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Effect of COVID-19 on Comprehensive Predictor Exam Scores and Nursing Program Scores and First Generation College Students

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This is to certify that the doctoral dissertation by

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Abstract

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by

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MSN, Excelsior College, 2016

BS, Michigan State University, 2000

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The COVID-19 pandemic forced nursing education programs to change traditional face-to-face teaching to virtual education and simulated experiences. Therefore, research is needed to determine how this change affected nursing students' academic performance and their performance on standardized exams. The purpose of this three-part study, guided by Knowles's adult learning theory, was to determine if there was a difference in Associate of Science in Nursing (ASN) students' performance on: (a) Assessment Technology Institute (ATI) Comprehensive Predictor (CP) scores, (b) end of program scores, and for (c) CP scores for first generation students before the COVID-19 pandemic compared with nursing students' scores during the pandemic. Ex post facto data collected from three semesters of ASN students before the COVID-19 pandemic and three semesters during the COVID-19 pandemic made up the sample used for analysis. Results revealed no significant difference in students' CP scores between the two timeframes. A significant decrease was seen in students' end of program scores during the pandemic compared to prepandemic. No significant difference was seen on the CP scores of first generation students during the two time periods; however, the first generation students scored significantly lower regardless of the time compared to non-first generation students. This research is important to nursing education as it may facilitate positive social change by raising awareness of the need to improve virtual learning strategies to improve program outcomes and to recognize first generation students as needing additional assistance compared to non-first generation students. Future research is needed on strategies for virtual learning and specifically for first generation students.

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Dedication

I dedicate this dissertation to my family, and especially to Maire, my favorite First Gen. Thank you for your inspiration and support throughout this process. I am forever grateful.

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I would like to thank Dr. Janice Long, my dissertation chair, for your guidance, encouragement, and support throughout this process. I couldn't have had a better mentor in this journey, and I am so appreciative of the work you did with me. I would also like to thank Dr. Leslie Hussey, my committee member, for helping me to strengthen my writing and methods. Finally, I would like to thank everyone that supported me academically, professionally, and personally during this journey.

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Part 1: Overview

Introduction

When the World Health Organization (WHO) characterized COVID-19 as a pandemic, colleges of nursing throughout the United States were suddenly forced to move classes and clinicals online (Tracy & McPherson, 2020). Hill et al. (2020) stated that as a result of COVID-19, innovative practices were implemented to ensure that nursing student learning was not disrupted because of face-to-face teaching restrictions. Zimmerman (2020) suggested that the pandemic created a natural learning experiment and educators needed to seize this opportunity, in part by examining the evidence of student learning. According to Mattila et al. (2020) further exploration was needed of actual assessment of clinical competence and reasoning, and specific outcomes of these skills given the impacts of COVID-19. Mattila et al. suggested the gap in nursing education literature is the lack of evidence showing the pandemic's effect on nursing education learning outcomes. In prelicensure nursing education, passing the NCLEX-RN is the ultimate measure of the evidence of student learning determined using computerized adaptive testing (CAT; National Council of State Boards of Nursing [NCSBN], 2022). The COVID-19 pandemic has had numerous impacts on prelicensure nursing education clinical and didactic processes (Hwang et al., 2022; Konrad et al., 2021). However, published research does not show the extent to which the COVID-19 pandemic affected nursing students' predicted NCLEX-RN passing scores and nursing program passing scores.

According to Spurlock (2020) there is a projected nursing shortage of 1.1 million registered nurses (RN) by 2022. In 2019, 183,682 nurses entered the healthcare workforce by passing the NCLEX-RN (NCSBN, 2020). To combat the nursing shortage, over half a million nursing students were needed to pass the NCLEX-RN in 2020 and 2021 (Buerhaus et al., 2020). A decline in NCLEX-RN pass rates due to the COVID-19 pandemic educational disruption would be detrimental to the nursing workforce, and to nursing educational programs. Determining whether the pandemic has affected nursing students by measuring their predicted NCLEX-RN passing scores as well as their nursing program passing scores will contribute to nursing education by providing needed data and evaluation of actual program outcomes.

At-risk student groups, such as first generation college students, could potentially be affected by the COVID-19 pandemic at statistically different rates compared to nursing student populations studied as a whole. According to McFadden (2015) first generation college students are defined as students whose parent's highest education is a high school diploma or less. First generation college students are an invaluable population of nursing and health care providers and have barriers and challenges to overcome in their education (Wagner et al., 2020). According to Byrd and Meling (2020), through careful monitoring of vulnerable student populations and NCLEX-RN pass rates nursing schools more accurately can help to influence the nursing workforce to represent the diverse patients they serve.

Nursing students must pass their nursing program to be able to sit for the NCLEX-RN. For the nursing student a failure to pass their nursing program does not

mean that the student will not be able to take the NCLEX-RN, though it does delay the process as the student will need to remediate and then attempt again to pass their program or repeat their final semester. The purpose of this quantitative comparative ex post facto designed study was to determine the effect of the COVID-19 pandemic on nursing student's predicted NCLEX-RN scores and nursing program passing scores, and among first generation college students predicted NCLEX-RN scores. The COVID-19 pandemic was the change studied on the predicted NCLEX-RN scores and nursing program passing scores as well as the predicted NCLEX-RN scores of the first generation college students. This study was unique because the effect of the COVID-19 pandemic on nursing students' success in their nursing education program and in their licensure examination has not been measured. This study addressed a previously unresearched area of nursing education in a group of learners that has been challenged by the current pandemic.

Background

When conducting the review of the literature, I examined published studies on NCLEX-RN pass rates, the pandemic/COVID-19/coronavirus, the Comprehensive Predictor, nursing programs, nursing education, and first generation college students. To conduct the literature review, I included the databases for Academic Search Complete, Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus with full text, Education Source, ERIC, Medline Plus with full text, ProQuest, PubMed, Science Direct, and Supplemental Index. The inclusion criteria for database searches were English language, full text, peer-reviewed scholarly journals, and publication dates from 2015 to 2021. Seminal studies prior to 2015 were included to provide theoretical, methodological,

or foundational support. The following key search terms were used: *NCLEX, NCLEX pass rates, NCLEX readiness, COVID-19 or coronavirus or pandemic, covid*, comprehensive predictor, nursing program, nursing education, nursing, first generation college students, andragogy, nursing students, disasters, environmental effects,* and *professional pass rates.* The reference lists of studies meeting search criteria were reviewed to obtain additional pertinent literature and complete an exhaustive review.

I began the literature review with the NCLEX-RN and nursing education as well as NCLEX-RN pass rates, what affects them and what they affect, and the NCLEX-RN and the COVID-19 pandemic. The literature review includes the Comprehensive Predictor. Next, I move to nursing programs in nursing education, nursing students passing their nursing programs, and nursing programs and the COVID-19 pandemic. The literature review addresses first generation college students, first generation college students in nursing, and first generation college students and the COVID-19 pandemic. I then expand the search to include other environmental effects in addition to the COVID-19 pandemic on nursing education, nursing students (including first generation college students), and pass rates (NCLEX and nursing programs). The pass rates of other professional examinations and professional educational programs are included in the literature review for the COVID-19 pandemic. I conclude the literature review with the theoretical framework of andragogy in nursing education.

NCLEX-RN and Nursing Education

Prelicensure nursing education includes an array of discipline specific knowledge, clinical skills, and enhancement of critical thinking and teaching of clinical judgment.

Student achievement is evaluated in many ways throughout a student's licensure qualifying nursing education (Birkhead et al., 2018). The culmination of nursing education is the NCLEX-RN, where the student demonstrates the knowledge and critical thinking gained during their nursing education (Doyle et al., 2019). The NCLEX-RN is a computerized adaptive test designed to demonstrate a prospective nurse's safety, critical thinking, and problem solving needed to perform patient care throughout the lifespan (Quinn et al., 2018). The successful completion of the NCLEX-RN shows the quality of the educational preparation of nursing students (Havrilla et al., 2018). Successful nursing education results in an earned degree in nursing and completion of the professional licensure exam or NCLEX-RN. Quality nursing education is necessary to progress students on a learning trajectory that will ensure passing this exam.

NCLEX-RN Pass Rates

NCLEX-RN pass rates are important statistics for nursing education programs to maintain accreditation and to demonstrate the quality of the program. High NCLEX-RN pass rates, a key indicator of nursing program success, help programs to be competitive in acquiring students (Havrilla et al., 2018). NCLEX-RN pass rates are measured using the first attempts when nursing students take the exam. Nursing programs with high NCLEX-RN pass rates are more attractive to potential students as this is an indicator that these programs prepare their students well. Attracting potential nursing students is important in a competitive educational industry where many nursing schools now exist, and enrollment numbers are important. Enrollment in nursing programs leads to funding and revenue. Loftin et al. (2020) found that first time NCLEX-RN pass rates significantly

influenced admissions and progression policies and NCLEX-RN pass rates were a measure of program effectiveness. Nursing programs with low or decreasing NCLEX-RN pass rates can be in danger of losing their accreditation or being placed on probationary status until improvements are made and NCLEX-RN pass rates increase, because programs in every state must meet specific NCLEX-RN pass rate standards (Foreman, 2017). The penalties for infraction can range from intervention and reporting to probation to program closure (Foreman, 2017). Penalties for low NCLEX-RN pass rates are dangerous for nursing programs, challenging to overcome, and often result in a decrease in enrollment as there are enough nursing programs for students to choose a program not under sanctions.

Comprehensive Predictor

In nursing education, it is necessary to predict the likelihood that a student eligible to take the NCLEX-RN will pass on their first attempt. This is their NCLEX-RN readiness and can be predicted by exams. According to Smith and Meyer (2020), the use of standardized end-of-program assessments support student success and increases first time NCLEX-RN success. Examples of end-of-program assessments designed to predict first-attempt passing of the NCLEX-RN are Assessment Technology Institute (ATI) and Health Education Systems, Inc. (HESI; Victor et al., 2020). The ATI RN Comprehensive Predictor is a three hour exam composed of 180 questions designed to assess the student's likelihood of passing the NCLEX-RN (ATI Testing, 2021). Standardized end-of-program assessments have many benefits, including predicting the nursing student's probability of passing the NCLEX-RN and detailing areas for further remediation. When

paired with the educational component of learning tools and periodic assessments, students increase their probability through a scaffolded complementary standardized program that works alongside the nursing program. This enhancement to nursing education is widely employed by nursing programs throughout the United States, as one third of nursing programs use an end-of-program examination (Presti & Sanko, 2019). The RN Comprehensive Predictor has an expectancy table that provides numeric indication of the likelihood of passing the NCLEX-RN on the first attempt for every possible score on the exam (ATI Testing, 2019). A statistically significant relationship has been found between the Comprehensive Predictor score and the NCLEX-RN pass/fail status, therefore the actual Comprehensive Predictor percentage score is a significant predictor of NCLEX-RN success (ATI Testing, 2019; Chen & Bennett, 2016). Liu and Mills (2017) found that the Comprehensive Predictor is in alignment with the NCLEX-RN test plan and their results support the construct validity of the Comprehensive Predictor. The Comprehensive Predictor is a trusted, reliable predictor of NCLEX-RN readiness in nursing students.

NCLEX-RN and the COVID-19 Pandemic

The COVID-19 pandemic was a disruption to educational systems around the world. In the United States, all levels of education experienced drastic changes. There were shutdowns in prekindergarten through high school (Auger et al., 2020). Colleges and universities were suddenly forced to educate entirely online, resulting in a disruption to the usual operational procedures for nursing schools. The NCLEX-RN administrators had to adapt to temporary closures of administration sites, increased social distancing,

masking, scheduling changes, and back logs of students waiting to take the NCLEX-RN (NCSBN, 2020). The COVID-19 pandemic also caused many changes for everyone involved in NCLEX-RN testing. However, the challenges encountered for nursing programs, their faculty, and their students due to COVID-19 opened up many research opportunities. Research opportunities include the analysis of changing educational delivery methods from face to face to an online format (Konrad et al., 2021). The ways to measure this include measuring NCLEX-RN pass rates.

Nursing Students and COVID-19

The COVID-19 pandemic and its impacts on the lives of nursing students caused stress and anxiety that challenged the process of nursing teaching and learning (Silva et al., 2021). Impacts such as quarantining, around the clock child-care and education, experiencing adult education in new modalities, and economic decline are difficult on nursing students. The COVID-19 pandemic caused a new situation that elicited fear in students, including fear of illness and death and fear of ill family members and economic shortages (Silva et al., 2021). Nursing students nationwide had no prior experience dealing with such a monumental challenge as this was the first world-wide pandemic since the 2009 H1N1 influenza A outbreak (Centers for Disease Control and Prevention [CDC], 2021). The H1N1 pandemic led to 60.8 million cases, with 12,469 deaths reported in the United States (CDC, 2021). However, the H1N1 pandemic did not greatly affect nursing students as it did not result in mass closures and social distancing guidelines. As of August 27, 2022, the COVID-19 pandemic resulted in 93,880,573 cases in the United States with 1,037,953 deaths (CDC, 2022). The stress, anxiety, and fear

experienced by nursing students from COVID-19 could result in negative effects on passing their nursing programs. NCLEX-RN pass rates could be negatively affected by student anxiety around the numerous COVID-19 disruptions (Gaffney et al., 2021).

Nursing Programs in Nursing Education

In the United States, prelicensure nursing programs can be a part of an associate degree program or a bachelor's degree program and in either program degree type, nursing curricula are structured to educate students who have no nursing knowledge to the readiness to pass the NCLEX-RN. The NCLEX-RN pass rate is therefore used as a measurement of undergraduate nursing program success (Meehan & Barker, 2021). The quality of a nursing program can also be measured by NCLEX-RN pass rates in addition to rates of student attrition, new graduate employment, and graduation success rates (Chen & Bennett, 2016). Being a successful, quality nursing program is important in attracting students who seek nursing careers. To support student success in completing their nursing education and add to the quality indicators for nursing programs, a standardized learning and testing program is often integrated into the nursing curriculum as a tool to assess and increase student success. According to Meehan and Barker (2021) it is important for nursing programs to ensure that students are qualified to enter clinical practice and imperative that they are given adequate preparation for the NCLEX-RN. Success in the nursing program is the student's first step in qualifying for the NCLEX-RN (Chen & Bennett, 2016). Nursing programs often undergo self-assessments to identify areas for improvement as well of areas of achievement in order to better serve their nursing students, communities, and healthcare employers.

