often lead to undesirable patient outcomes. Utilizing quantitative, causal-comparative, pretest-posttest design, this research explored the effect of four categories of clinical unit placements (specialty units, acute care, critical care, and emergency departments) on senior bachelor of science in nursing (BSN) students' cognitive decision-making processes to explore which type of unit, if any, significantly changes nursing student cognitive processes while making decisions. A convenience sample of 30 senior BSN students from a private, faith-based university completed both a demographic survey and the Nurse Decision Making Instrument-Revised 2014 (NDMI-R14) before and after a five-week clinical rotation in which each student was assigned to only one unit. A theoretical dyad of Hammond's cognitive continuum theory and Benner's novice to expert theory were the framework for this research. The instrument for this study was the NDMI-R14, which quantifies decision-making from analytical cognition to intuitive cognition. Analysis compared the NDMI-R14 posttest results of students assigned to one of the four categories of units while controlling for pretest scores on the NDMI-R14. Though the results of the analysis of covariance were not statistically significant, the results suggested a need to consider clinical curriculum design congruent with desired outcomes for BSN graduates.

Keywords: decision making, nursing students, clinical placement, critical thinking, clinical judgment

Dedication

I praise my Lord and Savior, Jesus Christ, for giving me the strength to complete this educational research process. I pray that He is represented well through my daily walk.

I dedicate this project to my precious niece, Hannah Shay Wiggins (June 20, 2014–June 30, 2014), whose tragically short life shone a glaring light on the problem of preventable medical errors, inspiring me and fueling my passion to explore this topic. Her spirit dances through every word and drives me to never stop trying to find innovative answers to clinical education questions because every single living person bears the image of the Almighty and deserves healthcare providers who are expertly prepared to make safe and appropriate decisions.

Thank you to my husband, Ron, our sons, Nathan and his wife Shiloh, Noah, Nicolas, Ron Jr. and his wife, Dana, and granddaughter, Ryien. I love you all more than words can say and I pray that you can forgive the nights I closed the study door, cried, and turned down invitations to events. I couldn't have done this without you. Neal, Ronda, Alicia, Brandi, and all the grands and great-grands, I love you and thank you for your acceptance, love, and patience.

To my parents, I want you both to know that I love you *seven times sky high!* You set the expectation of excellence in my life and led me by example to persevere in answering God's call. I have no doubt that your prayers have carried me through. To my five siblings, nieces, nephews, and incredible friends and family members, laughing with you and being loved by you has energized my heart and healed my tired mind. It is not possible to name every person who has touched my life and inspired, encouraged, or helped me in some way. I did not do this on my own.

I'm not saying that I have this all together, that I have it made. But I am well on my way, reaching out for Christ, who has so wondrously reached out for me. Friends, don't get

me wrong: By no means do I count myself an expert in all of this, but I've got my eye on the goal, where God is beckoning us onward—to Jesus. I'm off and running, and I'm not turning back. (Phil. 3:14, The Message)

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I must acknowledge the profound role that the Falwell family, Dr. Jerry Falwell, Sr., and Jerry Falwell, Jr., have played in my educational journey. I am infinitely blessed to be counted among the alumni of Liberty University.

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I owe a special acknowledgement to my precious family, Ron, Jr., Dana, and Ryien. You opened your home to your dad and me for every intensive class I travelled to take. Thank you for entertaining your dad while I spent long hours at the library and for all you did to accommodate, entertain, and simply bless us.

To the students who participated in this study and the faculty for the course in which this research was conducted, thank you. Dr. SB, God graced my life by putting you in it. You define what it means to give faith hands and feet.

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List of Abbreviations

American Association of Colleges of Nursing (AACN)

Analysis of Covariance (ANCOVA)

Assessment, Data and Diagnosis, Planning, Implementation, and Evaluation (ADPIE)

Bachelor of Science in Nursing (BSN)

Clinical Decision Making in Nursing Scale (CDMNS)

Cognitive Continuum Theory (CCT)

Dreyfus Model of Skill Acquisition (DMSA)

Institutional Review Board (IRB)

Learning Management System (LMS)

Multivariate Analysis of Variance (MANOVA)

National Council of State Boards of Nursing (NCSBN)

Novice to Expert Theory (NTE)

Nurse Decision Making Instrument (NDMI)

Nurse Decision Making Instrument-Revised 2014 (NDMI-R14)

Registered Nurse (RN)

CHAPTER ONE: INTRODUCTION

Overview

National regulating bodies and advisory institutions publish expectations for nurses at all levels of practice to engage in higher-level clinical decision making (The National Academies, 2011; National Council of State Boards of Nursing, 2016; Robert, Tilley, & Petersen, 2014). Decisions are critical to nursing practice, yet there is little empirical evidence related to the decision-making processes of nursing students (Melin-Johansson, Palmqvist, & Ronnberg, 2017; Payne, 2015). Chapter One includes the background of this study, designed to explore nursing student decision-making processes. The chapter also contains the problem statement driving the research, describes the purpose, and establishes the theoretical, empirical, and practical significance of the study. The research question guiding the study and definitions of essential terms conclude the chapter.

Background

Each year approximately 44,000 to 98,000 people die in the United States due to preventable medical errors (Koehn, Ebright, & Draucker, 2016). Medical errors, either the result of commission or omission, are the third-leading cause of death in the United States (Makary & Daniel, 2016). Although nurses are not responsible for all of the errors mentioned by Koehn et al. (2016), they routinely make life-and-death decisions affecting patients, families, peers, communities, and health care systems (Perkins & Kisiel, 2013). The profoundly impactful consequences of nursing actions integrally link decision-making competence to safe and effective nursing practice (Koehn et al., 2016; Payne, 2015).

The American Association of Colleges of Nursing (AACN; 2008a) requires baccalaureate programs to prepare students to enter professional practice as generalists with the ability to make ethical, evidence-based, valuable, competent, safe, collaborative, emergent, complex, and patient-centered decisions. Colleges of nursing include rigorous clinical experiences in the curriculum to facilitate the application of theory to practice and encourage decisional growth (Aktas & Karabulut, 2016; Birks, 2017; Chong, Lim, Liu, Lau, & Wu, 2016). Unfortunately, despite the high expectations set by regulating bodies and targeted efforts made by colleges to meet the standards, unsafe, unprofessional, and harmful nursing decisions made by nursing students and newly graduated nurses remain alarmingly common (National Council of State Boards of Nursing [NCSBN], 2017). Reports from the NCSBN (2017) suggest that nurses fresh out of college make more preventable errors due to unsafe practices and poor decisions than nurses with clinical experience.

Historical Overview

Prior to the 1850s, nursing education primarily occurred through apprenticeship. Florence Nightingale changed the role of the nurse and innovatively transformed nursing education during the Crimean War in 1854 and 1855. The Nightingale model for schools included both didactic and clinical experiences with a focus on ensuring sanitation and assisting physicians (Hanks, 2013). Nightingale's model, also known as the medical model, persisted in nursing education until the 1990s.

In recent years, changes in healthcare has shifted many aspects of direct patient care away from physicians and placed more responsibility in the hands of nurses. (Benner, 2001; Benner, Sutphen, Leonard, & Day, 2010; The National Academies, 2011). In response to the paradigm shift in healthcare and a forecasted national nursing shortage, advisory institutions

have published a series of recommendations focused on removing barriers to safe and effective nursing practice (American Association of Critical-Care Nurses, 2014; The National Academies, 2011). The recommendations included specific mandates for schools of nursing to focus on preparing graduates to care for increasingly ill populations requiring a higher complexity of care and increased focus on developing competence in decision-making skills (The National Academies, 2010; Robert et al., 2014). Other recommendations included having an 80% baccalaureate-prepared nursing workforce by the year 2020 and an expectation for nurses to function within their full scopes of practice (The National Academies, 2011).

Since 2010, nursing education has trended toward a focus on promoting intuitive cognition among students. Subsequently, colleges of nursing have evaluated and adjusted teaching and learning approaches. Curricular changes included a shift to a conceptual curriculum, problem-based learning, and various innovative simulation and clinical practice models to better prepare students for demanding practice (Benner, 2012; Birks, 2017; Chong et al., 2016; Ironside, McNelis, & Ebright, 2014). The emphasis of these curricular changes is the application of theoretical principles to actual patient situations and classroom experiences designed to promote clinical-level thought process. Carefully designed didactic experiences prepare students for patient care in the clincial assignments.

The clinical practice model for nursing education has not changed significantly over time, and one aspect remains uncontested: Clinical experiences remain key to developing competence in student nurses (Birks, 2017; Courtney-Pratt, FitzGerald, Ford, Marsden, & Marlow, 2012; Moonaghi, Mirhaghi, Oladi, & Zeydi, 2015). However, the theoretical objectives for clinical experiences have shifted away from knowledge and skills to concentrate on professionalism and the navigation of students toward grounded and appropriate situational responses (Chong et al.,

2016). As nursing students progress through clinical placements, they experience patient care in multiple units while taking on progressively increased levels of responsibility with progressively decreased levels of faculty supervision. When students reach their culminating clinical assignments, accredited colleges of nursing provide opportunities for them to practice in a single unit for an extended time during an immersive rotation designed to mirror the schedule, responsibility, and practice of a professional nurse (AACN, 2008b).

Theoretical Background

Actions reflect decisions, but the processes involved in decision-making evolve over time through gained experience (Benner, 2001; Dreyfus & Dreyfus, 1980; Lauri & Salanterä, 2002a). For example, when one relocates to a new city or state, the simplest travels to run errands require detailed instructions, visual cues, and turn-by-turn guides. Decisions to make right or left turns are dictated by lists, maps, verbal cues, or global positioning systems. Over time, navigating routes becomes easier. After a year or two passes, regardless of conditions, an internal compass guides directional decisions, seemingly without conscious thought and certainly without one taking the time to pull over a read a map, destinations are reached. Similarly, nurses apply a logical, systematic approach or map to patient care decision making called the nursing process. The nursing process consists of assessment, data and diagnosis, planning, implementation, and evaluation (ADPIE; NCSBN, 2015; Orlando, 1972). Though students may be taught the nursing process, or ADPIE, as a logical approach to patient care, they are bound to checklists, rules, algorithms, and detailed instructions to make every decision as they navigate their new state of caring for patients (Benner, 2001). Newly graduated nurses enter a career with the theoretical knowledge and skills honed in nursing classes and clinical experiences. As nurses gain experience, however, decisions become more fluid, efficient, and natural (Benner, 2001; Robert

et al., 2014). The experienced nurse intuitively cares for patients with higher-level, independent decision-making processes similar to those of a long-time resident of a city navigating a route (Robert et al., 2014). Application of the nursing process becomes organic and fluid.

Through the years, researchers have framed investigations into clinical decision making with the work of theorists from varied disciplines including nursing, medical, and behavioral sciences. Jenkins (1985) constructed the framework on which she built the Clinical Decision Making in Nursing Scale (CDMNS) on the self-perception and normative decision theories, which were borrowed from psychology (Bem, 1972; Kassouf, 1970). Multiple studies tested Jenkins's (1985) instrument and the framework utilized to construct it to explore nursing students' perceptions of clinical decision making (Aktas & Karabulut, 2016; Ho et al., 2013). Researchers investigating students' abilities to think like nurses based studies on the clinical judgment model (Tanner, 2006; van Graan, Williams, & Koen, 2016). Scholars seeking to quantify potential physiological reactions nurses experience while engaging in clinical decision making have applied the cognitive continuum theory (CCT), novice to expert (NTE) theory, and somatic marker hypothesis to support projects (Bechara & Damasio, 2004; Benner, 2001; Hammond, 1980; Payne, 2013, 2015). Interestingly, results of the studies by Payne (2013, 2015) support Hammond's (1980) assumption that cognitive processes in decision making are physiologically identifiable and measurable.

The theoretical framework for this study included a unifying middle range theory that explained the cognitive processes of decision-making and judgment and a grand theory of nursing created to enumerate and define the progression to competency. Benner's (2001) NTE theory provided the framework for numerous studies related to nursing decision making (Canova, Zanotti, Brogiato, & Roveron, 2016; Harmon & Thompson, 2015; Hendricks, Wallace,

Narwold, Guy, & Wallace, 2013; Lovecchio, DiMattio, & Hudacek, 2015). Hammond's (1980) CCT framed the inquiry of Lauri and Salanterä (2002a, 2002b), leading to the development of an instrument to quantify the decision-making processes of nurses and nursing students in multiple clinical settings. Other researchers utilized CCT to explore nursing decision making in crisis situations (Melin-Johansson et al., 2017; Moonaghi et al., 2015; Parker, 2014).

Problem Statement

Despite the recommendations by regulating and advising bodies and responses by colleges of nursing, new graduate nurses do not consistently demonstrate the ability to make sound clinical decisions (Kumm, Godfrey, Richards, Hulen, & Ray, 2016; Payne, 2015; van Graan et al., 2016). Clinical rotations provide crucial patient care encounters on which students may build an experiential foundation for growth in nursing decision-making skills (Benner, 2001; Courtney-Pratt et al., 2012). Unfortunately, there is a lack of evidence regarding which clinical structure or what category of patient care unit provides optimal experiences for developing decision-making competence in student nurses (Birks, 2017; Courtney-Pratt et al., 2012). A limited number of studies have evaluated the quality of clinical experiences, specific attributes of decision making, and the professional implications of clinical placements among nursing students (Alfaro-Lefevre, 2011; Canova et al., 2016; Courtney-Pratt et al., 2012; Dicle & Durmaz Edeer, 2013; Harmon & Thompson, 2015; Hendricks et al., 2013; Ho et al., 2013; Jessee, 2016; Lovecchio et al., 2015; Moonaghi et al., 2015; Payne, 2015; Ross, Mahal, Chinnapen, & Rana, 2013; Wareing, Taylor, Wilson, & Sharples, 2017). Nurse preceptors have reported that up to 80% of newly graduated nurses do not engage in decision making at all (Hickey, 2009). The problem is that the body of literature provides no data measuring the

cognitive processes of nursing decision making in student nurses based on culminating clinical unit placements experienced during the final semester of a baccalaureate nursing program.

Purpose Statement

The purpose of this causal-comparative study was to test whether clinical unit assignments have a causal effect on how senior nursing students think while making clinical decisions. The study tested the theories of Hammond (1980) and Benner (2001) by comparing the independent variable of clinical unit placement experiences to the dependent variable of posttest scores on the Nurse Decision Making Instrument-Revised 2014 (NDMI-R14) while controlling for pretest scores on the NDMI-R14 (Lauri & Salanterä, 2002a; Phillips, 2015). The sample for the study was senior students in a bachelor of science in nursing (BSN) program in their culminating clinical rotation. The independent variable, clinical unit placement, was generally defined as the hospital units to which senior nursing students are assigned, categorically grouped as specialty units, acute and critical care units, and emergency departments. The experiences were block-scheduled, immersive residency formats in which the students worked under the supervision of an experienced BSN degree–holding registered nurse (RN) or RNs functioning as preceptors for approximately 180 hours over five to six weeks (Benner, 2001; Birks, 2017; Courtney-Pratt et al., 2012). The dependent variable was generally defined as senior BSN student scores on the NDMI-R14 (Lauri & Salanterä, 2002a; Phillips, 2015), a scale that quantifies nursing decision making from analytical cognition to intuitive cognition based on Hammond's (1980) CCT and the five-stage Dreyfus Model of Skill Acquisition (DMSA; Dreyfus & Dreyfus, 1980). Pretest scores were controlled to eliminate threats to consistency (Warner, 2013).

Significance of the Study

The primary significance of this study is that it fills an empirical and theoretical gap in the literature regarding the effect of clinical unit placements on the nursing decision-making processes of senior nursing students during culminating clinical experiences. Vulnerable patients rely on the decisions of both nurses and nursing students. Filling the identified gap has the potential to positively impact nursing school clinical curriculum, negotiations for clinical sites, and funding for clinical curricula (Courtney-Pratt et al., 2012). Professional recruitment and nursing orientation foci in organizations may also be impacted by the results (Courtney-Pratt et al., 2012; Wareing et al., 2017).

The second significant contribution of this study was the identification of the variances in cognitive continuum scores based on clinical unit placements to suggest which types of units, if any, move student scores toward the intuitive decision-making pole (Lauri & Salanterä, 2002a). Classroom content tells students what to think and narratives provide reasons it is important to make sound decisions, but this study considered how students think and the influence various clinical placements have on those complex cognitive processes. This finding may contribute to the development of clinical curricula with a focus on building an experiential basis for intuitive nursing decision making in students through optimal clinical placements (Courtney-Pratt et al., 2012). The review of the literature revealed a deficit in sound decision-making skills in nursing students, leading to poor decisional ability observed among newly graduated nurses (NCSBN, 2017; Payne, 2015; van Graan et al., 2016). Contemporary changes in health care have created an environment in which nurses must make more practice decisions with greater efficiency and autonomy than their predecessors (Robert et al., 2014). The theoretical framework dyad for the study explains that for nursing, intuition is a revered cognitive process resulting from experience

and professional growth (Benner, 2001). Hammond (1980) placed intuition at one end of the cognitive continuum of processes used in decision making. Just as a destination does not judge whether the driver requiring a map is better than one who does not, Hammond (1980) did not hold one pole of the CCT in higher esteem than the other. He did, however, confirm that analytical cognitive decision-making processes take more deliberation and a greater amount of time than cognitively intuitive decision-making processes.

A third significant contribution of this study is related to the findings of Wareing et al. (2017). Newly graduated nurses tend to begin their careers working on the type of unit to which they were assigned during their culminating clinical experience (Wareing et al., 2017). Considering recommendations to build a nursing workforce capable of intuitive decision making, the findings of this study may help potential employers with nursing recruitment focused on senior students in specific units (The National Academies, 2011; Robert et al., 2014). Additionally, per NTE theory, intuition, a hallmark of competence, is reached through extensive experiences in one area (Benner, 2001). Following the logic of NTE, newly graduating nurses will possess a foundational level of experiences in the units to which they were assigned for a block-formatted, immersive, nursing residency-type culminating clinical experiences. Significant data potentially pointing to clinical areas that foster intuitive growth could, therefore, direct not only school placements but also guide hospital recruitment and the onboarding of new nurses based on their most immersive clinical experiences (NCSBN, 2017; Wareing et al., 2017).

Research Question

The research question for this study considered senior BSN student scores on the NDMI-R14 based on clinical unit placement (Lauri & Salanterä, 2002a; Phillips, 2015). The NDMI-R14 measures cognitive processes involved in decision making in three domains: analytical,

quasi-rational, and intuitive (Lauri & Salanterä, 2002a; Phillips, 2015). Clinical unit placements for senior BSN students during their culminating clinical rotations include block-formatted, immersive student-residency clinical models in specialty units, acute and critical care units, and emergency departments (Benner, 2012; Birks, 2017; Lauri & Salanterä, 2002a).

RQ1: Is there a statistically significant difference between posttest scores of senior BSN students on the NDMI-R14 based on clinical unit placement group (specialty, acute, critical, emergency) during culminating clinical experiences when controlling for pretest scores?

Definitions

1. *Advanced beginner nurse* – The advanced beginner nurse is in the second stage in the Benner (2001) NTE theory and functions minimally acceptably in clinical practice. The advanced beginner may be a nursing student with who has completed some clinical rotations and demonstrates an ability to draw on limited prior experiences and learned information to make decisions without complete dependence on prescribed rules or algorithms. Advanced beginners struggle with prioritization but are beginning to establish patterns in clinical situations on which to build intuitive decision-making processes (Benner, 2001).
2. *Analytical cognition* – Analysis is an empirical, step-by-step approach to decision making based on rules, guidelines, or instructions (Hammond, 1980). Analytical cognition is also considered an intentional and measured thought process (Melin-Johansson et al., 2017).
3. *Clinical decision making* – The complex skill of nursing decision making requires application of critical thinking, clinical judgment, and clinical reasoning to take the safest and most efficient, applicable, advantageous, and suitable action for a given situation (Dicle & Durmaz Edeer, 2013). Nursing decision making involves a wide scope of

cognitive processes from analysis to intuition (Benner, 2001; Hammond, 1980; Lauri & Salanterä, 2002a).

