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SELECTING SUCCESS: ADMITTING ADN STUDENTS WITH THE HIGHEST PROBABILITY OF SUCCESS

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SELECTING SUCCESS:

ADMITTING ADN STUDENTS WITH THE HIGHEST PROBABILITY OF SUCCESS

by

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A DISSERTATION

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Abstract

Declining numbers in healthcare workers are nearing critical levels. In the next few years, more than a million nursing positions are predicted to be needed, increasing the demand on institutions to produce quality and competent graduates in health-related fields. Hundreds of potential students apply for nursing programs each semester, and numerous qualified applicants are denied admission due to limited space, thus placing emphasis on the selective admissions process. This study serves to validate current admissions criteria utilized by the nursing program at Hopkinsville Community College (HCC) to ensure students with the highest probability for success are admitted. Participants include admitted nursing students ($n = 237$) from the Spring 2014 through Spring 2017 admission cycles. Analyzed data focused on NLN PAX-RN entrance exam scores to determine if relationships exist between individual scores and probability for successful completion of the nursing program, as well as passing the NCLEX-RN on first attempt.

Limited current research was available for comparison, but results concluded that the NLN PAX-RN does minimally predict student success. Each of the three individually tested sections on the NLN PAX-RN were evaluated and Mathematic scores have the highest correlation for predicting success. Contrary to the current ideology at HCC, no statistically significant relationship was identified between national percentile scores on the NLN PAX-RN and student success. Discussion on findings from the study and suggested continued research, provide opportunities to more effectively assist with closing the growing divide in healthcare.

Keywords: ADN program, student success, admissions criteria, NLN PAX-RN

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Chapter I: Introduction

Purpose of Study

According to the Bureau of Labor Statistics, the nationwide demand for nurses will reach a critical level in the next five years with over one million positions to fill before 2022 (Bureau of Labor Statistics [BLS], 2017). Numerous factors contribute to the accelerated disparity of the current ratio between qualified healthcare workers and patient. Nursing programs on college campuses have been challenged to support the initiative of providing qualified healthcare graduates to bridge the gap.

The growing nursing shortage and concerns regarding the inevitable impact on healthcare has been emphasized in current literature (Blair, 2014; Blitchok, 2018; Snavely, 2016; Young, 2018). Collaborative efforts between the healthcare industry and higher education are struggling to keep pace with escalating patient demands. Supplemental nursing positons are needed. A better understanding of what precipitated the emergent nursing crisis by identifying some of the contributing factors, will support the need for additional nursing programs, graduates, and positions.

Referring to a specific generation, baby boomers were born following World War II between the years 1940 to 1964 (Johnstone, 2018). Of the 76 million births in the United States during these years, 65.2 million were still alive in 2012 (Pollard & Scommegna, 2014). Projected by 2029 to represent more than one fourth of the population, the approximate 61.3 million baby boomers have a significant contribution to the aging population and demand for elevated medical care (Grant, 2016; Jimenez, 2016; Pollard & Scommegna, 2014).

Defined as an incurable and continual illness that can often be medically managed, chronic diseases or conditions are becoming more prevalent in the aging population (Centers for

Disease Control and Prevention [CDC], 2018). In 2012, nearly half of the reported deaths were contributed to chronic illnesses, and healthcare professionals predict over 164 million new patients will suffer from at least one chronic illness by 2025 (CDC, 2018; Partnership for Solutions, 2004). Considering these numbers, 80% of the population suffers from a chronic condition and 64% with at least two chronic illnesses which validates the need for additional nursing care (Jimenez, 2016).

Similar to the aging population of patients, the average age of working nurses is also on the rise (Jimenez, 2016). Over the next few years, more than one third of the current workforce in nursing will reach retirement age, meaning over 700,000 retirees must be replaced by 2024 (Grant, 2016). These predicted positions are in addition to the 1.1 million nurses needed to satisfy growing patient demands.

Health-related programs represented on college campuses across the nation are also a contributing factor to the expanding shortage witnessed in nursing (Grant, 2016; Jimenez, 2016). Due to the limited space of classrooms, inability to secure qualified faculty members, and continuing federal and state budget cuts, nursing programs are restricted on the number of students admitted each year (American Association of Colleges of Nursing [AACN], 2017).

Despite the fact that nursing is one of the fastest growing career opportunities and the demand for nurses in the United States is dire, institutions turn away a significant amount of highly qualified applicants each admission cycle (Blitchok, 2018). Many of the students denied admission were of the top academic performers at the institution and met all admission criteria successfully (Blitchok, 2018). In 2014, over 35% of qualified applicants were denied admission into nursing programs (National League for Nursing [NLN], 2018). For the past 10 years, more than 30,000 applicants meeting all requirements for nursing programs were rejected (Young,

2018) due to reasons mentioned above by the AACN (2017), specifically the lack of classroom space and qualified faculty to teach the programs.

In 2014, 78% of nursing programs were forced to deny the admission of qualified candidates (NLN, 2018). Institutions are challenged to admit applicants with the highest probability of success within nursing programs. The formidable selection process relies heavily on the validity of admissions criteria. Identifying the most accurate measure of probable success in nursing programs has been inconclusively represented in current research.

Hopkinsville Community College (HCC) is dedicated to providing quality education and graduating competent healthcare professionals. In attempt to support the local and national demand for nurses, HCC has committed to review the current admissions criteria to ensure the most accurate indicator of student success is utilized. Current research is inconclusive regarding which admissions criteria are the best indicators of student success within nursing programs, as well as in predicting students with the highest probability of first time passing the National Council Licensure Examination (NCLEX-RN).

Nursing programs implement a variety of admissions criteria and set standards for acceptance. Depending upon the degree conferred, variations on admission requirements are noted. Students applying to the Associates Degree in Nursing (ADN) at HCC have specified requirements that must be met prior to consideration for admission into the nursing program. Applicants at HCC with all admissions criteria completed are reviewed and considered by an admissions committee. The decision to admit a student is based heavily upon the candidates National League for Nursing Pre-Admission Exam (NLN PAX-RN) score, although research representing the validity of this entrance exam is limited.

Students at HCC are admitted into the ADN program each fall and spring semester, and of the numerous qualified applicants, approximately 40 candidates are granted admission. Consistent with the current literature, restricted classroom space and limited available faculty prevent the admission of additional students at HCC. Currently there are over 300 students vying for the coveted seats in the ADN program. Of those 300 applicants, approximately 10 students per semester will be placed on a waiting list, and will be accepted only if an admitted student decides not to accept the seat. Historically, students admitted into the program confirm their spot, therefore very few students from the waiting list are accepted. Any student that is not admitted into the program must go through the application process each admission cycle.

The purpose of the current study is to evaluate the predictive validity of the NLN PAX-RN when utilized as an admissions requirement. This study will determine the relationship between overall NLN PAX-RN scores and student success. Likewise, an examination of individual sections represented on the NLN PAX-RN will be considered to determine if there is a significant correlation between student success and a specific tested area. Finally, this study will identify any relationships between admission cutoff scores on the NLN PAX-RN and student success.

Research Questions

The following research questions and hypotheses will be addressed in this study:

Research question 1: What is the correlation between individual NLN PAX-RN scores and successful completion of the HCC ADN program?

H_0: There is no correlation between NLN PAX-RN scores and success of students in the HCC ADN program.

Research question 2: What is the predictive power of the combined three individual sections represented on the NLN PAX-RN exam and successfully passing the NCLEX-RN on first attempt?

H_1: There is no combined predictive power of using the three individual sections of the NLN PAX-RN and passing the NCLEX-RN on first attempt.

Research question 3: What is the correlation between NLN PAX-RN scores of admitted HCC ADN students and first time pass rate of the NCLEX-RN?

H_2: There is no correlation between NLN PAX-RN scores and first time pass rates of the NCLEX-RN.

Research question 4: Do students scoring at the 88th national percentage (or above) on the NLN PAX-RN have a higher first time NCLEX-RN pass rate than students scoring below the 88th national percentage?

H_3: There is no statistical difference in national percentage scores on the NLN PAX-RN and first time pass rates of the NCLEX-RN.

Definitions

The following terms and acronyms are used throughout the current study, and have been defined for clarity.

1. Associate degree in Nursing (ADN): A two-year program, typically taught at community colleges, that provides the minimal educational requirements for graduates to sit for certification as a licensed registered nurse (RN).

2. National Council Licensure Examination (NCLEX-RN): State required licensure examination to become an RN and eligible for employment as a nurse.

3. National League for Nursing (NLN): A national organization that endorses academic excellence in the field of nursing through professional development opportunities, testing services, current research, and partnerships to ensure competent and qualified graduates enter the workforce (NLN, 2018).

4. National League for Nursing Pre-Admission Exam (NLN PAX-RN): An entrance exam with three tested areas, designed to assist nursing programs in admitting students with a higher probability of success, and often included in ADN admissions criteria (NLN, 2018).

5. Student success: Students admitted into an ADN program, successfully complete the nursing program within four semesters, and pass the NCLEX-RN on first attempt.

Significance of Study

Identifying factors to predict student success in nursing programs is critical as the shortage of available nurses continues to be of growing concern. Qualified applicants are being denied from programs, thus selecting students with the highest probability of successful completion of the program and obtaining national certification as a Registered Nurse (RN) is priority.

Required criteria for the selective admissions process is common practice in numerous allied health programs. Commonalities in the admission requirements are identified in current research between varying healthcare programs. Such findings support the need to validate specific criteria and statistically confirm that admission policies are capable in identifying potential students with a higher probability for success.

While studies have suggested that a relationship exists between entrance exam scores and student success, many of the studies are dated and have not been recently reviewed. Studies also

have inconclusive findings, leaving admission committees unsure if instruments used to select candidates are valid. Ideally, results from this study will determine the strength of the admissions criteria being utilized at HCC.

Based upon the results of this study, implementation and adoption of best practice during the admissions process at HCC will assist in predicting student success as measured by completion of the ADN program within four semesters and first attempt passing of the NCLEX-RN. By accepting students likely to succeed, HCC will provide qualified and competent nurses in the workforce to help bridge the growing divide in healthcare. Likewise, admission of these students will ensure that more admitted students will succeed, thus reducing the overall cost to both the institution and the students for those who fail to complete the program.

Chapter II: Literature Review

The current critical shortage of nurses in healthcare facilities across the United States, along with the impact from these declining numbers, is predicted to become worse over the next few years. More than 1.09 million nurses will be needed to adequately cover patient needs by the year 2024, meaning an increase in demand of 16% (American Association of Colleges of Nursing [AACN], 2017). Similarly, a substantial number of nurses in the workforce are reportedly over the age of 50 and will be retiring within the next 10 years (Snavely, 2016). Considering this data, over one million nurses will be eligible for retirement by 2024, multiplying the concerns for the future of healthcare.

Nursing positions have an alarmingly high attrition rate, and numerous causative factors must be considered as the nursing turnover has reached a critical point. Reportedly one out of five newly hired nurses leave their job within the first year, and one in three will leave within the first two years (Blair, 2014). Even more surprising, just over 50% of newly graduated nurses will leave the medical profession within three years of beginning clinical work (Snavely, 2016). The high demands of being a nurse, extreme physical and emotional stress, insufficiently staffed work environments with high nurse to patient ratio, a mismatch between personal and organizational values, and lack of organizational and leadership support are just a few examples reported as major contributing factors to the high attrition rate (Blair, 2014; Gillet et al., 2017; Snavely, 2016).