Nursing Students Passing Nursing Programs

Nursing students require numerous approaches to successfully learn how to become safe and competent nurses. Nursing programs include theory, clinical, simulation, and standardized testing. For a student to pass their nursing program, successful completion of each course combined with successfully passing the end-of-program standardized exam is required. Successfully passing the end-of-program standardized exam helps to ensure that cumulative learning and improvement combined with critical thinking have taken place. A comprehensive assessment can report a student's score, their predicted probability of passing the NCLEX-RN, national and program means, and categorical scores showing where students have focus areas for remediation or further study (ATI Testing, 2021). Nursing students having this data can use it to better prepare for and succeed on the NCLEX-RN.

The impact of NCLEX-RN failure on nursing students and nursing institutions has led to the implementation of end-of-program comprehensive predictive testing in order for students to both pass the nursing program and to predict their NCLEX-RN failure (Brussow & Dunham, 2018). End-of-program comprehensive predictive testing can be provided by ATI, the National League for Nursing (NLN), HESI and other less widely used companies. The nursing students' performance on their professional licensure examination is important because these students expect to pass the NCLEX-RN and enter into nursing practice after completing their nursing program (Oliver et al., 2018). Ensuring that students pass their end-of-program exam gives an important assurance to nursing programs. Nursing students who pass their end of program are

statistically likely to pass the NCLEX-RN which helps to keep the nursing programs first time NCLEX-RN pass rate statistics high. Students that fail their first attempt on the NCLEX-RN have a 42.9% chance of passing the NCLEX-RN on the second attempt according to the National Council of State Boards of Nursing (2020). Students who are less likely to pass the NCLEX-RN, determined by their end-of-program score, are often held back from passing their nursing programs until remediation is completed and the student passes the end-of-program examination (Myles, 2018). Remediation gives students more time and a relearning plan that helps students while delaying sending them to test for their licensure (Myles, 2018).

Nursing Programs and the COVID-19 Pandemic

The social isolation required during the COVID-19 pandemic resulted in the suspension of non-essential in-person activities and subsequently the adoption of alternative forms of teaching (Silva et al., 2021). These alternate forms of teaching included online classes, live-online classes, and virtual clinicals and simulation. The COVID-19 disruption led to unexpected changes in all aspects of nursing education (Gaffney et al., 2021) including an instant shift to a remote modality for lectures, practicums, and testing. While nursing programs may have faced multiple challenges in delivering quality education before the COVID-19 pandemic, the level of challenges increased and intensified during the pandemic requiring programs become increasingly resilient to adapt to the challenges. Prepandemic challenges such as funding, staffing, and student issues increased during the pandemic while new challenges such as quarantining, sheltering in place, and social distancing arose.

Resiliency in a nursing program is a process used in the face of adversity to maintain the functionality and well-being of the system and to recover from the disruption (Dowling et al., 2021). Nursing programs were forced to look at their resiliency, and a resilient nursing program was in a better position to prepare competent nurses ready to meet the challenging needs of a growing and diverse patient population (Dowling et al., 2021). The pandemic showed the importance of inclusivity in the classroom, organizational resilience, and the use of resilience oriented educational strategies that are both risk and asset focused in nature (Dowling et al., 2021). The pandemic will leave a positive legacy on nursing programs with regard to incorporating and making viable technology in nursing education that was previously underutilized (Silva et al., 2021).

First Generation College Students

In the United States there were nearly 20 million college students enrolled in the fall of 2020 (NCES, 2019). An estimated one-third of those were first generation college students (Cataldi et al., 2018). First generation students are college students whose parents have not received a higher education degree. First generation college students are a diverse group which includes nonnative English-speaking students (Wagner et al., 2020). According to Redford and Hoyer (2017) first generation students are more likely to be older, single parents, have dependent children, and work full-time while attending school. First generation students can experience stressors including the absence of support from family and friends, difficult cultural transitions, increased financial pressures, and lack of academic preparation compared to non-first generation college

students (House, et al., 2020). According to McFadden (2016) the most at-risk population of college students to leave college without completing a degree are first generation. The high attrition rates of first generation students have been shown to be associated with students' educational backgrounds, inadequate preparation, financial constraints, and sociologic factors such as family and social support (Grace-Odeleye & Santiago, 2019). These characteristics of financial constraints, educational backgrounds, sociologic factors, and inadequate preparation of first generation college students combined with factors contributing to their profile make first generation students an at-risk group of students. The first generation student population is present in every college program including nursing.

First Generation College Students in Nursing

Little is published about first generation students and nursing. According to Wagner et al. (2020) the admission of first generation students increases the diversity of nursing programs and nursing. These authors studied first generation students during admissions including the barriers faced during the application process. Educational programs that raise awareness of the unique challenges faced by first generation students could assist nursing faculty, help support the recruitment of diverse applicants, and support the long-term goal of increasing diversity in the nursing workforce (Wagner et al., 2020). First generation students are present in nursing programs and more research is needed to examine their prevalence, needs, struggles, and successes.

First Generation College Students and the COVID-19 Pandemic

First generation college students and the COVID-19 pandemic is an area open to research. I identified only one article (Jeong, et al., 2021) examining the psychological well-being, help-seeking likelihood and resources, supportive parent communication, and life satisfaction of first generation students during the early period of the pandemic. The authors found that first generation students have higher anxiety and lower supportive parent communication and life satisfaction when compared to non-first generation students. First generation students are also less likely to seek academic help compared to non-first generation college students (Jeong et al., 2021). The COVID-19 pandemic caused an unexpected decrease in access to campus resources for college students, and as a result, colleges and healthcare need to give attention to the unique situation faced by first generation students (Jeong et al., 2021).

Other Environmental Effects

Research on nursing education regarding other environmental health emergencies and disasters is present though not extensive. Nursing literature does include the impacts on nursing education during Hurricane Harvey (Robinson et al., 2020; Sickora et al., 2020) and the Wenchuan Earthquake (Li et al., 2015). According to Robinson et al. (2020), facing unanticipated obstacles as a result of Hurricane Harvey made planning for future events in the college of nursing easier. Sickora et al. (2020) suggested that natural disasters can lead to unique learning experiences for nursing students that would not arise otherwise. Dealing with power outages as a result of natural disasters and its effects on remote students was explored by Heithaus (2015). Heithaus found advanced emergency

preparedness to be essential including students and instructors taking additional measures to maintain an online presence and keep pace with the workload prior to storm activity. Wilkenson and Matzo (2015) addressed the need for nursing education improvements to prepare nurses for disasters. Additionally, climate changes and the need for nursing education programs to prepare nurses for the environmental effects that could occur with climate change was proposed by Neal-Boylan et al. (2019). None of the studies in this literature review examined the effects of disaster related global issues on nursing program pass rates. Research into other environmental effects on NCLEX-RN pass rates has yet to be explored. Also absent from nursing literature is the impact on nursing education from previous pandemics (influenzas). Moreover, I found no literature on other environmental effects and first generation college students.

Other Professional Examinations and COVID-19

Literature on the effect of COVID-19 and the United States Medical Licensing Examination (USMLE) is minimal. According to Whelan (2020), the medical education community should accept any positive changes resulting from this pandemic which has been a major disruptor to education and dominated clinical and educational environments. In my search of the literature, I found no studies on the effect of COVID-19 on other professional examinations such as the bar exam (law), the American Board of Dental Examiners (ADEX), the North American Veterinary Licensing Examination (NAVLE), the North American Pharmacist Licensure Examination (NAPLEX), or the Comprehensive Osteopathic Medical Licensure Examination (COMLEX). This lack of

studies on the topic is therefore an indication of a need to further examine higher education and particularly nursing education in times of pandemics such as COVID-19.

Theoretical Framework: Andragogy

The theoretical base for my study was Knowles's (1980) theory of andragogy which describes adult learners as self-directed and therefore expected to take responsibility for their own learning. Nursing programs are composed of adult learner nursing students. Based on this theory adult learners are self-directed, and these nursing students have chosen to apply to and work within nursing programs to attain their goal of becoming a licensed registered nurse. Nursing students must ultimately take responsibility for their own learning that culminates in the passing of their nursing programs and the NCLEX-RN. Nursing students that are adult learners and are not self-directed and do not take responsibility for their own learning are often unsuccessful in nursing programs and their goal will be unattained.

Knowles's posited assumptions that adults need to know why they need to learn something, adults learn best when the topic is of immediate value, adults approach learning as problem solving, and adults learn experientially (Knowles's, et al., 2005). In nursing education nursing students need to know not only why they are learning something, but how to apply it to complex and often fluid real life patient care. Harnessing the assumption of nursing students learning best when the topics are of immediate value is evident in the clinical aspect of their education. The nursing students' approach to learning as problem solving adds to their development of critical thinking skills necessary to pass the NCLEX-RN and succeed in nursing practice. The assumption

that nursing students learn experientially is fulfilled in clinical education and students' reflection on that hands-on learning is necessary for their growth and development.

Andragogy includes four principles which are planning, experience, relevance, and content (Health Research Funding, 2020) and these are incorporated in prelicensure nursing education. The planning principle allows nursing students to be directly involved in the planning of their learning opportunities and involved in the evaluation of their instruction. The experience principle lets nursing students learn from their experiences, including their mistakes, to build a foundation. The relevance principle explains nursing students' preference to learn information of immediate value. The fourth principle, content, describes nursing education from a problem-centered perspective as opposed to content oriented.

Andragogy aligns with nursing education in the collaboration between adult learners and nursing educators, and student-centered, problem based nursing education (Decelle, 2016). Knowles's proposed steps of self-directed learning including diagnosing learning needs, formulating learning goals, implementing appropriate learning strategies, and evaluating learning outcomes (Bair, 2019). This mirrors aspects of the nursing process of assessment, diagnosis, planning, implementation, and evaluation (ANA, n.d.) that is the foundation of nursing. This andragogical nursing education generates the level of critical thinking and clinical judgment necessary in nursing and to pass the NCLEX-RN.

Overview of the Manuscripts

The purposes of my study were to determine: (a) if there is a difference in Comprehensive Predictor scores as a proxy for the NCLEX-RN for Associate of Science Degree Nursing (ASN) students who took the Comprehensive Predictor before the COVID-19 pandemic began compared to those who took the Comprehensive Predictor during the COVID-19 pandemic, (b) if there is a difference in ASN end of program passing scores for nursing students before the COVID-19 pandemic compared with ASN end of program passing scores for nursing students during the COVID-19 pandemic, and (c) if there is a difference in Comprehensive Predictor scores before the COVID-19 pandemic compared to during the COVID-19 pandemic for first generation students.

This study may fill the gap in nursing literature on the effect of COVID-19 in nursing education outcomes. Contributing quantitative research on the effect of the COVID-19 pandemic on nursing students may help nursing educators to be better equipped to navigate through future challenges. The results of this study may provide insights on the effects of a pandemic on nursing education outcomes and be used to prepare nursing programs to survive and thrive in the face of challenges such as a pandemic.

Manuscript 1

The COVID-19 pandemic was a disruption to nursing education on a wide-spread level. This pandemic disrupted every aspect of nursing programs, the lives of nursing students, and threatened nursing testing success. The ultimate measure of successful nursing education is passing the NCLEX-RN. Nursing students are eligible to take the

NCLEX-RN after successful completion of their nursing programs to measure their safety and competence to practice as a registered nurse. NCLEX-RN pass rates prior to the COVID-19 pandemic were stable allowing for a steady and predictable flow of new graduate nurses into the workforce. The Comprehensive Predictor is a reliable way for nursing programs to predict a student's likelihood of passing the NCLEX-RN (Liu & Mills, 2017). If the COVID-19 pandemic had a negative effect on nursing students taking the NCLEX-RN and pass rates decreased fewer new nurses would be available to help combat the increasing nursing shortage. My study examined the effect of the COVID-19 pandemic on Comprehensive Predictor scores as a proxy for passing the NCLEX-RN.

Research Question

RQM1: What is the difference in Comprehensive Predictor scores for ASN students who took the Comprehensive Predictor before the COVID-19 pandemic began compared to those who took the Comprehensive Predictor during the COVID-19 pandemic?

Nature of the Study and Design

I conducted a quantitative study analyzing the Comprehensive Predictor scores of nursing students before and during the COVID-19 pandemic. The Comprehensive Predictor is used as a proxy for the student's passing NCLEX-RN. The nature of this study was quantitative research with a comparative analysis using ex post facto data (Trochim et al., 2016). Sampling was purposive. The education of the nursing students taking the Comprehensive Predictor and the NCLEX-RN in this study took place before the COVID-19 pandemic or during the pandemic. The dependent variable,

Comprehensive Predictor scores, before and during the pandemic was reported as a percentage and is continuous. The pandemic was defined as beginning in the semester including March 2020, or when the United States began to shelter in place due to COVID-19 (AJMC staff, 2020). I used a nonequivalent groups design where the existing groups appear similar, but only one of the groups experienced the treatment. In this research the independent variable was the existence of the COVID-19 pandemic shown through cohort semester and year. This comparative research allowed for the analysis of the Comprehensive Predictor scores prior to the pandemic and the comparison of these data to the Comprehensive Predictor scores obtained during the pandemic.

Sources of Data

Secondary data were accessed from an ASN program at a college in the southern region of the United States. The data collected were the Comprehensive Predictor scores for students from semesters before the pandemic and during the pandemic. The college has over 250 graduates annually. I requested data from the college to gain access to the Comprehensive Predictor scores for each student as well as demographic data (see Appendix A). Prepandemic data were collected with the semester immediately prior to the pandemic and included three semesters (Fall 2019, Spring 2019, and Fall 2018) ensuring sample size was reached or exceeded as calculated using G*Power 3.1.9.7. During pandemic data began after the semester which included March 2020 and included data from three semesters (Fall 2020, Spring 2021, and Fall 2021) ensuring sample size was reached or exceeded.