4. *Clinical judgment* – Clinical judgment involves the integration of critical thinking and clinical reasoning skills and is considered the foundation for competent nursing decision-making (Mann, 2012; van Graan et al., 2016).
5. *Clinical reasoning* – The application of knowledge to clinical experiences is referred to as clinical reasoning, which is integral to the ability to arrive at sound judgments and make competent nursing decisions. Koharchik, Caputi, Robb, and Culleiton (2015) asserted that reasoning is believed to include four steps: taking notice, making an interpretation, responding, and reflecting.
6. *Cognitive Continuum Theory (CCT)* – Hammond's (1980) CCT is a middle-range descriptive theory that identifies judgment and decision making as cognitive processes with intuitive cognition at one pole, analytical cognition at the opposite pole, and quasirationality (common sense) in the center (Cader, Campbell, & Watson, 2005). The research involved was intended to unify previous theories surrounding the concepts of judgment and decision making. Hammond's CCT has multidisciplinary applications (Connolly, Arkes, & Hammond, 2000).
7. *Critical thinking* – Critical thinking is the primary foundational skill required for clinical judgment. It is defined as a reflective cognitive process in which the analysis of information gained through assessments is intentionally utilized to make judgments by utilizing both inductive and deductive reasoning (Alfaro-Lefevre, 2011; Crawford, 2002; Harmon & Thompson, 2015; Locsin, 2001).

8. *Expert nurse* – The expert nurse has achieved the fifth and final stage of competence in the NTE theory. Drawing on a vast amount of clinical experiences, the expert nurse no longer depends upon rules and data to make decisions and intuitively connects experiences and theory to practice situations (Benner, 2001).
9. *Immersion* – An immersive clinical experience is required for students in accredited BSN programs. The immersion experience is an extended period in which the student performs nursing care as a part of the interprofessional team in a single unit by practicing patient care skills and improving clinical reasoning ability (AACN, 2008b).
10. *Intuitive cognition* – Intuition is a theoretical cognitive skill that constructs associations between situations, past experiences, and knowledge to enable quick, competent actions without the use of rules or instructions that is considered the hallmark of expert nursing decision making (Benner, 2001). Intuitive cognition is also known by the terms *gut feeling* (Melin-Johansson et al., 2017; Robert et al., 2014) and *imagination* (Hammond, 1980).
11. *Novice nurse* – The novice nurse is in the first stage of competence in the Benner (2001) NTE theory. The novice nurse has no experiential background in the field, depends upon rules and analysis to guide decisions, and does not prioritize actions (Benner, 2001; Hammond, 1980). New nursing students are novices, as are any nurses entering a new area of practice in which they have no prior experience and return to a rule-dependent, data-driven practice (Benner, 2001; Koharchik et al., 2015).
12. *Novice to Expert Theory (NTE)* – NTE is a grand theory in which Benner (2001) applied the humanistic model of Dreyfus skill acquisition theory to nursing practice (Dreyfus & Dreyfus, 1980).

13. *The Nursing Process* – The nursing process is a scientific list of steps originally created in the 1950s by nursing theorist Orlando. The NCSBN considers the nursing process to be integral to nursing practice and patient care. The steps of the nursing process are: assessment, data analysis (also described as nursing diagnosis), planning, implementation, and evaluation (ADPIE; NCSBN, 2015; Orlando, 1972).

CHAPTER TWO: LITERATURE REVIEW

Overview

Nursing is not a profession of subservience, contrary to images from popular culture. Baccalaureate programs in nursing education must prepare students to critically think and integrate sound judgment into professional decisions (AACN, 2008a; Texas Board of Nursing, 2011). On any given day, in any hospital unit, nurses decide whether to notify physicians or call specialized teams to address changes in patients' statuses. Nurses make choices, or decisions, regarding whether to give or hold pain medications or other treatments (Hart et al., 2015; Parker, 2014). The results of nursing decisions impact individuals and affect the overall health of communities (Jessee, 2016; Koehn et al., 2016; Payne, 2015). Given an endless list of possible independent interventions and multiple options in the forms of protocols, standing orders, policies, and medications, the nurse must decide what action is appropriate, when to use it, and how to evaluate its effectiveness (Melin-Johansson et al., 2017). There is much room for both autonomy and collaboration in nursing; unfortunately, doubt and error are the ever-present reality and unsavory consequences of decision making for nursing students and professional nurses alike (Koehn et al., 2016; Payne, 2015).

The purpose of Chapter Two is to explore the body of evidence as it relates to senior nursing students' clinical placement experiences in one of four categories of patient care units and how those experiences impact clinical decision making among students during the last semester of a BSN program. Theoretically framed by Benner (2001) and Hammond (Connolly et al., 2000; Hammond, 1980; Lauri & Salanterä, 2002a; Parker, 2014) this review delves into the critical nature of nursing decision making and how students academically and professionally mature in deciding which nursing actions to take in various clinical situations.

Theoretical Framework

The NTE theory (Benner, 2001) and CCT (Hammond, 1980) provide a theoretical framework for the cognitive, psychological, physiological, and professional processes involved in nursing decision making. Principles in both NTE and CCT apply to nurses at different stages in their careers and in widely varied areas of practice (Melin-Johansson et al., 2017; Payne, 2015). The theories of Hammond (1980) and Benner (2001) correlate in that both theorists explained the processes of decision making based on continuums of cognition and skill. On one end of the spectrum, decisions are organized based on rules and data analysis. When the pendulum swings to the side of ambiguous situations in which rules and data do not neatly apply, the decision maker depends upon intuition to respond (Benner, 2001; Hammond, 1980; Robert et al., 2014). NTE theory and CCT were not developed in tandem, but the two may be applied together to explain the manner in which professional clinical development changes decision-making cognitive processes (Payne, 2015).

Hammond's Cognitive Continuum Theory

In 1980, Kenneth R. Hammond, a professor and researcher, conducted research to integrate prior theoretical understandings of judgment and decision making. The resulting CCT provided five primary principles for judgment and decision making based on actual physiological and intellectual cognitive processes. CCT promoted exploration into *how* human beings think rather than *what* they think when making decisions. Hammond's (1980) theory described a bipolar continuum illustrating the fluid process of decisional cognition, with intuitive cognition occupying one pole and analytical cognition on the opposite side. While the definition for analytical processes is straightforward, intuitive thinking presents a conundrum. Intuitive cognition was described by Hammond (1980) in terms of "imagination" (p. 12), "talent" (p. 12),

or “expertness” (p. 13). The theorist acknowledged the contrast between the schools of thought related to intuition. However, Hammond (1980) recognized the positive aspects of intuitive cognition while he objectively presented it as potentially flawed due to the risk of human emotion clouding the intellectual and mathematical processes associated with analytical thought. Hammond presented neither intuition nor analysis as more valuable than the other; likewise, he did not claim one pole required a greater level of intelligence or ability than the other. He provided a framework for understanding the types of cognitive processes utilized by any person and influenced by the structure of tasks at hand. For example, very structured tasks call for analytical cognition, while loosely structured tasks inspire intuitive cognition (Brown & Clarke, 2014; Cader et al., 2005; Hammond, 1980).

Five premises of Hammond’s cognitive continuum theory.

Hammond (1980) placed common sense, or quasirationality, at the center of a continuum of decision making that ranges from intuitive cognition to analytical cognition. CCT includes five premises. The first and second premises on which the theory stands explain how decisions are made based on a cognitive continuum with analytical cognition one end, quasirationality (common sense) in the middle, and intuitive cognition on the opposite end. The third premise is the idea that it is possible to enumerate the phases of cognitive decision making into steps. The fourth premise explains the movement of decision making along the continuum from intuitive to analytical and back. In the fifth and final premise, Hammond (1980) suggested that intuition, common sense, and analytical cognition are neurophysiological processes carried out by specific anatomical parts of the brain (Tower & Chaboyer, 2014).

Premises one and two. In Hammond’s theoretical explanation of cognitive processing, analytical cognition occupies one end of a continuum of cognitive processing. Intuitive

cognition sits at the opposite end. Prior to Hammond's analysis of human decision making, theorists believed cognition to be dichotomous, and the two poles, analytical and intuitive cognition to be juxtaposed and competitive (Dahmi & Mumpower, 2018; Dahmi & Thomson, 2012; Hammond, 1980). Six types of questioning or modes of discovery lead the decision maker to one pole or the other, to analytical or intuitive cognitive decision-making processes. Reflecting the continuum, the six modes of inquiry range from highly structured forms of questioning and discovery to questions guided by peers and internally motivated inquiry (Cader et al., 2005; Lauri & Salanterä, 2002a; Smith, 2013). Hammond (1980) believed that most decision-making involves common sense or quasirationality.

Premise three. Intuition, analysis, and quasirationality each represent identifiable properties, influences, and unique modes of inquiry, permitting placement on a continuum. The third premise of CCT focuses on the direct relationship between tasks and cognitive processes. Hammond theorized that movement back and forth along the cognitive continuum is fluid and influenced by the nature and amount of structure of various tasks facing decision makers (Brown & Clarke, 2014; Hammond, 1980). The third premise supports Hammond's refusal to tout one pole of cognition above the other, but rather emphasizes the necessity of situationally engaging in many modes of inquiry and varied approaches to decision-making tasks. For example, per CCT, poorly structured, time-restricted tasks permit intuitive cognition, in contrast to highly structured, time-unrestricted, or less time-constrained tasks, which are believed to lead to analytical cognition.

Premise four. The name *cognitive continuum theory* denotes the pendulous behavior of cognition. Hammond (1980) clarified that decision making was not part of a chart, target, or dichotomy but is a continuum that moves over a timeframe. Just as a pendulum swings until it

meets a force or point of interruption, the continuum moves dynamically until an ending is met. The fourth premise of CCT explains that the driving force along the continuum is the need for continued cognitive processing. The point of cognitive success, or the making of a decision, signals the end of movement across the cognitive continuum. Indecision, the need for continued processing, and ongoing cognition promotes movement along the continuum.

Premise five. Giving a nod to his interest in evolutionary biology, the fifth premise of Hammond's (1980) CCT draws from anatomy and neurophysiology to explain the relationship between identifiable regions of the brain and decisions. Hammond (1980) admitted to the simplicity of the "left-brain equals analysis; right-brain equals creativity" modality and explored the possibility of whole-brain involvement with measurable anatomical markers involved in decision making. The research team of Rubin et al. (2017) used advanced coding and imaging methods to provide visual support of corresponding anatomical markers and cognitive processes. Cognitive processing occurs in identifiable regions of the physical brain. The specific locations change based on context, experience, and various associations of individuals, and analytical to intuitive processes have varying effects on decision makers (Payne, 2013; Rubin et al., 2017).

Unifying component of the theoretical dyad. Although it has been adopted by nursing researchers, Hammond's (1980) theory was not formed as a nursing theory. The original manuscript for the CCT was submitted under a grant from the Office of Naval Research. Parker-Tomlin, Boschen, Morrissey, and Glendon (2017) conducted a critical analysis in which CCT was found to be an appropriate unifying decision-making theory for the health care profession. Hammond's CCT has been employed as a framework for numerous studies and is featured in interdisciplinary decision-making texts as a nontraditional cognitive process–based decision-making theory (Connolly et al., 2000). Because nursing practice is dependent upon the making

of appropriate decisions, the theory lends itself well to nursing and nursing education applications. Historically, CCT has been utilized as a framework for multiple nursing research studies (Lauri & Salanterä, 2002a, 2002b; Melin-Johansson et al., 2017; Moonaghi et al., 2015; Parker, 2014; Payne, 2015).

Benner's Novice to Expert Theory

The second leg of the theoretical underpinning for this literature review is the work of Patricia Benner (2001), a nursing scholar and theorist who was also one of the nurses at the helm of reform in nursing and nursing education. Applying the DMSA to nursing, NTE lists five levels of professional skills and cognitive development a nurse journeys through to progress from an inexperienced novice to a seasoned and competent expert (Benner, 2001; Dreyfus & Dreyfus, 1980). Student nurses are novices per the NTE continuum and will reach no higher than the second level of competence, the advanced beginner, by their final clinical semester due to a lack of experience on which to build intuition and a dependence on rules to guide actions (Benner, 2001). The highest level of attainment in the NTE stages, the expert, demonstrates an "intuitive grasp" (Benner, 2001, p. 32) of clinical situations and makes competent decisions without relying on tools, rules, or analytical thinking. In contrast to Hammond's (1980) thoughts, Benner (2001) considered intuition to be a strength that is only gained through accumulating vast amounts of clinical experience. Benner et al. (2010) theorized by what means expert intuition evolves through gaining salience of knowledge and experience. Reflecting notes from CCT, Benner promoted a type of clinical imagination in which the expert nurse viscerally perceives and visualizes situations, decisions, and consequences of decisions before acting (Benner, 2001; Benner et al., 2010; Hammond, 1980). Whether intuition is thought of as effortless and efficient or unpredictable and dangerous, intuitive decision making is believed to

be the primary defining theoretical characteristic of increasing proficiency per NTE theory (Benner, 2001; Hammond, 1980; Robert et al., 2014).

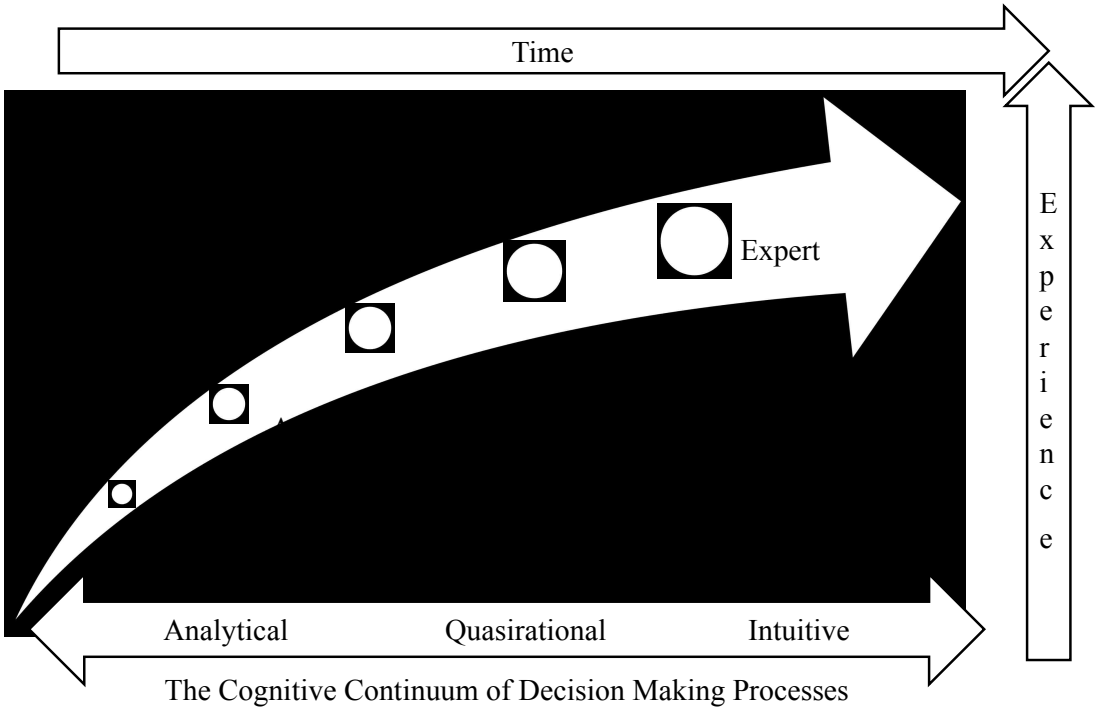

Figure 2.1. Cognitive continuum of novice to expert decision making.

Figure 2.1 illustrates the way a nurse or nursing student progresses from novice to expert. Framed by passing time and increasing experience, the professional progression from novice to expert climbs while the cognitive continuum allows decision making to remain fluid, sliding back and forth from analytical to intuitive at all stages (Benner, 2001; Hammond, 1998). The figure shows that although time and experience drive the theoretical progression of nurses through the stages of skill acquisition from novice to expert, nurses will move back and forth across the cognitive continuum while making decisions. However, the expert in NTE is characterized by more intuitive decisions. The novice is bound to analytical thinking (Benner, 2001; Hammond, 1980). As nurses progress through each of the five stages of clinical

competence in NTE, the increasing levels of experience lend context to practice. Context and experience minimize the need for rule-guided, rigid, analytical practice and organically lead the nurse to transition into intuitive modes of decision making.

Nursing decisions in Benner's five stages of competence in nursing. Nursing competency, per Benner (2001), is not an isolated end goal; rather, the nurse theorist claimed nurses move through five phases of clinical competency throughout their educational pursuits and professional endeavors (as cited in Payne, 2015). Benner (2001) identified the stages as novice, advanced beginner, competent, proficient, and expert. One of the hallmarks of progression through the stages is the change in patterns of cognition and the theoretical increase in depth of intuition with each stage. Therefore, clinical decision making and patterns of cognition are intricately connected.

The novice stage. The earliest stage of clinical competence and skill identified by Benner (2001) is the novice. The novice is a beginner, either a student who possesses only didactic knowledge when entering an experience or a professional taking on a new role. As Benner (2001) described, the novice makes decisions using checklists and takes actions based strictly on textbook knowledge, guides, rules, and lists. Presented with a clinical decision, the novice nurse relies on well-defined rules and guides. Hammond (1980) referred to this pattern of decision making as analytical. Like Hammond (1980), Benner (2001) did not suggest that the word *novice* was a derogatory term. To the contrary, in NTE theory, Benner (2001) suggested that nurses move back and forth across the stages as professional changes occur that present new practice contexts and the need to learn new skills. Therefore, the novice designation is not relegated to students or newly graduated nurses. Whether the novice is a student, new nurse, or

an experienced nurse practicing in a new environment, the novice simply has no context for decisions and must base actions on rules, checklists, and clearly delineated guidelines.

The advanced beginner stage. At the second phase in Benner's (2001) theory, the nurse becomes an advanced beginner. The advanced beginner phase is the highest level of competence associated with nursing students and represents a nurse or student with fledgling ability to discern more abstract concepts but with only marginal competence. Advanced beginners draw on learned information and limited experience to make minimally context-based decisions. Advanced beginners struggle with prioritization as they connect academic, analytical knowledge to clinical, intuitive practice. Nursing students and new nurses at this second level of clinical competence need strong preceptors or mentors to provide examples of skilled practice and provide both context and experiences to foster solid clinical decision making (Benner, 2001).

The competent stage. The third NTE phase, achieved after two to three years of consistent job experience, represents clinical competence. The competent nurse was described as organized and efficient, but not as quick and practiced as a nurse at the next phase, the proficient nurse. Benner (2001) believed the competent nurse to need structured decision-making practice through planned clinical activities. Competency represents more than psychomotor skill, an attribute confused with competency in nursing. The competent nurse begins to prioritize decisions while meeting the demands of an increasingly complex role.

The proficient stage. The proficient nurse draws on experience to assess a situation in its entirety and prioritize interactions and interventions. Compared to those at other stages of NTE, proficient nurses' decision making became more intuitive, context-specific, and well rounded. For example, the novice nurse moves from task to task usually making decisions based on written or memorized checklists without applying context. The advanced beginner perceives the

most profound part of a situation and acts accordingly as the competent nurse organizes care very well but lacks flexibility in some attributes of individualized care giving. The proficient nurse may move from analytical to intuitive cognition adaptably depending upon the situation. Proficient nurses are capable of drawing on a rich depth of experience and understanding while making patient care decisions (Benner, 2001).

The expert stage. Benner's (2001) theoretical stages of competency culminate at the expert level, with the nurse described as functioning virtually free from written cues, lists, or rules, freely engaging in intuitive cognition. To Benner (2001), the consideration of lists, rules, or guides is a waste of time and is not required by the expert nurses due to their vast amount of experience and their rapid, intuitive cognitive processing ability. Benner (2001) undoubtedly held intuition in higher esteem than analysis in decision making, but she clarified that the expert nurse, while efficient and intuitive, may resort to analytical processing when presented with a new problem or situation. Rather than draw on the wrong context, the expert nurse can adjust his or her grasp of a situation and move to the analytical end of the cognitive continuum to follow evidence-based guides for the best patient outcomes. Nevertheless, in familiar surroundings, the expert nurse employs keen assessment skills to respond swiftly with competent decisions and asks questions or analyzes aspects of the occurrence after deciding to act (Milhomme, Gagnon, & Lechasseur, 2018).