The mounting shortage in clinical nursing can be also be attributed to numerous trepidations within nursing programs across the nation. Nearly 60,000 applicants were denied admission into nursing programs in 2017 due to limited classroom space, clinical availability, and an inadequate number of faculty members available teach numerous sections of nursing

courses (Kavilanz, 2018). Research on the current nursing faculty shortage highlight the obvious unbalanced salary offered to nurses in academia versus those in clinical work as a significant barrier in finding qualified faculty (Nardi & Gyurko, 2013). Despite the demand of nursing graduates, since 2008 at least 30,000 qualified applicants have been denied admission into programs (Young, 2018). Considering these constraints and the current state of healthcare, nursing programs are faced with the daunting task of admitting students who have the highest probability of success during and after the program.

Success can be defined and represented in many ways depending on, and linked to, a variety of different factors. In this study, the definition of student success will remain consistent with the most common definition represented in current literature. The current accepted definition for success includes successful completion of a nursing program within the appropriate time frame, and the first time pass rate on the National Council Licensure Examination (NCLEX-RN) (Schmidt & MacWilliams, 2011). This definition will be used throughout the study as a measure of program success.

Pass rates on the NCLEX-RN vary from state to state, and each state is required by the accrediting body and nursing boards to report the pass/fail ratio for the first attempt on the NCLEX-RN exam. State nursing boards set a minimal benchmark percentage, which is required by all nursing programs within that individual state to meet in order to remain compliant and in good status. The state of Kentucky has a higher than average benchmark requirement for passing. Specifically, nursing programs in Kentucky are expected to have a first time pass rate of 85% or higher to remain in good standing with the Kentucky Board of Nursing (Kentucky Board of Nursing [KBN], 2018).

The NCLEX-RN exam is under perpetual review and updated every three years to assure expected competencies for a newly graduated nurse are accurately evaluated before entering into the medical field (National Council of State Boards of Nursing [NCSBN], 2018). Individual questions are continuously reviewed by the National Council of State Boards of Nursing (NCSBN) to ensure the accuracy and effectiveness of the master question pool (NCSBN, 2018). The exam is proctored by an approved testing center and administered to students via computer. According to the NCSBN (2018), the adaptive computerized exam will end when one of the following occurs: 1. The computer is 95% confident that the student is above the standard pass rate, 2. The student has taken all of the exam questions and is either found to be above or below the standard pass rate, or 3. The candidate runs out of time and has or has not reached the minimum number of required questions, or has reached a minimum number of questions and is or is not above the standard pass rate.

Nursing programs meticulously vet applicants to ensure admission of students with the highest probability of succeeding in the program. Failure to succeed has a palpable impact on the program, the institution, the faculty, the student, and the healthcare field (Tipton et al., 2008). Extensive research has focused on how to identify appropriate admissions criteria that predict student success. Conflicting findings are represented in nearly all current literature with no conclusive evidence in support of the most significant predictor. This gap in identifying effective admissions criteria supports opportunities for a more focused research opportunity of the specific criteria currently being utilized in nursing programs.

Admission Criteria

Historically, college and program admission requirements have evolved to represent a more diverse and talented student population (Beale, 1970). While many academic and non-

academic factors are examined during the admissions process by nursing programs, the three most common admissions criteria noted in the literature reviewed were interview scores, student grade point average (GPA), and standardized testing scores. As discussed in detail below, contradicting findings for each of the three criteria were consistently reported, indicating uncertainty in the validity of utilizing these criteria for admissions.

Interview scores. Incorporation of interviews has provided programs with representation of non-academic factors in the admissions process. Even with the support of interviews represented in current literature, concerns were identified by many groups (Deluca, 2012; Edwards, Johnson, & Molidor, 1990; McNelis et al., 2010). For example, prior to the interview, review of all submitted applications is complete and academically strong students have been identified. With academic markers identified, the likelihood of biased opinions greatly increases and several studies expressed concerns with utilizing interviews as criteria to admit students due to this represented biased factor (McNelis et al., 2010).

Another apprehension concerning the usage of interviews was identified by the manner in which each candidate is rated or scored. Inconsistencies of the rating for interview scores, committee members represented on the interview panel, and the degree of structure represented in the interview design all play a role in the validity of using interviews as admissions criteria (Edwards et al., 1990). Many institutions provide a scale for scoring individual applicants as well as a list of desired traits or characteristics to improve consistency within the interview process and assist in deciding admission (Deluca, 2012). However, Deluca (2012) still reported significant concerns with consistent findings of erratic ratings.

Contrary to the research showing problems with the interviews in the admissions process, many studies highlighted that interviews increase the diversity of student population represented

in healthcare related programs (Schmidt & MacWilliams, 2011). Statistically, the numbers for nursing programs and employed nurses show a serious need to improve diversity. Minority populations in nursing over the past few years have been improving, however are still extremely underrepresented. In 2000, only 12% of Registered Nurses (RNs) were minority nurses (McNelis et al., 2010) compared to 24.6% in 2018 (Nursing Statistics, 2018). Minimal diversity within the healthcare field has been recognized as problematic by numerous associations, institutions, and research groups.

Gender gaps are also exemplified, with men in the RN field representing only 10.7% (Data USA, 2018). Limited studies have been focused on the recruitment and representation of male nurses (Stanley et al., 2016). In an environment historically dominated by women, a shift in the promotion of gender diversity has been appreciated in current literature (Olson, 2014). Even with challenges identified for men in nursing, the advantages for male nurses have been utilized as a recruitment tool for programs and employment (Stanley et al., 2016). Still, the negativity and stereotypes that surrounds men in nursing hinder male students from pursuing the career (Rajacich, Kane, Williston, & Cameron, 2013; Stanley et al., 2016).

Cultural, ethnic, and gender diversity increased in some nursing programs from 2% to as high as 25% after the implementation of interviews as required admissions criteria (McNeils et al., 2010). Interviews also provide an opportunity to accentuate personality and characteristics not reviewable or demonstrated through standardized testing or GPA (Trice & Foster, 2008). While academic factors arguably have solid validity for candidate consideration, non-academic influences, such as interviews, provide valuable information not represented in academia. Applicant's personality and desirable traits such as compassion, empathy, ability to establish and maintain relationships, authenticity, motivation, and intent are not measurable by a standardized

test, yet provide valuable insight for the admissions committee and can be demonstrated during interviews (Rosenberg, Perraud, & Willis, 2007).

Despite the sentiment expressed by Rosenberg et al., (2007), incorporating interviews as a predictor of academic success provided conflicting results in research conducted by the Indiana University School of Nursing. The research focused on the addition of interviews to admissions criteria, concluding that the information obtained from interviewing candidates was beneficial, but agreed more data was needed to conclusively say that interviews helped predict success (McNelis et al., 2010). Schmidt and MacWilliams (2011), however, concluded that interviews increased the diversity of selected applicants, however was only slightly predictive of students that are more likely to drop out of the program as opposed to predicting those more likely to pass the required NCLEX-RN. Contrary to these findings, several researchers concluded that interviews do predict the success of students (Alaki, Yamany, Shinawi, Hassan, & Tekian, 2016; Goho & Blackman, 2009). Research surrounding interviews noted that gender and ethnicity was shown to have little predictive advantage of overall success; however, the research often noted that the age of the student and the primary language spoken were found to be significant predictors of first time pass rates on the NCLEX-RN (Sears, Othman, & Mahoney, 2015).

Review of the current literature provided inconclusive conclusions on the significance of incorporating interviews as part of the admissions criteria for nursing programs to predict success. However, all literature reviewed agreed that interviews assisted in improving the diversity of admitted candidates. Likewise, interviews were consistently deemed useful in the overall process for admitting students; however, the significance of impact from interviews varied. Prediction of student success based off of the inclusion of interviews was inconclusive.

Grade point average. The most common predictor of student success utilized during the nursing program admissions process is the quantitative values from student GPA (Schmidt & MacWilliams, 2011). Numerous programs considered the overall or cumulative GPA of applicants prior to entering into the nursing program, while others only considered how students performed academically in specified prerequisite courses for the GPA consideration. Science and math courses were the two most common prerequisite course GPAs assessed for admission into nursing programs. As with the previous research, opposing conclusions regarding the validity of GPA as a predictor of success were represented in the current literature.

For example, according to findings from Sears et al. (2015), pre-nursing GPA is a significant predictor of first time NCLEX-RN pass rate. Early research conducted on indicators of student success within nursing programs recognized cumulative GPA as the most accurate predictor used by admissions committees when selecting candidates (Daley, Kirkpatrick, Frazier, Chung, & Moser, 2003). In some studies, a positive correlation was identified between higher GPAs, successful first time pass rate on the NCLEX-RN, and overall success in the nursing program (Daley et al., 2003; Feldt & Donahue, 1989). Frith, Sewell, and Clark (2008) found that higher GPAs were a predictor of passing the NCLEX-RN on the first attempt; whereas. lower academically performing students were more likely to fail the NCLEX-RN. In research conducted by Bosch, Doshier, and Gess-Newsome (2012), cumulative GPA was indicated as the best predictor for NCLEX-RN failure.

Several research groups identified individual course GPAs, specifically Biology and Chemistry, as more likely to be predictive of student success (Simon, McGinniss, & Krauss, 2013). Terminal grades for Anatomy and Physiology and Pathophysiology were the only two courses found statistically significant as a predictor of NCLEX-RN success rates by Daley et al.

(2003), where Rancoli, Lisanti, and Falcone (2000) could not conclusively identify specific science courses as more predictive. Research conducted at Arizona State University identified students receiving a grade of B or higher in Pathophysiology as significantly more likely to succeed in the program and on the NCLEX-RN (Herrera & Blair, 2015). In one study, science specific GPAs were shown to be significant predictors of on-time graduation; however, this particular study did not examine the impact of GPA on NCLEX-RN pass rates (Seago, Keane, Chen, Spetz, & Grumbach, 2012).

Contrary to the support of GPA as a predictor of student success, other studies suggested no relationship between GPA and overall success. For example, a detailed study on predicting nursing success by Blackman, Hall, and Darmawan (2007) reported that pre-nursing GPA had minimal predictive validity on overall success in the nursing program. Similarly, Uyehara, Magnussen, Itano, and Zhang (2007) found no significant correlation between student GPA prior to entering into the program and first time NCLEX-RN pass rate. Neither Anatomy and Physiology or Biology I and II were found by Beeman and Waterhouse (2001) to be significant predictors of student success. These findings were partially repeated by Tipton et al. (2008) who concluded that GPA of certain specified courses which are required by nursing programs were useful in predicting NCLEX-RN pass rate; however, they reported that overall GPA was not an indicator of success.

While prior GPA had significant validity in predicting nursing school success in several studies, a vast majority of the reviewed literature focused heavily on student GPA while enrolled in nursing school as the best predictor of NCLEX-RN pass rate. Students with higher GPA in nursing courses consistently showed a higher pass rate on the NCLEX-RN than did students with lower GPA (Tipton et al., 2008). Corroborating studies concluded that students with fewer C's in

nursing courses were more likely to pass the NCLEX-RN on first attempt (Crow, Handley, Morrison, & Shelton, 2004). Arizona State University examined nursing courses that consistently have lower academic performance and therefore representing the lowest grades received during the nursing program and found conclusively that students doing poorly in these classes were more likely to fail the NCLEX-RN (Herrera & Blair, 2015).