Manuscript 2

For a nursing student to earn an ASN they must pass their courses in addition to an end of program cumulative exam. With the emergence of the COVID-19 pandemic, the way nursing students received their education changed abruptly. Shelter in place orders in March and April 2020 (Castaneda & Saygili, 2020) moved didactic, clinical, simulation, and lecture to an online format. Nursing students faced challenges outside of their education which could have an effect on a nursing students' ability to pass their nursing programs. Research into the effect of the abrupt change in education delivery to an online format was beneficial to fully analyze the effects of the COVID-19 pandemic on important aspects of nursing education and testing. Final program grade scores were used to examine the effect of the COVID-19 pandemic on nursing student's passing their nursing programs.

Research Question

RQM2: What is the difference in Associate of Science Degree Nursing (ASN) end of program passing scores for nursing students before the COVID-19 pandemic compared with ASN end of program passing scores for nursing students during the COVID-19 pandemic?

Nature of the Study and Design

The nature of this study was quantitative research with a comparative analysis using ex post facto data (Trochim et al., 2016). Sampling was purposive. I compared the education of the nursing students before the COVID-19 pandemic to the education during the pandemic. Therefore, the nursing students either passed/did not pass their programs

before or during the pandemic. The COVID-19 pandemic was defined as beginning in the semester including March 2020, or when the United States began to shelter in place due to COVID-19 (AJMC staff, 2020). I used a nonequivalent groups design where the existing groups appear similar, but only one of the groups experiences the treatment. In this research the independent variable was the existence of the COVID-19 pandemic demonstrated through cohort semester and year. I analyzed the nursing program passing scores prior to the pandemic and the comparison of these to the program passing scores from during the pandemic.

Sources of Data

Secondary data were accessed from an ASN program at a college in the southern region of the United States. The data collected were nursing end of program passing scores per semester prior to and during the pandemic. The college has an average of 250 students graduating annually. I requested data from the college to gain access to the nursing program passing scores for each student as well as demographic data (see Appendix A). Prepandemic data were collected with the semester immediately prior to the pandemic and included three semesters (Fall 2019, Spring 2019, and Fall 2018) ensuring sample size was reached or exceeded as calculated using G*Power 3.1.9.7. During pandemic data began after the semester which included March 2020 and included data from three semesters (Fall 2020, Spring 2021, and Fall 2021) ensuring sample size was reached or exceeded.

Manuscript 3

Nursing student populations include both at-risk and non-at-risk students. The factors and characteristics that make some students at-risk students could make them more vulnerable to the effects of the COVID-19 pandemic (Jeong et al., 2021). The COVID-19 pandemic caused important resources and support needed by nursing students to no longer be available. These resources are vital to the success of first generation students. First generation students represent an at risk group of nursing students. Research was needed to determine if the COVID-19 pandemic affected this at risk group of first generation students at a different rate compared to non-first generation nursing students. My study analyzed these data to determine if a difference exists.

Research Question

RQM3: What is the difference in Comprehensive Predictor scores for first generation students compared to non-first generation students before and during the COVID-19 pandemic?

Nature of the Study and Design

The nature of this study was quantitative research with a comparative analysis. The education and examinations of the first generation and non-first generation nursing students in this study took place before the COVID-19 pandemic or during the COVID-19 pandemic. The COVID-19 pandemic was defined as beginning in the semester including March 2020, or when the United States began to shelter in place due to COVID-19 (AJMC staff, 2020). Therefore, the first generation or non-first generation nursing students either passed/did not pass the Comprehensive Predictor before or during

the pandemic. This study used a non-equivalent groups design where the existing groups appear similar, but only one of the groups experiences the treatment. In this research the treatment is the existence of the COVID-19 pandemic. This design involved research on groups that already exist based on their semester and cohort year and allowed for the analysis of the first generation and non-first generation Comprehensive Predictor scores as a proxy for NCLEX-RN scores prior to the COVID-19 pandemic and the comparison of these to the scores from during the COVID-19 pandemic.

Sources of Data

Secondary data were accessed from an ASN program at a college in the southern region of the United States. The data collected was the first generation college students and non-first generation college students Comprehensive Predictor scores for semesters before and during the COVID-19 pandemic. The college has an average of 250 students graduating annually. I requested data from the college to gain access to the Comprehensive Predictor scores for each student, their first generation status, as well as demographic data (see Appendix A). Prepandemic data were collected with the semester immediately prior to the pandemic and included three semesters (Fall 2019, Spring 2019, and Fall 2018) ensuring sample size was reached or exceeded as calculated using G*Power 3.1.9.7. During pandemic data began after the semester which included March 2020 and included data from three semesters (Fall 2020, Spring 2021, and Fall 2021) ensuring sample size was reached or exceeded.

Significance

This study added to the literature regarding the effects of COVID-19 on nursing education measured by Comprehensive Predictor scores as a proxy for NCLEX-RN passing scores, nursing program passing scores, and those of first generation college students in nursing programs. The results of this study showed how the COVID-19 pandemic affected nursing education and its learning outcomes, and if this change resulted in an increase or decrease in Comprehensive Predictor scores and nursing program passing scores. To consider the impact to a greater extent, the results provided needed information on whether there was a decrease in the number of nurses entering the workforce, via passing the NCLEX-RN and their nursing programs compared to previous years before the pandemic occurred. According to Manz et al. (2021) the demand for nurses is growing by 1-2% each year and the nursing demand projected by 2026 is expected to far outweigh the estimated increase in the nursing workforce of 15% over the next decade (Alexander & Johnson, 2021). By March 2020, the COVID-19 pandemic had forced state(s) orders to close all schools and businesses, forcing all classes and clinicals to online and virtual learning environments (Mariani, et al., 2020). Any source of change in nursing education that decreased program outcomes or NCLEX-RN pass rates may have had an impact on the nursing workforce entering the profession from schools of nursing. The impact of the COVID-19 pandemic was particularly concerning because the pandemic caused a universal change to online classes where many programs were traditionally face to face, and clinical experiences were largely canceled in favor of increasing simulated and virtual experiences (Maykut et al., 2021). Therefore, this study

was significant as a means of learning to what degree the pandemic affected nursing education program outcomes, and to what degree those outcomes may have affected the number of new nurses entering practice. Additionally, the results may provide nurses and healthcare industry leaders with evidence to support planning to address the healthcare demands for nurses. The results of this study may also provide nursing educators and program leaders with information that helps them identify areas for improvement in prelicensure nursing education during the current and future pandemics.

According to Walden University (2021) positive social change includes strategies and actions to promote the development of individuals and institutions. The findings of this study may lead to positive social change by providing evidence of the impact of the actions nursing programs and health systems were required to make because of the COVID-19 pandemic and that affected nursing program outcomes. Findings may help nursing educators to improve pre-licensure nursing education in the current pandemic or future pandemics. Positive social change in educating successful and diverse nursing students leads to a successful and diverse nursing workforce that can meet the needs of society (Byrd & Meling, 2020). These changes will allow nursing education to be prepared to triumph in a changed educational landscape and be prepared for possible future challenges.

Summary

I examined the effect of the COVID-19 pandemic on two important aspects of nursing education assessment and then considered an at-risk student group. The nursing students' Comprehensive Predictor scores were used as a proxy for the NCLEX-RN, and

nursing end of program passing scores were studied. The Comprehensive Predictor scores as a proxy for the NCLEX-RN of first generation college students in nursing school were compared to non-first generation nursing students before and during the COVID-19 pandemic. The purposes of my study were to determine (a) if there was a difference in Comprehensive Predictor scores for ASN students who took the Comprehensive Predictor before the COVID-19 pandemic began compared to those who took the Comprehensive Predictor during the COVID-19 pandemic, (b) if there was a difference in ASN end of program passing scores for nursing students before the COVID-19 pandemic compared with ASN end of program passing scores for nursing students during the COVID-19 pandemic, and (c) if there was a difference between first generation students Comprehensive Predictor scores as a proxy for the NCLEX-RN and non-first generation students Comprehensive Predictor scores as a proxy for the NCLEX-RN before and during the COVID-19 pandemic.

Data gathering included the Comprehensive Predictor scores and end of program passing scores before and during the COVID-19 pandemic on ASN students from a college in a southern region of the United States. Data gathering also included first generation college student status as well as demographics. There is a lack of literature on the effect of COVID-19 on nursing education learning outcomes and on nursing students. Examining the evidence of nursing student learning affected by the pandemic and assessing nursing student competence will provide information about the impacts of COVID-19 (Zimmerman, 2020; Mattila et al., 2020).

Part 2: Manuscripts

Manuscript 1: The Effect of COVID-19 on Comprehensive Predictor Scores as a Proxy for the NCLEX-RN

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Outlet for Manuscript

The target journal for this manuscript is the *Journal of Nursing Education* (https://journals.healio.com/journal/jne). The formatting expectation is APA 7th edition, and major articles are limited to 15 pages before any references, tables, and figures. The link to information for authors is https://journals.healio.com/journal/jne/submit-an-article#Authors. This journal aligns with the content in this manuscript as the journal publishes research and scholarly works that influence and involve nursing education (Journal of Nursing Education, n.d.). This article involves nursing education and testing results during the COVID-19 pandemic. The results could influence nursing education for future pandemics and worldwide disruptions.

Abstract

The COVID-19 pandemic brought challenges to nursing education never before experienced. Continuing to provide quality nursing education in a changed landscape where much of what was traditionally face to face was forced online and simulated, was required. Measuring the results of that effort was necessary in nursing research. The purpose of this quantitative comparative study, guided by Knowles's adult learning theory, was to determine the effect of the COVID-19 pandemic on nursing students' Comprehensive Predictor scores as a proxy for the NCLEX-RN before and during the pandemic. There was no statistically significant difference in the Comprehensive Predictor scores before and during the COVID-19 pandemic. The results of this analysis provided information to nursing educators to be better prepared to meet future challenges and to enhance resiliency. Educators can utilize the results of this study to continue successful strategies, thus aiding nursing students to be adequately prepared to pass the NCLEX-RN regardless of world events and enter the healthcare workforce where they are greatly needed.

Introduction

The COVID-19 pandemic created a natural learning experiment to examine the evidence of student learning during a pandemic (Zimmerman, 2020). Passing the NCLEX-RN is the ultimate measure of the evidence of student learning in prelicensure nursing education. The Assessment Technology Institute (ATI) Comprehensive Predictor is a trusted and reliable exam that predicts the likelihood of a nursing student successfully passing the NCLEX-RN on the first attempt. Little is known about the extent to which the COVID-19 pandemic affected nursing students' NCLEX-RN passing. With an increasing concern over the nursing shortage and awareness that nurses are needed more than ever to serve patients admitted for COVID-19 related illnesses, studies were needed to learn as much as possible about the impact of the pandemic on student education outcomes that the NCLEX-RN measures (Mattila et al., 2020). If NCLEX-RN pass rates were found to decline, the decrease in nursing graduates would further complicate the nursing shortage.

According to Haddad et al. (2022) more than 275,000 additional nurses are needed annually from 2020-2030. The nursing shortage was predicted to hit 1.1 million nurses in the United States in 2022 (Spurlock, 2020). In 2019, 183,682 nurses entered the healthcare workforce by passing the NCLEX-RN (NCSBN, 2020). Research showed to combat the nursing shortage over half a million nursing students were needed to pass the NCLEX-RN in 2020 and 2021 (Buerhaus et al., 2020). A decline in NCLEX-RN pass rates due to the COVID-19 pandemic educational disruption would be detrimental to the nursing workforce, combating the nursing shortage, and to nursing educational programs. Determining whether the pandemic affected nursing students by measuring their

Comprehensive Predictor scores as a proxy for the NCLEX-RN contributed to nursing education by providing needed data and evaluation of actual program outcomes.

Significance

The results of this study provided information to fill a gap in nursing education literature by contributing quantitative research that showed the COVID-19 pandemic's effect on Comprehensive Predictor scores and therefore NCLEX-RN pass rates. The results of this study showed that COVID-19 affected nursing education and its learning outcomes. To consider the impact of COVID-19 on the numbers of new graduate nurses, the results of this study provided needed information on whether there was a decrease in the number of nurses entering the workforce, via passing the NCLEX-RN, compared to years before the pandemic occurred. As the demand for nurses grows by 1-2% each year (Manz et al., 2021) and by 2026 is expected to far outweigh the estimated increase in the nursing workforce (Alexander & Johnson, 2021) any decrease in new nurses will add to an already strained system.

The theoretical framework used to guide my study was Knowles's (1980) theory of andragogy. This theory describes adult learners as self-directed and therefore expected to take responsibility for their own learning. Knowles posited assumptions that adults need to know why they need to learn something, adults learn best when the topic is of immediate value, adults approach learning as problem solving, and adults learn experientially (Knowles et al., 2005). Andragogical principles are incorporated in prelicensure nursing education. Andragogy aligns with nursing education in the collaboration between adult learners and nursing educators, and in student-centered,

problem based nursing education (Decelle, 2016). Knowles's proposed steps of self-directed learning including diagnosing learning needs, formulating learning goals, implementing appropriate learning strategies, and evaluating learning outcomes (Bair et al., 2019). This mirrors the aspects of the nursing process of assessment, diagnosis, planning, implementation, and evaluation (ANA, n.d.) that is the foundation of nursing. This foundation in education generates the level of critical thinking necessary in nursing.

This topic made an original contribution to nursing education by determining whether the pandemic has affected nursing students by measuring their Comprehensive Predictor scores as a proxy for the NCLEX-RN and contributed to nursing education by providing needed data evaluation of actual program outcomes. Moreover, determining if there was a decrease in NCLEX-RN pass rates due to the COVID-19 pandemic may help predict the effect on the nursing shortage. This will also help predict the change in the number of nurses needed to enter the workforce by passing the NCLEX-RN after the pandemic. The purpose of this quantitative research was to determine the effect of the COVID-19 pandemic on nursing student's Comprehensive Predictor scores as a proxy for the NCLEX-RN.