Novice to expert clinical decision making. NTE theory defines seven domains of nursing practice, each with the potential to be experienced in nursing-patient interactions at any of the five stages of skill and competence. While NTE does not specifically address the nursing process, the seven domains of nursing practice align with the implementation and evaluation steps of the classic process representing nursing decisions and patient responses (Benner, 2001;

Masters, 2015). The seven domains of nursing practice encompass the roles of the nurse as a helper and teacher-coach. The domains also include the function of the nurse in diagnostic monitoring, management of dynamic patient needs including medications and treatment. Finally, quality assurance and professional role competency requirements complete the seven domains (Benner, 2001). Within each of those roles lies the opportunity for nurses or students at each stage of competency and skill acquisition to function from novice to expert, cognitively moving from analytical to intuitive cognition to apply the nNursing process to nursing decisions (Benner, 2012; Hammond, 1980; Melin-Johansson et al., 2017).

Nursing students do not surpass the advanced beginner level of NTE but, based on prior experiences and level of natural intuition, may integrate some quasirationality, or common sense, and limited intuition into clinical decisions (Benner, 2001; Hammond, 1980). The advanced beginner does not typically prioritize actions and sees all decisions as equally important, which is a stagnating factor prior to licensure and professional practice (Benner, 2001). Research results pointed to methods for quantifying and improving clinical judgment and reasoning skills, identified as the building blocks for clinical decision-making processes (Harmon & Thompson, 2015; van Graan et al., 2016).

Advancing CCT and NTE

Comparing the effects that various unit assignments have on the cognitive decision-making processes of nursing students during their culminating clinical experiences in a BSN program will advance both CCT and NTE through practical application to prelicensure nursing education. Researchers estimate that only cancer and heart disease kill more Americans than largely preventable medical errors (Makary & Daniel, 2016). The NCSBN (2017) linked preventable medical errors committed by nurses to novice nurses and newly graduated nurses

entering practice. The National Center for Health Statistics (2017) disclosed problems with death-reporting practices among hospitals and an inability to pinpoint exact mechanisms of death. Nurses do not commit all of the medical errors ending in patient demise; however, the exploration of nursing judgment and decision-making process improvement is recommended to improve nursing education, practice, and patient outcomes (Ballard et al., 2016). The practical application of framing this study with CCT and NTE to senior nursing student clinical decision making encompasses aligning the domains and modes of decision making, the nursing process of clinical decision making, and domains of nursing practice as illustrated in Table 2.1 (Benner, 2001; Hammond, 1980; Lauri & Salanterä, 2002a; Masters, 2015).

Related Literature

To prepare for professional bedside practice, nursing students must actively engage in clinical learning experiences in various patient care settings (Bowling, Cooper, Kellish, Kubin, & Smith, 2018; Spector, Hooper, & Silvestre, 2018). Boards of nursing from each state establish recommendations related to clinical experiences students must complete based on degree types and licensure pursuits. For example, the Texas Board of Nursing (2011) recommends that students in BSN programs receive three hours of clinical training for every one hour of classroom learning. Representatives from colleges of nursing work with hospitals and facilities to negotiate, plan, and trace student placement (Salyers, Carter, Antoniazzi, & Johnson, 2013).

Table 2.1

Alignment of Decision Making, the Classic Nursing Process, and Domains of Nursing Practice

Four Domains of Decision Making	Five Steps of The Nursing Process	Seven Domains of Nursing Practice
Data collection	Assessment	3. The diagnostic and patient monitoring function 5. Administering and monitoring therapeutic interventions and regimens
Data processing & problem identification	Diagnosis (and data analysis)	3. The diagnostic and patient monitoring function 4. Effective management of rapidly changing situations 5. Administering and monitoring therapeutic interventions and regimens
Planning	Planning	1. The helping role 2. The teaching-coaching function
Implementation and evaluation	Implementation of interventions Evaluation of interventions	1. The helping role 2. The Teaching-coaching function 3. The diagnostic and patient-monitoring function 4. Effective management of rapidly changing situations 5. Administering and monitoring therapeutic interventions and regimens 6. Monitoring and ensuring the quality of health care practices 7. Organizational and work-role competencies

Note. The four domains of decision making and five steps of the nursing process are represented sequentially. The seven domains of nursing practice are not sequential and are numbered as functions or roles aligned with appropriately ordered steps in decision-making and the nursing process (Benner, 2001; Lauri & Salanterä, 2002a; Masters, 2015; Orlando, 1972).

As students matriculate through nursing school, clinical experiences typically build upon didactic, or theoretical, learning with the introduction of larger numbers of patients with increasingly complex conditions (Jessee, 2016). Students may also experience longer hospital shifts (Birks, 2017). During clinical experiences, students move from performing teacher-directed tasks to working with bedside nurses and engaging in various nursing care practices,

including making clinical care decisions (Benner, 2001; Courtney-Pratt, Ford, & Marlow, 2015). It is common for colleges of nursing to culminate the student clinical experience with one immersive, intensive clinical placement in which the student works under the supervision of a nurse preceptor and performs the job of that preceptor, mirroring his or her schedule for a designated number of shifts, days, or even weeks (AACN, 2008a; Birks, 2017). Clinical immersion experiences build critical thinking, reasoning, and clinical judgment skills while introducing the student to time management practices and prioritization and promoting autonomy (AACN, 2008b). The culminating clinical experience becomes the last supervised clinical experience students in many BSN programs will complete before taking the National Council Licensure Examination for Registered Nurses and entering professional practice.

The review of the literature revealed the work of researchers who have explored various facets of clinical placements and clinical decision-making practices of nursing students. Reports from studies also unveiled a tendency among scholars to consider clinical topics related to senior nursing students and professional nurses, specifically newly graduated nurses, simultaneously (Lovecchio et al., 2015; Payne, 2013, 2015). The framework of NTE theory and CCT provided structure for both the search and the composition of the review, including investigations into the clinical decision-making practices of novice and advanced beginner students and newly graduated novice nurses with a focus on components of clinical decision making. Evidence related to methods and approaches to classroom teaching of decision making was explored. The review also focused on students' clinical placements within the nursing curriculum as the experiences related to nursing decision making and the professional practice implications of senior students' clinical placement.

Clinical Decision Making

Clinical decision making is ultimately a cognitive process that is defined by researchers as occurring in four phases or constructs: data gathering, data processing and problem identification, planning, and implementing, and evaluating the results (Lauri & Salanterä, 2002a). Nurses make sound clinical decisions using three proficiencies identified as critical thinking, clinical judgment, and clinical reasoning skills (Benner, 2001; Harmon & Thompson, 2015). Payne (2015) explained that while many resources tout the need for nursing students to develop critical thinking ability, strong, intuitive decision-making ability is a more desirable, higher-level attribute. Both CCT and NTE represent continuums of competence and cognition. NTE theory considers intuition to be the highest level of decision-making skill, while CCT describes intuitive cognition in terms of higher efficiency but does not claim its superiority over other cognitive processes (Benner, 2001; Hammond, 1980). For example, in NTE, the novice nurse or novice nursing student functions in the nursing role by engaging in practice solely using analysis of theory, didactic knowledge, rules, and guides (Benner, 2001). The novice in NTE represents an analytical decision maker, aligning with the ideas of CCT, as rules and information analyses provide the bases for decisions (Hammond, 1980). On the opposite end of the continuum, the expert nurse functions intuitively, making decisions relatively unconsciously without dependence on rules, reminders, and cues (Benner, 2001; Hammond, 1980; Melin-Johansson et al., 2017; Payne, 2015). At least one author cautioned about expert dependence on his or her experiences and intuition, citing an increase in emotion-based decisions and the potential for error inherent in intuitive processes (Ellis, 2017). However, Robert et al. (2014) noted that nurses should not dismiss intuition as abstract or emotive, calling intuitive thought a

highly cognitive function that guides expert nurses in making decisions to positively impact patient-centered care decisions.

The body of literature provides evidence and examples of nursing decision making moving along a cognitive continuum (Hammond, 1980). Expert nurses are more likely to use intuitive processing when making decisions involving more complexity, but they are more likely to use analytical cognition in protocol-driven, emergent situations (Parker, 2014; Robert et al., 2014). The research of Parker (2014) provided an example of nurses moving from analytical to intuitive cognitive processes in deciding when to activate an emergency rapid response team. Parker (2014) utilized the Nurse Decision Making Instrument (NDMI) to quantitatively explore the correlations between nursing decision making and rapid response team activation. Parker's (2014) findings were significant, indicating a correlation exists between cognitive continuum process and rapid response team activation. Analytical decision makers were twice as likely to call a rapid response team during the study. These nurses were more experienced and older, which contradicts both Benner's (2001) and Hammond's (1980) theories. Perhaps the work of Lauri and Salanterä (2002a) explained this finding, as their international study showed a tendency for intuitive expert nurses to use analytical processes during times in which patient problems needed identification and carefully prescribed action.

Teaching of decision making in the nursing classroom. The curriculum adopted by a nursing program crucially impacts faculty's ability to teach students to make strong clinical decisions (Ho et al., 2013). Benner (2001) and other nursing scholars refer to different types of knowledge as theoretical, tacit, and experiential (Agency for Healthcare Research and Quality, 2008). Critical thinking, the bedrock of solid decision making, involves applying all three types of knowledge to fully grasp the consequences of a decision (Agency for Healthcare Research and

Quality, 2008, Benner, 2001, 2012). Answering the challenge of the Institute of Medicine, many colleges of nursing have adapted curricula to better prepare students to enter practice prepared to meet the increasing demands placed on nurses and to apply theoretical, tacit, and experiential knowledge to clinical decision making (The National Academies, 2010). Despite recommendations, researchers found newly graduated nurses struggling and ill-prepared for the roles in which they were placed (Ho et al., 2013). One product of the nursing educational reformation was the concept-based approach to teaching and learning, a curriculum designed in part to introduce clinical application in classroom settings (Giddens, Caputi, & Rogers, 2015). Other innovative approaches to increasing the efficacy of nursing education included experiential learning, team-based learning, problem-based learning, and expanded use clinical simulation (Arkan, Yaprak, & Yilmaz, 2018; Jones, 2017; Morris, 2016; Victor, 2017).

Expert nurses must progress beyond theoretical and practical knowledge to reach a tacit level of intuitive thinking and salience to become expert clinical decision makers, rather than simply learning about topics and how to perform tasks. The expert nurse intuitively processes and visualizes possibilities, understanding why clinical decisions are made and imagining all consequences of acting or failing to act on that decision (Benner, 2001). To instill the seeds of intuitive processes in nurses, some colleges of nursing have embraced concept-based curriculum, a teaching and learning approach that utilizes broad concepts to help students organize broad clinical and professional topics (Giddens et al., 2015). The purpose of concept-based curriculum is to help student nurses leap from theoretical and practical information to sound clinical judgment through classroom learning engagement. Concept-based curricula teach students to draw on deeply learned attributes of biophysical, psycho-social, and professional concepts to arrive at higher-level and interrelated conclusions that guide their nursing education and practice

(Giddens et al., 2015; Kaddoura, Van-Dyke, & Yang, 2016). In contrast, traditional curricula require students to listen to lectures and memorize tasks, facts, numbers, responses, and other aspects of various patient conditions and nursing situations.

Pioneers of concept-based curriculum believed in the superiority of the curricular strategy over traditional lecture-based, teacher-centered andragogy. Giddens, Caputi, and Rogers (2015) defined cognitive frameworks associated with teaching the student to practice nurse-like thinking habits within the walls of the classroom. Scholars who focused on concept-based curriculum have acknowledged the physiologic processing centers involved in nursing-oriented metacognition and have linked disciplining brain structures to training students to think on professional levels (Giddens et al., 2015; Hammond, 1980). Broad cognitive schema conceptually frame didactic teaching, allowing for specific applications in the clinical setting without dependence on memorized facts and lists. In an applied use of this approach, students map concepts first on paper and then cognitively progress to mind mapping as critical thinking and clinical reasoning skills improve (Caputi, 2015; Kaddoura et al., 2016). Kaddoura et al. (2016) compared the critical thinking scores of nursing students on HESI tests before and after exposure to concept mapping to those who were taught using traditional lecturing. Critical thinking scores for the experimental group indicated a significant improvement over the control group, which was taught using lecture only. While researchers acknowledged weaknesses in the study due to the small sample size of 83 students and potential student maturation, the scores point to a need for more research into the potential for conceptual teaching strategies to hone critical thinking skills in nursing students.

Teaching students to make sound clinical decisions also involves teaching the discipline of clinical judgment. Proponents of concept-based curriculum claimed that this is done through

scenario-based, active learning in the classroom setting in which students solve clinical problems or analyze case studies rather than being directly lectured by professors (Caputi, 2015). Victor (2017) and Morris (2016) each studied groups of students who learned in teams to find the effects of team-based, conceptual teaching on students' clinical judgment and overall performances. Clinical simulation is a teaching strategy that is considered appropriate for augmenting or even replacing clinical experiences in most curriculum formats. Teams of students taught clinical decision-making using an experiential framework and scenario-based simulation had a 9% increase in scores on the Lasseter Clinical Judgment Rubric when compared to second-year nursing students who were taught using traditional curriculum design (Victor, 2017). Team-based learning in the classroom, although not as popular among students due to a perception that they taught themselves and each other, was correlated with statistically significant improvement in posttest scores and overall pass rates among 257 students in a cross-sectional, mixed-methods survey and program evaluations study of a decision-making course (Morris, 2016). Researchers consistently agreed on the premise of nontraditional, conceptual, team-based, and experiential approaches effectively teaching students to arrive at conclusions in contrast with the traditional approach of the teacher lecturing and telling student what to think and how to respond. The NCSBN (2016) stated that up to half of actual clinical hours can be replaced by simulation. Researchers conducted an experimental, longitudinal study of 666 student nurses and newly graduated nurses from 2010 to 2014 and found no statistically significant difference in the performance preparation or practice between control and experimental groups with 25% to 50% of their clinical hours replaced by simulation experiences (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). Teaching students to make sound decisions begins in the classroom with skilled and innovative nurse educators applying

various teaching strategies in the campus or classroom setting (Kaddoura et al., 2016; Koharchik et al., 2015; Morris, 2016; Victor, 2017). More research is needed to investigate the clinical implications of classroom and simulation-based decision-making teaching approaches.

Teaching and learning decision making in the clinical setting. Clinical judgment and decision making are basic, required concepts taught within accredited nursing programs (Spector et al., 2018). Learning solid decision making may start on the college of nursing campus, but the clinical setting is believed to hone early decision-making skills (Ho et al., 2013). Alarmingly, an extensive study and a second sizeable project showed decreasing levels of clinical competence, including judgment skills and decision making, among nursing students and professional nurses (Canova et al., 2016; Dicle & Durmaz Edeer, 2013). A small qualtitative study of 15 nursing faculty in California revealed themes related to faulty decision making, poor judgment, and generally unsafe behaviors leading to an increase in student clinical failure rates (Potter, 2018). In a 15-year study of 2,855 participants (nurses = 1,406; students = 1,449), Canova et al. (2016) used the Jenkins CDMNS to evaluate cognitive processes used by student, novice, and expert nurses in various countries and found decreasing use of effective cognitive decision making strategies. A second sizeable study of sophomore, junior, and senior nursing students in a BSN program using problem-based learning curriculum showed significantly lower clinical decision-making skills of the senior nursing students (Dicle & Durmaz Edeer, 2013). Researchers administered the CDMNS and found senior nursing students scored higher only in reflection. NTE theorists believe the trend of scores should move in a positive direction toward intuition as experience is gained (Benner, 2001). Replicated studies are needed to confirm the results.

A possible explanation for the deterioration of some nursing students' clinical decision-making skills could be the age and career experience of the students (Ho et al., 2013). Using the

CDMNS, Ho et al. (2013) found several factors to be associated with higher-level decision making, including entering nursing as a second career. The work of Ho et al. (2013) also associated satisfaction with a clinical unit placement and more education with higher decision-making scores. One study suggested that an alternative explanation for deteriorating student decision-making scores could be the use of tools, such as early warning systems, to physically alert students to serious patient changes with alarms or other indicators (McCallum, Duffy, Hastie, Ness, & Price, 2013). Such early warning systems may be utilized as safety measures for patients under the care of novices but may also become crutches that hinder the development of intuitive decision making rather than facets of complex care processes (McCallum et al., 2013).

Theoretical knowledge, good grades, and motivation do not consistently translate into solid clinical decisions as theoretically high-achieving students tend to be unaware of their own clinical deficits (Perkins & Kisiel, 2013). Experts view the theory-practice gap as a theoretical chasm between knowledge and practice and a significant barrier to student and novice clinical performance (Cunningham, Wright, & Baird, 2015). Although curricular innovations have included experiential decision-making training aimed at narrowing the theory-practice gap, clinical decision-making weaknesses persist among student and new nursing graduates. The research of Perkins and Kisiel (2013) and Aktas and Karabulut (2016) suggested that due to assumptions about clinical skills being easier to master than theoretical knowledge, motivated students with excellent grades do not always make better clinical decisions than their academically challenged peers. The results of a mixed-method study of nursing students supported assertions that the conceptual theory-practice gap negatively impacts nursing student decisions (Perkins & Kisiel, 2013). A descriptive study also showed no correlation between student motivation and clinical decision making (Aktas & Karabulut, 2016). More studies into

the areas of motivation, academic achievement, clinical environment, and nursing student decisions are needed. It is possible that outlying covariates in the research of Aktas and Karabulut (2016), such as subpar clinical environment, may have affected student responses on surveys and impacted the scores on the CDMNS. Perkins and Kisiel (2013) recommended urgent exploration into the decision making of students to address the theory-practice gap and expose areas of false confidence in students with theoretical knowledge and decisional incompetence.

Critical Thinking

The first characteristic process associated with clinical decision making is critical thinking. Nurses must not only assess a situation and react accordingly; the nurse must quickly consider consequences of action or inaction while weighing possible options with incredible efficiency and accuracy. The NCSBN (2016) defines critical thinking as "the use of logic and reasoning to identify the strengths and weaknesses of alternative health care solutions, conclusions or approaches to clinical practice problems" (p. 3). In a cross-sectional survey of 119 nurses utilizing Jenkins's CDMNS, Ludin (2018) found strong positive correlations between critical thinking and clinical decision-making skill. Interestingly, newly graduated nurses scored higher in critical thinking ability but lower in clinical decision making than experienced nurses, indicating that strong critical thinking scores do not always indicate solid decision-making ability (Ludin, 2018).

A nurse or nursing student need not be an expert to critically think. In fact, critical thinking is a term widely used in general education and professional development both inside and outside of the nursing profession. However, when viewed as an essential building block of clinical decision making, critical thinking becomes integral to nursing education and practice.

Benner (2001) asserted that novice and advanced beginner nurses engage in analytical cognition and are dependent upon cues, guides, rules, and evidence to make decisions, but even novices and advanced beginners should demonstrate critical thinking ability.

With few exceptions, the literature evaluating critical thinking in nursing students consists of older evidence and simulation-based studies. For this study, research released before 2013 was not considered unless used for theoretical or defining purposes and simulation was considered an on-campus curriculum approach. The findings of a meta-ethnographical study conducted by Voldbjerg, Gronkjaer, Sorensen, and Hall (2015) pointed to a propensity for newly graduated nurses to be confident in task-driven practice and rely on more experienced peers for answers and cues rather than consume evidence-based literature on which to build critical decisions. The tendency to lean on Benner's (2001) theoretical task-driven lists and evidence-based rules persists among student nurses and new nurses in the literature, but, unfortunately, the quality of the evidence seems to diminish over time. A study of senior nursing students indicated an inverse relationship between the use of scholarly or evidence-based literature and student clinical hours (Kim, Kim, Ji, Kim, & Hee, 2018), aligning with the findings of Voldbjerg et al. (2015). The work of Kim et al. (2018) indicated a significant positive correlation between evidence-based practice use and critical thinking among 280 student nurses but also reflected a decrease in what students utilized as evidence as they spent more time in the clinical setting. Student nurses and newly graduated nurses tend to lean more on confidence in their ability to accomplish organized tasks and the advice of peers and preceptors rather than appraise evidence, eroding the foundations of successful clinical decisions. Studies point to a need for more research into student nurse critical thinking modalities and practices in various settings (Kim et al., 2018).