Nationally, the average benchmark for passing nursing courses is 73%, meaning any student averaging a score below 73% for the final grade will subsequently fail the class and must reapply to the program for readmission into the semester (Norton et al., 2006). Limited research could identify an exact nursing school predictive GPA for indicating success, however Frith et al. (2008) concluded that a GPA of 3.14 was an indicator of success on the NCLEX-RN where a GPA of 3.07 or lower indicated a higher probability of failure. This small range indicates that even one grade letter or one course could be the difference between student success or failure on the NCLEX-RN. To ensure academic preparedness in the nursing program, strong nursing faculty, clear organization of nursing courses, and effective content delivery are a necessity (Simon et al., 2013).

Regarding specific courses, some studies have indicated that particular courses within the nursing program were better predictors of student success, suggesting these courses could identify the students more likely to fail the NCLEX-RN. Nursing Foundational Principles, often taught in Nursing I, were found to be highly predictive of student success. Similarly, Medical/Surgical course grades correctly identified 78.4% of students that failed the NCLEX-RN (Simon et al., 2013). Other studies supported the importance of Medical/Surgical nursing courses, as well as added Pathophysiology as a strong indicator (Alameida et al., 2011; McGahee, Gramling, & Reid, 2010). In one study, Pathophysiology was found to be statistically

a very strong indicator of student success, wherein students receiving a grade of A in the course were ten times more likely to succeed than students receiving a grade of C (Seldomridge & DiBartolo, 2004). Students performing academically strong in the first two nursing courses were consistently found to be more likely to pass the NCLEX-RN upon first attempt (Tipton et al., 2008). Ukapabi (2008) concurred that Nursing Fundamentals was a solid indicator of student success, but added Mental Health and Pharmacology as predicative courses. Students with lower GPA in the first nursing semester were not only more likely to fail the NCLEX-RN, but also predicted to do poorly or fail the second semester nursing (Blackman et al., 2007).

While some studies disputed exact percentages of predictive GPA and what percentage constituted a C letter grade, the majority of reviewed literature agreed that nursing GPA was statistically significant in predicting first time success on the NCLEX-RN. Contrary to these findings, Uyehara et al. (2007) found no significant correlation between nursing GPA and predicting NCLEX-RN pass rate. Overall the reviewed literature supported nursing school GPA to be consistently found as one of the most accurate predictors of student success (Crow et al., 2004; Daley et al., 2003; Herrera & Blair, 2015; Romeo, 2013; Seago et al., 2012; Sears et al., 2015; Tipton et al., 2008).

Standardized testing. Considering the current shortage of healthcare workers, identifying students with a higher probability of completing the nursing program successfully and passing the NCLEX-RN exam on the first attempt is a high priority for nursing faculty and their institutions. Standardized testing has been used by nursing programs since the 1930's (Shultz, 2010). A variety of entrance exams and standardized tests were identified in the reviewed literature as currently being used to predict student success including but not limited to: The Scholastic Aptitude Test (SAT), the American College Test (ACT), the National League for

Nursing Pre-Admission Exam (NLN PAX-RN), the Test of Essential Academic Skills (TEAS), and the Health Education Systems, INC Exam (HESI).

Despite the popularity of using standardized testing in admissions criteria, concerns were raised in research conducted by Wang and Yeh (2005). This study emphasized that many students are not properly prepared academically or emotionally prior to applying for nursing programs that would require an entrance exam. Their work concluded that the emotional stress of preparing for and taking an entrance exam could potentially eliminate academically strong students with a high probability of succeeding from being admitted (Wang & Yeh, 2005).

Emphasis on the high level of test anxiety for nursing students was studied by Zargarzadeh and Shirazi (2014). Reportedly more than 30% of students admit to having severe test anxiety (Ejei, Rezaei, & Gholamali, 2011). Nursing students report the limited space for admission into programs adds to the stress of entrance exams (Beggs, Shields, & Janiszewski-Goodin, 2011). Elevated levels of anxiety during exams has been linked to loss of concentration, second guessing cognitive ability, physical illness or discomfort, minimal motivation, and overall significant decrease in academic performance (Dongfang & Bo, 2017; Enright, Baldo, & Wykes, 2000; Hancock, 2010). Anxiety during entrance exams can result in an eight percent drop in the score, sparking concerns on the validity of entrance exams (Cassidy & Johnson, 2001; Dongfang & Bo, 2017).

While disadvantages of standardized testing have been noted, they remain a significant component of most nursing programs' admission requirements (NLN, 2018). The following will briefly discuss each of the most popular standard exams used by ADN nursing program for admission. A more detailed discussion on the NLN PAX-RN will be emphasized as that particular exam reflects the purpose of this study.

An assortment of research teams identified the SAT and the ACT as two of the most common and traditional standardized tests reviewed during the admissions process in many programs (Crow et al., 2004; Frith et al., 2008; Gallagher, Bomba, & Crane, 2001; Schmidt & McWilliams, 2011; Wolkowitz & Kelley, 2010). Conflicting research on the validity of standardized tests offered no conclusive evidence that either of these tests accurately predict student success. While many groups supported the SAT as a significant predictor of student success and correlated a high SAT score with passing the NCLEX-RN (Alameida et al., 2011; Beeson & Kissling, 2001; Rancoli et al., 2000; Stuenkel, 2006), others did not agree with these findings. Conflicting studies by Beeman and Waterhouse (2001) and Crow et al., (2004) concluded that SAT scores were inversely related to NCLEX-RN pass rates. Haas, Nugent, and Rule (2004) concluded that overall SAT scores were not predictive of student success; however, the Verbal scores alone did predict NCLEX-RN pass rates.

Of the studies discussed above, those in support of the SAT as a predictor of NCLEX-RN first time pass rates were also in support of the ACT as an indicator of success (Alameida et al., 2011; Beeson & Kissling, 2001; Rancoli et al., 2000; Stuenkel, 2006). Likewise, Sayles, Shelton, and Powell (2003) found a strong correlation between higher ACT scores and students passing the NCLEX-RN on first attempt. The ACT assess English, Math, Reading, Science, and an optional Writing section of which Higgins (2005) and Sayles et al. (2003) found only Math and Reading sections to be predictive of NCLEX-RN success. Additionally, at the community college level, nursing programs found a significant correlation between students scoring low in Reading sections being more likely to fail the NCLEX-RN (Gallagher et al., 2001).

Contrary to those studies, Tipton et al. (2008) did not support Math or Reading as indicators for success. Similarly, Lengacher and Kelly (1990) concluded that neither Math nor

English sections of the ACT were significant in predicting student success. Wolkowitz and Kelley (2010) determined the ACT often reports scores below expected performance, suggesting the weighted score of each section is not accurately represented by an unweighted composite score. Many studies supported pre-nursing science courses as indicators of nursing program success, yet very few standardized tests incorporate a science section, potentially limiting the validity of standardized tests as a measurement of success (Wolkowitz & Kelley, 2010).

Admissions criteria required by several nursing programs assesses potential candidates by administering an entrance exam. Unlike the ACT, the TEAS test has a weighted composite average where English is weighted heavier than math, then reading, and finally science (Wolkowitz & Kelley, 2010). Support for nursing programs to adhere to a predetermined benchmark score on the TEAS test as an indicator for student success was emphasized by Bremner, Blake, Long, and Yanosky (2014). Their findings were similar to those found by Newton, Smith, Moore, and Magnan (2007) who concluded the TEAS test was a predictor of early nursing school success, but not correlated to NCLEX-RN pass rates. Research from Ukpabi (2008) identified the TEAS as a strong predictor of student ability to pass the NCLEX-RN on first attempt with applicants that score 78 or higher on the TEAS.

Elsevier's HESI admissions exam incorporated into nursing admission requirements was found to be significant in predicting first-semester nursing success (Chen & Voyles, 2013). Consistent with this research Yoho, Young, Adamson, and Britt (2007) reported that the comprehensive reading score on the HESI was the best indicator of success. More current research found conflicting results and concluded comprehensive reading was not specifically correlated with success in the program or on the NCLEX-RN (Chen & Voyles, 2013). Furthermore, Chen and Voyles (2013) reported all tested sections were observed to be positively

correlated and significant in predicting student success in the first two nursing courses, and the Math section was found highly significant for nursing Pharmacology courses. Contrary to these findings, Tipton et al. (2008) found no significant correlation of entrance exam comprehensive Reading or Math to passing the NCLEX-RN.

While entrance exams have been a primary focus of predicting success, HESI exit exams have also been studied for validity. The HESI exit exam with a benchmark score of 850 or higher was identified as a strong predictor of NCLEX-RN pass rate (Barton, Wilson, Langford, & Schreiner, 2014). Numerous research groups support the addition of HESI exit exams to nursing programs, concluding the exam is a dominating indicator for NCLEX-RN first time pass rate (Alameida et al., 2011; Frith et al., 2005; Harding, 2010; Lauchner, Newman, & Britt, 2008; Morrison, Adamson, Nibert, & Hsia, 2005; Sears et al., 2015;). Substantiating these findings, Barton et al. (2014) reported the HESI exit exam as accurate as 99.16% in predicting NCLEX-RN success.

Isolating the most accurate nursing school admissions criteria to predict both successful and unsuccessful candidates is minimally represented in current literature (Bennett, Bormann, Lovan, & Cobb, 2016). Much of the represented research uses data to predict students with higher probability of success, but does not utilize the same data to deduce students with high probability of failing. Focused on providing quality data to ensure the most accurate information for programs to utilize during the selective admissions process, the National League for Nursing (NLN) uses a variety of research methods for continual evaluation of the ability to and process of predicting student success (Kaufman, 2012).

Since 1987, educators and leaders of the nursing community gather annually to discuss all collected data and make suggestions to improve the overall training of nurses and enhance

current healthcare practices (Grady & Adams, 2015). The overall mission and vision of the NLN supports the improvement of nursing programs to ensure quality education and competent nurses to enrich the inclusive healthcare workforce (National League for Nursing [NLN], 2018). By providing a plethora of resources, networking, professional development, and grant opportunities, the NLN (2018) is dedicated to improving higher education and the medical community.

One of the most common assessment exams required by nursing schools for admission is the NLN PAX-RN, a tailored exam created by the NLN to assist the admissions process in predicting students likely to succeed in nursing programs (NLN, 2016). Redesigned in 2016 to ensure higher validity and better accuracy, the NLN PAX-RN is a computerized exam consisting of multiple choice questions chosen at random from over 1000 available test bank items to make every exam a unique and individual test (NLN, 2016). The test was developed as a specific tool to be utilized by nursing program to predict student success.

As with other standardized exams, the NLN PAX-RN assesses content by scoring three sections individually as well as computing a weighted overall score (NLN, 2016). The comprehensive score is calculated into a national percentile for comparisons of all students across the United States completing that particular NLN PAX-RN exam (NLN, 2016). The exam does not set pass or fail precedents, instead provides the national comparison to assist individual programs in gauging academic ability of applicants.