Relevant Scholarship

To begin practice as a registered nurse (RN), a nursing student must pass the NCLEX-RN (Doyle et al., 2019). The NCLEX-RN is a computerized test designed to demonstrate a prospective nurse's safety, critical thinking, and problem solving needed to perform patient care throughout the lifespan (Quinn et al., 2018). A key indicator of a nursing programs success is the NCLEX-RN pass rate (Havrilla et al., 2018). NCLEX-

RN pass rates are a measure of program effectiveness (Loftin et al., 2020). Quality nursing education is necessary to progress students on a learning trajectory that will ensure passing this exam. The successful completion of the NCLEX-RN shows the quality of the educational preparation of nursing students (Havrilla et al., 2018).

Predicting the likelihood that a student eligible to take the NCLEX-RN will pass on their first attempt is their NCLEX-RN readiness, which is important to assess in senior nursing students who are approaching the end of their educational program. The Comprehensive Predictor is a three-hour exam composed of 180 questions designed to assess the student's likelihood of passing the NCLEX-RN (ATI Testing, 2021). This predictor is widely employed by nursing programs throughout the United States, as one third of nursing programs use an end-of-program comprehensive examination (Presti & Sanko, 2019). The Comprehensive Predictor has an expectancy table that provides numeric indication of the likelihood of passing the NCLEX-RN on the first attempt for every possible score on the exam (ATI Testing, 2019). A statistically significant relationship has been found between the Comprehensive Predictor score and the NCLEX-RN pass/fail status, therefore the actual percentage score on the Comprehensive Predictor is a significant predictor of NCLEX-RN success (ATI Testing, 2019; Chen & Bennett, 2016). Because of the changes in educational delivery required of programs during the COVID-19 pandemic, having a predictor to measure students' readiness for NCLEX-RN became important for programs to determine educational effectiveness.

The COVID-19 pandemic was a disruption to educational systems. Colleges and universities were suddenly forced to educate entirely online, resulting in a disruption to

the usual operational procedures for nursing schools. The COVID-19 pandemic caused a disruption to licensure examination as NCLEX-RN administrators had to adapt to temporary closures of administration sites, increased social distancing, masking, scheduling changes, and back logs of students waiting to take their professional licensure examination (National Council of State Boards of Nursing [NCSBN], 2020). Examining the effects of these disruptions is an opportunity for research and growth as a profession.

Research Question and Design

The research question (RQ) that this study addressed was: What is the difference in Comprehensive Predictor scores for Associate of Science Degree Nursing (ASN) students who took the Comprehensive Predictor before the COVID-19 pandemic began compared to those who took the Comprehensive Predictor during the COVID-19 pandemic?

The null hypothesis (H_0) was: There is no difference in the Comprehensive Predictor scores of ASN students who took the Comprehensive Predictor before and during the COVID-19 pandemic.

The alternative hypothesis (H_a) was: There is a statistically significant difference in the Comprehensive Predictor scores of ASN students who took the Comprehensive Predictor before and during the COVID-19 pandemic.

I conducted a comparative quantitative study analyzing the Comprehensive Predictor scores as a proxy for the NCLEX-RN of nursing students before and during the COVID-19 pandemic (Creswell, 2014) using secondary data. This comparative research

allows for the analysis of the Comprehensive Predictor scores prior to the pandemic and the comparison of these data to the scores from during the pandemic (Trochim et al., 2016).

Methods

Participants

The target population for this secondary data study was taken from the results of ASN program nursing students' Comprehensive Predictor exams that were taken either prior to or during the COVID-19 pandemic at a college in the southern region of the United States. This ASN program graduates over 250 students annually. The data set included the student number, the cohort year, the term (semester), gender, first generation college student status, Comprehensive Predictor exam scores, and final program scores. The data were deidentified.

Sample and Power

I took the Comprehensive Predictor scores data from an ASN program at a college in the southern region of the United States before and during the COVID-19 pandemic ensuring an adequate sample size. Inclusion criteria include data from nursing students that took the Comprehensive Predictor exam before or during the pandemic. I defined the COVID-19 pandemic as beginning in the semester including March 2020, or when the United States began to shelter in place due to COVID-19 (AJMC staff, 2020). Prepandemic semesters were those that occurred prior to 2020.

I conducted a power analysis to determine sample size. I used a power level of 0.8 which indicates that if the study is conducted repeatedly it is likely to produce a

statistically significant effect 80% of the time if a statistically significant effect exists (Field, 2016). I set the alpha level at 0.05 which indicates a 5% probability of a type I error, or the incorrect rejection of the null hypothesis when it is actually true (Field, 2016). The effect size represents the strength of relationship between variables. I calculated a power analysis for my sample size using the two-tailed independent *t* test, using a 0.80 power, 0.5 effect size (medium), and 0.05 alpha which yielded a sample of 128 (see Buchner et al., 2021).

Variables and Sources of Data

The dependent variable (DV) was the Comprehensive Predictor score which is a continuous variable expressed in percentages. The independent variable (IV) was cohort year and term before or during the COVID-19 pandemic which is a dichotomous variable. The source of secondary data that I used originated from ATI and was taken from an ASN nursing program at a college in the southern region of the United States.

Measures

I used a unique student identifier, deidentified data for a college in a southern state, and assured validity and reliability. The Comprehensive Predictor is a national exam considered to be highly reliable which produces the same results under the same conditions consistently (Field, 2018). The Comprehensive Predictor contains an expectancy table that provides numeric indication of the likelihood of passing the NCLEX-RN on the first attempt for every possible score on the exam (ATI Testing, 2019). The ATI test measures what it sets out to measure conceptually, ensuring that validity is achieved (Field, 2018). Liu and Mills (2017) found that the Comprehensive

Predictor is in alignment with the NCLEX-RN test plan and their results support the construct validity of the Comprehensive Predictor.

Design and Analysis

The research design was a quantitative comparative ex post facto study using secondary data (Trochim et al., 2016). I used SPSS Statistics version 28 (IBM) to analyze the data. I conducted an independent *t* test to test for the effect of the pandemic on the ATI Comprehensive Predictor scores of nursing students determining if there is a significant difference in the means of the nonequivalent groups (Trochim et al., 2016). The Comprehensive Predictor scores are percentages and are a ratio level of measurement. Prior to analyzing the results of the independent *t* test, I tested the data to check the assumptions for the *t* test. The assumptions for the independent samples *t* test are the DV is normally distributed, homogeneity of variance, the samples are independent of each other, samples are drawn from the population at random, all observations are independent of each other, and the DV must be measured on an interval or ratio scale (Statistics Solutions, 2021).

Results

Execution

The purpose of this quantitative comparative study was to determine the difference, if any, between the ASN students' Comprehensive Predictor scores before and during the COVID-19 pandemic. The timeframe for secondary data inclusion was the three semesters prior to the COVID-19 pandemic including fall 2018, spring 2019, and fall 2019. The semester including the COVID-19 pandemic shelter in place federal order

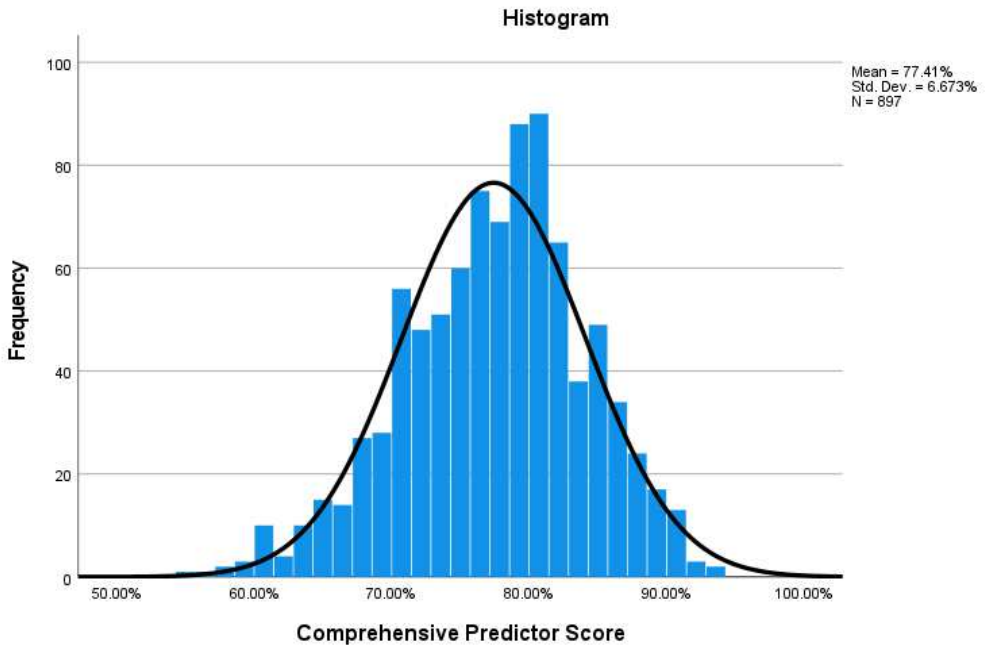
(March 2020) was excluded as these students received their nursing education prepandemic and took their Comprehensive Predictor during the pandemic. The timeframe for data inclusion during the pandemic was the three semesters including fall 2020, spring 2021, and fall 2021. Before the secondary data were acquired, I received IRB approval (04-13-22-0758516) from Walden University and the partner site. The data were deidentified, password protected, and are stored securely for 5 years before permanent deletion. There were no missing data.

Results

Baseline characteristics of the sample included $n = 431$ prepandemic and $n = 466$ during pandemic Comprehensive Predictor exam scores from ASN students. The results of the Comprehensive Predictor scores were examined to determine frequency distribution (see Figure 1).

Figure 1

Comprehensive Predictor Scores



I conducted an independent *t* test to compare the mean of the dependent variable scores between the two independent groups (Laerd Statistics, 2018). Prior to the analysis with the independent *t* test, I examined the six assumptions of the independent *t* test, and all six assumptions were met. The first assumption was that the dependent variable was continuous. The Comprehensive Predictor scores were a continuous scale variable from 0.00 to 100.00. Therefore, first assumption was met.

The second assumption of the independent *t* test was that the independent variable consists of two independent categorical groups. The independent variables for this study were prepandemic and during pandemic ASN student groups. Therefore, the second assumption was met.

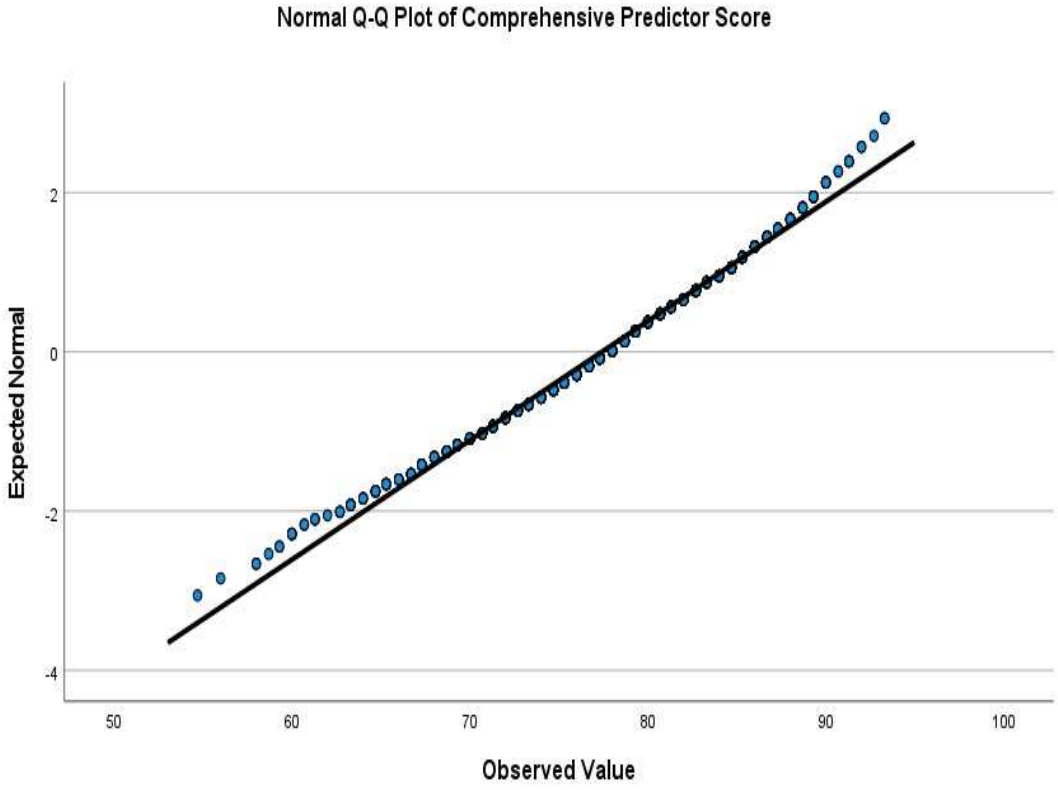
The third assumption of the independent *t* test was that there is independence of observations. Each ASN student was part of one group being studied and no ASN student was part of both groups being studied. Therefore, the third assumption was met.

The fourth assumption was to determine if there were any significant outliers for the study. The histogram and scatter plot revealed no significant outliers. The skewness value is -0.350 and according to Laerd Statistics (2018) if the skewness is between -0.5 and 0.5 the data are fairly symmetrical. Therefore, the fourth assumption was met.

The fifth assumption of the independent *t* test was that the dependent variable should be approximately normally distributed for each group of the independent variable. The Shapiro-Wilk test of normality statistic is .990, df 897, $p < .001$ and the Q-Q Plot shows normality (see Figure 2). Kurtosis was 0.015. and if the kurtosis is close to zero then a normal distribution is assumed (SPC for Excel, 2022).

Figure 2

Normal Q-Q Plot of ATI Comprehensive Predictor Scores



The sixth assumption of the independent *t* test, homogeneity of variance, was tested using Levene's test which indicated group variances can be treated as equal $F = 2.872$ and $p = 0.90$. Therefore, equal variances were assumed, and the sixth assumption was met.