Clinical Reasoning

Clinical reasoning involves thought processes and mental organizers used by nurses when drawing conclusions related to patient information. The conclusions may be applied to identifying patient needs, diagnosing problems, and ultimately, making clinical decisions. Ideally, clinical reasoning leads to sound decisions and positively affects patient outcomes (Harmon & Thompson, 2015). Clinical reasoning helps nurses move beyond the advanced beginner phase of NTE into competence as a nurse (Jessee, 2016). Increased competence allows for prioritization and increasingly intuitive decision making (Benner, 2001; Hammond, 1980). In a small study of second-year nursing students, Harmon and Thompson (2015) utilized the outcome present-state model to explore the impact of intentional, collaborative clinical activities on student reasoning skills. Results of Harmon and Thompson's (2015) study showed a significant increase in overall reasoning skills per the outcome present-state model following collaborative activities in clinical experiences. Although the sample was small, this study indicated student clinical reasoning could be strengthened through intentional, collaborative use of activities to direct student thought processes.

Clinical Judgment

Critical thinking and clinical reasoning are critical components of clinical judgment, a prerequisite for decision making (AACN, 2008a; Mann, 2012; van Graan et al., 2016). The AACN (2008a), an accrediting body for nursing programs, requires baccalaureate-level nurses to seek and employ evidence-based resources with high levels of reliability and validity into their professional practices. In a study involving nursing students, van Graan et al. (2016) posited that clinical judgment is the point where theory and practice connect. The researchers went on to explain by what processes clinical decision making happens as students apply clinical judgment

to specific situations (van Graan et al., 2016). In an earlier study, Mann (2012) found nursing schools emphasized critical thinking through didactic content, but opportunities for judgment or prioritized application in clinical are not as common in formal curricula.

Using the Critical Thinking Assessment and Lasseter's Clinical Judgment Rubric, Mann (2012) tested an innovative approach to facilitating clinical judgment among four groups of BSN students. The treatment was the use of grand rounds to prepare four groups of students for a simulated clinical experience. The results indicated that the treatment did not make a significant difference in critical thinking or clinical judgment scores, but the treatment group did show slight improvements on both measures (Mann, 2012). The work of van Graan et al. (2016) qualitatively supported and explained Mann's (2012) findings. In an explorative, descriptive study, van Graan et al. (2016) questioned professional nurses about clinical judgment. The resulting conversations produced some student- and education-focused themes that emphasized the need for innovative faculty, positive nursing preceptors in the clinical setting, good professional role modeling, and intentionally designed clinical placements (van Graan et al., 2016). The studies of Mann (2012) and van Graan et al. (2016) explain pieces of a critical component of clinical decision making; weaknesses in both studies included small sample sizes and the use of convenience samples from single schools, potentially limiting generalizability.

Decision Making in Student Clinical Experiences

It is not possible to explore nursing students' clinical decision making without considering actual clinical placements and experiences. It is in the clinical arena, at the bedside of patients, that nursing students must apply critical thinking and judgment and begin to make decisions (Lovecchio et al., 2015). Boards of nursing and accrediting bodies require clinical experiences to be built into every prelicensure nursing curriculum (AACN, 2008a; Salyers et al.,

2013; Texas Board of Nursing, 2011). However, only 10 states have minimum stated requirements for clinical hours for undergraduate nursing students (Bowling et al., 2018). Baccalaureate programs have more freedom than vocational and associates degree programs in determining the number of clinical hours as well as the structure of experiences in some states (Texas Board of Nursing, 2011). Only 26 state boards of nursing have published guidelines and criteria for qualifying clinical experiences. Regardless of the number of hours spent in clinical experiences, nursing program accrediting bodies set the expectation that students will build skills and knowledge to a professional level as they matriculate through respective clinical programs with specific, spiraling, and measurable clinical objectives. Nursing education leaders envision higher levels of evidence integration, leadership, critical thinking, judgment, and reasoning at the BSN level, which would lead to better clinical decisions from novice nurses (AACN, 2008a; Bowling et al., 2018; Texas Board of Nursing, 2011).

Clinical formatting and placement. Following the pattern established by Benner (2001), student clinical placements typically start in facilities with less acutely ill patients, providing novice students the opportunity to practice basic assessments and skills on a single patient at a time under the direct supervision of faculty. It is not unusual for students to rotate through multiple locations and many different units, including long-term care, acute care, critical care, emergency rooms, specialty units, and community sites, in a distributed model of clinical throughout the early semesters of BSN training (Birks, 2017). During the final semester, however, most colleges of nursing place graduating seniors in a culminating, transitional clinical experience in which they care for multiple patients alongside the nursing staff, functioning in the role of the advanced beginner nursing student in one primary unit (Benner, 2001). Utilizing the block schedule or residency format of clinical experiences, students work with a professional

nurse preceptor, fulfilling a full-time nursing schedule for an extended period of time (Benner, 2012; Birks, 2017). Students and faculty have not shown a clear preference for one model of clinical formatting or timing. Both the block model, in which students complete the entire clinical experience in one unit, and distributed models with a variety of experiences have pros and cons (Birks, 2017). Bowling et al. (2018) recommended state boards of nursing or other regulating bodies to set minimum clinical hour requirements for colleges of nursing, a recommendation backed by professional organizations but not evidence. The length of time spent in one unit was not found to be a significant factor in students' achievement of greater clinical or technical skills (Kumm et al., 2016). Opposing recommendations by Bowling et al. (2018) and research by Kumm et al. (2016) revealed no statistically significant difference in the decision-making practices of senior nursing students following eight or 16-week immersion experiences.

Student nurses have preferences for certain units over others, primarily based on opportunities to perform skills, but the objectives of clinical experiences reach far beyond psychomotor skill acquisition (Doyle et al., 2017). Clinical placements in the units with carefully supervised bedside learning experiences provide students the opportunities apply theory to practice, build confidence and competence, gain experience, and establish career plans (Ross et al., 2013; Wareing et al., 2017). Ross et al. (2013) administered the Mental Health Nursing Clinical Confidence Scale to BSN students and found that confidence increased significantly after clinical experiences regardless of unit placement. A mixed-methods study of final semester nursing students provided insight into the connection between clinical placement and job selection (Wareing et al., 2017). Nursing students tend to associate action-oriented experiences and tasks with positive clinical experiences. Wareing et al. (2017) found that students associated

higher acuity and the fast pace of a unit with learning opportunities. A predictive study of nursing students showed an affinity for task-oriented clinical experiences, as demonstrated by increased satisfaction scores on the Clinical Learning Environment Inventory (CLEI). Additionally, positive clinical placement experiences in the final semester of nursing school had a significant influence on career choice for the newly graduated nurse (Wareing et al., 2017). Two teams of researchers in separate studies encouraged nurse educators to emphasize problem solving and evidence-based practice rather than tasks and activities to encourage students to build cognitive skills in the clinical setting (Chong et al., 2016; Ironside et al., 2014). Theoretically, task performance and increased action in the clinical setting does not represent decision making in that skills are performed using step-by-step checklists and routines (Benner, 2001; Hammond, 1980).

A probable connection exists between clinical placement experiences and cognitive processes (Dicle & Durmaz Edeer, 2013; Ho et al., 2013; Lauri & Salanterä, 2002a). Lauri and Salanterä (2002a) found that nurses in different areas move back and forth on the cognitive continuum of decision making depending, in part, on type and location of nursing practice. Ho et al. (2013) found a possible link between clinical placement satisfaction and clinical decision-making scores. Data compiled from more than 6,000 comments made by nursing students suggested that students prefer units in which their didactic knowledge can be applied to tasks and that students form biases toward and against clinical units based on prior experiences (Lea, Marlow, Altmann, & Courtney-Pratt, 2017). However, Aktas and Karabulut (2016) found no significance between clinical environment and clinical decision making. On the contrary, a study of 150 senior nursing students using the Clinical Learning Environment, Supervision, and Nurse Teacher instrument indicated a positive predictive relationship between student

satisfaction and likelihood of engagement on the unit. Practice areas with warmth, a positive culture, and a healthy environment were significant indicators of student success on those units (Doyle et al., 2017). Again, an association was drawn by students between tasks and clinical learning. Evidence showed a link between student clinical satisfaction and job selection; opportunities to place students in healthy-culture units could both increase engagement and allow for more experienced new graduates to enter the workforce in specific areas (Doyle et al., 2017; Wareing et al., 2017). Further research is warranted to draw conclusions based on the effects of clinical placement on the cognitive processes required to make nursing decisions (Benner, 2001; Ho et al., 2013; Lauri & Salanterä, 2002a; Wareing et al., 2017).

Clinical Supervision

Nursing students complete clinical experiences under the supervision of a range of professionals. Nursing faculty responsible for teaching in the classroom, or primary faculty, often oversee students during hospital rotations. Nursing may also experience clinical rotations supervised by part-time or adjunct faculty. Quite frequently, nurse preceptors, or experienced nurses who meet agency-set criteria, oversee student clinical experiences. The AACN (2008a) requires clinical faculty supervising students and preceptors to have at least a master's degree in nursing and clinical experience in the area being supervised. The AACN (2008a) mandates that nurses working as preceptors for BSN programs have a minimum of a BSN. The clinical faculty or preceptor serves to ensure patient safety while encouraging student decision making and ultimately fostering autonomy (Nielsen et al., 2017). Clinical faculty lead by example and provide cues to students to encourage critical thinking and reasoning so they may develop decision-making skills. The selection of faculty depends upon the educational level of the student and the college's affiliation agreement with the hospital, clinical, or other facility.

Newer students attend clinical in groups directly supervised by faculty. Upper-level students are more likely to be paired with nurse preceptors.

Research findings are mixed on the topic of student clinical supervision. Benner (2001) encouraged the pairing of advanced beginners with expert nurses to create positive clinical context. Studies evaluating the relationships of students and preceptors have made inconsistent findings related to the value and influence of the preceptor role. The qualitative work of Moonaghi et al. (2015) colorfully depicted the clinical environment as an inhospitable arena for BSN students. The discussion indicated that the responsibility for successful clinical learning experiences lies squarely on the shoulders of faculty (Moonaghi et al., 2015). However, the work of Hendricks et al. (2013) indicated that among nursing students, more learning occurred when bedside nurse preceptors supervised clinical rather than when professional faculty members did so. Hendricks et al. (2013) speculated the reasoning behind significantly higher levels of satisfaction with nurse-preceptored clinical experiences was increased hands-on experiences. In contrast, the results of a cross-sectional study of students, faculty, and nurse preceptors indicated that most of the students found faculty more supportive in the clinical supervisory role, but they were more relaxed in the presence of a nurse-preceptor (Courtney-Pratt et al., 2012; Courtney-Pratt et al., 2015). Nursing faculty potentially positively and negatively influence student learning in the clinical setting in profound ways based on the teachers' willingness to allow the student to ask questions and general rapport and demeanor (Arkan et al., 2018; Hemberg & Sjoblom, 2018). Hemberg and Sjoblom (2018) found clinical preceptorship and supervision to be an ethical duty that was more effectively carried out when students were comfortable inviting preceptors into their practice area. The work of Ho et al. (2013) linked clinical satisfaction to improvements in decision-making scores. Evidence points to both faculty

preparation and opportunities for students to perform tasks with bedside nurses as promoters of clinical unit placement satisfaction (Austria, Baraki, & Doig, 2013; Courtney-Pratt et al., 2012; Hendricks et al., 2013; Moonaghi et al., 2015).

Summary

Regardless of the unit, the facility, the level of skill or experience, or type of preparation, nurses make critical clinical decisions every day. The National Academy of Medicine mandated an emphasis on decision making in nursing education as a proactive means of improving patient outcomes (The National Academies, 2010). Regulating and accrediting bodies mandated that colleges of nursing prepare students to enter practice prepared to engage in appropriate decision-making activities (AACN, 2008a; NCSBN, 2017) Applying the theoretical framework of Benner (2001) and Hammond (1980) to a search for evidence relating to nursing students' clinical decision-making skills yielded a wide range of information. As nursing students mature experientially from novices to advanced beginners, the expectation is that critical thinking, clinical reasoning, and clinical judgment growth will begin to yield solid clinical decisions. Theoretical processes, such as the nursing process, exist to teach students the steps, but theorists and researchers suggest that time and effective practice build competent clinical decision-making skills (Benner, 2001; Lauri & Salanterä, 2002a; Orlando, 1972).

Existing evidence reveals a gap when seeking insight into cognitive clinical decision-making processes of nursing students. Specifically, there is a lack of existing research into the impact that clinical unit placement has on the decision-making processes of senior BSN students during a culminating clinical experience. Students resoundingly showed a preference toward units they perceived as exciting in which they could stay busy performing tasks. The literature pointed to a need to pull students away from task-driven experiences and into care areas in which

decision-making skills could be practiced with instructor-driven critical thinking and decision-making activities (Chong et al., 2016; Doyle et al., 2017; Ironside et al., 2014; Lea et al., 2017; Wareing et al., 2017). The following chapter addresses the research methodology designed to explore student nurse decision-making and to fill the identified gap in the literature related to clinical decision making and culminating clinical experience unit placements.

CHAPTER THREE: METHODS

Overview

Chapter Three addresses the methods used to conduct this study, which investigated the implications of senior nursing students' culminating clinical unit placement on their place on the cognitive continuum of nursing decision making. It is not known whether a final, residency-type, block-formatted, immersive clinical placement experience would positively impact senior nursing students' cognitive decision-making processes. The NTE nursing theory and the decision-making work of Hammond's CCT balance the theoretical framework for the study (Benner, 2001; Hammond, 1980). Benner's (2001) NTE suggests that as a nurse gains experience, he or she gains confidence and competence, moving from the analytical novice to the intuitive expert along a five-level path to competency. Hammond's (1980) CCT advanced a five-premise concept of decision making in which measurable cognitive functions employed by individuals promote intuitive or analytical decision-making processes. While Benner's (2001) theory is hierarchical, with intuition defining the pinnacle of competent decision making, Hammond's (1980) theory is based on a true continuum, with neither pole considered better than the other. The contents of Chapter Three include information related to the study design, research question, hypothesis, participants, and setting. Details related to the instrument utilized for data collection, research procedures, and data analysis conclude the chapter.

Design

A quantitative, causal-comparative, pretest/posttest, nonexperimental, between-subjects design was utilized in this study. Experts recommend a causal-comparative approach to explore relationships and investigate statistically significant differences between variables in existing situations (Gall, Gall, & Borg, 2007). This study examined senior BSN students' mean scores on

the NDMI-R14 based on hospital unit placement during culminating clinical placement experiences (Gall et al., 2007; Lauri & Salanterä, 2002a; Phillips, 2015). The independent variable for the study was the four groups of student clinical placements: specialty units (A_1), acute care (A_2), critical care (A_3), and the emergency department (A_4). Student scores on the NDMI-R14 were the dependent variable. Three continuous categories for the dependent variable (Y) were analytical cognition, quasirationality, and intuitive cognition. Pretest scores on the NDMI-R14 were the covariate (X_c) for the study.

The causal-comparative design can help the researcher explain differences between means of students on the NDMI-R14 scale but will not point to the causation of variances between scores. Gall et al. (2007) refer to causal-comparative studies as ex post facto because relationships are established prior to the beginning of the study. The senior BSN students participating in this study were assigned to clinical units before the study began. Student requests, professor discretion, and class needs determined placements. University/hospital affiliation agreements were not manipulated as a part of the study (Birks, 2017). Multiple units at various hospitals were utilized, but four basic categories of clinical placements were established: specialty units, acute care, critical care, and emergency departments (Lauri & Salanterä, 2002a; Wareing et al., 2017). Causal-comparative studies allow for categorical independent variables (Gall et al., 2007; Warner, 2013). The dependent variable, BSN students' scores on the NDMI-R14, provided the continuous scores needed in causal-comparative research. An additional distinguishing characteristic of a causal-comparative study is the ability to have unmatched, unequal groups without randomization or a control group. The researcher had no control over clinical placement as a part of the study, and no control groups were established; therefore, the possibility of unequal groups existed. Post hoc matching of groups

may also be utilized in this type of study (Gall et al., 2007). Studies have shown that academic characteristics do not affect decision-making scores, but satisfaction with clinical placement experiences and prior nursing experiences could impact results (Aktas & Karabulut, 2016; Ho et al., 2013; Wareing et al., 2017). Most applicable to the scope of this research is that the theoretical framework for this study attributes higher intuitive scores to more nursing experience as well as more life experience and a natural tendency to process decisions intuitively (Benner, 2001; Hammond, 1980). The pretest-posttest aspect of the design allowed for control of the pretest scores, the theoretical indicator of a higher level of experience or natural intuitive processing skills. Controlling for the scores of students on the NDMI-R14 at the onset of the study mitigated the influence of most major factors shown to impact decision-making scores in previous studies.

Research Question

RQ1: Is there a statistically significant difference between posttest scores of senior BSN students on the NDMI-R14 based on clinical unit placement group (specialty, acute, critical, emergency) during culminating clinical experiences when controlling for pretest scores?

Hypotheses

$H_0$1: There is no statistically significant difference between posttest scores of students on the NDMI-R14 based on the type of clinical unit placement (specialty, acute, critical, emergency) during culminating clinical experiences when controlling for pretest scores.

Participants and Setting

The participants for this research consisted of a voluntary convenience sample of senior BSN students from a private, faith-based university in Texas that is referred to using the pseudonym TBSN in this study. The students had successfully completed coursework to reach

their final semester and had satisfactorily passed all previous clinical and lab assignments to achieve placement in the culminating clinical rotation. The time frame for pretest data collection was September 10, 2018, through October 1, 2018, and posttest collection occurred from November 25, 2018, through December 7, 2018, the fall term for TBSN.

A convenience sample was selected from a population of 80 students. Fifty-nine students completed the Qualtrics survey to participate in the pretest. Ten students subsequently selected "no" to the informed consent and did not proceed. Therefore, 49 students completed the pretest portion of the study. The posttest portion of the study was completed by a total of 40 participants; after the removal of declinations, incorrect, and incomplete cases, 34 participants' posttest surveys remained. From the samples of completed pretests and posttests, SPSS software was used to compare unique identifiers and remove identical entries and subsequently, randomly select cases from each set, grouped by clinical unit assignments. The final sample size for the study was $N = 30$.

An a priori calculation was conducted using G*power statistics software (Buchner, Erdfelder, Faul, & Lang, 2010–2018). To achieve a large effect size using analysis of covariance (ANCOVA) with four groups of the independent variable and one dependent variable with three potential categories and one covariate, an alpha of .05 ($\alpha = .05$), and a desired statistical power of .8, the minimum sample size was determined to be 22. The use of a covariate allows for a smaller sample size due to controls put in place to cancel interferences in the results (Gall et al., 2007). To allow for attrition and incorrectly completed NDMI-R14 surveys, no limitations were placed on the number of students from the overall population of 80 who could volunteer to participate in the study (Friendly, n.d.; Gall et al., 2007; Warner, 2013).

The sample consisted of volunteers from among 80 senior BSN students in the setting of a private, faith-based university in Texas (TBSN). TBSN is fully accredited and has approximately 4,000 students; 1,000 of those enrolled are either in the nursing program or have declared nursing as a major. Approximately 10% of the student body is active military. The university offers four-year degrees in multiple areas including the humanities, arts, and sciences, as well as masters and doctoral degrees. Approximate cost of attendance is $38,000 per year. The cost of an undergraduate degree in nursing is approximately $110,000 (National Center for Education Statistics, 2017). The College of Nursing at TBSN offers a traditional bachelor's degree, hybrid-format master's and doctoral degrees in nursing, and an online RN to BSN degree. The rationale for selection of this population included convenience and access to the students, secure university survey software easily accessible to student participants through their learning management system (LMS), affiliation agreements with clinical facilities representing all four categories of units to be studied, and the immersive, block, residence-style culminating structure of clinical experiences for all graduating students (Birks, 2017).