Preparing for the NLN PAX-RN exam can be daunting for potential nursing students. To aid in this preparation for nursing entrance exams, Swick and Callahan (2016) provide a detailed breakdown of the content covered on the NLN PAX-RN. Three separate subsections are assessed in 60 minute increments. Consisting of 40 questions, the Mathematics portion covers topics such

as, but not limited to: Algebra, Geometry, word problems, charts, ratios, percentages, and

fractions. The Science subsection has 60 questions comprised of content from Biology,

Chemistry, Anatomy and Physiology, Genetics, and Development. Finally, the 60 questions on

the Verbal Skills addresses the students' ability to understand vocabulary, analogies, verbal

reasoning, reading comprehension, spelling, grammar, and root words. (Swick & Callahan,

2016)

To interpret the composite scores ranging from 0 to 200, the NLN provides a computed

percentage from 0 to 99. This percentage is not reporting the number of questions answered

correctly, but instead is calculated from a reference group that recorded raw scores lower than

the individual taking the test (Santa Monica College, 2017). Providing this information allows

students and institutions the opportunity to compare an individual applicant's performance in

relation to all others testing with the same exam. According to the NLN Testing Services (2016),

a student scoring a 150 on the NLN PAX-RN would be at the 99 percentile. Whereas, a student

scoring a 100 on the same NLN PAX-RN test would be ranked at the 48 percentile (NLN

Testing Services, 2016). Based on the reported national norms, institutions and faculty decide on

a benchmark percentile for applicants to be considered for admissions.

Improving the admissions criteria to more effectively predict student success improves

retention of students and increases graduation rates, therefore affecting the overall numbers of

healthcare workers available to serve patient needs (Bissett, 1995). Nursing programs represent

some of the highest attrition rates in education (Stickney, 2008). While NCLEX-RN pass rates

are used to assess the effectiveness of nursing programs, Giddens (2009) questions the validity of

reporting high NCLEX-RN pass rates when a very low percentage of admitted nursing students

finish the program and take the NCLEX-RN. According to a study on factors that contribute to

attrition, Stickney (2008) emphasizes the need to identify at-risk students during the admissions process to address and improve the elevated attrition rates. Suggestions on a solution included pre-admissions entrance exams, specifically the NLN PAX-RN which was found to be the most accurate predictor of student success (Campbell & Dickson, 1996; Stickney, 2008).

Community College Nursing Programs

To meet the demands and challenges facing current and future healthcare, community colleges across the nation are struggling to provide adequate enrollment space and qualified faculty to close the growing gap. For more than 60 years, community colleges provided the majority of entry-level healthcare professionals in the workforce (Mahaffey, 2002). More than 37% of qualified candidates were rejected from admission into an associate degree in nursing (ADN) program at community colleges across the United States in 2014 (NLN, 2018). This number is down from the 45% of students turned away in 2012 (NLN, 2018). Even with a high percentage of qualified students denied admissions into a program, more than 60,000 students graduated from an ADN program in 2008 in comparison to the 35,000 that same year that graduated from a four-year baccalaureate program (NLN, 2018).

Community colleges are important to the healthcare community as they provide quality, effective, affordable, and accessible education (Skillman, Keppel, Patterson, & Doescher, 2012). Research specifically focused on community colleges and improving the overall admissions is reviewed by administrators and faculty to assist in making decisions or implementing program changes, yet the information and data are often outdated and conflicting (Mahaffey, 2002). Community college ADN programs are supported by the American Association of Colleges of Nursing (AACN) and acknowledged as having a significant impact to the medical environment (AACN, 2017).

In the state of Kentucky, students have an opportunity to apply to 41 different ADN programs (KBN, 2018). Successful completion of an ADN program requires 65-70 credit hours, including general education and nursing courses. Typically, programs will be designed to take students five to six semesters for graduation with the first and often second semester reserved for general education courses. While there are numerous ways to gauge program success, NCLEX-RN pass rates is a popular indicator reviewed (KBN, 2018).

Kentucky sets high expectations for ADN graduates with an NCLEX-RN pass rate of 85% or higher which exceeds NCLEX-RN scores (KBN, 2018). Each year, more than 1,000 nursing positions are opened for employment, which means an overall outlook for nursing positions is predicted at 20% every year (Registered Nursing, 2018). With over 69,000 employed nurses, Kentucky still feels the impact of the healthcare shortage and predicts an increase in nursing demand by more than 36% over the next seven years (Patrick, 2017). Kentucky acknowledged the immediate need to combine efforts between healthcare and higher education to strategically plan for the future in nursing (Patrick, 2017).

Kentucky Community Technical College System

Serving nearly 875,000 students, 16 community colleges across the state of Kentucky make up the Kentucky Community Technical College System (KCTCS, 2018). Originally apart of the University of Kentucky, 14 institutions and 15 technical colleges from Kentucky Workforce Development were combined in 1998 to establish KCTCS. Now the largest postsecondary education provider in the state, more than half of graduates in the state of Kentucky started the college journey with one of the KCTCS community colleges (KCTCS, 2018).

Implementation of a new strategic plan in 2016 focuses on elevated program and institutional performance and improving affordability, accessibility, and engagement (KCTCS, 2018). Supporting student success, KCTCS (2018) mission and value highlights the responsibilities of institutions to: be more responsive to students and the community, deliver information to students with innovative and flexible methods, provide clear communication, sustain continuous assessment for improvements, and promote diversity.

Each of the KCTCS community colleges offers an ADN program with selective admissions criteria required of all potential students. Data from individual colleges reported 12 of the 16 colleges required an acceptable entrance exam score for admission into the nursing program (KCTCS, 2018). Several colleges specifically utilize the NLN PAX-RN for selecting students. Reportedly, nine out of sixteen KCTCS colleges require the NLN PAX-RN; however, of those nine colleges, three have an "either/ or policy" and will accept other admissions criteria such as a high ACT score in place of the NLN PAX-RN (KCTCS, 2018). The HESI entrance exam was required by two of the sixteen colleges and one other college would accept either the HESI or the TEAS entrance exam (KCTCS, 2018).

First time pass rates on the NCLEX-RN for all institutions are reported by individual states' Board of Nursing. In Kentucky, the Kentucky Board of Nursing maintains records of first time pass rates for five consecutive years (KBN, 2018). This allows colleges to compare program effectiveness amongst other two-year institutions as well as four-year universities. Likewise, reporting the passing rates maintains clear records for the Board of Nursing to track trends in nursing and assure compliance and good standing of each institution.

First time pass NCLEX-RN results in 2017 supported the high initiative expected by the state of Kentucky and by KCTCS. Of the six KCTCS colleges that require the NLN PAX-RN for

admission into the nursing program, a range of 13 to 114 represented the number of students per program taking the NCLEX-RN, with an average at 56.67. Of this particular group of students that tested, KBN (2018) reported a range of 84.5 to 100 percent first attempt pass rate, with an average of 91 percent. Three KCTCS colleges will accept the NLN PAX-RN or other admissions criteria in place of the entrance exam. Of these, a range of 17 to 64 students took the NCLEX-RN, with an average of 48 students. Reportedly, a range of 88 to 94 percent passed on the first attempt with an average of 91 percent passing. Requiring an entrance exam other than the NLN PAX-RN, three KCTCS colleges reported a range of 35 to 67 students, average of 50, testing on the NCLEX-RN in 2017. From those students, 83 to 97 percent passed with an average of 90.33 percent. Finally, four KCTCS colleges do not use any entrance exam for admissions criteria. Of these four colleges, a range of 20 to 39 students with the average of 31 were tested. From these specific colleges, 77 to 100 percent, averaging to 88.75 percent, reportedly passed the NCLEX-RN on first attempt (KBN, 2018). Despite the diverse range of enrolled number of students, the average pass rate on the NCLEX-RN was very similar.

Hopkinsville Community College. Specific to the current study, Hopkinsville Community College (HCC) is one of the sixteen KCTCS colleges. Located in Hopkinsville, Kentucky, HCC offers associate level degrees, diplomas, and certificates to more than 3,700 students (Hopkinsville Community College [HCC], 2018). Students have the option to pursue numerous Allied Health programs currently including: Register Nurse, Licensed Practical Nurse, Medical Assisting, Surgical Technology, Massage Therapy, Emergency Medical Technician, Paramedic, Respiratory Therapy, Medicaid Nurse Aide, Phlebotomy for Healthcare Workers, and Medical Information Technology.

Since founded in 1965, institutional values, visions, and overall mission of HCC supports innovative academic excellence to encourage, prepare, and support student learning. Hopkinsville is a uniquely diverse college with two main campuses, one in Hopkinsville and the other located on the Army military base at Fort Campbell, Kentucky. Students have the opportunity to take courses online, as a hybrid, or in-person to accommodate personal learning styles and individual schedules (HCC, 2018).

The college is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC), which requires institutional assessments to be conducted on regular basis (Southern Association of Colleges and Schools Commission on Colleges [SACSCOC], 2018). Continual assessment ensures a high standard for the quality of education and overall educational experience. Specific guidelines for institutional effectiveness are monitored closely with institutional submissions of annual program reports and a five-year site visit from the accrediting body to emphasize the importance of excellence in higher education (SACSCOC, 2018).

Along with the four-semester ADN program, HCC also offers an eleven-month practical nursing program (PN) and a three semester bridge program for licensed practical nurses (LPN) to complete the required education for an RN (HCC, 2018). Inclusion of an Allied Health division at HCC in 2017 was implemented to provide a variety of opportunities to students and address the current healthcare crisis. The ADN program at HCC has consistently remained the largest and one of the most successful technical programs represented on campus (HCC, 2018).

In 1971, HCC admitted the first group of nursing students. During the initial stages of the program, the ADN was affiliated with the Pennyrile Regional Associate Degree Program (PRADP). Sharing instructors, classrooms, curriculums, and resources between HCC and

Madisonville Community College (MCC), the joint program remained functional until 1992 (KCTCS, 2018). While successful in graduating 938 nursing students, the mutual decision to separate the two college programs dissolved the PRADP and led to individual programs as seen in other KCTCS sister colleges (KCTCS, 2018).

As a stand-alone program, HCC has graduated on average 45 ADN nursing students with an Associate of Allied Science in Nursing annually since 1992 (HCC, 2018). Designed to be completed in five semesters with the first semester set aside for general education courses, students complete a total of 24 to 30 credits in general education classes and 38 nursing credits to complete the degree. In 2000, HCC received initial accreditation through the National League for Nursing Accrediting Commission (NLNAC) and has been held in good standing each year (HCC, 2018). Now known as the Accrediting Commission for Educating Nurses (ACEN), the NLNAC granted HCC the maximum term for continuing accreditation of eight years in 2006. As of 2018, the program remains in continuing accreditation with the next evaluation and site visit for accreditation scheduled for the Fall 2021 semester (HCC, 2018).

Students are admitted into the ADN nursing program at HCC every fall and spring semester. Admission into the program depends upon the following: submission of application, ACT composite score of 20 or higher or a combined SAT score of 940 in Reading and Math, attendance at an offered Pre-Admissions Conference held by HCC nursing faculty, a minimum score of 111 on the NLN PAX-RN exam, a GPA of 2.0 or higher, a grade of C or higher in all Math and Science course pre-requisites (HCC, 2018).

Once admitted into the program at HCC, students are required to pass all nursing courses with a final letter grade of C or higher. The grading scale for HCC's nursing program deems a grade of 75% or higher as a passing score. Any student that does not meet the 75% final grade

will subsequently fail the class and will not be permitted to continue to the next semester. Failing students are allowed to re-apply into the nursing program as early as the following semester; however, are not guaranteed a spot. (HCC, 2018).