The results of the independent *t* test showed that there was no statistically significant difference between the prepandemic group (M = 77.64%, SD = 6.79%, n = 431) and the during pandemic group (M = 77.21%, SD = 6.56%, n = 466), t (895)=.965, p = .335, 95% CI (-0.45%, 1.31%; see Table 1). Therefore, the null hypothesis was accepted.

Table 1

Independent Samples t test

		Levene's test for equality of variances		*t* test for equality of means							
						Significance				95% confidence interval of the difference	
		F	Sig.	*t*	df	One-sided *p*	Two-sided *p*	Mean difference	Std. error difference	Lower	Upper
Comprehensive Predictor Score	Equal variance assumed	2.872	.090	.965	895	.167	.335	0.430%	0.446%	-0.445%	1.306%
	Equal variance unassumed			.963	883.860	.168	.336	0.430%	0.447%	0.446%	1.307%

Discussion

Interpretation

As Zimmerman (2020) suggested COVID-19 created a natural learning experiment to examine the evidence of student learning, and the results of this study showed no statistically significant difference in ASN nursing students' passing the Comprehensive Predictor during the COVID-19 pandemic compared to before the COVID-19 pandemic. Shuler et al. (2021) found that the increase in online educational programs and rapid transition to remote learning as a result of the COVID-19 pandemic

resulted in four major themes to nursing student responses: costs, benefits, too many programs, and technological challenges. This qualitative study did not assess the evidence of nursing student learning and cannot be directly compared. Weston and Zauche (2021) found that there were no statistically differences in ATI scores between nursing students who completed their pediatric clinical practicum in the clinical setting compared with virtually due to the COVID-19 pandemic required transition from in-person clinical to virtual learning. The findings of this quantitative study compare to the findings of my study in that both found no significant difference in the evidence of nursing student learning before and during the COVID-19 pandemic. The findings of these research studies showed that the COVID-19 pandemic was not too great of a challenge for nursing education to overcome.

As there was no significant difference in ASN students passing the Comprehensive Predictor as a proxy for the NCLEX-RN there will not be a change in the number of new graduate nurses entering clinical practice. Therefore, the nursing shortage will not be amplified due to the COVID-19 pandemic negatively affecting nursing education for ASN students. Extending knowledge in the profession with this research study helps nursing education examine and strengthen their resiliency in the face of current and future challenges. The findings of this study add to the current body of knowledge examining the effects of the COVID-19 pandemic on the Comprehensive Predictor scores for ASN students at one institution. The findings of this study in the context of Malcolm Knowles's (1980) theory of andragogy confirm the adult learner as self-directed throughout their study and through challenges such as the COVID-19

pandemic. Andragogical nursing education successfully generates the level of critical thinking and clinical judgment necessary in nursing to pass the Comprehensive Predictor and thus the NCLEX-RN.

Limitations

Generalizability of the findings of this study to other settings is limited because the data sample came from one educational institution. Another limitation in this study is only one type of undergraduate nursing program, ASN, was used. Therefore, generalizability to Bachelor of Science in nursing (BSN) programs is limited. The results for my study were not statistically significant, but the results may not accurately represent the difference between Comprehensive Predictor scores before and during the COVID-19 pandemic locally, statewide, or nationally.

Implications

The research findings contribute evidence to the discipline of nursing education that efforts related to the COVID-19 pandemic challenge were successful. The health crisis caused by COVID-19 forced nursing programs to rapidly institute resilience-oriented strategies focused on maintaining connectedness in a new and mostly virtual learning environment (Dowling et al., 2021). The resilience demonstrated by the delivery of prelicensure nursing education throughout the COVID-19 disruption resulted in the nursing program's continued generation of consistent numbers of new graduate nurses ready to enter the workforce and thus combat the nursing shortage. The results of my study can be applied to the practice of nursing education related to both other and future challenges. It is important for nursing programs to be strong and resilient in the face of

challenges to continue quality nursing education and sustained numbers of new graduate nurses. The recent studies by Weston and Zauche (2021) and Shuler et al. (2021) have advanced the field by adding COVID-19 research to the body of nursing education knowledge. My study can further add to this body as various changes and effects of COVID-19 should be examined. The current nursing shortage and pandemic caused schools of nursing to see more strain on their students with disruptions to clinicals and changes to the curriculum (American Association of Colleges of Nursing [AACN], 2020). Social change is evident in the contribution of nursing education to the consistent and reliable production of new nurses that are in great need in today's society to combat the nursing shortage. Current events related to the COVID-19 pandemic and the effects of climate change have heightened the realization for securing an influx of well-prepared new graduate nurses (Ulenaers et al., 2021). The success in nursing education through the COVID-19 pandemic, evidenced by this study, ushers our society towards its goals of having enough nurses to care for its population, including during a great healthcare crisis such as a world-wide pandemic.

Recommendations

Recommendations for further study include reproducing this study in both ASN and BSN education settings. Using research to assess for any differences in ATI Comprehensive Predictor, end of program, and NCLEX-RN scores and outcomes in local, state, or regional nursing education can be an important predictor of success. As the world moves into a post-COVID-19 phase further study could include three time periods (pre, during, and post-pandemic) to analyze the consistency with which nursing education

generates new graduate nurses ready to enter the workforce. Further research is needed to discover what qualities or attributes in nursing education led to the resiliency that contributed to the research findings of no significant difference in scores from before and during the pandemic, and qualitative study is recommended.

Conclusion

The findings of this study show no significant difference in Comprehensive Predictor scores before and during the COVID-19 pandemic. The findings suggest evidence of strong and adaptable nursing education that is ready to succeed in the face of great challenge. Therefore, nursing education rose to the challenge of the COVID-19 pandemic and fought through the adversity that came with the pandemic, to educate nursing students to outcomes that were not statistically different from those prepandemic. This success contributed to steady and consistent numbers of new graduate nurses ready to enter the workforce during the COVID-19 pandemic compared to before the pandemic. Prelicensure nursing education is strong and a positive contributor in the field and society.

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Manuscript 2: The Effect of COVID-19 on Nursing Program Passing Scores

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Outlet for Manuscript

The target journal for this manuscript is *Teaching and Learning in Nursing* (https://www.journals.elsevier.com/teaching-and-learning-in-nursing). The formatting expectation is APA 7th edition, and the total recommended length of the research manuscript should be limited to 16 pages including all references, tables, and figures. The link to the guide for authors is https://www.elsevier.com/journals/teaching-and-learning-in-nursing/1557-3087/guide-for-authors. This journal aligns with the content in this manuscript as it is focused on associate degree nursing education, research, and practice. This manuscript is focused on the effect of COVID-19 on nursing program passing scores in an Associate of Science in Nursing (ASN) program at a college in the southern region of the United States. The results could enhance associate degree nursing education in future pandemics and worldwide disruptions.

The manuscript was submitted for publication on September 25, 2022. Revision and modification are required by the reviewers and are in progress at time of submission.

Abstract

The COVID-19 pandemic greatly challenged nursing education. Nursing programs had to continue providing quality nursing education in an altered environment where much of what was traditionally face-to-face learning was forced online and into simulation. The purpose of this study, guided by Knowles's adult learning theory, was to determine the effect of the COVID-19 pandemic on nursing students' nursing program passing scores before and during the pandemic. There was a statistically significant decrease ($p < .001$) in the nursing program passing scores for students during the COVID-19 pandemic compared to before the COVID-19 pandemic. The results of this analysis provided new information to nursing educators to be better prepared to meet future challenges and to enhance their resiliency. Nursing programs can use this study to recognize there are students requiring extra support in the face of a challenge such as the COVID-19 pandemic.

Introduction

The COVID-19 pandemic affected nursing students and nursing programs. The World Health Organization (WHO) characterized COVID-19 as a pandemic in March 2020 and colleges throughout the United States were suddenly forced to move classes and clinicals online (Tracy & McPherson, 2020). In nursing programs innovative practices were implemented to ensure that nursing student learning was not disrupted because of face-to-face teaching restrictions (Hill et al., 2020). Nursing students need to pass their nursing programs to be eligible for the NCLEX-RN. For the nursing student a failure to pass their nursing program does not necessarily mean that the student will never be able to take the NCLEX-RN. This failure does delay the nursing education process as the student will need to remediate and then attempt again to pass their program.

Nursing students have varied abilities to cope with the challenges of the COVID-19 pandemic. Many students experienced increased anxiety due to the highly disruptive nature of the pandemic. The COVID-19 pandemic and its impacts caused stress and anxiety that challenged the process of nursing teaching and learning (Silva et al., 2021). The new situation also caused fear in students, including fear of illness and death and fear of ill family members and economic shortages (Silva et al., 2021). All of these contributing factors could cause a change in nursing students passing their nursing programs. This study was unique because the effect of the COVID-19 pandemic on nursing students' success in their nursing education program has not been measured.

Significance

This study attempted to fill a gap in nursing education literature by contributing quantitative research showing the COVID-19 pandemic's effect on nursing program passing scores. The results of this study may show the COVID-19 pandemic affected nursing education and its learning outcomes, and this affect may result in a decrease in nursing program passing scores. A decrease in nursing program passing scores would lead to a decrease in eligible candidates ready to become licensed and enter the nursing work force. This decrease in new graduate nurses would negatively affect the supply needed to fill the great demand for nurses. According to Spurlock (2020) there is a projected nursing shortage of 1.1 million registered nurses (RN) by 2022 in the United States. The nursing shortage has worsened since the COVID-19 pandemic. In 2019 183,682 nurses entered the healthcare workforce by passing the NCLEX-RN in the United States (NCSBN, 2020). To combat the nursing shortage over half a million nursing students were needed to pass in 2020 and 2021 (Buerhaus et al., 2020). In 2020 and 2021 182,610 and 191,964 nurses entered the healthcare workforce by passing the NCLEX-RN in the United States (NCSBN, 2021, NCSBN 2022). A decline in the total number of nurses ready to take the NCLEX-RN by failing their nursing programs worsens this problem facing the nursing profession.

The theoretical framework used is Knowles's (1980) theory of andragogy. This theory describes adult learners as self-directed and therefore expected to take responsibility for their own learning. Knowles's posited assumptions that adults need to know why they need to learn something, adults learn best when the topic is of immediate

value, adults approach learning as problem solving, and adults learn experientially (Knowles's, et al., 2005). Andragogy includes four principles of planning, experience, relevance, and content (Health Research Funding, 2020) and these are incorporated in prelicensure nursing education. Andragogy aligns with nursing education in the collaboration between adult learners and nursing educators, and in student-centered, problem based nursing education (Decelle, 2016). Knowles proposes steps of self-directed learning including diagnosing learning needs, formulating learning goals, implementing appropriate learning strategies, and evaluating learning outcomes (Bair, 2019). This mirrors the aspects of the nursing process of assessment, diagnosis, planning, implementation, and evaluation (ANA, n.d.) that is the foundation of nursing. This foundation in education generates the level of critical thinking necessary in nursing.

Results from my study may add to the knowledge about whether the COVID-19 pandemic affected nursing students by measuring their nursing program passing scores and providing data and evaluation of nursing program outcomes. Moreover, determining if there was a decrease in nursing program passing scores due to the COVID-19 pandemic may indicate if there were less nurses ready to enter practice. The purpose of this quantitative research was to determine the effect of the COVID-19 pandemic on nursing student's nursing program passing scores.

Relevant Scholarship

Nursing students passing their nursing programs is an important area of study. According to Smith and Meyer (2020), the use of standardized end-of-program assessments support student success and increases first time NCLEX-RN success.

Nursing education aims to prepare safe and competent nurses ready to grow in their roles as nurses. The COVID-19 disruption led to nursing students experiencing unexpected changes in all aspects of their nursing education (Gaffney et al., 2021). Overall, what was face to face was moved online due to the effects of COVID-19 forcing quarantining, sheltering in place, and social distancing.

The pandemic and its impacts caused stress and anxiety that challenged the process of nursing teaching and learning (Silva et al., 2021). Nursing programs were forced to look at their resiliency, and a resilient nursing program was in a better position to prepare competent nurses ready to meet the challenging needs of a growing and diverse patient population (Dowling et al., 2021). The pandemic showed the importance of inclusivity in the classroom, organizational resilience, and the use of resilience oriented educational strategies that are both risk and asset focused in nature (Dowling, et al., 2021).

Research Questions and Design

The research question (RQ) that this study addressed was: Is there a difference in Associate of Science Degree Nursing (ASN) program passing scores for nursing students before the COVID-19 pandemic compared with ASN program passing scores for nursing students during the COVID-19 pandemic?

The null hypothesis (H_0) was: there is no difference in Associate of Science Degree Nursing (ASN) program passing scores for nursing students before the COVID-19 pandemic compared with ASN program passing scores for nursing students during the pandemic.

The alternative hypothesis (H_a) was: there is a difference in Associate of Science Degree Nursing (ASN) program passing scores for nursing students before the COVID-19 pandemic compared with ASN program passing scores for nursing students during the pandemic.

The approach used to research the problem was a quantitative comparative analysis (Creswell, 2014). I analyzed secondary data on the nursing end of program passing scores of nursing students before and during the COVID-19 pandemic using purposive sampling. The comparative research allowed for the analysis of the nursing end of program passing scores prior to the pandemic and the comparison of these data to the nursing end of program passing scores during the pandemic (Trochim et al., 2016).

Methods

Participants

The target population for this secondary data study was taken from the results of ASN program nursing students' end of program scores having passed or not passed their nursing program during or prior to the COVID-19 pandemic at a college in the southern region of the United States. The dataset included the student number, the cohort year, the term, gender, first generation status, Comprehensive Predictor exam scores, and final program scores. The data were deidentified to preserve privacy and ensure that no nursing student's identity were revealed.

Sample and Power

The purposive sampling strategy used takes the nursing end of program passing score data from an ASN program in a southern state before and during the COVID-19

pandemic ensuring an adequate sample size. Inclusion criteria include data from nursing students that either passed/did not pass their nursing programs before or during the pandemic. I defined the COVID-19 pandemic as beginning in the semester including March 2020, or when the United States began to shelter in place due to COVID-19 (AJMC staff, 2020). Prepandemic semesters were those prior to 2020. I included fall 2018, spring 2019, and fall 2019. During pandemic semesters I included were fall 2020, spring 2021, and fall 2021.