Clinical placements included residency-type, block-formatted, immersive clinical experiences in which each participant was assigned to only one hospital unit (AACN, 2008b; Benner, 2012; Birks, 2017). Each student completed up to five weeks of working three days a week with a nurse for the nurse's entire 12-hour shifts for a total of up to 180 clinical hours. The nurses to which the students were assigned were required by the hospital system to have at least one year of experience in the specific clinical placement unit and have a form of documented preceptor agreements on file with TBSN. The units exist within various medium-to-large facilities within a 50-mile radius of TBSN. Due to limits placed on schools based on hospital needs, unit staffing, patient acuity, and regulating bodies, varied numbers of students were

allowed per unit. Legal affiliation agreements crafted between hospital compliance officers and university officials ensure that students and faculty are well trained, have passed criminal background checks, remain current on all vaccinations, and are eligible to safely perform clinical work (Birks, 2017). Research shows that students prefer high-acuity, fast-paced units, but critical, certain specialty, and emergency units may not provide the best learning environments; likewise, due to stated limitations, fast-paced units may not be available for an entire class to experience (Hendricks et al., 2013). Students at TBSN submitted requests for preferred clinical placements to their professors early in the semester, prior to the start of this study. Placements were then determined by the professor based as much as possible on the requests with no guarantee of any student being placed where he or she wanted to work.

Units were categorized by the type of care, patient acuity, and widely varied patient-to-nurse ratios as specialty, acute, critical, and emergency units. For this study, specialty units consisted of labor and delivery, physical and neurological rehabilitation, psychiatric care, long-term care, and all surgical departments. The specialty unit category contains widely varied types of nursing care. Placements in each of these units were individually scarce but collectively and historically involved a large enough number of students each semester to merit consideration.

Acute care units were defined as the typical medical-surgical nursing units with low-to-moderately high acuity patients. The populations on acute care units can range from very young pediatric to very old geriatric patients with numerous specialties defining the type of care each patient needs (e.g. oncology, nephrology, orthopedics, cardiology). The nurse-patient ratio on acute care units the students in this study experienced ranged from 4:1 to 6:1 depending on patient acuity and unit focus.

Nurses in critical care units care for the most fragile patients in the facilities. The level of patient acuity in critical care ranged from moderately high to extremely high. Patient demographics included premature neonates to very old geriatric patients. The patient-to-nurse ratio in critical care units ranged from 1:1 to 3:1.

Emergency department units to which students were assigned encompassed Level 1 and Level 2 trauma centers. Patient ages ranged from neonatal to very old, and acuities ranged from very low to extremely high. Typical nurse-patient ratios were carefully determined by patient situation and triage categories. In traumas and cardiopulmonary arrests, ratios were as high as six nurses to one patient. Under most circumstances, the emergency department patient-to-nurse ratio is 1:1 to 4:1 (Gonzalo, Himes, McGillen, Shifflet, & Lehman, 2016). Regardless of the category of unit placements, students were expected to be immersed in patient care during their culminating clinical experiences, and patient loads and responsibilities were designed to increase to a level that mirrors that of a professional nurse by the end of the immersive clinical rotation (AACN, 2008a; Birks, 2017).

Instrumentation

Two instruments were utilized in this study. First, the NDMI-R14 and second, a demographic survey was administered to senior BSN students (see Appendices A and B; Lauri & Salanterä, 2002a; Phillips, 2015). Instruments were keyed into a secure online system (Qualtrics, 2018), and survey administration software was used to collect the data from students. For ease of participant use, both instruments were placed in the same survey.

Nurse Decision Making Instrument-Revised 2014

Lauri and Salanterä (2002a, 2002b) developed an instrument to test the decision-making continuum of nurses and nursing students in multiple fields of practice based on the theoretical

constructs of Hammond's CCT and the Dreyfus DMSA, the foundation for NTE (Benner, 2001; Dreyfus & Dreyfus, 1980; Hammond, 1980). Aligning with Hammond's CCT, higher scores on the instrument indicate intuitive cognition, lower scores indicate analytical cognition, and middle-range scores indicate quasirationality. The original instrument contained 56 items covering the four phases, or domains, of the decision-making process: (a) information gathering, (b) information processing and problem identification, (c) planning to act, and (d) implementing, monitoring, and evaluating of the plan. Following an international study of 1,460 nurses from different areas of practice and subsequent factorial analysis, the researchers pared the NDMI down to a 24-item bimodal tool with four domains equally represented by six items each (Lauri & Salanterä, 2002a; Phillips, 2015). The instrument measures four models of cognitive processing on the continuum of nurse decision making, encompassing the analytical model, analytical-processing model, intuitive processing model, and intuitive model. Even-numbered items reflected cognitive processing on the intuitive side of the continuum while odd-numbered items explored analytical cognition (Hammond, 1980; Lauri & Salanterä, 2002a).

The NDMI was originally developed in the Finnish language. Translation into English caused six of the questions to need clarification. With permission from instrument authors, Phillips (2015) revised the six ambiguously translated items. Revising the six items resulted in the 24-item NDMI-R14. Analytical cognition items 1, 3, 5, 13, and 17 and intuitive-cognition item 4 were revised with permission from the authors of the original instrument with the mandate that items 1, 3, 5, 13, and 17 remain completely consistent with the original instrument. The translation of the fourth item was approved by authors as well. The revised survey was named NDMI-R14 (Phillips, 2015).

Validity. The original 56-item instrument was tested on a sample of 200 nurses from two different facilities in Finland. The factor analysis yielded four factors consistent with the four phases of decision making constructed into the instrument. Construct validity of items measuring analytical models had statistically significant or highly statistically significant correlations, $p < .01$ and $p < .001$. Intuitive models did not correlate with the analytical items. Intuitive model items showed statistically significant correlations one with another (Lauri & Salanterä, 2002a; Phillips, 2015). Instrument authors tested for validity by comparing results with Hammond's (1980) CCT. Analysis results consistently aligned with the theoretical framework. Ultimately, the instrument was tested on an international sample of nurses from multiple categorical areas of practice including long-term and short-term care, critical care, and psychiatric and health care units ($N = 1,460$). The validity factors coincided with previous data. Moreover, the results aligned with CCT (Lauri & Salanterä, 2002a).

In a study of 197 nurses, Parker (2011) administered and tested the 24-item NDMI to explore decision-making processes of nurses during emergent situations. An exploratory factor analysis was performed to test the validity of the 24-item instrument utilizing the same methods employed by researchers when developing the original instrument. A Varimax rotation showed no multicollinearity. Factorial analyses conducted by Parker (2011) produced five factors that accounted for 58.25% of the variance. Factors one and three were related to intuitive models and accounted for 23.12% and 5.56% of the variances respecitvely. Factors two and four were related to the analytical model and accounted for 20.7% and 5.56% of the variances respectively. Factor five related to both intuitive and analytical items and accounted for 4.29% of the variance. Further analysis of the fifth factor showed a significant positive correlation between analytical model items ($p < .05$), and intuitive model items were significantly correlated ($p < .05$), but

intuitive and analytical items were either not statistically significantly correlated or showed a negative correlation (Parker, 2011). In a separate study, Parker (2014) administered the 24-item NDMI again. The researcher found analytical items had statistically significant correlations ($p < .05$). Intuitive items were statistically significantly correlated as well ($p < .05$). Analytical and intuitive items were not significantly correlated with each other or showed a statistically significant negative correlation (Parker, 2011).

Validity of the NDMI-R14. Phillips (2015) conducted both a pilot study and additional research using the NDMI-R14. Content validity index scores on the pilot study following revisions to six items were good, with an average of .92. Individual items' content validity index scores were > 0.80. The content validity index measures the degree questions within a survey address the domains represented within the material (Warner, 2013). Content validity index scores > 0.80 are considered acceptable (Phillips, 2015). Results of validity tests conducted on the NDMI-R14 for the second study were acceptable as well. Phillips (2015) conducted a Varimax rotation and eliminated none of the 24 items.

Reliability. Lauri and Salanterä's (2002a) 56-item NDMI produced high reliability scores ($\alpha = .85–.90$). Reliability scores from Parker's (2011) study were a Cronbach's alpha of .84, indicating the good reliability of the instrument. Parker's (2014) study produced a Cronbach's alpha of .81. A Cronbach's alpha of .80 is considered a good level of reliability, an indication of the internal consistency of an instrument (Warner, 2013). Reliability scores for the NDMI-R14 were good for the overall instrument ($\alpha = .90$). Cronbach's alphas for the subscales of the NDMI- R14 were .84 for analytical items and .83 for intuitive items (Phillips, 2015).

Scores. Participants answering the items on the NDMI-R14 enter responses on a five-point Likert-type scale. The number 1 correlates with an answer of "almost never," and the

number 5 correlates with "almost always." In the center of the responses lie "rarely" (2), "not rarely or not often" (3), and "often" (4) (Lauri & Salanterä, 2002a, p. 96; Phillips, 2015, p. 138). Lower scores (< 67 points) indicate analytical cognition during decision making. Moderate scores (68–78 points) indicate quasirational decision making, or a mix of analytical and intuitive processes. High scores (> 78 points) represent intuitive cognition during decision making. No participant can score lower than 24 points, and none can score higher than 120 points. No students scored in the analytical cognition range on either test. During this study, only two participants scored in the quasirationality range (68–78) on the pretest, and all participants scored in the intuitive cognition range (> 78) on the posttest.

Demographic Survey

To link pretest and posttest scores while protecting participant anonymity, each participant created a unique identifier (see Appendices B and C). The unique identifier was not necessary to carry out this study, as only the units were critical to the analysis, but they will aide in data pairing for future study. Each participant was directed to create a unique identifier by entering the first and last initials of his or her best friend's name followed by the two-digit date of his or her mother's (or closest parental figure's) birth (01–31). Finally, the participant entered the two-digit date of his or her birth (01-31). The survey program guided participants through the process. In a step that was crucial to the study, participants self-identified their clinical placement units by completing the demographic survey included in the pretest. The pretest survey demographic data included questions about participant age range, gender identification, current grade point average range, and the number of years, if any, of experience of each student working as a healthcare professional. Each participant also identified the category of clinical unit to which he or she was assigned in both the pretest and posttest demographic section,

although the posttest did not include the remaining demographic questions. The literature revealed no connection between academic factors and clinical decision making (Aktas & Karabulut, 2016; Perkins & Kisiel, 2013). However, studies indicated that a potential link exists between prior experience and decision-making scores (Ho et al., 2013). For this reason, the pretest/posttest design was implemented for this study to control for preexisting variables that have been shown to affect clinical decision-making scores. Demographic data were integral information to have when describing the sample and adding depth to the study. Details about the sample may have also been of interest in post hoc testing if it had been indicated.

Procedures

Carrying out this study first required permission from the authors of the NDMI-R14 and the dean of the TBSN College of Nursing. Letters were sent via email to obtain preliminary permission from the NDMI authors, Lauri and Salanterä, and college leadership to move forward. Both the dean of TBSN and the survey author, Salanterä, provided preliminary permission (see Appendices D and E). Then, to ensure the protection of participants in the study, Institutional Review Board (IRB) approval was obtained from both Liberty University and TBSN. All IRB instructions were followed. The study was determined to meet the criteria for IRB exemption (see Appendices F and G).

An announcement was made to senior students in the final semester of their BSN program via the online LMS utilized by the school (see Appendix H). Students were made aware of the upcoming study and its design. The email provided details about the pretest/posttest design and assured students of anonymity. Dates for the collection of data (pretest and posttest) were provided. A second announcement was made the week before pretesting took place,

reminding students to bring a personal laptop or tablet to class the day of the pretest. All announcements were distributed to the students by their clinical course faculty.

Anonymous links were provided to course faculty for all online surveys and consent forms. The links were posted to the course on a restricted-access module that was opened during class the week prior to the first clinical experiences of the semester. Because this was a causal-comparative study, there was no control group or randomization of the sample (Gall et al., 2007). Students were assigned to clinical placement areas by the course professor prior to the collection of the pretest data. Following placement assignments, during a regularly scheduled class meeting, the professor instructed students to open the course page in the LMS. Instructions for completing the surveys were provided to course faculty and the scripts were read verbatim to the class (see Appendices I and J). An anonymous link within the course module provided access to the consent form (see Appendix K), a screen enabling participants to create a unique identifier, the NDMI-R14, and demographic survey questions. The professor allowed the students approximately 20 minutes to complete the pretest survey during class. Survey access then remained open for students to complete the pretest on a voluntary basis up until the start date of the first clinical assignment. Faculty gave reminders using the same provided email script up until the day the survey was closed prior to the start of clinical rotations. Data were password-protected in the secure online survey system approved by the IRB. Students then individually completed their clinical hours for the semester.

A week prior to the end of the semester, an announcement about posttest was published via the course LMS. Students were reminded of the necessity of completing the post survey to complete the study. Other reminders were posted by the professor throughout the last week of class. As soon as students had completed five weeks of clinical experiences, participants were

scheduled to gather on campus to complete the posttest during a regularly scheduled meeting time. The course professor directed the students in attendance to the secure link to the posttest within the course modules in the LMS. The link provided access to the consent screen, unique identifier entry, identification of unit assignment group, and NDMI-R14 for post testing. The data from the posttests remain password-protected and stored in a private finger-print protected laptop for at least three years following the conclusion of the study.

Data from both the pretests and posttests were downloaded from the online survey software and imported into SPSS for analysis. A professional statistician was contracted by the researcher to help randomize and balance the sample and configure the variables in SPSS for analysis. The researcher aligned the data side-by-side for comparison and grouped the pretest and posttest in clusters for ANCOVA analysis to answer RQ1. A second dataset, configured with reasonably paired and matched unique identifiers was created for comparison analysis.

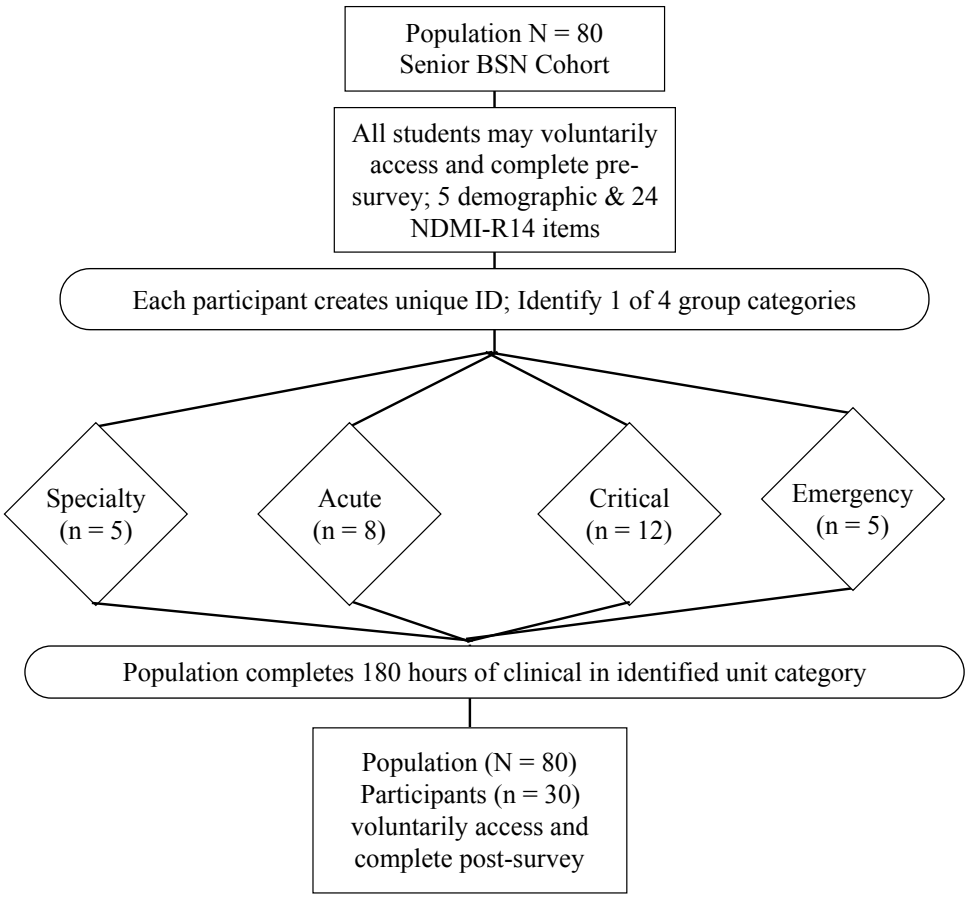

Figure 3.1. This figure is a schematic representation of the research procedures.

Data Analysis

Using SPSS, descriptive statistics revealed unadjusted means and standard deviations of the dependent variable, posttest scores on the NDMI-R14, as well as adjusted means and adjusted standard deviations, controlling for the covariate of pretest scores. An SPSS general linear model, univariate ANCOVA, was conducted to reveal significant differences between student posttest scores on NDMI-R14 based on clinical unit assignment means while controlling for the covariate of pretest scores for each groups' clinical unit assignments (Gall et al., 2007; Laerd Statistics, 2017; Warner, 2013). The null hypothesis ($H_0 1$) was tested through ANCOVA.

If results had been statistically significant, post hoc testing would have been warranted (Warner, 2013).

The causal-comparative research design allowed for a covariate to be used to control for variances that may be created by factors other than the independent variable (Warner, 2013). Warner (2013) also explained that ANCOVA is appropriate when groups are nonequivalent on some factors; therefore, pretest scores on the NDMI-R14 were the covariate for this study. The ANCOVA analyzed the NDMI-R14 mean scores of all four groups of independent variables, focusing on the mean scores of interest to test if there was a statistically significant difference in posttest scores on the NDMI-R14 based on clinical placement in one of the four practice areas. The posttest NDMI-R14 scores were analyzed for significant Wilks's lambda scores (Wilks's λ) and Pillai's trace scores to detect slight variances between group means while considering both the variable scores and covariate scores equally using SPSS general linear model multivariate analysis of variance (MANOVA; Tabachnick & Fidell, 2007; Warner, 2013). The ANCOVA compared between-group variances on NDMI-R14 scores to the within-group variances while controlling for pretest scores (Gall et al., 2007). Statistical power for the analysis was established at .8 and the confidence interval was 95% ($\alpha = .05$).

Assumptions

The assumptions to be met for ANCOVA required a continuous dependent variable, a categorical independent variable, and independent observations. The ANCOVA also required a continuous covariate. The NDMI-R14 provided a continuous dependent variable and covariate. Nursing students were assigned to clinical placements in four different categories of units that were not related, and no students experienced more than one unit placement. Therefore, the first assumptions were met within the study design (Laerd Statistics, 2017). The following

assumptions were required to be met for ANCOVA analyses: no significant outliers on the dependent variable, normal distribution of the dependent variable, and homogeneity of variances. To meet all assumptions for the ANCOVA, additional assumptions must have been met, including linearity between the dependent and independent variables throughout the data, homogeneity of regression slopes between the covariate (X_c) and the dependent variable (Y). Homoscedasticity must show that the error variances are the same across dependent variables within each independent group (Laerd Statistics, 2017; Warner, 2013).

In addition to the assumptions that must be met for ANCOVA, the MANOVA analysis which was necessary to generate the Wilks's lambda and Pillai's trace statistics required tests of multicollinearity and the assumption of equality of covariance matrices (Tabachnick & Fidell, 2007). To determine whether multicollinearity was absent, a Pearson's correlation analysis was conducted. Box's test of equality of covariance matrices was completed to evaluate the data of homogeneity of variance-covariance matrices (Laerd Statistics, 2017). Box's M results of $p >$ .05 helped ensure the strength of overall multivariate analysis results (Tabachnick & Fidell, 2007).

Analysis

The examination of histograms and box-and-whisker plots was used to screen for outliers and normal distribution of the data. Scatterplots showed linearity between Y and X_c, revealed any concerning outliers, and tested the assumption of homoscedasticity. In SPSS, the Shapiro-Wilk ($N < 50$) test results verified the assumption of normality. The covariate (X_c) must be independent of and not influenced by the treatment. To meet this assumption, the students could not experience the clinical placement prior to completing the pretest. A one-way between-subjects ANOVA with the groups (A) as the independent variable and Y and X_c as

separate dependent variables tested the homogeneity of variance. The mean scores of Y and X_c must be distributed equally across the independent groups (A). The covariate (Xc) cannot influence the groups (A), which indicates the assumption of homogeneity of regression is upheld. To assess for potential treatment by covariate violations, the option to test interactions was selected in the SPSS general linear model testing using univariate homogeneity tests. A statistically insignificant result ($p > .05$) from tests of interactions indicated that this assumption was not violated (Green & Salkind, 2014; Warner, 2013). The alpha level for analysis was .05, and effect size for the analysis was measured by η^2 (Gall et al., 2007; Green & Salkind, 2014).