Of the students admitted into the nursing program, HCC reports the percentage of students that complete all four semesters successfully without repeating any nursing courses. In the fall semester of 2014 a total of 58% of students were successful, where in spring 2015 77% of students admitted passed (HCC, 2018). Fall 2015 reported 49% and spring 2016 had 44% of nursing students graduate the program. Only 52% of those admitted passed the nursing program in fall 2016, and in spring 2017 HCC reported 85% of students passed (HCC, 2018). Compared to other ADN programs in Kentucky, with average graduation rates for all ADN programs at 62.5% in 2016 and 62.6% in 2017, HCC was below average in 2016 but above average in 2017 (KBN, 2018).

Program completion at HCC reflects the national statistics reported in nursing programs, supporting a higher than normal attrition rate (Merkley, 2015). According to the NLN (2018), two-year institution nursing programs have experienced a retention rate of 65%. Similarly, one study reported a national nursing attrition average for ADN programs to be 47%, and suggested that nursing programs address their admissions process in order to improve attrition rates (Harris, Rosenberg, & O'Rourke, 2014). Declining numbers of available seats for enrollment into nursing programs, lack of qualified nursing faculty to teach courses, poor retention of admitted nursing students, and fewer graduates of ADN programs (AACN, 2017), all validate the need to research effective admissions criteria to admit those students with the highest probability of success.

Over the last five years, HCC has been successful in graduating competent students and providing qualified nurses to help bridge the gap in healthcare. In 2013, 51 students from HCC

took the NCLEX-RN and of those tested, 94% passed on the first attempt (KBN, 2018). Of the 51 HCC graduates that tested in 2014, 86% initially passed the NCLEX-RN. The following year, 50 students sat for national certification and 90% passed (KBN, 2018). Due to the high attrition rates noted in second semester, a change in the breakdown of content lectured during the first two semesters of nursing was implemented in 2016 (HCC, 2018). On the NCLEX-RN in 2016, 38 students tested with a 97% first time pass rate (KBN, 2018). In 2017, 43 students sat for the NCLEX-RN exam and 100% of students that took the national certification passed on the first attempt (HCC, 2018; KBN, 2018).

Limited Validity of the NLN PAX-RN

Current research is very limited regarding validity of the NLN PAX-RN as a predictor for student success. Support requiring the NLN PAX-RN for selective admissions was represented in the reviewed literature as an indicator for student success (Briscoe & Anema, 1999; Crow et al., 2004; Ukpabi, 2008). Strength of indication provided by the NLN PAX-RN was conflicting in much of the research. Crow et al. (2004) reported a low percentage of nursing programs that implemented the NLN PAX-RN into admissions criteria found significant ability to predict early nursing school success. Sayles et al. (2003) concluded that higher Math and Reading comprehension subsection scores of the entrance exam were a significant indicator of first attempt NCLEX-RN pass rates, and that the overall composite score is a valid tool for admissions committees to review when assessing which students are more likely to succeed in the program.

Concerns with utilizing any standardized testing for selective admissions into nursing programs have been reported (Randolph, 2017; Tagher, 2017). Randolph (2017) argues that high pass rates on the NCLEX-RN are not always indicative of a nursing program or intuition's

efficiency because the test does not examine any skills and addresses only minimal competencies covered in nursing curriculum. While standardize testing could benefit students by highlighting academic areas of strengths and weaknesses, these tests are rarely used for content analysis (Tagher, 2017). Therefore, students often have a negative perspective towards standardize testing, view such exams as an academic hindrance, and tend to score lower than on program exams they deem beneficial (March & Robinson, 2015; Tagher, 2017).

In 2012, the National League of Nursing implemented the national fair testing guidelines in response to growing concerns of using standardized testing in nursing programs to predict student success (NLN, 2012). The high attrition of nursing students and low graduation numbers were recognized by the public, institutions, and industries, and the NLN acknowledged the lack of guidelines or policies for how nursing programs should utilize standardized testing may contribute to these issues (NLN, 2012). The national fair testing guidelines consists of five major points including: 1. Faculty are ethically obligated to ensure the tests are consistent and fair to all students, 2. Faculty must consider assessed skills and abilities that are not included in standardized testing, 3. Programs should use multiple sources of evaluation, 4. Standardized testing results must be used to improve the overall program, and 5. Results and how programs will use standardized testing must be clearly communicated to students (NLN, 2012).

Regardless of the concerns for using standardized testing in nursing, ADN programs utilize tests such as the NLN PAX-RN entrance exam to admit students. A majority of the research supporting the validity of using entrance exams was dated and not represented or recreated in current studies. Recent publications on admissions criteria for nursing schools was found to support entrance exams, however these studies were focused on the different available options of entrance exams, and presented without conclusion of which exam is the most accurate

indicator of student success (Liu, Codd, & Mills, 2018). Studies suggest that nursing programs should examine the admissions process very closely to ensure the predictive validity of tools used as indicators for selecting applicants (Fowles, 1992; Gallagher et al., 2001).

Obvious gaps in the current literature and concerns regarding the validity of entrance exams provides a platform for this study to evaluate the NLN PAX-RN as an indicator for student success. Comparison of overall composite score with each subsection score may provide insight on the most significant predictor of success. The goal of this study was to provide nursing programs with current data on the validity of using the NLN PAX-RN in the admissions process to select candidates with the highest probability of completing the program and passing the NCLEX-RN on first attempt.

Chapter III: Methodology

Growing concerns in healthcare reflect the need to graduate qualified nurses for employment. Application pools are filled with qualified candidates, however limited availability in programs denies admission to hundreds of potential nurses each semester. The purpose of the study was to determine the validity of Hopkinsville Community College's (HCC) admissions policy in the highly competitive Associate Degree Nursing (ADN) program.

This chapter highlights methods utilized during the study to address the research questions previously detailed in Chapter I. This chapter describes the selection of the sample, data collection procedures, and the analysis of quantifiable data in order to validate the use of the NLN PAX-RN entrance exam as a predictor of student success in the nursing school program at HCC. The goal of this study was to provide selective admissions committees with applicable results to ensure admittance of candidates with a higher probability of program success.

Sample Selection

The current study examined data collected from HCC nursing program inclusive of admission cycles from January 2014 through January 2017. The sample specifically included students that were admitted into the ADN program. Students at HCC are admitted into the ADN program each fall and spring term, and graduate in four semesters. The sample was limited to only one of sixteen Kentucky Community and Technical College System (KCTCS) institutions with the understanding that results could have systematic impact upon similar nursing programs. Findings from the study could be implemented at HCC and applied to other KCTCS ADN nursing programs.

The collected data identified HCC nursing students who reported a composite national percentile score on the NLN PAX-RN, were admitted into the ADN program, successfully

graduated in four semesters, and passed the NCLEX-RN upon first attempt. Considering the NLN PAX-RN, the study addressed students admitted into the program who scored in the 85th to 89th percentile and successfully passed the NCLEX- RN. Selected percentiles were studied based upon the average NLN PAX-RN scores reported at HCC that resulted in students being admitted. Likewise, detection of students scoring below the 85th percentile who were admitted into the nursing program and passed the initial NCLEX-RN attempt will be reviewed.

Participants

The sample included students that were admitted, based upon predetermined admissions criteria, into the ADN program at HCC during the spring and fall terms from January 2014 through January 2017. A total of 237 students were admitted into the nursing program during these seven admission cycles. A description of the admitted students for each semester is provided in Table 1. Required admissions criteria data were provided for all admitted student for analysis. Following IRB approval from MSU and KCTCS, data were collected from historical HCC nursing records, and scrubbed of all personal identifiers. Confidentiality was maintained throughout the duration of the study.

On average 150 applications are submitted for the fall admissions consideration into the HCC ADN program, and approximately 100 applications are submitted for the spring semester. During the seven semesters analyzed within this study, an average of 33.86 students were admitted each semester. The low number of students accepted into the ADN program each semester is consistent with the reviewed literature (Kavilanz, 2018; Nardi & Gyurko, 2013; Young, 2018). Factors such as classroom space, qualified faculty, and clinical availability contribute to the enrollment restrictions.

Table 1

Number of ADN Admits Between Spring 2014 and Spring 2017

Admission Cycle	N
Spring 2014	33
Fall 2014	36
Spring 2015	31
Fall 2015	36
Spring 2016	31
Fall 2016	37
Spring 2017	33

Admission Criteria

Eligibility for admission into the HCC nursing program is based upon published criteria, as detailed below, and is required by all applicants for consideration. Applications that are incomplete, submitted after the deadline, or that do not meet any portion of the admission criteria are marked ineligible for acceptance. Applications are reviewed by the Director of Nursing and the Nursing Administrative Assistant, removing any ineligible applications from the pool prior to the admissions committee consideration. Potential ADN students are allowed to submit a request to waive any portion of the admission criteria, and waivers are determined on individual basis.

Required criteria are available on the HCC nursing webpage and in the nursing department. Academic advisors cover ADN requirements during advising sessions to ensure that potential students are aware of current standards to apply. Prior to the admission cycle deadline, students must complete the following criteria for consideration: submit a completed application, have any official transcript on file, have a minimum of a 20 composite score on the ACT or a combined score of 940 in Critical Reading and Math on the SAT, attend a Nursing Pre-Admission Conference, score a minimum of 111 on the NLN PAX-RN, be in good academic

standing at HCC, and have at least a 2.0 GPA with a grade of C or higher in all Math, Science, and pre-requisite courses.

ACT scores. Of the admitted students during the selected semesters, 227 students reported ACT scores ($M = 22.99$; $SD = 2.949$). Individual scores ranged from a minimum of 19 to a maximum of 33. This requirement was waived for five students, and five students reported SAT scores in the place of the ACT.

NLN PAX-RN scores. All 237 of the admitted applicants reported NLN PAX-RN scores which were converted to a national percentile for comparison and consideration. The mean was the 88th percentile, with a minimum individual score accepted being the 67th percentile and the maximum reported individual in the 99th percentile. For the selected admission cycles, 75% of the admitted students scored at the 94th percentile or higher.

Grades. For students admitted into the HCC nursing program, 144 students (60.8%) successfully passed all four required semesters and graduated the ADN program. The program had a total of 93 students (39.2%) that were not successful during these semesters. Of the unsuccessful students, 64 students (68.8%) did not meet the minimum academic grade of a C or higher required to continue in the program, 14 students (15.1%) chose to withdraw from the program prior to the final exam due to the impossibility of academic recovery, and 15 students (16.1%) withdrew due to non-academic related issues. Table 2 summarizes the findings for students admitted into the HCC nursing program.

Table 2

Fate of Students Admitted into the ADN Program

Admission Cycle	*N*	Passed	Failed	WD Failing	WD Non-Academic
Spring 2014	33	16	12	3	2
Fall 2014	36	14	17	3	2
Spring 2015	31	18	9	3	1
Fall 2015	36	31	3	1	1
Spring 2016	31	23	2	3	3
Fall 2016	37	26	10	1	0
Spring 2017	33	14	11	0	6

Student success as defined by the current study, includes successful completion of the ADN program within four semesters and passing of the NCLEX-RN licensure examination on first attempt. To evaluate the effectiveness of the HCC nursing program in preparing graduates for eligibility of nursing employment, successful first attempt pass rates of the NCLEX-RN were analyzed. A total of 131 students took the NCLEX-RN licensure examination during the selected terms. Of those who took the NCLEX-RN, 119 students (90.1%) passed on first attempt, and 12 students (9.2%) who passed the ADN program at HCC then failed the initial NCLEX-RN. These data suggest the nursing program at HCC is effectively preparing students for passing the NCLEX-RN licensure examination.