I conducted a power analysis to determine sample size. I used a power level of 0.8 which indicates that if the study is conducted repeatedly it is likely to produce a statistically significant effect 80% of the time if a statistically significant effect exists (Field, 2016). I set the alpha level at 0.05. An alpha level of 0.05 indicates a 5% probability of a type I error, or the incorrect rejection of the null hypothesis when it is actually true (Field, 2016). The effect size represents the strength of relationship between variables. I calculated a power analysis for my sample size using the two-tailed independent *t* test, using a 0.80 power, 0.5 effect size (medium), and 0.05 alpha which yielded a sample of 128 (see Buchner et al., 2021).

Variables and Sources of Data

The independent variable (IV, categorical) had two groups: before and during the COVID-19 pandemic (cohort year/term). The continuous dependent variable (DV) was the final program score (scale). The source of data was an ASN program at a college in the southern region of the United States that graduates over 250 nursing students annually.

Measures

The data collection strategies I used included maintaining a unique student identifier, using deidentified data from a college in a southern state, and maintaining reliability and validity. Reliability, or the possibility to consistently reproduce results, will be maintained as the program score is measured consistently over time and without change. Ensuring reliability, or the consistent reflection of the measure being measured (Field, 2018) is achieved including interrater reliability. Validity will be maintained, including content validity, and the achievement of conclusion, internal, construct, and external validity are cumulative and lead to validity in this research (Trochim et al., 2016).

Design and Analysis

The research design was a quantitative comparative ex post facto design using secondary data (Trochim et al., 2016). I used SPSS Statistics version 28 (IBM) to analyze the data. I conducted an independent *t* test to test for any statistically significant difference between the unrelated groups (Laerd Statistics, 2018). Prior to analyzing the results of the *t* test, I tested the data to check for the assumptions of the *t* test. The assumptions of the *t* test are: Normality of the dependent variable and homogeneity of variance. SPSS was used to test for normality with the Shapiro-Wilks test and was used to test for homogeneity of variance using Levene's Test of Equality of Variances (Laerd Statistics, 2018).

Results

Execution

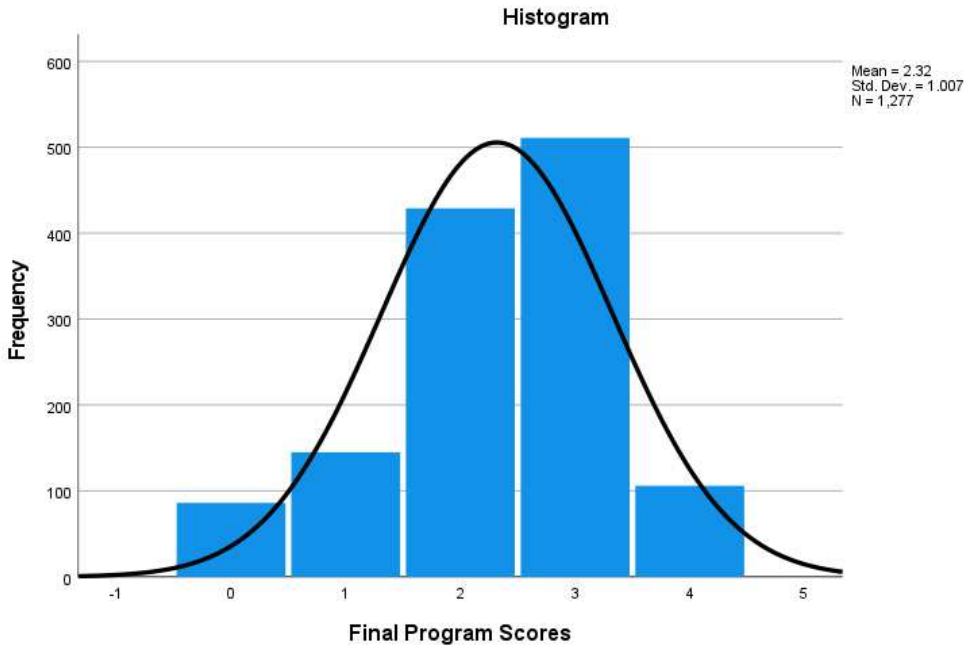
The purpose of this quantitative comparative study was to determine the difference, if any, between the ASN students' nursing program passing scores before and during the COVID-19 pandemic. The timeframe for prepandemic secondary data inclusion was the three semesters prior to the COVID-19 pandemic including fall 2018, spring 2019, and fall 2019. The semester including the COVID-19 pandemic shelter in place federal order (March 2020) was excluded as these students received their nursing education prepandemic and received their nursing program passing score during the pandemic. The timeframe for secondary data inclusion during the pandemic was the three semesters including fall 2020, spring 2021, and fall 2021. Before the secondary data were acquired, IRB approval (04-13-22-0758516) was granted from Walden University and the partner site. The data was deidentified prior to use in SPSS version 28. There were no missing data. The data are password protected and stored securely for 5 years before permanent deletion.

Results

Baseline characteristics of the sample included $n = 484$ prepandemic and $n = 623$ during pandemic nursing program passing scores from ASN students. Results of the nursing program passing scores were examined to determine frequency distribution (see Figure 1).

Figure 1

Nursing Program Final Passing Scores Histogram



An independent *t* test was used to compare the mean of the dependent variable scores between the two independent groups (Laerd Statistics, 2018). Prior to the analysis with the independent *t* test, I examined the six assumptions of the independent *t* test, and all six assumptions were met. The first assumption was that the dependent variable was continuous. For this study final nursing program grades were converted to final program scores using A = 4, B = 3, C = 2, D = 1, F = 0, W = 0, and WF = 0 and treated as a continuous variable. Ordinal level data were treated as an interval ratio level (see Robitzsch, 2020) because for items with 3–6 categories, using the linear factor model by treating variables as continuous is as defensible as treating them as ordinal (Robitzsch, 2020), and the first assumption was met.

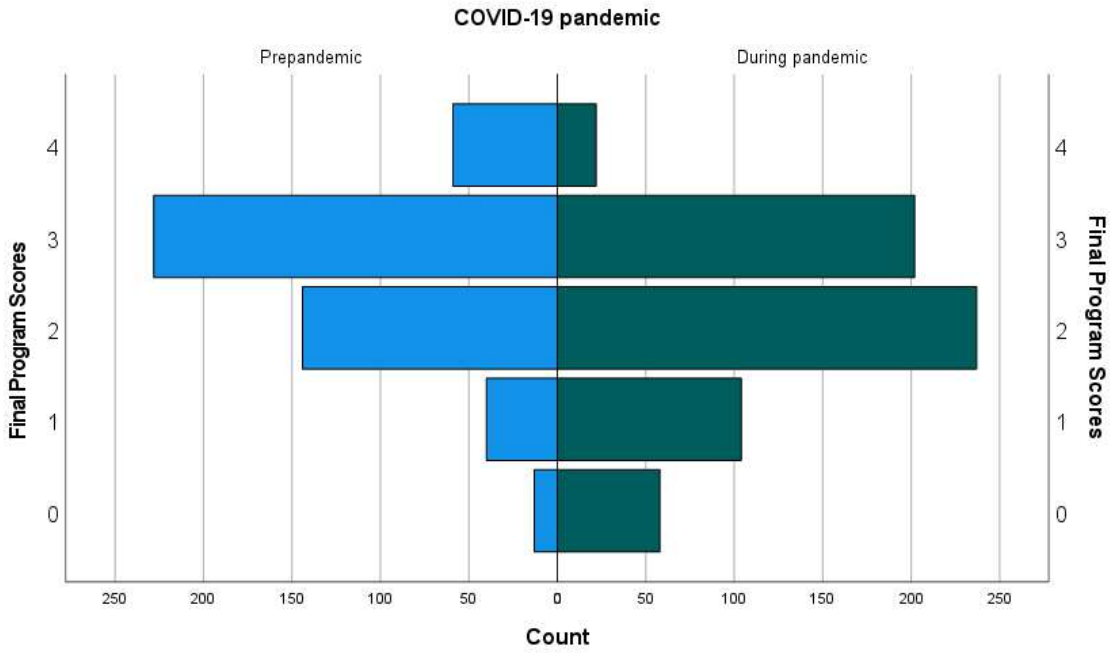
The second assumption of the independent *t* test is that the independent variable consists of two independent categorical groups. The independent variable groups for this study were prepandemic and during pandemic ASN students. Therefore, the second assumption was met.

The third assumption of the independent *t* test was that there is independence of observations. Each ASN student was part of one group being studied and no ASN student was part of both groups being studied. Therefore, the third assumption was met.

The fourth assumption was to determine if there were any significant outliers for the study. The histogram revealed no significant outliers (see Figure 1). The skewness value is -.625 prepandemic and -.430 during pandemic and according to Laerd Statistics (2018) if the skewness is between -0.5 and 0.5 the data are fairly symmetrical. The prepandemic data is less symmetrical than the during pandemic data as shown in Figure 2, and the fourth assumption was met.

Figure 2

Nursing Program Final Passing Scores



The fifth assumption of the independent *t* test was that the dependent variable should be approximately normally distributed for each group of the independent variable. The Shapiro-Wilk test of normality statistic is .866, df 484, $p < .001$ prepandemic, and .886, df 623, $p < .001$ during the pandemic and the Q-Q Plots show normality (see Figures 3 and 4).

Figure 3

Normal Q-Q Plot of Final Program Scores Pre COVID-19

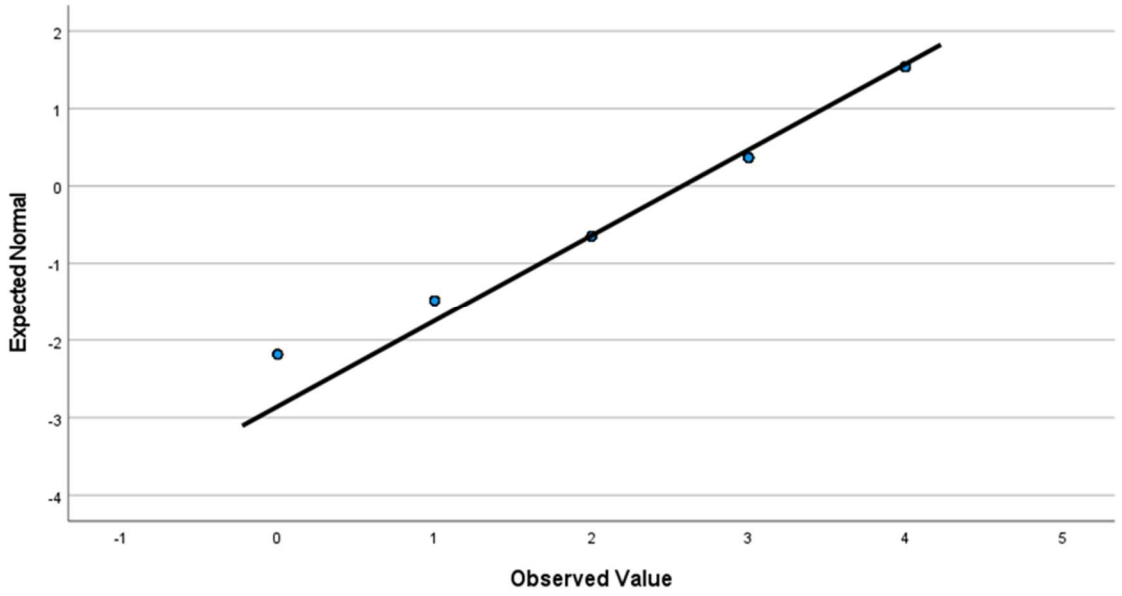
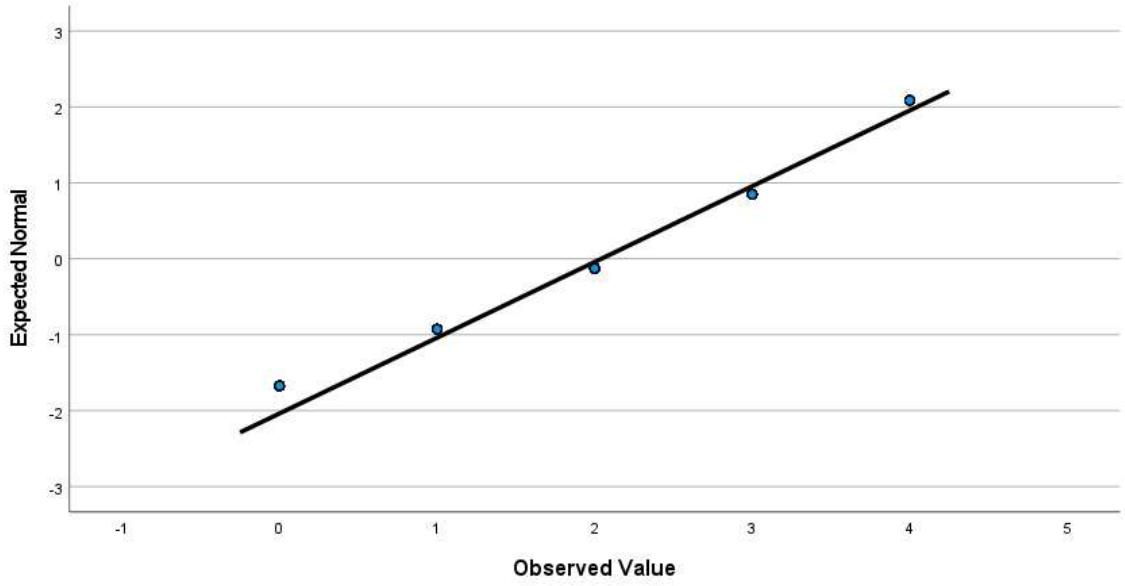


Figure 4

Normal Q-Q Plot of Final Program Scores During COVID-19



Kurtosis is -.038 and according to SPC for Excel (2022) if the kurtosis is close to zero then a normal distribution is assumed. Therefore, the fifth assumption was met.