Summary

Testing of the data collected from the demographic survey and NDMI-R14 was intended to reveal statistically significant differences in the mean scores of BSN students placed in different types of units for their final clinical experiences. Based on power analysis, the minimum sample size needed for a large effect size was 22 participants voluntarily selected based on convenience. The population was 80 BSN students from a faith-based university in Texas. ANCOVA testing searched for differences in posttest scores while controlling for pretest scores. Multivariate analysis was conducted to determine if minute differences existed between all variables grouped by clinical unit assignment. The following chapters contain the results of analysis and a discussion of the findings.

CHAPTER FOUR: FINDINGS

Overview

The study of BSN students' clinical decision-making processes as determined by the NDMI-R14 utilized a causal-comparative research design to explore the implications of clinical unit placements. The independent variable was student clinical placement represented in in four clinical unit categories: specialty care, acute care, critical care, and emergency units. The dependent variable was posttest scores on the NDMI-R14. Pretest scores on NDMI-R14 were the covariate for the analysis. This chapter includes the research question, hypothesis, results of analysis, assumption tests, and descriptive statistics as generated using SPSS 25 software.

Research Question

RQ1: Is there a statistically significant difference between posttest scores of senior BSN students on the NDMI-R14 based on clinical unit placement group (specialty, acute, critical, emergency) during culminating clinical experiences when controlling for pretest scores?

Null Hypothesis

$H_0$1: There is no statistically significant difference between posttest scores of students on the NDMI-R14 based on the type of clinical unit placement (specialty, acute, critical, emergency) during culminating clinical experiences when controlling for pretest scores.

Results

Descriptive Statistics

The sample size for this study was $N = 30$. Participant selection was based on a convenience sample from a graduating cohort of senior BSN students from a faith-based, private university in Texas, which was appropriate for the design and objective of this research (Gall et al., 2007). Forty-nine participants completed the pretest, and thirty-four completed the posttest.

Duplicate surveys, as determined by analysis of the unique identifiers, and incomplete and incorrectly completed surveys were eliminated. When participants submitted more than one case, the first completion was used, and additional entries with the same identifiers were treated as duplicate entries and removed from the dataset. The final set of posttest data included $N = 30$ responses. Pretest cases were selected through a process of randomization using the data menu in SPSS. The sample size $N = 30$ was sufficient to produce the desired large effect size and to generate results from which valid and reliable inferences could be drawn (Buchner et al., 2010–2018; Gall et al., 2007; Warner, 2013). Case processing in SPSS indicated that 100% of cases within the groups were completed with no missing data. The alpha level used to determine the statistical significance of the results of this study was .05. The statistical power of this study was 0.8.

Participants voluntarily completed a demographic survey during the pretest phase of the study. The final data sample was 97.2% female with a median age range of 20–24 and a median self-reported, estimated grade point average of 3.5–3.9. Of the participants, 63.8% self-reported prior professional healthcare experience with an average of 1.8 years of in their respective fields (Table 4.1). TBSN's nursing program mandated that 100% of the participants were eligible for assignment into culminating clinical rotation in one of the four self-selected categories of units. Participants were assigned to clinical units based on a combination of personal requests and professor determination following guidelines provided by clinical facilities and faculty or preceptor availability prior to the start of this study (Table 4.2).

Table 4.1

Demographic Data for Sample

Demographic	Frequency	Percentage
Gender		
Female	30	100.0
Age		
20–24	22	73.3
25–29	6	20.0
30–34	2	6.7
Grade point average		
3.0–3.4	14	46.7
3.5–3.9	12	40.0
4.0	4	13.3
Experience		
Yes	22	73.3
No	8	26.7

Table 4.2

Clinical Unit Assignments

Clinical Unit Group	*N*
Specialty units	5
Acute care	8
Critical care	12
Emergency department	5

Descriptive statistics (Table 4.3) for the dependent variable reveal a difference of 13 points between the mean scores of the specialty unit clinical group ($M = 103.00$) and the emergency unit ($M = 90.00$). Adjusted means maintain a similar gap between NDMI-R14 unit scores.

Table 4.3

Descriptive Statistics for Pretest and Posttest NDMI-R14 Scores

	Pretest		Posttest		Posttest Adjusted for Covariate			
Unit Type	*M*	*SD*	*M*	*SD*	*M*[a]	*SE*	Lower Bound	Upper Bound
Specialty	89.60	13.183	103.00	13.210	102.794	4.489	93.548	112.040
Acute care	92.75	9.316	102.38	10.474	102.337	3.501	95.127	109.547
Critical care	94.83	8.178	103.25	8.551	103.323	2.869	97.415	109.231
Emergency	95.20	11.077	90.00	6.782	90.092	4.438	80.953	99.232
Total	93.47	9.551	100.77	10.428				

[a]Covariates appearing in the model are evaluated at the following values: Pretest score = 93.47

Assumptions Testing

ANCOVA testing procedures were used to assess for differences in mean scores of senior nursing students on the NDMI-R14 posttest while controlling for pretest results. Completion of an ANCOVA requires assumptions to be met. First, a continuous dependent variable and covariates ware required (NDMI-R14). The requirement for a categorical independent variable with two or more independent groups was met through the four clinical unit assignment groups (specialty units, acute care, critical care, and emergency department). The assumption of independence of observations was met, as TBSN's program generally requires that students complete their final, culminating clinical assignments in only one unit. However, upon forensic examination of datasets based on unique identifier, one participant was found to have listed two different units. This case was eliminated from the sample before groups were randomized, clustered, and placed side by side in SPSS. The assumption of independence of observations was met. Data were then tested for the presence of outliers. Participants completed the pretest NDMI-R14 before the first day of clinical experiences, meeting the assumption of no treatment by covariate interactions.

SPSS was used to perform analysis testing for additional assumptions. The assumption of outliers was evaluated using box-and-whisker plots (see Figure 4.1 and Figure 4.2). Additionally, standardized residual scores were sorted in descending order and assessed for variances of greater than ±3 standard deviations. There were no outliers in the data noted upon visual examination of the plots and the data scores. The assumption of no outliers was met.

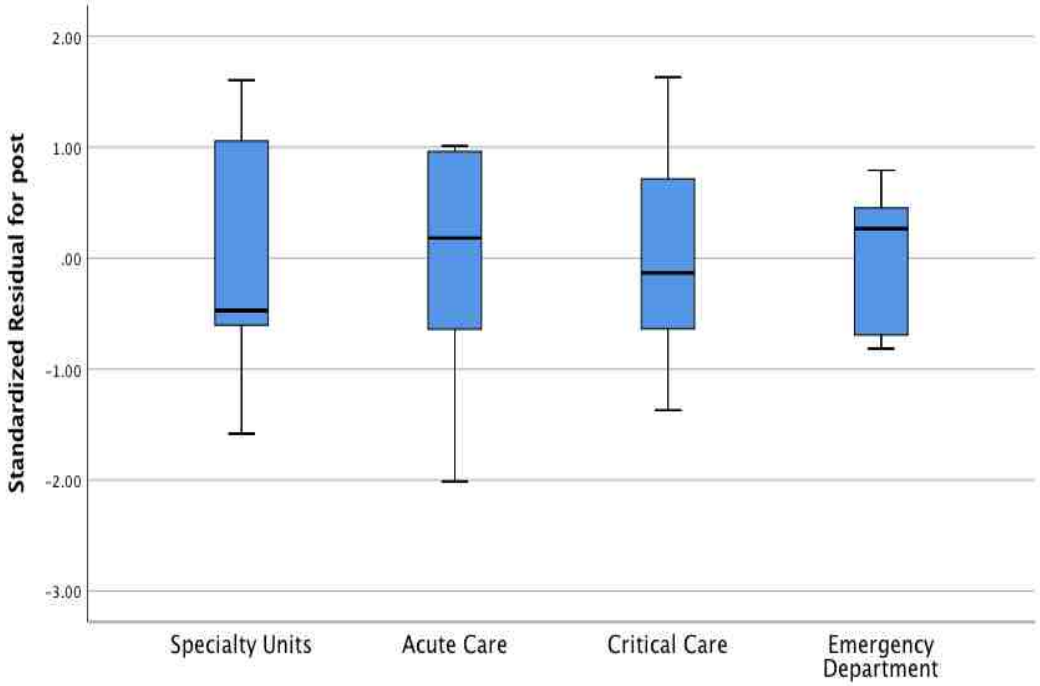

Figure 4.1. Box-and-whisker plot for standardized residuals of posttest scores on NDMI-R14.

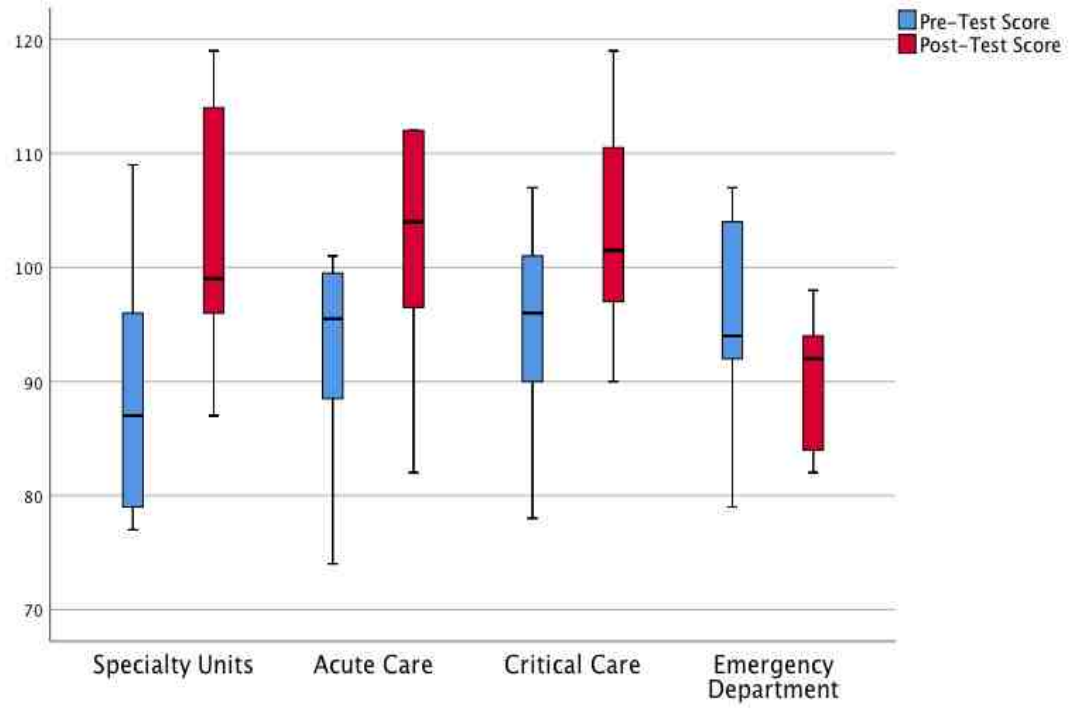

Figure 4.2. Box-and-whisker plots of the dependent variable and covariate.

The assumption of normality of variances indicates that the sample represents the population. Because the sample was small ($N < 50$), the Shapiro-Wilk statistic was evaluated to determine if this assumption was met. The assumption of normality of variance was met, as $p > .05$ for all units (specialty units $p = .635$; acute care $p = .195$; critical care $p = .708$; emergency department $p = .323$; Table 4.4). The Shapiro-Wilk score for standardized residuals of the posttest was ($p = .276$; Table 4.5). A histogram of the standardized residuals of the posttest scores show a bell-shaped curve, indicating normal distribution (see Figure 4.2). The assumption of normality of variances was met.

Table 4.4

Shapiro-Wilk Tests of Normality by Clinical Unit Standardized Residual for Posttest

	Shapiro-Wilk		
Clinical Setting	Statistic	*df*	Sig.
Specialty units	.936	5	.635
Acute care	.882	8	.195
Critical care	.955	12	.708
Emergency department	.883	5	.323
	.958	30	.276

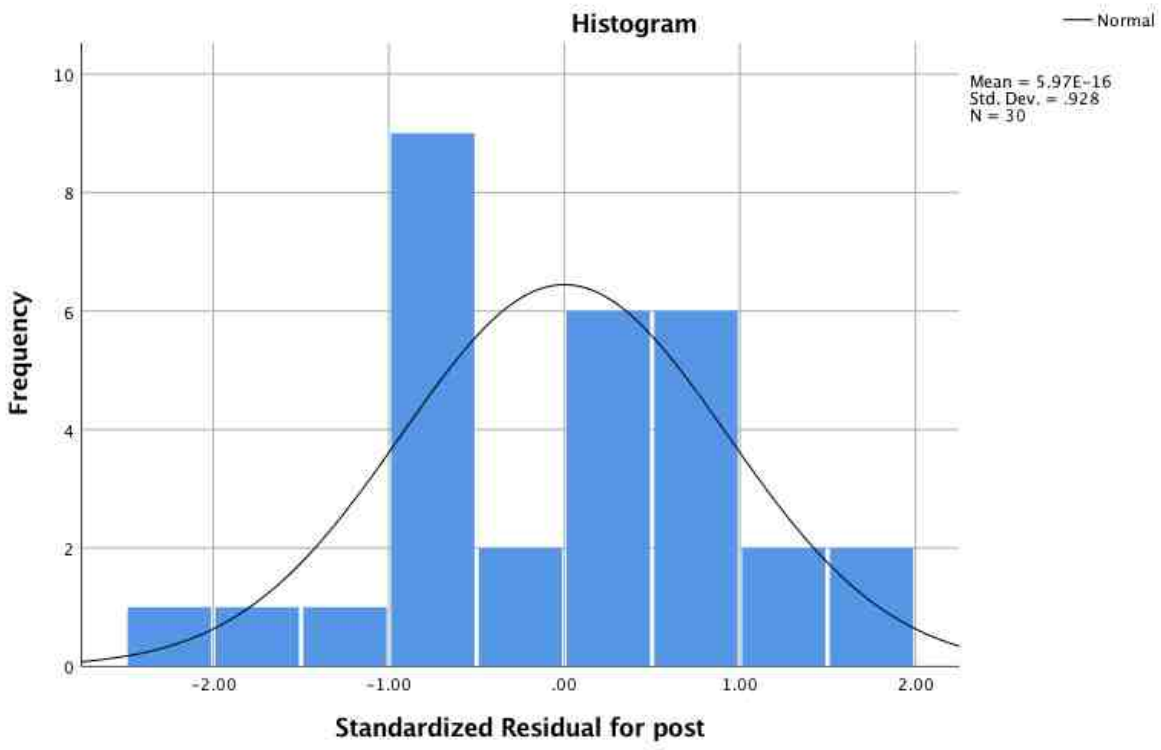

Figure 4.3. Histogram illustrating normal distribution of standardized residuals of posttest.

The ANCOVA testing procedures required the verification of linearity and bivariate normal distribution. Scatterplots were created using SPSS and set with a line of fit at the totals and subgroups. The resulting images revealed a linear relationship between the pretest and

posttest scores by clinical unit upon visual examination of the charts. The assumption of linearity was reasonably met by visual inspection of the scatterplots for each clinical unit assignment group (Specialty Units R^2 Linear = 0.247, Acute Care R^2 Linear = 0.003, Critical Care R^2 Linear = 0.020, Emergency Department R^2 Linear = 0.217; Laerd Statistics, 2017) (see Figures 4.4-4.7). Further analysis of linearity was conducted using bivariate correlation analysis in SPSS. Tests for correlation indicated a moderate negative correlation between pretests and posttests in the specialty units (n = 5, r = -.497; p = .395), a weak negative correlation between acute care unit tests (n = 8, r = -.056, p = .895), a small positive correlation between pretests and posttests in the critical care units (n = 12, r = .142, p = .659), and a moderate positive correlation between pretests and posttests in the emergency department (n = 5, r = .466, p = .429). None of the bivariate correlations were statistically significant (see Tables 4.5–4.8). The sample size for each group were very small. Much larger sample sizes are optimal for obtaining statistically significant Pearson's correlation results. The decision to continue with analysis was made based on r values and visual inspection of the scatter charts (Laerd Statistics, 2017; Warner, 2013).

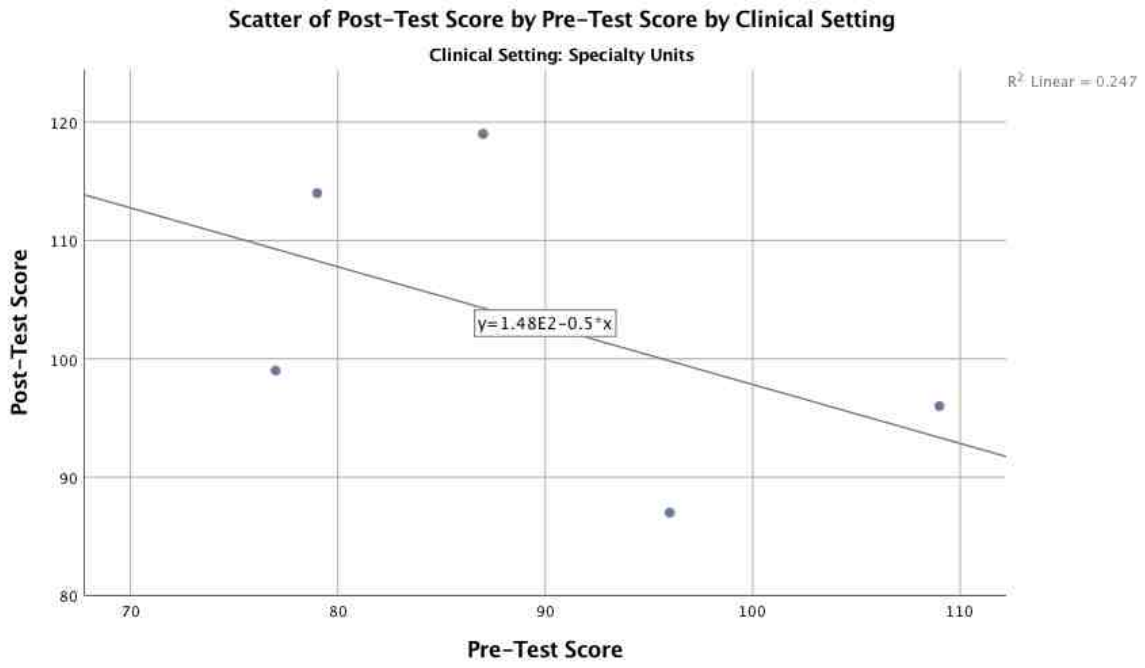

Figure 4.4. Scatterplot visually providing evidence of linearity between pretest and posttest scores for specialty units.

Table 4.5

Bivariate Correlations for Specialty Units

	Posttest score
Pretest score	
Pearson correlation	-.497
Sig. (2-tailed)	.395
n	5

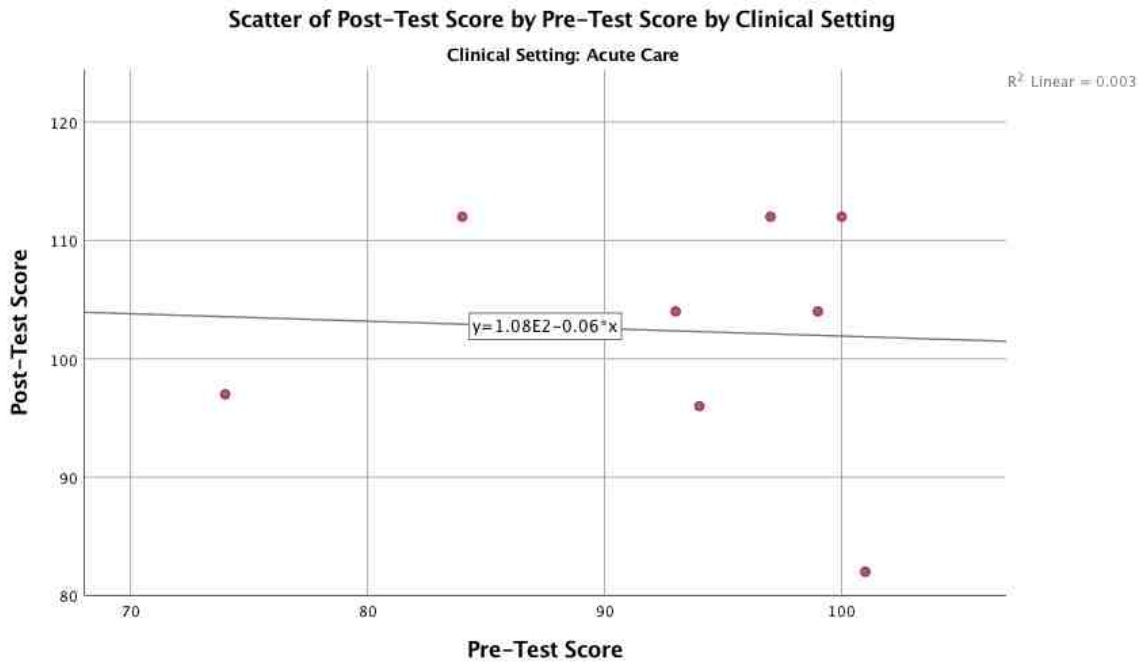

Figure 4.5. Scatterplot visually providing evidence of linearity between pretest and posttest scores for acute care.