When considering only the students that were successful in the HCC ADN nursing program ($n = 144$), a Chi-square test indicated a statistically significant relationship between ADN program completion and successfully passing the NCLEX-RN. The Chi-square test examines the differences between categories within a sample, and accounts for which categorical variables are responsible for the observed differences (McHugh, 2013). Students who pass the

HCC nursing program have a very high likelihood of being successful on the initial nursing

licensure examination. A summary of these findings are found in Table 3.

Table 3

ADN Program and NLCEX-RN Results for Admitted Students

Admission Cycle	Passed ADN and Passed NCLEX-RN	Passed ADN but Failed NCLEX-RN
Spring 2014	16	0
Fall 2014	14	5
Spring 2015	17	1
Fall 2015	30	0
Spring 2016	21	2
Fall 2016	16	4
Spring 2017	5	0

Data Collection

Prior to the collection of data, the Institutional Review Boards (IRB) of Murray State

University (MSU) and the KCTCS approved the current study. Historical data were collected

with all personal identifiers removed and confidentiality was maintained throughout the study.

The data were collected from HCC program admission files, NLN PAX-RN records, ADN

course records, and NCLEX-RN records. All statistical analyses utilized the 25th edition of the

SPSS Statistical Software.

Participants included 237 students admitted by an appointed committee to the HCC

nursing program based upon the required NLN PAX-RN entrance exam scores, completed

application, ACT score of 20 or higher, a grade of C or higher in prerequisite courses, and an

overall GPA of 2.0 or higher. Focus was on those students that were successful in their first

attempt at passing the NCLEX-RN for all students graduating in the following terms: Spring 2014, Fall 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2017, and Spring 2017.

Research Questions

In an attempt to explore the overall selective admissions criteria for nursing programs, the following research questions and hypotheses were addressed in this study:

Research question 1: What is the correlation between individual NLN PAX-RN scores and successful completion of the HCC ADN program?

H_0: There is no correlation between NLN PAX-RN scores and success of students in the HCC ADN program.

Research question 2: What is the predictive power of the combined three individual sections represented on the NLN PAX-RN exam and successfully passing the NCLEX-RN on first attempt?

H_1: There is no combined predictive power of using the three individual sections of the NLN PAX-RN and passing the NCLEX-RN on first attempt.

Research question 3: What is the correlation between NLN PAX-RN scores of admitted HCC ADN students and first time pass rate of the NCLEX-RN?

H_2: There is no correlation between NLN PAX-RN scores and first time pass rates of the NCLEX-RN.

Research question 4: Do students scoring at the 88th national percentage (or above) on the NLN PAX-RN have a higher first time NCLEX-RN pass rate than students scoring below the 88th national percentage?

H_3: There is no statistical difference in national percentage scores on the NLN PAX-RN and first time pass rates of the NCLEX-RN.

Analyses

  To determine if the NLN PAX-RN is an adequate indicator of student success, individual research questions must be studied statistically. The current study defined student success as successful completion of the HCC nursing program within the allotted four semesters and passing of the NCLEX-RN licensure examination on first attempt.

  In order to establish if any relationship existed between NLN PAX-RN scores and success in passing HCC nursing program courses, data were analyzed with a series of point-biserial correlation and multiple regression. Data were further analyzed to determine if any one of the three specific sections of the NLN PAX-RN was a more accurate indicator of student success than the others. The Verbal Ability, Mathematics, and Science sections of the NLN PAX-RN were evaluated via regression to quantify any relationship between each section and student success. Multiple regression determines which independent variable or variables best predicts the dependent variable.

  First time pass rates on the NCLEX-RN and individual NLN PAX-RN scores were compared via a point- biserial coefficient to determine the strength of the relationship is. Data were analyzed further to determine if the relationship between NLN PAX-RN and NLCEX-RN pass rates is stronger than the relationship identified in the first research question with NLN PAX-RN and students passing the nursing courses.

  Finally, the national percentage scores from the NLN PAX-RN were examined to determine if a particular benchmark percentile serves as a defined indicator for student success. A Chi-square test was utilized to decipher if students scoring at the 88th national percentile or higher on the NLN PAX-RN were more likely to pass the NCLEX-RN on initial attempt than students scoring below the 88th percentile. Current admission practices at HCC for the ADN

program identifies a cutoff score based upon the size of the applicant pool as opposed to a

minimal percentile that students are required to obtain for admission.

Summary

Based upon the data collected, the current study analyzed each of the identified research

questions in an attempt to validate the current admission criteria used in predicting student

success. This study provides the opportunity to make results-based recommendations that can

lead to best methods and policies that will identify applicants with the highest probability of

success in the HCC ADN program and initial passing of the NCLEX-RN.

Chapter IV: Findings and Analyses

This chapter presents the findings of this study for each of the research questions and hypotheses. This study investigated the relationship between the NLN PAX-RN entrance exam, required for admission into the ADN nursing program at HCC, and student success as previously defined in Chapter 1. Furthermore, individual sections of the NLN PAX-RN were examined to determine if a specific section of the NLN PAX-RN was a better indicator of success. Lastly, the NLN PAX-RN percentile scores of successful students were analyzed to determine if there was a relationship between an identified benchmark score on the NLN PAX-RN and overall success.

Research Questions

Data were used to analyze the four research questions and hypotheses with the intention of validating current admissions criteria utilized in the HCC nursing program.

Research question 1: What is the correlation between individual NLN PAX-RN scores and successful completion of the HCC ADN program?

H_0: There is no correlation between NLN PAX-RN scores and success of students in the HCC ADN program.

To determine if a relationship exists between NLN PAX-RN scores and students successfully completing the ADN program, a point-biserial correlation was calculated. A point-biserial correlation is a specific correlation used to examine possible relationships between a dichotomous variable (i.e., successful completion of the ADN program) and a continuous variable (i.e., NLN PAX-RN scores) (Varma, 2006). The point-biserial correlation revealed a statistically significant relationship between individual NLN PAX-RN composite percentile scores and successful completion of the HCC nursing program ($r_{pb} = .222$, $n = 234$, $p = .001$). A positive correlation was found, meaning that as NLN PAX-RN percentile scores increase, the

likelihood of passing the ADN program increases as well. The results indicated individual NLN PAX-RN percentile scores are useful in predicting students likely to successfully complete the nursing program at HCC. The null hypothesis is rejected.

The results of Research Question 1 suggest that individual NLN PAX-RN percentile scores and successful graduation from the ADN program have a statistically significant positive relationship ($p = .001$). The obtained correlation was weak ($r = 0.222$), indicating that individual NLN PAX-RN percentile scores are minimally useful in predicting success in the ADN program.

Research question 2: What is the predictive power of the combined three individual sections represented on the NLN PAX-RN exam and successfully passing the NCLEX-RN on first attempt?

H_1: There is no combined predictive power of using the three individual sections of the NLN PAX-RN and passing the NCLEX-RN on first attempt.

Multiple regression analysis is a valuable tool for determining the predictive power of several continuous independent variables on a dichotomous dependent variable (Aiken & West, 1991). To determine the best predictor of the dependent variable, a mathematical linear equation composed of all represented variables is constructed for correlation (Kelley & Maxwell, 2003).

Considering the slope of a line, the independent variables are compared by calculating how closely each of the variables fit the prediction slope and are reported as R^2 (McDonald, 2014). Such values are reported between .000 and .100, where .000 shows no relationship between the variables and .100 shows absolute correlation between the independent and dependent variable (Kenton, 2018).

Verbal Ability, Mathematics, and Science are the three represented and reported sections on the NLN PAX-RN. A multiple regression analysis *(n = 197)* utilizing the Enter method was

performed to evaluate if the individual NLN PAX-RN sections, independently or combined, significantly predicted the likelihood for passing the NCLEX-RN on first attempt. Collectively, the individual percentage of NLN-PAX RN scores were significant ($F = (3,193) = 5.596$, $p = .001$) with an R^2 of .081, meaning that 8.1% of the variance in the data can be explained by the three variables.

However, of the three individual sections reported on the NLN PAX-RN, only Mathematics proved statistically significant ($p = .001$, $R^2 = .053$) in predicting success on the NLCEX-RN. Neither the Verbal Ability ($p = .128$, $R^2 = .012$) and nor the Science ($p = .160$, $R^2 = .025$) sections were statistically significant in predicting first attempt success on the NCLEX-RN. Thus, the null hypothesis is rejected. Mathematics scores are the most significant predictor of passing the initial NCLEX-RN exam.

Individual NLN PAX-RN Mathematic scores reported *(n = 203)* for the selected semesters within the current study ranged from 45 to 98 (*M* = 76.41, *SD* = 11.960). To further evaluate the association between Mathematics and student success, a point-biserial test revealed a significant relationship between NLN PAX-RN Mathematic percentile scores and successful passing of the ADN program ($r_{pb} = .174$, $n = 201$, $p = .013$). As Mathematics scores on the NLN PAX-RN increase, the likelihood of passing the NCLEX-RN on first attempt increases as well. Consideration of individual NLN PAX-RN Mathematics scores would prove beneficial in admitting students into the ADN program at HCC.

Research question 3: What is the correlation between NLN PAX-RN scores of admitted HCC ADN students and first time pass rate of the NCLEX-RN?

H$_2$: There is no correlation between NLN PAX-RN scores and first time pass rates of the NCLEX-RN.

A point-biserial correlation revealed a statistically significant relationship between individual NLN PAX-RN composite percentile scores and successfully passing of the NCLEX-RN on first attempt (r_{pb} = .254, n = 220, p < 0.001). A positive correlation was found, meaning that as NLN PAX-RN percentile scores increase, the likelihood of passing the NCLEX-RN licensure exam on the first attempt increase as well. The results indicated individual NLN PAX-RN percentile scores are useful in predicting first attempt passing of the NCLEX-RN. The null hypothesis is rejected.

Research question 4: Do students scoring at the 88th national percentage (or above) on the NLN PAX-RN have a higher first time NCLEX-RN pass rate than students scoring below the 88th national percentage?

H_3: There is no statistical difference in national percentage scores on the NLN PAX-RN and first time pass rates of the NCLEX-RN.

Of the admitted ADN students at HCC represented in the current study (n = 237), the mean NLN PAX-RN percentile score was the 88th percentile. The lowest admitted score was at the 67th percentile and highest admitted score was at the 99th percentile. Current NLN PAX-RN requirements for admission into the ADN program is a composite score of 111, or the 61st percentile. The lowest reported percentile admitted into the program that was successful in the ADN program and passed the initial NCLEX-RN was in the 68th percentile. Data from the NLN PAX-RN scores are represented in Table 4.

Table 4

NLN PAX-RN Percentile Scores of Admitted Students

Admission Cycle	Number Admitted	Mean Percentile	Maximum Percentile	Minimum Percentile	Number of Students at the 88th Percentile or Higher
Spring 2014	33	89	99	81	20
Fall 2014	36	87.47	98	74	19
Spring 2015	31	87.77	99	76	17
Fall 2015	36	93.33	99	86	35
Spring 2016	31	86.28	99	76	10
Fall 2016	37	88.51	99	71	23
Spring 2017	33	82.41	99	67	12

To address Research Question 4, a Chi-square test of independence was conducted to examine the relationship between NLN PAX-RN percentage scores and initial success on the NCLEX-RN. Chi-square analysis has been historically valuable in determining if an association of variables exists (Federighi, 1950). There was a statistically significant association found between the percentile score on individual NLN PAX-RN exams and passing the NCLEX-RN on the first attempt ($X^2(58) = 76.713$, $p = 0.051$). Percentile scores above the 88th percentile on the NLN PAX-RN are a better indicator for passing the NCLEX-RN on first attempt when compared to those students scoring below the 88th percentile. Thus the null hypothesis is rejected. Admitting students into the ADN program with an NLN PAX-RN score at the 88th percentile or higher would increase the likelihood of student success.