The sixth assumption of the independent *t* test homogeneity of variance was tested using Levene's test which indicated group variances can be treated as equal $F = .198$ and $p = .656$. Therefore, equal variances were assumed, and all six assumptions were met.

I conducted the independent samples *t* test using IBM SPSS Version 28 and evaluated if there was any statistically significant difference between the mean nursing program final passing scores for the prepandemic and during pandemic groups. The results of the independent *t* test showed that there was a statistically significant difference between the prepandemic group ($M = 2.58$, $SD = .903$, $n = 484$) and the during pandemic group ($M = 2.04$, $SD = 1.002$, $n = 623$) $t(1105) = -9.226$, $p < .001$, 95% CI (-.651, -.423; see Table 1). Therefore, I rejected the null hypothesis. Effect size to determine the strength of the difference between the two groups was examined using Cohen's *d* and the effect size was large (Standardizer .960, Point Estimate -.559, 95% CI (-.680, -.438). This was expected with such large sample sizes.

Table 1

Independent Samples t test

		Levene's test for equality of variances		*t* test for equality of means							
						Significance				95% confidence interval of the difference	
		F	Sig.	*t*	Df	One-sided *p*	Two-sided *p*	Mean difference	Std. error difference	Lower	Upper
Final Program Scores	Equal variance assumed	.198	.656	-9.226	1105	<.001	<.001	-.537	.058	-.651	-.423
	Equal variance unassumed			-9.347	1080.984	<.001	<.001	-.537	.057	-.649	-.424

Discussion

Interpretation

The results from my study showed a decline in nursing student performance and outcomes during the COVID-19 pandemic. This contrasts the research of Weston and Zauche (2021) who found that there were no statistically differences in ATI scores between nursing students who completed their pediatric clinical practicum in the clinical setting compared with virtually, due to the COVID-19 pandemic transition from in-person clinical to virtual learning. The body of literature on the effects of COVID-19 on nursing students, their outcomes, and nursing education is increasing. Ulenaers et al. (2021) conducted qualitative research on the impact of COVID-19 on nursing students including their clinical experience and resilience. Their research does not directly compare with mine as they did not analyze student learning outcomes or scores.

Extending knowledge in the discipline of nursing education with regard to the COVID-19 pandemic continues and opens the door to further research to determine the causes of the difference in scores.

The results of my study align with Knowles's Andragogy (1980) in that the nursing student is self-directed and learns experientially. The experiences available to nursing students during the pandemic changed compared to prepandemic. This change in learning experiences could explain the significant decline in during pandemic student outcomes. Of the four andragogical principles: planning, experience, relevance, and content (Health Research Funding, 2020) incorporated in prelicensure nursing education, planning, experience, and content could have been altered due to events surrounding the COVID-19 pandemic. While adult learners are self-directed and their learning is problem-focused, they need educator guidance, or a scaffolded approach (Dolan et al., 2021) to the planning and content delivered to support their learning experiences. The planning of nursing education was altered by shelter in place orders (AJMC staff, 2020), social distancing, and clinical site availability during the pandemic (Dolan et al., 2021). As aspects of nursing education were forced online (Weston & Zauche, 2021) content could change and these andragogical changes could explain the differences in nursing student performance reflected in their program scores.

Limitations

The results of this study should be interpreted in considering the following limitations. The usefulness of this study for the broader group of prelicensure nursing education is somewhat limited because I used data from one institution and from only an

ASN group. Therefore, findings from my study cannot be generalized to students in a BSN program. Generalizing the findings of this study to additional localities, regions, and states could also be limited.

Implications

The findings of this study contributed original research into the challenges faced by the discipline of nursing education and by nursing students due to the COVID-19 pandemic. Identifying where COVID-19 affected the practice of nursing education and its outcomes has important implications in overcoming future challenges and pandemics. This study identified that nursing student final program scores decreased significantly during the pandemic. My data showed that nursing students also struggled to achieve passing scores during the pandemic compared to before the pandemic, and a greater number of students did not pass in semesters during the pandemic (see Figure 4). These differences in passing may have resulted in fewer students graduating and being NCLEX-RN ready. Those students not passing may be delayed entering the nursing workforce during COVID-19. The evidence my study provides in declining nursing student outcomes causes the need to evaluate what factors during the COVID-19 pandemic caused the difference. Positive social change implications derived from this research lie in identification of areas of improvement needed to mitigate these factors in challenging times of nursing education such as this pandemic. Nursing education can use what was learned during the pandemic to see weaknesses, develop action plans, and better support students in times of struggle and times of ease. Greater support of nursing students that helps them to overcome challenging events may result in higher scores, more students

passing their programs, and more new graduate nurses entering the workforce, thereby decreasing the nursing shortage and effecting positive social change in nursing.

Recommendations

Recommendations for further research include replicating this study in nursing programs in ASN and BSN programs to incorporate both aspects of prelicensure nursing education. More research is needed to identify the factors that contributed to the decrease in nursing passing scores during the COVID-19 pandemic. I recommend qualitative research recognizing and assessing these factors from the nursing student and nursing education perspectives.

Conclusion

The COVID-19 pandemic had a negative impact on the passing scores of nursing students compared to prepandemic. The findings of this study can contribute to nursing education research by filling a gap of how the COVID-19 pandemic affected nursing students, nursing education, and its outcomes. My study may provide guidance for future studies to explore the effects of a pandemic on nursing students. My research findings may help to show how the COVID-19 pandemic affected the passing scores of nursing students compared to prepandemic.

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Manuscript 3: The Effect of COVID-19 on First Generation College Nursing Students

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Outlet for Manuscript

The target journal for this manuscript is *Nursing Education Perspectives* (https://journals.lww.com/neponline/pages/default.aspx). The formatting expectation is APA 7th edition, and featured articles should not exceed 20 pages including references or 6000 words. The link to the instructions for authors is https://edmgr.ovid.com/nep/accounts/ifauth.htm. This journal aligns with the content in this manuscript as the journal welcomes submissions on academic nursing education research including teaching and learning and the recruitment and retention of students (Nursing Education Perspectives, 2021).

Abstract

The COVID-19 pandemic had a substantial impact on nursing education and nursing students in the United States. Innovative practices such as online and simulation learning were implemented to ensure that nursing student learning was not disrupted because of face-to-face teaching restrictions which caused significant stress. Some students may have experienced more difficulty adapting to the change in teaching methods than others. One of these groups was first generation college students who have higher anxiety and lower supportive parent communication and life satisfaction when compared to non-first generation students. The purpose of the study, guided by Knowles's theory of andragogy, was to determine if there was a difference in Comprehensive Predictor scores for first generation students compared to non-first generation students before and during the COVID-19 pandemic. Results showed there was no statistically significant difference in the Comprehensive Predictor scores for first generation college students during the COVID-19 pandemic compared to before the COVID-19 pandemic. There was a statistically significant difference in Comprehensive Predictor scores for first generation college students compared to non-first generation college students regardless of time frame before or during the COVID-19 pandemic. At-risk student groups should be well supported at all times to guide them towards success which effects positive social change.

Introduction

The COVID-19 pandemic has affected students in nursing education. When the World Health Organization (WHO) characterized COVID-19 as a pandemic, colleges throughout the United States were suddenly forced to move classes and clinicals online (Tracy & McPherson, 2020). Hill et al. (2020) stated that as a result of COVID-19, innovative practices were implemented to ensure that nursing student learning was not disrupted because of face-to-face teaching restrictions. Zimmerman (2020) suggested that the pandemic created a natural learning experiment and educators need to seize this opportunity, in part by examining the evidence of student learning.

At risk student groups and vulnerable populations, such as first generation college students, could potentially be affected by the COVID-19 pandemic at statistically different rates compared to the nursing student populations studied as a whole. First generation college students are defined as students whose parents' highest level of education is a high school diploma or less (McFadden, 2016). First generation college students have barriers and challenges to overcome in their education and are an invaluable population of nursing and health care providers (Wagner, et al., 2020). Through careful monitoring of vulnerable student populations and NCLEX-RN pass rates nursing schools can help to shape the nursing workforce to represent the diverse patients they serve more accurately (Byrd & Meling, 2020). First generation college students represent an at risk group of nursing students therefore research is needed to determine if this at risk group of first generation students was affected at a different rate compared to

non-first generation nursing students. My study analyzed this data to determine if a difference exists.

Significance

Research into at risk and vulnerable nursing student populations is needed regarding COVID-19. This study will fill that gap in nursing literature. The pandemic was a great challenge to nursing education and vulnerable students may have been greatly affected. The impact of the COVID-19 pandemic was particularly concerning because the result of the pandemic was a universal change to online classes, where many programs were traditionally face-to-face, and clinical experiences were largely canceled in favor of increasing simulated and virtual experiences (Maykut et al., 2021). Therefore, this study is significant as a means of learning to what degree the pandemic affected nursing education program outcomes for at risk students, and to what degree those outcomes may affect the number and diversity of new nurses entering practice. The findings of this study may lead to positive social change by providing evidence of the impact of the actions nursing programs were required to make because of the COVID-19 pandemic that affected at risk nursing students. Findings may help nursing educators to improve prelicensure nursing education in the current or future pandemics. Positive social change in educating successful and diverse nursing students leads to a successful and diverse nursing workforce that can meet the needs of society. These changes will allow nursing education to be prepared to triumph in a changed educational landscape and be prepared for possible future challenges.

The theoretical framework for my study was Knowles's (1980) theory of andragogy which describes adult learners as self-directed and therefore expected to take responsibility for their own learning. Knowles's posited assumptions that adults need to know why they need to learn something, adults learn best when the topic is of immediate value, adults approach learning as problem solving, and adults learn experientially (Knowles's, et al., 2005). Andragogy includes four principles of planning, experience, relevance, and content (Health Research Funding, 2020) and these are incorporated in pre-licensure nursing education. Andragogy aligns with nursing education in the collaboration between adult learners and nursing educators, and student-centered, problem based nursing education (Decelle, 2016). Knowles's proposes steps of self-directed learning including diagnosing learning needs, formulating learning goals, implementing appropriate learning strategies, and evaluating learning outcomes (Bair, 2019). This mirrors aspects of the nursing process of assessment, diagnosis, planning, implementation, and evaluation (ANA, n.d.) that is the foundation of nursing. This education generates the level of critical thinking necessary in nursing. The purpose of this quantitative research was to determine if the COVID-19 pandemic affected first generation nursing students to a different degree than non-first generation nursing students.

Relevant Scholarship

There were nearly 20 million college students enrolled in the fall of 2020 in the United States (NCES, 2019) and an estimated one-third of those were first generation college students (Cataldi et al., 2018). First generation are college students whose parents

have not received a higher education degree. This is a diverse group with non-native English speaking students prevalent among first generation students (Wagner et al., 2020). First generation students are more likely to be single parents, have dependent children, and work full-time while attending school (Redford & Hoyer, 2017). First generation students were found more likely to be older, persons of color, and military (Wagner et. al., 2020).

These students can experience stressors including the absence of support from family and friends, difficult cultural transitions, increased financial pressures, and lack of academic preparation compared to non-first generation college students (House et al., 2020). First generation students have higher anxiety and lower supportive parent communication and life satisfaction when compared to non-first generation students, and first generation students are also less likely to seek help (Jeong et al., 2021). The most at-risk population of college students to leave college without completing a degree are first generation (McFadden, 2016). The high attrition rates of first generation students has been shown to be associated with students' educational backgrounds, inadequate preparation, financial constraints, and sociologic factors (Grace-Odeleye & Santiago, 2019). All of these challenges faced by first generation nursing students were compounded by the COVID-19 pandemic. The COVID-19 pandemic caused an unexpected decrease in access to campus resources for college students, and as a result, colleges and healthcare need to give attention to the unique situation faced by first generation students (Jeong et al., 2021).

Research Questions and Design

The research question (RQ) was: what is the difference in Comprehensive Predictor scores for first generation students compared to non-first generation students before and during the COVID-19 pandemic?

The null hypothesis (H_0) was: there is no statistically significant difference in Comprehensive Predictor scores for first generation students compared to non-first generation students before and during the COVID-19 pandemic.

The alternative hypothesis (H_a) was: there is a statistically significant difference in Comprehensive Predictor scores for first generation students compared to non-first generation students before and during the COVID-19 pandemic.

The approach I used to study the research problem was a quantitative comparative ex post facto study of secondary data (Creswell, 2014). The sampling was purposive, and the comparative design allowed for the analysis of the first generation student variable on Comprehensive Predictor scores during and prior to the pandemic (Trochim et al., 2016). The selected variables related to nursing education and the intent to contribute to nursing literature by studying at risk nursing students and COVID-19.

Methods

Participants

The target population for this secondary data study was taken from the results of ASN program nursing students' Comprehensive Predictor exams that were taken either prior to or during the COVID-19 pandemic at a college in the southern region of the United States and will include their first generation status. The data set included the

student number, the cohort year, the term, gender, first generation status, Comprehensive Predictor scores, and final program scores. The data was deidentified to protect the identity of the nursing students.

Sample and Power

The purposive sampling strategy used takes the Comprehensive Predictor score data from an ASN program at a college in the southern region of the United States before and during the COVID-19 pandemic and identifying a student as first generation or non-first generation, ensuring adequate sample size. I defined the pandemic as beginning in the semester including March 2020, or when the United States began to shelter in place due to COVID-19 (AJMC staff, 2020). Prepandemic semesters were those that occurred prior to 2020.

I conducted a power analysis to determine sample size. I used a power level of 0.8 which indicates that if the study is conducted repeatedly it is likely to produce a statistically significant effect 80% of the time if a statistically significant effect exists (Field, 2016). I set the alpha level at 0.05. An alpha level of 0.05 indicates a 5% probability of a type I error, or the incorrect rejection of the null hypothesis when it is actually true (Field, 2016). The effect size represents the strength of relationship between variables. I calculated a power analysis for my sample size using ANOVA, using a 0.80 power, 0.25 effect size (medium), and 0.05 alpha which yielded a sample of 158 (see Buchner et al., 2021).