Table 4.6

Bivariate Correlations for Acute Care

	Posttest score
Pretest score	
Pearson correlation	-.056
Sig. (2-tailed)	.895
n	8

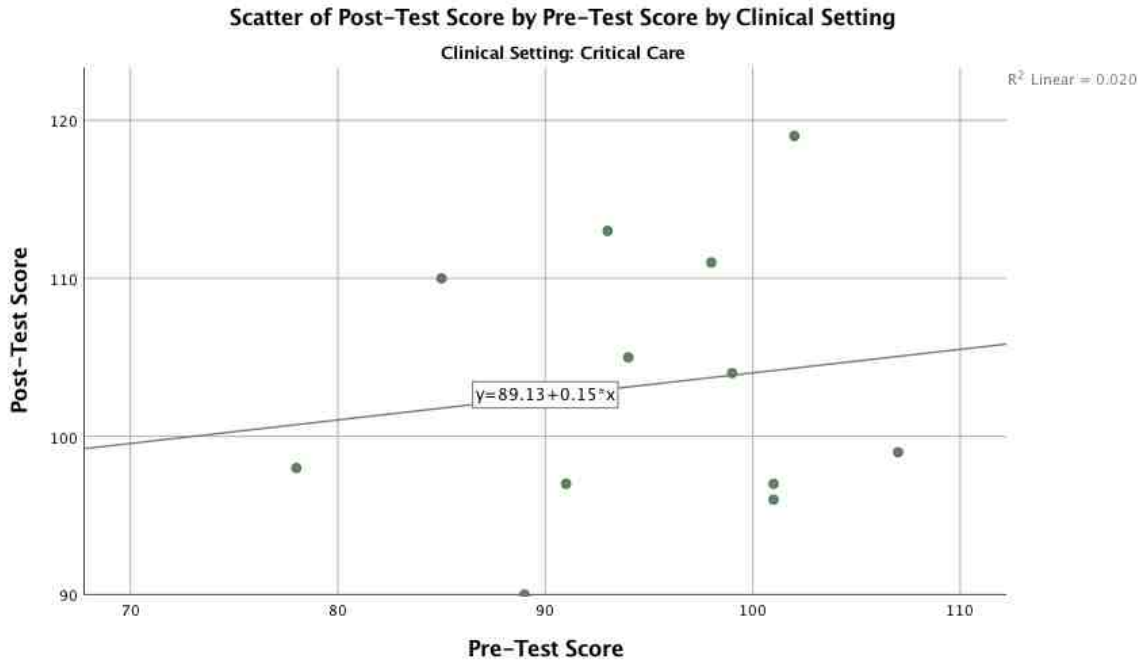

Figure 4.6. Scatterplot visually providing evidence of linearity between pretest and posttest scores for critical care.

Table 4.7

Bivariate Correlations for Critical Care

	Posttest score
Pretest score	
Pearson correlation	.142
Sig. (2-tailed)	.659
n	12

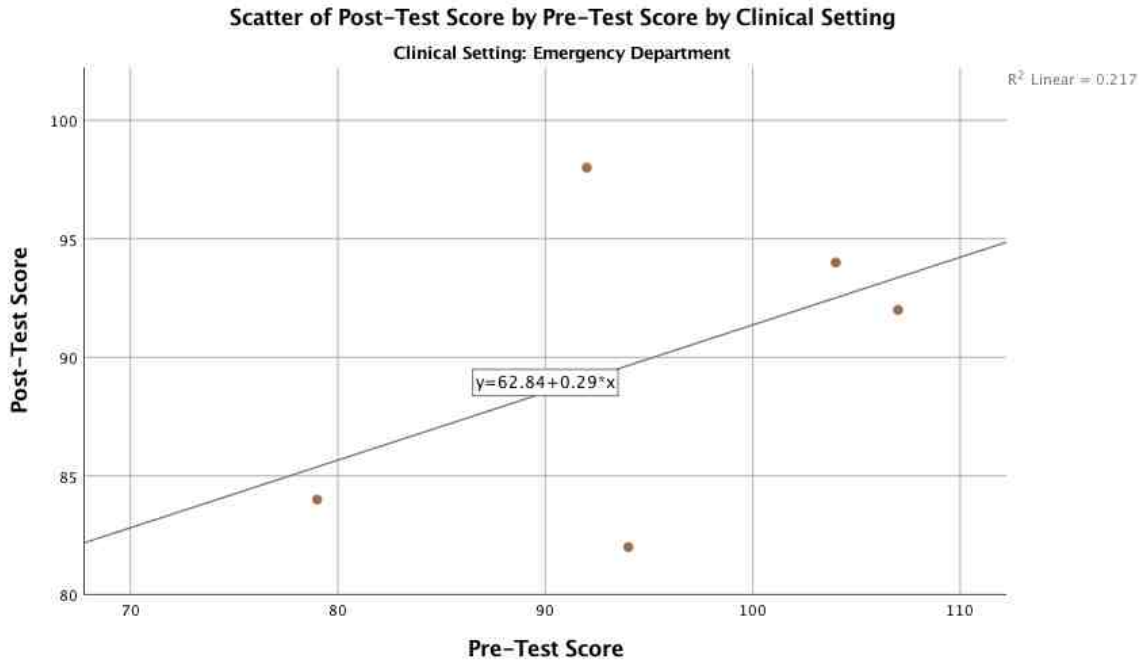

Figure 4.7. Scatterplot visually providing evidence of linearity between pretest and posttest scores for the emergency department.

Table 4.8

Bivariate Correlations for Emergency Department

	Posttest score
Pretest score	
Pearson correlation	.466
Sig. (2-tailed)	.429
n	5

The assumption of homogeneity of slopes was met as determined by the clinical group pretest between-subjects effect score that was statistically insignificant $F(3, 22) = .738$, $p = .541$ (Table 4.10).

Table 4.9

Assumption of Homogeneity of Regression Slopes

Source	Type III Sum of Squares	*df*	Mean Square	F	Sig.
Corrected model	930.087[a]	7	132.870	1.315	.290
Intercept	2916.994	1	2916.994	28.865	.000
clinical	270.492	3	90.164	0.892	.461
pre	2.472	1	2.472	0.024	.877
clinical * pre	223.666	3	74.555	0.738	.541
Error	2223.280	22	101.058		
Total	307771.000	30			
Corrected total	3153.367	29			

Note. Dependent variable = posttest score.
[a]R Squared = .295 (Adjusted R Squared = .071)

Levene's test of Equality of Error Variances (Table 4.11) was conducted to determine that the homogeneity of variances assumption was met, $F(3,26) = .907$, $p = .451$.

Table 4.10

Levene's Test of Equality of Error Variances

F	*df*1	*df*2	Sig.
.907	3	26	.451

Note. Dependent variable = posttest score.
a. Design: Intercept + pre + clinical

The assumption of homoscedasticity was met, indicating that the standardized residuals for the posttest NDMI-R14 scores were approximately equal across the predicted values of the posttest scores by unit group. Visual inspection for fanning, funneling, or other organized array of the graphic display of standardized residuals and predicted values revealed no distinct patterns (Figure 4.8).

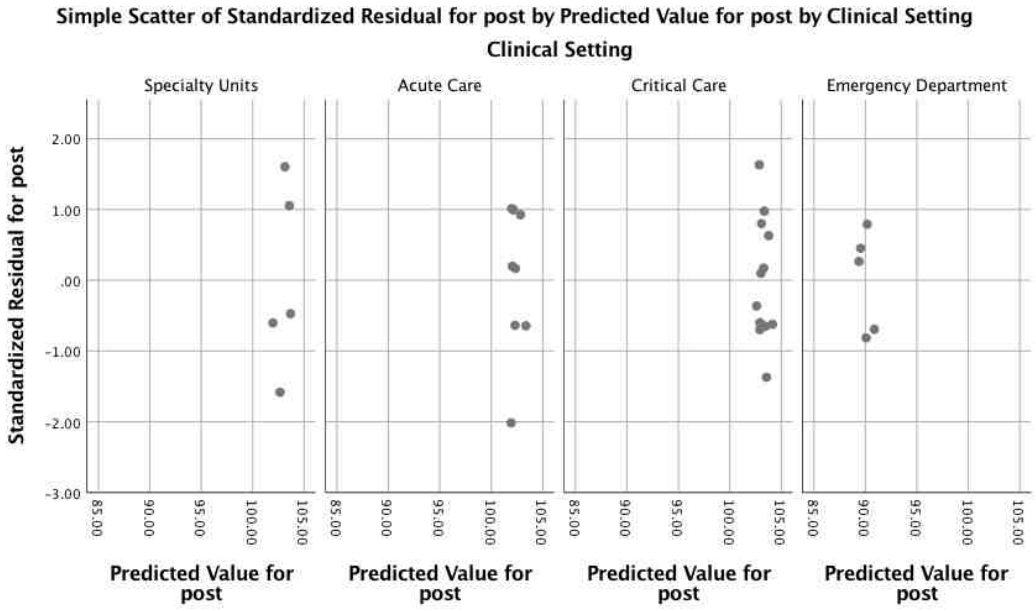

Figure 4.8. Scatterplots illustrating assumption of homoscedasticity.

Hypothesis

The null hypothesis for this study was, "There is no statistically significant difference between posttest scores of students on the NDMI-R14 based on the type of clinical unit placement (specialty, acute, critical, emergency) during culminating clinical experiences when controlling for pretest scores." The researcher tested the null hypothesis by analyzing posttest NDMI-R14 scores of a group of senior BSN students naturally divided into the four designated clinical unit categories as a part of their culminating clinical curriculum. Based on the ANCOVA results, the researcher failed to reject the null hypothesis. No statistically significant difference was found among the posttest scores on NDMI-R14 based on clinical unit assignments when controlling for pretest scores $F(3,22) = 2.332$, $p = .098$, partial eta squared, $\eta^2 = .219$ (see Table 4.12) indicating large effect size (Buchner et al., 2010-2018; Gall et al., 2007). Power analysis shows that the sample size ($N = 30$), statistical power of .8, partial $\eta^2 = .219$, the

number of groups (*df* numerator = 3) generated a large effect size for the study (actual effect size *f* = .53; Buchner et al., 2010–2018).

Table 4.11

Tests of Between-Subjects Effects ANCOVA

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig	Partial Eta Squared
Corrected model	706.421[a]	4	176.605	1.804	.160	.224
Intercept	3158.808	1	3158.808	32.273	.000	.563
Pretest	7.179	1	7.179	0.073	.789	.003
Clinical	684.696	3	228.232	2.332	.098	.219
Error	2446.946	25	97.878			
Total	307771.000	30				
Corrected total	3153.367	29				

Note. Dependent variable: NDMI-R14 posttest score.
[a]R Squared = .224 (Adjusted R Squared = .100)

Finally, a one-way MANOVA test was conducted to assess for differences in means that may have been too slight to be detected in the ANCOVA analysis (Tabachnick & Fidell, 2007). All multivariate assumptions were met, including those assumptions for ANCOVA. Pretest and posttest NDMI-R14 scores were treated as variables and were transformed using a logarithmic process in SPSS (Laerd Statistics, 2017). The new variable was called ComboPrePost and was treated as a third variable for tests of the assumption of equality of error variances and multicollinearity. There was no multicollinearity ($p < .001$, $r = .641$), Homogeneity of variance was shown by Box's M ($p = .828$). Because group sizes were not equal, Pillai's trace, $F(6,52) = 1.303$, $p = .272$, was considered rather than Wilks' Lambda ($p = .271$), which was also not statistically significant. No post hoc testing was indicated for multivariate analysis.

Summary

The research question asked for this study was, "Is there a statistically significant difference between posttest scores of senior BSN students on the NDMI-R14 based on clinical

unit placement group (specialty, acute, critical, emergency) during culminating clinical experiences when controlling for pretest scores?" The null hypothesis answered with, "There is no statistically significant difference between posttest scores of students on the NDMI-R14 based on the type of clinical unit placement (specialty, acute, critical, emergency) during culminating clinical experiences when controlling for pretest scores." After meeting all assumptions required for ANCOVA testing and running the analysis on posttest NDMI-R14 scores while controlling for pretest scores, the researcher failed to reject the null hypothesis. The next and final chapter of this report discusses the implications of the results this research despite the statistical findings and presents opportunities and ideas for future research into how clinical curriculum designs effect student and newly graduated nurses' decision-making cognition.

CHAPTER FIVE: CONCLUSION

Overview

Chapter Five discusses the findings of a causal-comparative study using pretest-posttest design and ANCOVA analysis to consider the implications of clinical unit assignments on the cognitive decision-making processes of BSN students in culminating clinical experiences. The chapter also provides suggestions for practical applications and implications of the study's results and openly discusses limitations the researcher encountered and identified. Recommendations for future research opportunities are provided.

Summary of Findings

A convenience sample of 30 senior BSN students completed the NDMI-R14 instrument before and after experiencing an immersive, block-style, residency-formatted clinical experience (Birks, 2017). The data were downloaded into SPSS and subsequently randomized and clustered by clinical unit assignment prior to ANCOVA analysis. Multivariate testing was then conducted to detect smaller variances in mean scores between all variables (Tabachnick & Fidell, 2007; Warner, 2013). After all assumptions were met, the analysis was conducted. The null hypothesis for this study was, "There is no statistically significant difference between posttest scores of students on the NDMI-R14 based on the type of clinical unit placement (specialty, acute, critical, emergency) during culminating clinical experiences when controlling for pretest scores." There was no statistically significant difference between the clinical assignment groups in either type of analysis, and no post hoc testing was required. Based on the findings of this study, the researcher failed to reject the null hypothesis.

Discussion

The potential loss of 98,000 lives annually due to preventable medical error is a stark reminder of the importance of solid clinical decision-making ability (Ironside et al., 2014). Nance (2008) provided a comparison between preventable medical error and the airline industry, suggesting that the number of lives lost due to medical errors is equivalent to more than 230 full Boeing 747 crashes with no survivors each year. Would travelers consider flying if airplanes were falling out of the sky on an almost daily basis? Yet, patients trust medical staff to make safe and competent care decisions (Nance, 2008). If the purpose of nursing students' clinical experiences is to promote problem-solving skills and improve intuitive decision making, which unit types, if any, may be causally linked to desired changes in cognitive processes (Birks, 2017; Chong et al., 2016; Ironside et al., 2014)?

The results of this study, though not statistically significant, supported and were supported by the work of previous researchers. The purpose of this causal-comparative, nonexperimental, quantitative study was to compare the causal implications of clinical unit assignments on senior BSN students' cognitive decision-making processes. The researcher analyzed participants' posttest scores on the NDMI-R14 while controlling for pretest scores on NDMI-R14. The pretest was administered prior to participants completing approximately 180 hours of an immersive, block-formatted, residency-style clinical experience (Birks, 2017). Clinical experiences were assigned prior to the beginning of the study as a natural part of the university's culminating clinical course curriculum. Each participant experienced the full clinical rotation in one category of clinical unit and, subsequently, completed the posttest (NDMI-R14).

Theoretically, the dyad for this study consisted of Hammond's (1980) CCT and Benner's (2001) NTE theory. Both theories support the movement of professionals across a continuum of decision making from analytical to intuitive. The nursing theorist and researcher Benner (2001), however, surmised that time spent in one area of practice coupled with life experience and didactic knowledge would lead to higher levels of intuitive practice, the more desirable decision-making process according to NTE. In contrast, Hammond (1980), a psychological researcher, believed all individuals move freely along a theoretical cognitive continuum from analytical to quasirational to intuitive while making decisions, with no process considered better than the others. The curriculum of TBSN was grounded in NTE theory, with various levels in the program named after Benner's (2001) theoretical phases, culminating in the advanced beginner phase. Participants in this study were assumed to be advanced beginners by the TBSN educators. However, to achieve higher levels of competency in practice according to NTE, the students must demonstrate higher levels of intuition by becoming less dependent on written guides, faculty or other cues, and checklists. A tenet of NTE suggests that intuition increases over time and experience in one area. The results of statistical analysis of this research do not support that idea; however, the raw scores on NDMI-R14 increased for students assigned to specialty units, acute care units, and critical care units. Each of the posttest scores clustered by those units differed by less than 1 point. Only the emergency department NDMI-R14 scores decreased (from 95 to 90) over the course of the study, approximately a 13-point difference from other units at the end of the study. However, all of the units' scores remained in the intuitive category (> 78) of the CCT scale on the NDMI-R14 (Benner, 2001; Hammond, 1980; Lauri & Salanterä, 2002a).

The research of Parker (2014) and Robert et al. (2014) supports the finding that the emergency department lends itself to more analytical thought processes. The nature of emergency nursing requires the memorization of algorithms, steps, and protocols for a wide variety of situations from trauma care to fundamental nursing skills. Researchers have explored the type of decision-making processes utilized by nurses in various areas of practice during emergency situations and found a correlation between emergency situations and analytical cognition (Parker, 2014).

The clinical selections of the sample groups of this study aligned with the evidence suggesting that nursing students tend to equate very active, higher-acuity patient care units with greater learning (Doyle et al., 2017; Wareing et al., 2017). This is illustrated by the fact that the critical care ($N = 12$) unit group was much larger than the acute care ($N = 8$) and specialty unit ($N = 5$) groups. The emergency departments of the trauma centers affiliated with TBSN place strict limits on the number of students who can experience clinical nursing, accounting for the small number in that unit ($N = 5$). Busy units with high-acuity patients in which students perform many skills may increase student excitement, but the evidence provided by this study supports the work of previous researchers that fast action and skills do not equal significant gains in intuitive cognition (Wareing et al., 2017). Perhaps the tendency for students to equate skills with success springs forth from the emphasis on skills performance in nursing school. Researchers have surmised that students believe they are learning more when they are comfortable and that they are more comfortable doing what they know (Hemberg & Sjoblom, 2018; Ross et al., 2013).

Implications

This importance of this study was defined by the research of Ho et al. (2013), who articulated that it is in the clinical setting that students begin sharpening decision-making skills. To this researcher, the statistically insignificant results of analysis speak as loudly those of significance, because the goal of a NTE-grounded, concept-based curriculum is to increase intuitive cognitive processes as students advance through classroom and clinical experiences.

The challenge for nurse educators is the global focus shift of nursing education from building psychomotor and technical skills to encouraging clinical judgment and strong decision-making to build bedside and organizational leaders (Chong et al., 2016). Historically, the classroom has provided the leadership focus and tested critical thinking ability and the clinical setting was the domain for psychomotor practice, but evidence supports the idea that clinical practice links classroom concepts to professional practice, supporting growth in judgment and decision making (van Graan et al., 2016). Health care organizations seek candidates for hire with exceptional levels of leadership ability, with one defining trait being the ability to make excellent decisions in general and in the face of crisis (Robert et al., 2014). Studies show that many nursing students begin their professional careers in the clinical setting in which they experienced their culminating clinical experiences (Wareing et al., 2017). That evidence and the results of this study suggest that there is work to be done in clinical curriculum design and further research to be undertaken to promote intuitive cognition among nursing students.

The results of this study indicated that most of the students entered their clinical experience with intuitive-level decision-making cognition, which is the goal of concept-based curricula (Giddens et al., 2015). Out of the sample of 30 students whose cases were randomly selected for this study, only two scored below the line of intuitive cognition while making

clinical decisions. In the clinical arena, nursing students apply the use of reasoning using the analytical cues they have learned in the classroom to situations they experience and connect the cognitive neurologic dots to good clinical judgment and deeply rooted, intuitive decision making (Lovecchio et al., 2015; van Graan et al., 2016). This evidence and the results of this study imply a need for a clinical curriculum that is thoughtfully linked to knowledge gained in the classroom (van Graan et al., 2016).