Chapter V: Conclusions and Discussions

Conclusions

Several conclusions may be made from analyzing data collected on students in the ADN nursing program at HCC during the admission cycles including Spring 2014 through Spring 2017. Research questions were designed to evaluate the current criteria utilized to select applicants for admission into the nursing program.

Research question 1. The first research question was intended to determine if individual NLN PAX-RN scores predict a higher likelihood of successfully completing the requirements set forth in the HCC ADN program. The results showed that there was a statistically significant relationship between these two variables, although this relationship was weak. The NLN PAX-RN scores are heavily weighted in the determination of admitting students at HCC. This aspect of entry requirements seems to be defensible, applicants are organized by NLN PAX-RN entrance exam scores and presented to the Admission Committee for admission consideration.

While applicants are required to meet all predetermined admission criteria, consideration or discussion of any criteria besides the NLN PAX-RN is not represented in the decision to admit students into the nursing program. Admission criteria are checked as completing the minimum requirements, and committee focus on the NLN PAX-RN score is extensive. In the event that two or more applicants with the same NLN PAX-RN scores are vying for the final admission seat, prerequisite GPA will typically be the next criteria evaluated for selection.

Based upon analysis of the data, the relationship between NLN PAX-RN scores and successful completion of the HCC nursing program is a very weak indicator of overall student success. Of the 93 total students who failed or withdrew from the program, 35 students (37.6%) scored at the 90th percentile or higher on the NLN PAX-RN.

Research question 2. While the percentile scores for the three individual sections represented on the NLN PAX-RN are readily available, the nursing admissions committee does not currently consider these sections in determining admission. The score used to determine admission for each applicant is the composite scores converted to a national percentile. Data collected were evaluated to decide if the individual sections were indicative of success on the NCLEX-RN. The individual Mathematics percentile score was the only section that statistically predicted success on the NCLEX-RN. Neither Science nor Verbal Ability scores were significant.

Of the semesters represented in the current study, nearly half of the students with reported individual NLN PAX-RN sections scored at the 77th percentile or lower in the area of Mathematics. While findings from this study suggest that individual Mathematics percentile scores are statistically significant in predicting success on the NCLEX-RN, a benchmark score was undetermined. Further research to statistically support which percentile score in Mathematics correlates to a 90% passing of the NCLEX-RN would be helpful.

These findings are of particular interest considering the prerequisite courses required by HCC for admission into the ADN program include Mathematics, Science, and English. Students must have a grade of C or higher in selected courses to be considered for admission. Based on the findings, student success in prerequisite Mathematic courses may provide greater insight on potential student success.

Comparable findings were witnessed in an internal assessment conducted by the nursing department that highlighted an obvious lack of basic Mathematical skills, thus hindering students from succeeding in the program. To address this need, interdepartmental discussions resulted in a weekly offering of a one-hour tutoring session for nursing students. The session was led by

faculty members in the Mathematics department to assist in homework problems and testing strategies that involved calculations. Due to a change in schedule, the tutoring was only available for two semesters.

Research question 3. To better understand if a relationship exists between the NLN PAX-RN and likelihood for students to pass the NCLEX-RN on first attempt, the study compared individual NLN PAX-RN percentile scores to NCLEX-RN pass rates. The results revealed similar findings as the first research question, and found a significant positive relationship between these variables. The overall goal for students entering into an ADN program includes passing the NCLEX-RN for licensure and certification in order to be eligible to enter into the healthcare work field. The HCC nursing admissions committee and nursing faculty rely on NLN PAX-RN scores to identify students capable of reaching this goal. Of the 119 students that passed the NCLEX-RN on first attempt, 33 students (27.7%) had an NLN PAX-RN score at the 85th percentile or lower, and 7 students (5.9%) were below the 80th percentile.

The NLN PAX-RN scores are heavily considered during the ADN admission process, and accepted cutoff percentiles vary each semester based on the application pools. Of the analyzed semesters, the lowest accepted percentile was in Spring 2017 and was at the 67th percentile. While that particular student was not successful in the program, in the same semester, a student scoring at the 68th percentile on the NLN PAX-RN was admitted and passed both the ADN program and the NCLEX-RN on first attempt. Current criteria requires students to have a composite score of 111 or higher on the NLN PAX-RN for admission consideration, which correlates to a 61st national percentile rank.

A range of NLN PAX-RN scores from the 67th national percentile to the 99th percentile was admitted during the seven selected semesters. Overall student success was varied with

respect to NLN PAX-RN scores. Some of the admitted students scoring in the lower national percentiles on the NLN PAX-RN passed the NCLEX-RN on first attempt, while other students scoring in the higher national percentiles did not pass the initial NCLEX-RN. Further evaluation to identify the national percentile score that best correlates to a 90% pass rate on the initial NCLEX-RN would provide insight for admission committees.

Research question 4. Currently HCC does not require a minimum benchmark percentile score on the NLN PAX-RN for acceptance into the program. Any student who has taken the NLN PAX-RN and has met all of the other specified criteria is eligible to apply and considered for admission. A minimum NLN PAX-RN composite score of 111 score is stated in the admissions packet, on the HCC nursing webpage, and relayed during advising sessions, however students with a score lower than 111 can still apply to the ADN program. Of the semesters studied, no admitted student scored lower than 115 on the PAX-RN. The average score of students accepted into the program was at the 88th percentile, a 32-point range was represented with the lowest percentile accepted being at the 67th percentile and the highest at the 99th percentile. Based on the results, the mean percentile was a statistically valuable predictor of success on the NLCEX-RN.

Despite the suggested composite score of 111 on the NLN PAX-RN, which corresponds to the 61st percentile, students scoring below the 80th percentile on the entrance exam are highly encouraged by nursing advisors to retake the NLN PAX-RN for a higher score before applying to the HCC nursing program. Reasoning behind this suggestion is based upon the ideology and assumptions that: 1. Students scoring below the 80th percentile are not likely to be admitted in an admission cycle due to the vast number of applicants, 2. Students scoring below the 80th percentile often fail the ADN program, and 3. Students scoring below the 80th percentile do not

succeed on the initial NCLEX-RN examination. Of the students admitted into the program during the represented admission cycles, 29 students (12.2%) scored below the 80th percentile on the NLN PAX-RN. As discussed above, 5.9% of the students successful on the initial NCLEX-RN exam had scored below the 80th percentile on the NLN PAX-RN, and the admitted student scoring at the 68th percentile on the NLN PAX-RN was recently successful in passing the NCLEX-RN on first attempt.

Discussions

Findings from the study are significant in predicting student success, and are as follows: 1. NLN PAX-RN scores are a weak indicator of ADN program success, 2. the NLN PAX-RN scores are significant in predicting passing the NCLEX-RN on first attempt, 3. the individual NLN PAX-RN Mathematics percentile score was found to be significant in predicting success on the NCLEX-RN, and 4. Students scoring at the 88th percentile or higher on the NLN PAX-RN are more likely to pass the NCLEX-RN on first attempt than students scoring lower than the 88th percentile.

Based upon the results of the current study, HCC can improve their selective admissions process into the ADN program by prioritizing the entrance components. Applicants with the highest probability of success, as defined by this study, will report an NLN PAX-RN score at the 88th percentile or higher, and once a percentile benchmark is established for a Mathematics score, HCC should consider the individual Mathematics percentile scores for admission.

Consistent with findings from previous research (Fowles, 1992; Gallagher, Bomba, & Crane, 2001; Liu, Codd, & Mills, 2018) entrance exams offer insight for selecting students with a higher probability of success. Validation that the NLN PAX-RN is an indicator for student success is consistent with research conducted by Briscoe and Anema, (1999), Crow, Handley,

Morrison, and Shelton, (2004), Sayles, Shelton, and Powell (2003), and Ukpabi, (2008). Strength of the correlation between the NLN PAX-RN and student success was consistent with Crow et al. (2004) who reported NLN PAX-RN scores were a weak indicator of predicting nursing school success. Considering the increased weight placed upon the NLN PAX-RN scores at HCC during the admission process, and the findings of a weak correlation to success, HCC should consider decreasing the weight of the NLN PAX-RN in the admissions selection.

Of the three tested content sections on the NLN PAX-RN, findings from the current research were inconsistent with earlier studies. Sayles et al. (2003) reported that both Mathematics and Reading can predict student success. Results for this study indicated only the Mathematics scores were statistically significant. Currently, the only score on the NLN PAX-RN that is considered for admission into the ADN program at HCC is the composite score. Based on the data, HCC should continue to consider the national percentile score on the NLN PAX-RN, but should also report the Mathematics percentile scores when admitting students. A benchmark Mathematics percentile score should be determined and considered during admissions.

No previous data were found to compare with the findings of this study in regards to a specific benchmark score on the NLN PAX-RN being a better indicator of student success. Individual ADN programs arbitrarily choose a cutoff score for admission, however findings from this study indicated that the average percentile score reported at HCC during the seven semesters on the NLN PAX-RN was a better indicator of student success.

Practical Implications

Students in the nursing program are required to complete College Algebra or higher for eligibility of admission. Based on the current study, Mathematics scores are significant in predicting overall success. Research on the addition of a first-semester, content-based, remedial

Mathematics course for admitted nursing students with a C in College Algebra may prove academically beneficial in successful completion of the student. Interdisciplinary coordination between Nursing and Mathematics to develop and deliver such a course is suggested.

High attrition rates, particularly in the second semester of the ADN program, are concerning. Evaluation of the current distribution of content delivered during the first and second semesters may provide insight on reasons that many students are not academically successful in the program. Second-semester nursing at HCC is focused on the management of patient care and requires students to utilize critical thinking skills, apply knowledge, and correlate information to succeed. Students historically struggle with the ability to perform the needed cognitive processes to answer questions that demand application of content. The addition of Allied Health specific Anatomy and Physiology, Mathematics, and Psychology courses, embedded with critical thinking style assignments and exams, designed collaboratively between nursing and general education faculty may prove beneficial in more effectively preparing students who identify as pre-nursing. Better preparation academically prior to admission into the nursing program may alleviate the elevated attrition noted in second semester.

Historically, emphasis on using pre-nursing grade point average (GPA) to predict student success has been represented in the literature. Of the reviewed literature, findings varied on the extent that pre-nursing GPA can be used to predict student success, however most studies concluded that GPA does provide some validity in predicating student success in nursing programs (Blackman, Hall, & Darmawan, 2007; Bosch, Doshier, & Gess-Newsome, 2012; Herrera & Blair, 2015; Seago, Keane, Chen, Spetz, & Grumbach, 2012; Sears, Othman, & Mahoney, 2015). Students applying to the ADN program at HCC are required to have a minimum pre-nursing GPA of 2.0, which is comparatively low when compared to the 2.5 to 3.0

GPA required by many similar nursing programs. Increasing the minimum GPA requirement to 2.5 may improve the likelihood of admitting students with a higher probability of overall success.