Educators may start by listening to the voices of students who made 6,000 comments in a study carried out by Lea et al. (2017). These students resoundingly expressed that they wanted clinical experiences relevantly linked to classroom teaching and learning, which means deliberately designing clinical curriculum to meet the learning objectives of classroom instruction. The role of the bedside educator may also be crucial in clinical curriculum. Reflecting the results of this study, current research emphasizes the importance of encouraging clinical experiences in slower-paced units where the bedside teacher, whether faculty or nurse preceptor, encourages questioning and fosters problem-solving skills in real time (Hemberg & Sjoblom, 2018; Nielsen et al., 2017). Such intentional design of clinical curriculum from the classroom to the bedside may be the key to improving student experiences and swinging the cognitive continuum pendulum toward intuitive decision making processes.

Limitations

The greatest limitation of this study was the small population from which the sample was taken. Due to academic attrition, the overall population decreased significantly from the originally anticipated size of over 100 students to 80 students. The small sample size limited some of the statistical analysis, specifically tests of linearity, and limits the generalizability of the

study (Warner, 2013). However, due to the immersive clinical model followed by the university and the topic of interest, it was determined to be appropriate to continue with the proposed study.

Further limitations were managed with the causal-comparative design of the study. Because causal-comparative studies occur ex post facto, the researcher maintained a great distance from the student population for the protection of the research subjects from the perception of coercion and for preservation of the research design (Gall et al., 2007; Warner, 2013). Due to hands-off design of this study, the researcher was unable to control clinical assignments or manage extrinsic factors, such as preceptor experience levels, faculty presence during experiences, or staff satisfaction on unit. The researcher also had no control over professor practices during pretest and posttest administration. A script was provided for professors to read verbatim prior to the pretest and posttest (see Appendices I and J), and each of the professors agreed at the onset of the study to administer the test during regularly scheduled class times. The professor who administered the posttest gave students the option to attend class during the time the posttest was administered, causing posttests to be given to a very small number of students in the live classroom setting. The study design and IRB approval allowed for email recruitment letters to be sent by faculty and administration. Therefore, most posttest participants completed the survey without the guidance of the professor.

Finally, to obtain IRB approval, instructions for creating the posttest's unique identifier had to be removed from the script provided for posttest instructions. The inability to share verbal instructions for a complex process provided no support for auditory learners as they completed the posttest.

Recommendations for Future Research

Immediate recommendations include a direct answer to the previously identified limitations of this study, including use of a larger sample and the involvement of more nursing programs. The primary focus of future research should be testing the causal influence of specific variables, such as clinical supervision and bedside teaching. This research strictly considered clinical placement without controlling for or including preceptor experience, approach, or prior education level in the data or analysis. The analytical shift in emergency department scores in this study point to a need for further exploration of correlations between various components of decision making in the emergency setting. Future studies may expand to educational institutions with diversified curricular approaches, including traditional, theoretical, concept based, or competency based, and consider the influence of various curricula on nursing student decision making. Finally, with clinical education leaning toward experiential learning through simulation, a strong recommendation is to consider whether or not simulation experiences move nursing students toward intuitive thinking on the cognitive continuum and in alignment with progress according to NTE (Benner, 2001; Hammond, 1980).

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Appendix A: Nurse Decision Making Instrument-Revised 2014 (NDMI-R14)

(Sirkka Lauri & Sanna Salanterä, 2002)

Listed below are some statements that describe how nurses make decisions in different situations of patients' care. Please read each statement carefully and mark the option that best describes your own action.

	Never or Almost Never (1)	Rarely (2)	Not rarely or not often (3)	Often (4)	Almost always or always (5)
1. I collect as much information from the patient's records prior to beginning care.					
2. I rely on my own interpretations when it comes to defining the patient's condition.					
3. I specify all the items I intend to monitor and ask the patient about based on the information I collect before beginning care.					
4. I make assumptions about potential nursing problems during the first contact with the patient.					
5. I confirm the impression I have formed from information collected by searching for symptoms that support my views.					
6. It is easy for me to make a distinction between relevant and irrelevant information in defining the patient's condition.					
7. I compare information I have received about the patient with my earlier knowledge of similar individual patients' cases.					
8. I compare information I have received about the patient with my					

own experiences in nursing practice.					
9. I compare information I have received about the patient with research knowledge about the nursing care and its impacts.					
10. It is easy for me to see, even without closer analysis, which pieces of information are relevant to defining the patient's nursing problems.					
11. I define the patient's nursing problems objectively on the basis of the symptoms and complaints observed.					
12. It is easy for me to form an overall picture of the patient's situation and major nursing problems.					
13. I devise the patient's nursing plan according to the stages of the nursing decision-making process.					
14. I base the patient's nursing plan on my own nursing views and/or the patient's views on his/her care.					
15. I base the patient's nursing plan on the general regimes prescribed for the patient's disease.					
16. I document without difficulties the general directions concerning the patient's care to the patient's records.					
17. I set target goals for the patient's care that are easy to measure.					
18. I anticipate the impacts of nursing interventions on the patient.					
19. I follow as closely as possible the patient's existing nursing plan for his/her disease and situation.					
20. I anticipate changes in the patient's condition on the basis of					

individual cues even before there are any clear symptoms.					
21. I use specific information about the treatment of the patient's disease when making decisions about nursing care.					
22. I flexibly change my line of action on the basis of feedback on the patient's situation.					
23. I try to find reasons for my own observations of changes in the patient's condition.					
24. It is easy for me to assess the impacts of my actions on the patient's condition.					

Appendix B: Demographic Survey to Accompany Pre-Test NDMI-R14

Create your unique identifier that will be used to link pre-survey data with post-survey data. Please follow the prompts (you may want to log this identifier in a secure place so you can re-enter it during the post-survey):

Enter the **first** and **last** initials of your best friend's name___
Enter the **two-digit date** of your mother's (or closest parental figure's) birth *(the day of the month 01 through 31).* ___
Enter the **two-digit date** of your birth *(the day of the month 01through 31).* ___

1. To what type of unit were you assigned for your clinical experience? All units are categorized through the lifespan to include Neonatal, Pediatric, Adult, and Geriatric care areas.

___**Specialty Units** (Labor and Delivery, Mother and Baby, Postpartum, Rehabilitation, Continuing care, Operating room, Psychiatric care, Hospice/Palliative *or any type of unit not listed in the other categories*)
___**Acute Care** (All pediatric or adult Medical-Surgical or Progressive Care Units)
___**Critical Care** (All neonatal, pediatric, or adult intensive care units)
___**Emergency Department** (All pediatric or adult Trauma Center or non-Trauma Center emergency departments)

2. Please select your age group.

___20-24
___25-29
___30-34
___35-39
___40-44
___45-49
___older than 50

3. **Please select your gender**

___Female
___Male

4. In what range would you consider your current grade point average?

___4.0
___3.5-3.9
___3.0-3.4
___2.5-2.9
___2.0-2.4

5a. Do you have prior experience working in healthcare (as a nurse, tech, aide, or some other healthcare profession)?

___Yes
___No

5b. If you answered “yes” to question #5, how many years of healthcare experience do you have?_____

Appendix C: Post-Survey Unique Identifier Entry

To link pre-survey data with post-survey data. Please follow the prompts to enter your unique identifier (this must be identical to what you entered for your pre-test):

Enter the **first** and **last** initials of your best friend's name___
Enter the **two-digit date** of your mother's (or closest parental figure's) birth *(the day of the month 01 through 31).* ___
Enter the **two-digit date** of your birth *(the day of the month 01through 31).* ___

Appendix D: Permission to Utilize NDMI-R14

From: Blackwood, Shelley [redacted]
Subject: Fwd: Nursing Decision Making Instrument -revised 2014: Request for Permission to Use in Dissertation
Date: August 28, 2017 at 5:54 AM
To: Heart Nurse [redacted]

Grace & Peace,

Shelley

"Christian nursing is a ministry of compassionate care for the whole person in response to God's grace toward a sinful world, which aims to foster optimum health (Shalom) & bring comfort in suffering and death for anyone in need" (Shelly & Miller, 2006, p. 244).

Sent from my iPhone 8

Begin forwarded message:

From: Sanna Salanterä [redacted]
Date: August 25, 2017 at 04:05:09 CDT
To: "Blackwood, Shelley" [redacted]
Subject: RE: Nursing Decision Making Instrument -revised 2014: Request for Permission to Use in Dissertation

Dear Shelley Blackwood,
I Sanna Salanterä am happy to give you permission to use our instrument in the below mentioned format:

- to use the Nursing Decision Making Instrument- revised 2014 (NDMI – r2014) in a dissertation research,
- to reproduce the NDMI-r2014 for each of the study participants to complete in a secure, online format,
- to publish the survey verbatim in the text of my dissertation,
- The instrument is not be altered and should be used in its entirety.
- Participants will be asked to complete a demographic questionnaire, which will allow for appropriate data analysis.
- the original work will be cited properly.

Sanna Salanterä
[redacted]
FINLAND

From: Blackwood, Shelley [mailto:[redacted]]
Sent: 22. elokuuta 2017 6:27
To: Sanna Salanterä <[redacted]>
Subject: Nursing Decision Making Instrument -revised 2014: Request for Permission to Use in Dissertation

Dr. Salanterä,

Appendix E: Letter of Permission from University

[redacted]

April 11, 2018

Chair of the Institutional Review Board
Liberty University
1971 University Drive
Lynchburg, Virginia 24515

Dear Shelley Blackwood:

After receipt of your request to conduct your proposed research entitled *Comparing the Causal Implications of Clinical Unit Placements on Senior Bachelor of Science Nursing Students' Cognitive Decision-Making Processes,* I have decided to grant you permission to conduct your survey-based research at the University [redacted] College of Nursing. This permission is contingent upon approval from the Liberty University IRB and fulfillment of [redacted] IRB requirements.

I look forward to seeing the results of your study.

Sincerely,

[redacted]

[redacted]
Dean
[redacted] of Nursing

[redacted]

Appendix F: IRB Exemption Liberty University

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

August 17, 2018

Shelley Layne Blackwood
IRB Exemption 3308.081718: Comparing the Causal Implications of Clinical Unit Placements on Senior Bachelor of Science Nursing Students' Cognitive Decision-Making Processes

Dear Shelley Layne Blackwood,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under exemption category 46.101(b)(2), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:101(b):

> (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
>
> (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
> (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Please note that this exemption only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at [redacted]

Sincerely,

[redacted]

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
The Graduate School

LIBERTY
UNIVERSITY.
Liberty University | Training Champions for Christ since 1971

Appendix G: IRB Approval from Research Site

August 18, 2018

Dear Dr. Shelley Blackwood:

Your application for the modification of the study entitled *"Comparing the Causal Implications of the Clinical Unit Placements on Senior Bachelor of Science Nursing Students' Cognitive Decision-Making Processes*" has been reviewed and approved for its risks to human subjects by the Institutional Review Board (IRB) at the [redacted] The study is approved through April 17, 2018. Upon completion of the study, it is your responsibility to notify the board.

Please keep in mind that any change in your study could alter your IRB approval status. Any modifications to the study must be approved by the board. If you have any questions, please contact me via email at [redacted].

Respectfully,

[redacted]
Institutional Review Board Chair

Appendix H: Student Recruitment Email

Dear Nursing Seniors:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for an Education Doctoral degree (Ed.D.). The purpose of my research is to compare the implications of clinical unit placements on senior BSN students' cognitive decision-making processes, and I am writing to invite you to participate in my study. If you are a senior [redacted] BSN student completing your clinical rotation this semester, and are willing to participate, you will be asked to complete the following:

1. Create a private, unique identifier using the prompts provided. This should take less than a minute to complete.

2. Prior to your immersion clinical experience, complete the pre-immersion survey. This survey includes 5 demographic questions and 24 questions related to your nursing experiences. This should take about 20 minutes.

3. After your immersion clinical experience, complete the 24 question post-immersion survey. You will also be asked to provide your private, unique identifier on this survey. This should take about 20 minutes.

Your participation will be completely anonymous, and no personal, identifying information will be collected.

To participate, go to your clinical course page and click on the link provided under the research study module:

1. Read the informed consent form and select the response indicating your understanding and consent.
2. Create your unique identifier by following the prompts.
3. Complete the pre-clinical survey prior to the start of your immersion clinical experiences.
4. After you have completed your immersion clinical experience, you will enter your unique identifier (prompts will be provided to help you remember) and complete the post-clinical survey.

The consent document contains more information about my research. You will not need to print or return that document, you will simply click on the button that indicates your choice ("YES" or "NO") to participate or decline participation in the study.

Your consideration is greatly appreciated.

Sincerely,
Shelley Layne Blackwood

Appendix I: Faculty Pretest Script

Script for Participants' Faculty

Read on the day of pretest administration

As you know, you have been invited to participate in the research being conducted by Mrs. Shelley Blackwood. She is completing this research as a requirement of her work in the Liberty University School of Education as she has been working toward her Doctor of Education degree there since 2014.

The purpose of her research is to compare the implications of clinical unit placements on senior BSN students' cognitive decision-making processes. In other words, she is looking at how the units in which you will be completing your immersion experiences affect the way you go about making decisions. The units are divided into four categories and the categories apply to EVERY facility and include the entire lifespan of patients from neonatal through geriatric care assignments.

___**Specialty Units** (Labor and delivery, Rehabilitation, Continuing care, Operating room, Psychiatric care, Hospice/Palliative *or any type of unit not listed in the other categories)*
___**Acute Ca**re (All pediatric or adult Medical-Surgical or Progressive Care Units)
___**Critical Care** (All neonatal, pediatric, or adult intensive care units)
___**Emergency Department** (All pediatric or Adult Trauma Center or non-Trauma Center emergency departments)

This class and your clinical experiences are a required part of your curriculum, but participation in the study is voluntary. If you decide to participate, you will be asked to complete a 24-question decision-making survey and five demographic information questions before and after your immersion experience. You can complete the first part today as soon after I have finished giving this information. You will complete the same survey again in November when you will be asked to provide post-clinical data. It should take approximately 20 minutes for you to complete each survey. Mrs. Blackwood has been approved by both Liberty and this school's Institutional Review Boards. You will need to create a unique identifier for data analysis. The survey software will guide you through this process. The identifier includes your best friend's initials, your mother's two-digit birth date (day of the month 01 through 31), and your two-digit birthdate (day of the month 01through 31). She has taken safeguards to protect your anonymity, like asking for ranges for any demographic information, in addition to protecting your survey data on a secure system.

To participate, log into your computer, get into this class, and click on the Modules link. Once you are in Modules, go to the Research module. Click the Pre-Clinical Survey Link. The first thing that will open is an informed consent statement. Read the form and select the response indicating your understanding and consent. If you have questions, please ask me, or email Mrs. Blackwood at [redacted].

I'll go ahead and give you 20 minutes to complete the survey. Those of you who decide not to participate may work on something else without penalty. The post survey will be administered in November when you come to campus to finish up the semester.
Mrs. Blackwood is extremely grateful to this school and to you for considering participation in her study.

Appendix J: Faculty Posttest Script

Script for participants' faculty

Read on the day of posttest administration

As you know, you have been invited to participate in the research being conducted by Mrs. Shelley Blackwood. She is completing this research as a requirement of her work in the Liberty University School of Education as she has been working toward her Doctor of Education degree there since 2014.

The purpose of her research is to compare the implications of clinical unit placements on senior BSN students' cognitive decision-making processes. In other words, she is looking at how the units in which you completed your immersion experiences affected the way you make clinical decisions. The units were divided into four categories and the categories apply to EVERY facility and include the entire lifespan of patients from neonatal through geriatric care assignments.

___**Specialty Units** (Labor and Delivery, Mother/Baby, Post Partum, Rehabilitation, Continuing care, Operating room, Psychiatric care, Hospice/Palliative *[or **any** type of unit not listed in the other categories]*)
___**Acute Care** (All pediatric or adult Medical-Surgical or Progressive Care Units)
___**Critical Care** (All neonatal, pediatric, or adult Intensive Care Units)
___**Emergency Department** (All pediatric or Adult Trauma Center or non-Trauma Center emergency departments)

This class and your clinical experiences were a required part of your curriculum, but participation in the study is voluntary. If you decided to participate by answering the questions on the pre-clinical survey, you were asked to complete create a unique identifier before you responded to the items. You will complete the post-clinical survey using the same unique identifier. Prompts will be provided, but please enter the same initials and two-digit days of the month you used for the pre-test. It should take approximately 20 minutes for you to complete the survey.

The post-clinical survey does not include the demographic information collection, so you will only be completing 25 total items including the unique identifier and the 24-item Nurse Decision Making Instrument –Revised 2014 survey.

Mrs. Blackwood has been approved by both Liberty and this school's Institutional Review Boards.

To participate, log into your computer, get into this class, and click on the Modules link. Once you are in Modules, go to the Research module. Click the Pre-Clinical Survey Link. If you have questions, please ask me, or email Mrs. Blackwood at [redacted]

I'll go ahead and give you 20 minutes to complete the survey. Those of you who decide not to participate may work on something else without penalty.

Mrs. Blackwood is extremely grateful to this school and to you for considering participation in her study.

Appendix K: Approved Participant Consent Letter

The Liberty University Institutional Review Board has approved this document for use from 8/17/2018 to --
Protocol # 3308.081718

CONSENT FORM

Comparing the Causal Implications of Clinical Unit Placements on Senior Bachelor of Science Nursing Students' Cognitive Decision-Making Processes

Shelley Blackwood
Liberty University
School of Education

You are invited to be in a research study of the impact clinical unit assignments during immersion have on the way senior nursing students process information while making decisions. You were selected as a possible participant because you are a senior BSN student completing clinical rotations this semester as a part of the graduating cohort at [redacted] Please read this form and ask any questions you may have before agreeing to be in the study.

Shelley Blackwood, a doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information: The purpose of this study is to investigate if clinical unit assignments in four different categories (specialty units, acute care units, critical care units, and emergency departments) have a significant impact on the cognitive decision-making processes of senior BSN students.

Procedures: If you agree to be in this study, I would ask you to do the following things:

1. Prior to immersion clinical experiences, you will be asked to enter the research module and create your private, unique identifier using the prompts provided in the instructions. This should take less than a minute to complete.
2. Answer 29 questions on a pre-[redacted] survey (five demographic questions and the 24-item Nurse Decision Making Instrument- Revised 2014 [NDMI-R14]). This should take about 20 minutes.
3. After your [redacted] clinical experiences, you will be invited to enter the research module and enter your private, unique identifier using the prompts provided to help you remember it. This should take less than a minute.
4. Answer a 24 question post-immersion survey (NDMI-R14). This should take about 20 minutes.

Risks: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

Benefits: Participants should not expect to receive a direct benefit from participating in this study. However, your participation may influence the future of clinical nursing education, fill an empirical gap in the body of nursing literature, and potentially influence the future of professional nursing recruitment and new nurse orientation practices.

Compensation: Participants will not be compensated for participating in this study.

Confidentiality: The records of this study will be kept private. Research records will be stored securely and only the researcher will have access to the records. I may share the data I collect from you for use in future research studies or with other researchers; if I share the data that I collect about you, I will remove any information that could identify you, if applicable, before I share the data.

- Surveys will be anonymous. You will be asked to create your own private, unique identifier using prompts provided for your ease of recall. The private, unique identifier will not be linked to you in any way and will only be used to link pre-survey and post-survey responses.

• Data will be stored on a fingerprint-protected, password-locked computer and may be used in future presentations. After three years, all electronic records will be deleted.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University or [redacted] If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey without affecting those relationships.

How to Withdraw from the Study: If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study.

Contacts and Questions: The researcher conducting this study is Shelley Blackwood. You may ask any questions you have now. If you have questions later, you are encouraged to contact her at [redacted] You may also contact the researcher's faculty chair, Dr. Meredith Park at [redacted]

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Liberty University Institutional Review Board, 1971 University Blvd., Green Hall Ste. 1887, Lynchburg, VA 24515 or email at irb@liberty.edu or the [redacted]

Please notify the researcher if you would like a copy of this information for your records.

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

Select one option to indicate your understanding of this document and your desires related to this study:

____Yes, I consent to participate in the study described in this document.

____No, I choose not to participate in the study described in this document.