Research shows a statistically significant relationship between GPA of nursing courses and overall student success (Alameida et al., 2011; Crow et al., 2004; Herrera & Blair, 2015; Tipton et al., 2008; Ukapabi, 2008). Students with high academic performance, particularly in the Nursing Fundamentals course taught in the first semester of nursing, have a statistically higher probability of completing the program and passing the NCLEX-RN on first attempt (Blackman et al., 2007; Simon, McGinniss, & Krauss, 2013; Tipton et al., 2008; Ukapabi, 2008). Based upon these findings, students in the HCC nursing program who receive a grade of C in the first semester of nursing, should be required to complete a three week accelerated remedial course before beginning second semester. The course should be designed in modules, developed by nursing faculty, with the intent to review content obtained in the first semester. To ensure students remain on track for graduation, fall semester students would complete the mandatory remedial course during the winter break and spring semester students would complete the course during the summer break. Students receiving the grade of an A or B in the first semester of nursing should have the option to complete the course for individual benefit.

The addition of an interview process may prove valuable in identifying students with a higher probability of student success. Discussions of an interview portion for admission into the nursing program has been considered at HCC, but not implemented. Interviews will assist in improving the diversity of students represented in the program and provide perspective on potential non-academic concerns. Both academic and non-academic factors should be considered when selecting applicants for admission into the nursing program.

Finally, input during the admissions process from faculty members that teach the required prerequisite courses could provide valuable insight on applicants being considered for acceptance into the ADN program. Faculty feedback could potentially be collected via a survey to be completed by each professor, designed specifically to evaluate the individual applicants. Responses must be submitted in a timely manner each semester to allow for ample analysis by the Nursing Admissions Committee for consideration of each candidate. While this particular mode of participation may be beneficial, a more effective method of soliciting cross-disciplinary input is suggested. Allowing Algebra, Psychology, and Anatomy and Physiology faculty to serve on the Nursing Admissions Committee cultivates an environment open to discussion on individual applicant's strength and weaknesses in the classroom prior to the decision to admit.

Limitations of the Study

Numerous limitations were identified within the study that will limit generalizability of the findings. The current study represented a small sample size in each of the seven analyzed semesters. The data collected focused on students admitted to the HCC nursing program. According to the NLN (2016) in 2014, 1,092 accredited ADN programs were available for enrollment. Nearly half of those programs were located in the South or Midwest region of the United States (NLN, 2016). In the state of Kentucky, 29 ADN programs are available and of those, the Accreditation Commission for Education in Nursing (ACEN) accredits 17 (KBN, 2018). Thus, the small sample size studied within this research may not represent the total population of ADN students.

The study did not include all students applying for the HCC nursing program, only those admitted during the selected semesters. Likewise, the current study did not examine gender, race, or age of the admitted students. Hundreds of applications are denied consideration due to limited

availability of space within the program. Of those students not accepted, several meet and even exceed the qualifications for the program. Students who applied, but were not accepted into the ADN program during the seven semesters were not considered or analyzed in the current study. Future research including data from all ADN applicants has potential to be proven statistically valuable.

Prior to the semesters represented within the study, data were not available for analysis. There has been little to no change in the admissions criteria required for acceptance in the HCC nursing program since Spring 2014. There was a reported change in the minimal ACT score requirement during the analyzed semesters from 19 to 20, and therefore ACT scores were not evaluated in this study. Of the 227 admitted students during this study who reported ACT scores, only 12 students had a score of 19.

In accordance to requirements set forth by accrediting bodies, only the first attempt of the NCLEX-RN is reported to the HCC nursing program. Any student passing the initial examination is considered successful, and any student that fails the first attempt is considered unsuccessful. Students that fail the first attempt have the opportunity to retake the licensure exam after a 45-day waiting period. A total of eight attempts each year are possible for persistent students. Upon passing the NLCEX-RN, regardless of how many attempts, students are eligible to work as an RN. While acknowledged as both a personal and professional achievement, these students are never considered a success for the program. Students that pass the NCLEX-RN after the first attempt and are subsequently employed in healthcare are successful in impacting the national nursing shortage; however, based on the definition of success within the current study, these students are considered a failure. No information beyond the first attempt was available for students that were eventually successful on the NLCEX-RN.

Recommendations for Future Research

Several recommendations for future research were identified. While some recommendations are outside of the scope of this study, additional and expanded research can have substantial impact on the nursing program at HCC. Findings from continual research can potentially be implemented at similarly structured nursing programs across the nation. Future research can corroborate findings of this study, justify suggestions for improvement, and foster successful programs.

The findings of this study should be replicated across educational nursing programs at both the community college and university levels. According to Cai et al. (2018), two optional methods for replicating educational research can be utilized. The first is called the exact method of replication, which Cai et al. (2018) concluded to be difficult when considering the diverse composition of education. The second method is called the conceptual method and openly accepts slight variations in the research with the goal to test the generalization of other findings (Cai et al., 2018). Data from other identified community college ADN programs that utilize the same admissions criteria, would enhance the validity of the findings from the current study. Due to the complex nature and extreme diversity of classrooms, nursing programs, admission policies, instructors, and students, future research should attempt to reproduce the findings of this study.

Upon examination of the data, further research to identify specific contributors to the attrition rate reported by the HCC nursing program would be of benefit. In the analyzed semesters, a total of 93 students (39.2%) failed or withdrew from the program. Research should focus on individual semesters of the nursing program to recognize major personal events or specific content that led to either the withdraw or failing of students.

Historically, the second semester of nursing at HCC has reported a very high attrition rate and could be an interest and focus for future researchers. Identifying the most likely reason for this high attrition rate has proven difficult for nursing faculty and administers. Of the 93 students that failed out of or withdrew from the ADN program during Spring 2014 through Spring 2017, 84 students (88.3%) were lost in the second nursing semester.

Additionally, of the 46 students admitted in Fall 2017, which were excluded from this study due to incompletion of the program at the time current study was performed, 16 of the 18 students which have already failed out or withdrew were in second semester. There is a specific need to improve retention in all college programs. Early detection of possible academic barriers must be identified and improvements made to increase retention and student success.

Based upon the current literature, a third suggestion for research would be to establish the significance of non-academic factors in predicting student success. Future research should determine if non-academic factors play any significant role in identifying applicants more likely to pass the nursing program and the NCLEX-RN on first attempt. Of the students who withdrew from the ADN program, 16.1% reported non-academic factors as the cause for leaving. Further investigation of these barriers will assist to identify potential problems and provide assistance to specifically address non-academic contributions. Recognition and improvement in such factors could improve the admissions policy and student success at HCC.

Many ADN programs utilize a point system in the admissions process to assist in ranking students for program consideration. Students are assigned points in identified categories with top ranking students endorsed for admission. Many of the point systems included an interview score to assess the non-academic factors. Further research on the ranking process and validity of such a

system, combined with the findings of this study, may provide enhanced methods for selecting students with a higher probability of success.

While outside of the scope for the current study, progressive healthcare educators should focus on improving the represented diversity of admitted nursing students. As reported in the reviewed literature, gender and ethnic gaps in the nursing field are obvious (Olson, 2014); however, the findings are contradicting and inconclusive regarding a statistical correlation between increasing diversity and overall student success in nursing programs (Sears et al., 2015). Future research on improving recruitment efforts of gender, cultural, and ethnic minorities may prove beneficial to the program and the institution as a whole.

Finally, further examination of student success in prerequisite courses to determine how academic preparedness impacts nursing school success would be of substantial benefit. Future researchers should study grades and academic performance in prerequisite courses, particularly in Mathematics, to determine if a C average statistically correlates to student success in the nursing program. Attention should be drawn to the fact that in the prerequisite courses at HCC, a 70% is considered a C grade. However, in the HCC nursing program, students must maintain a 76% or higher to be eligible for continuation. This discrepancy of the grading scale could prove statistically significant in predicting overall success.

P-20 Implications

The continual evolution of education, combined with the increasing need for healthcare workers, has provided a platform of opportunity for progressive leaders. Future successes depend upon the ability of institutions to implement more effective methods in selecting students for programs with the highest probability of overall success. Research-based suggestions for improvements validate changes made to current practice.

Transformational educational leaders must support the implementation of more effective methods and continue further research to identify factors that predict overall student success. Numerous qualified applicants are denied admission into the HCC nursing program due to limitations of classroom space, clinical availability, financial constraints, and lack of faculty. Such enrollment obstructions as these are difficult for programs and institutions to overcome, and thus solidifies the need for research-based suggestions on improving the selective admissions process. Innovative methods to increase the likelihood that selected students succeed have widespread implications.

Earlier identification, progressive advising, and academic preparation of students expressing an interest in nursing will facilitate stronger applicants with higher probability of overall success. Institutional and program recruitment efforts must begin prior to high school, and must be supported at all levels of education. Providing younger generations with the resources, the tools, and the academic pathways to succeed will assist in constructing a stronger educational future. Progressive leaders must work collaboratively from birth and beyond, breaking down current academic silos, to produce qualified, competent, and effective graduates.

Conclusion

Growing demands for healthcare workers have grabbed the attention of higher education programs. The responsibility to produce qualified and competent employees, helping to bridge the current divide in healthcare, falls upon institutions like HCC. Large applicant pools of qualified candidates are denied admission into programs for various reasons, thus selecting students for admittance with the highest probability of program success is critical. Confirmation that HCC's standard practice for admission criteria identifies students more likely to complete the nursing program and pass the nursing licensure examination validates current methods.

While the admissions methods are statistically significant, the reported correlations are weak, suggesting room for improvement. Further research may enrich the overall admissions process into nursing, assist to increase retention, produce more graduates employable in nursing, and therefore significantly impact the expanding healthcare crisis.

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Appendix A

MURRAY STATE
UNIVERSITY

Institutional Review Board

328 Wells Hall
Murray, KY 42071-3318
270-809-2916 • msu.irb@murraystate.edu

TO: Randal Wilson
          Dept. of Educational Studies, Leadership, and Counseling

FROM: Institutional Review Board
          Jonathan Baskin, IRB Coordinator

DATE: November 19, 2018

RE: IRB # ODF 19-25

Determination: Individuals not Identifiable - Activity does not involve human subjects as defined in 45 CFR 46.102(f)(2)

The MSU IRB has reviewed your student's application entitled, *Validity of admission requirements for KCTCS nursing program* Based on the information supplied on this application, it has been determined that your student's project does not involve activities and/or subjects that would require IRB review and oversight. Your IRB application will be kept on file in the IRB office for a period of 3 years.

Please note that there may be other Federal, State, or local laws and/or regulations that may apply to your project and any changes to the subjects, intent, or methodology of your project could change this determination. You are responsible for informing the IRB of any such changes so that an updated determination can be made. If you have any questions or require guidance, please contact the IRB Coordinator for assistance.

Thank you for providing information concerning your student's project.

Opportunity
afforded

murraystate.edu

February 5, 2019

Ms. Beth Beverly
Director of Allied Health
Program Coordinator Health Sciences and Technology
Hopkinsville Community College
Hopkinsville, Kentucky

Dear Ms. Beverly,

Thank you for your request to support your use of historical KCTCS data for your dissertation. As you noted, the data included no identifiers. Your research involves validating current admissions criteria for the Nursing program to assist in identifying applicants with the highest probability of success. This will help KCTCS advise students into Nursing careers in the future.

This letter supports your use of this historical KCTCS data (with no identifiers) in your research. Best wishes to you on the completion of your dissertation.

Regards,

Kris Williams, PhD
Chancellor

Cc: Pam Duncan, KCTCS Deputy General Counsel