Variables and Sources of Data

The independent variables (IV) were (two groups) before and during the COVID-19 pandemic, and (two groups) first generation college student status yes/no. These are dichotomous variables. The dependent variable (DV) is the Comprehensive Predictor score expressed as a percentage (continuous). The source of data is a sample collected by an ASN program at a college in southern region of the United States regarding Comprehensive Predictor scores, first generation identification, and a unique student identifier. The college has over 250 nursing students graduate annually.

Measures

The data collection strategies I used included a unique student identifier, deidentified data for a college in a southern state, and assuring validity and reliability. The Comprehensive Predictor is a national exam considered to be highly reliable. It produces the same results under the same conditions consistently (Field, 2018). The Comprehensive Predictor contains an expectancy table that provides numeric indication of the likelihood of passing the NCLEX-RN on the first attempt for every possible score on the exam (ATI Testing, 2019). The ATI test measures what it sets out to measure conceptually, ensuring that validity is achieved (Field, 2018). Liu and Mills (2017) found that the Comprehensive Predictor is in alignment with the NCLEX-RN test plan and their results support the construct validity of the Comprehensive Predictor. A statistically significant relationship has been found between the Comprehensive Predictor score and the NCLEX-RN pass/fail status, therefore the actual Comprehensive Predictor percentage

score is a significant predictor of NCLEX-RN success (ATI Testing, 2019; Chen & Bennett, 2016).

Design and Analysis

The research design was a quantitative comparative ex post facto design using secondary data (Trochim et al., 2016). G* Power 3.1.9.7 was used to determine sample size and a priori procedures. I used SPSS Statistics 28 (IBM) to analyze the data. I used an ANOVA to test for a within groups difference of first generation students and non-first generation students Comprehensive Predictor scores, as a proxy for the NCLEX-RN, between the groups before and during the COVID-19 pandemic. The COVID-19 pandemic is the change studied between the Comprehensive Predictor scores of the first generation students and non-first generation students. Prior to analyzing the results of the ANOVA, I tested the data for the assumptions of this test. The assumptions of ANOVA are independent observations, normality, homogeneity, and linearity (SPSS Tutorials, 2021).

Results

Execution

The purpose of this quantitative comparative study was to determine the difference, if any, between the ASN students' Comprehensive Predictor Exam scores before and during the COVID-19 pandemic and their first generation status. The timeframe for secondary data inclusion was the three semesters prior to the COVID-19 pandemic including fall 2018, spring 2019, and fall 2019. The semester including the COVID-19 pandemic shelter in place federal order (March 2020) was excluded as these

students received their nursing education prepandemic and received their Comprehensive Predictor exam score during the pandemic. Before the secondary data were acquired IRB approval (04-13-22-0758516) was granted from Walden University and the partner site. The data were deidentified prior to use in SPSS version 28. There was no missing data. Descriptive statistics and a two-way ANOVA were used. First generation status was coded 1 for first generation and 0 for non-first generation. Prepandemic was coded 0 and during pandemic was coded 1. The Comprehensive Predictor Exam score is a continuous interval level dependent variable. The data is password protected and stored securely for 5 years before permanent deletion.

Results

I used a two-way ANOVA to compare the mean differences between groups that have been split on the two independent variables (Laerd Statistics, 2018). Prior to the analysis with the ANOVA, I examined six assumptions of the two-way ANOVA, and all six assumptions were met. The first assumption was that the dependent variable was continuous. For this study the Comprehensive Predictor Exam score was a continuous variable from 0.00 to 100.00. The first assumption was met.

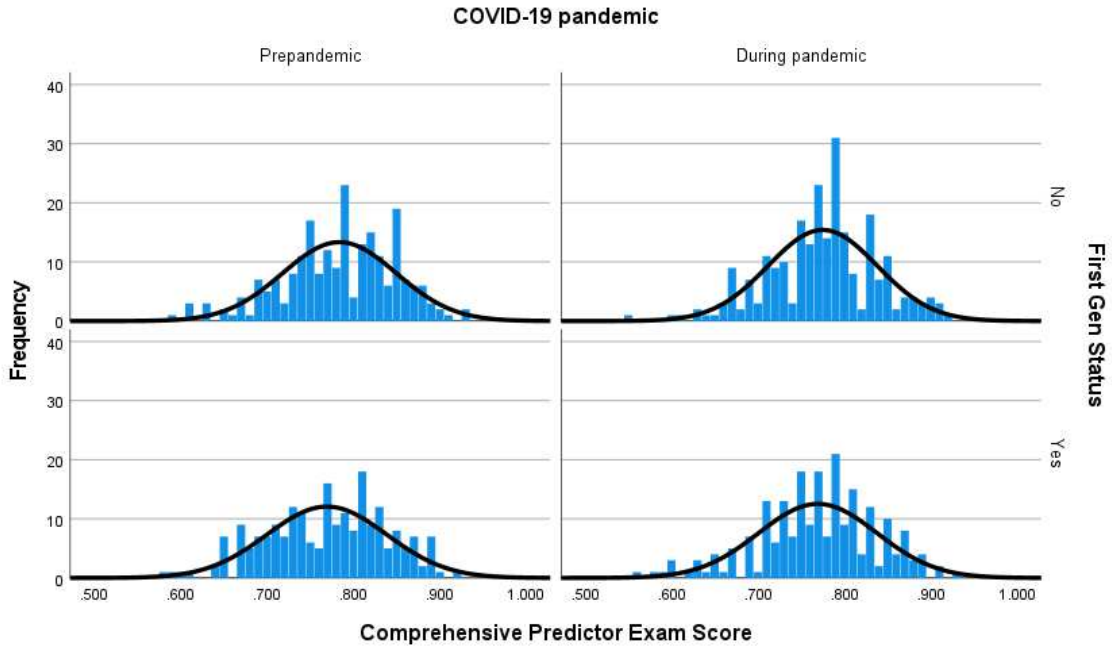
The second assumption of the of the two-way ANOVA was that the two independent variables each consist of two or more categorical independent groups. The independent variable first generation consisted of two groups which were first generation and non-first generation , and the independent variable consisted of two groups: pre and during the COVID 19 pandemic. Therefore, the second assumption was met.

The third assumption of the two-way ANOVA was that there is independence of observations. Each ASN student was part of one group while no ASN student was part of two groups being studied. Therefore, the third assumption was met.

The fourth assumption of the two-way ANOVA was to determine if there were any significant outliers. The histogram revealed no significant outliers (see Figure 1). The skewness value for first generation was -.330 and non-first generation was -.351, and the skewness value for pre COVID-19 was -.345 and during COVID-19 was -.367. According to Laerd Statistics (2018) if the skewness is between -0.5 and 0.5 the data are fairly symmetrical. Therefore, the fourth assumption was met.

Figure 1

Comprehensive Predictor Scores First Gen status COVID-19 Pandemic Histogram



The fifth assumption of the two-way ANOVA was that the dependent variable should be approximately normally distributed for each combination of the groups of the independent variables. The Q-Q Plots show normality (see Figures 2 and 3). The kurtosis for first generation was -.133 and non-first generation was .141, and the kurtosis for pre COVID-19 was -.292 and during COVID-19 was .331. According to Mishra et. al. (2019) if kurtosis, or the peakedness of distribution, is between -1 and 1, the data are approximately normal. Therefore, the fifth assumption was met.

Figure 2

Normal Q-Q Plot of Comprehensive Predictor Exam Scores for First Gen

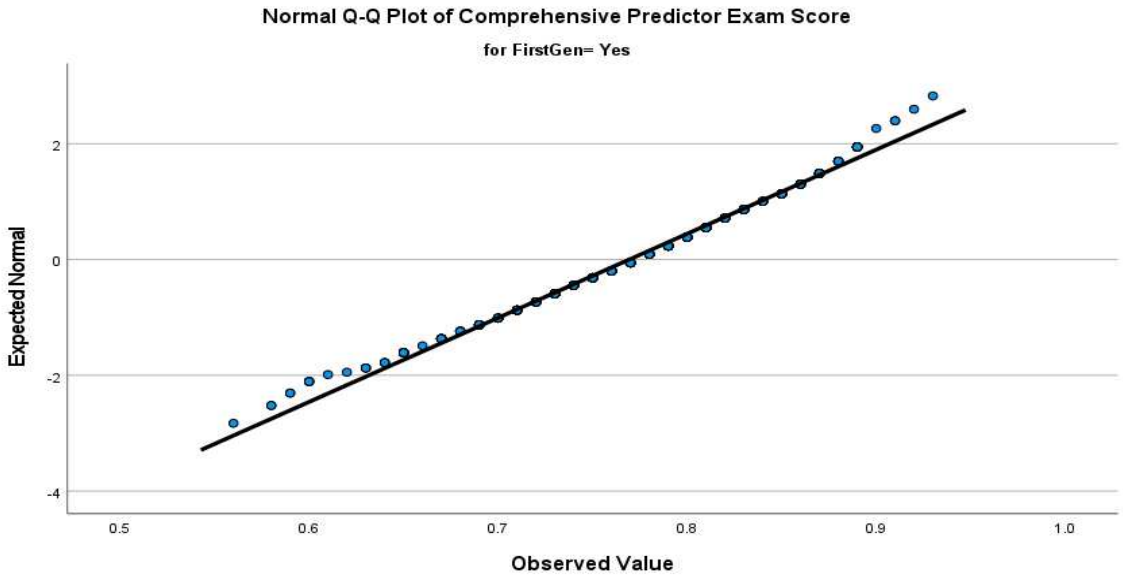
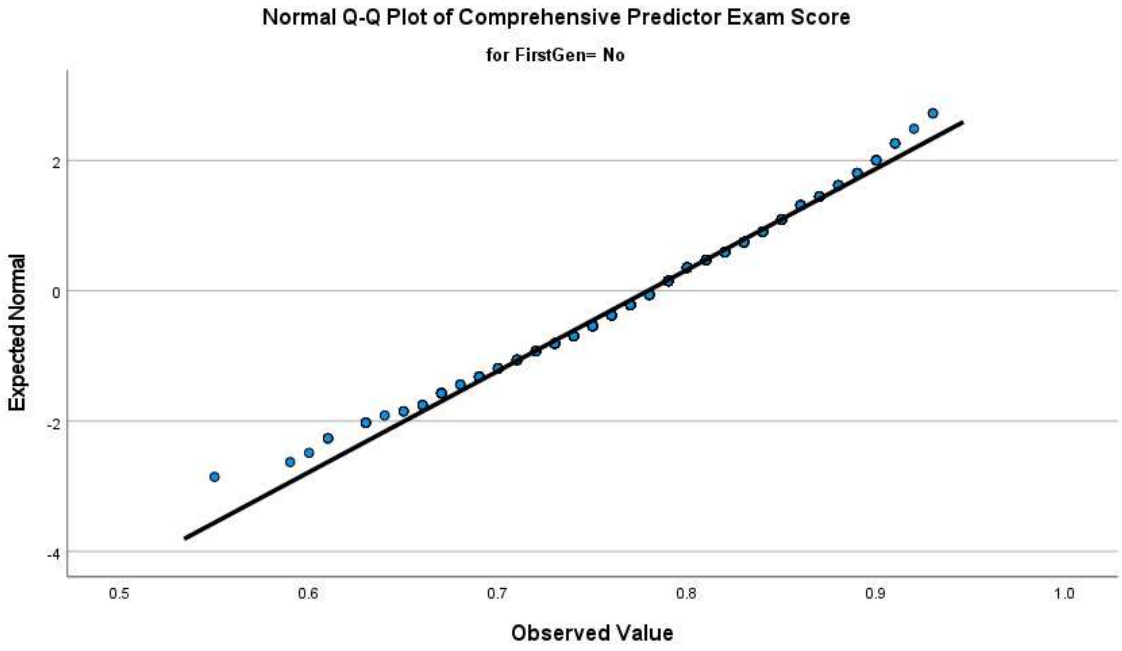


Figure 3

Normal Q-Q Plot of Comprehensive Predictor Exam Scores for non-First Gen



The sixth assumption of the two-way ANOVA homogeneity of variance was tested using Levene's test which indicated group variances can be treated as equal F= 1.751 and p = .1551. Therefore, equal variances were assumed and all six assumptions for the two-way ANOVA were met. Descriptive statistics for the study variables are shown in Table 1.

Table 1

Descriptive Statistics for First Gen Status and COVID-19 Timeframes

Variable	*Comprehensive Predictor Scores*			
First Gen	*COVID-19*	*M*	*SD*	*N*
No				
	Pre	*.78382*	*.065758*	*220*
	During	*.77500*	*.063164*	*244*
	Total	*.77918*	*.064488*	*464*
Yes				
	Pre	*.76929*	*.069399*	*210*
	During	*.76935*	*.068465*	*215*
	Total	*.76932*	*.068847*	*425*
Total				
	Pre	*.77672*	*.067873*	*430*
	During	*.77235*	*.065688*	*459*
	Total	*.77447*	*.066752*	*889*

I conducted a two-way ANOVA that examined the effects of first generation status and pre/during the COVID-19 pandemic timeframes on Comprehensive Predictor Exam scores. There was no statistically significant interaction between first generation status and pre/during the Covid-19 pandemic timeframes for Comprehensive Predictor Exam scores, $F(1, 885) = .985$, $p = .321$, partial $\eta^2 = .001$. The two-way ANOVA shown in Table 4 illustrates the effect of the two independent variables on the dependent variable examining the interaction between first generation ASN students and pre/during the COVID-19 pandemic on Comprehensive Predictor Exam scores. Analysis of the main effects was performed.

The main effect for first generation students was statistically significant, $F(1, 885) = 5.085$, $p = .024$, partial $\eta^2 = .006$. All pairwise comparisons were reported with 95%

confidence intervals and *p*-values are Bonferroni-adjusted. The unweighted marginal means of Comprehensive Predictor Scores for first generation were .769 ± .003, and for non-first generation were .779± .003, a statistically significant mean difference of .01, 95% CI [.001, .019], $p < .025$.

The main effect for the Covid-19 pandemic indicated there was no statistically significant difference in Comprehensive Predictor Exam scores for before or during the COVID-19 pandemic, $F(1,885) = .957$, $p = .328$, partial $\eta^2 = .001$. It was an unexpected finding that first generation students had lower Comprehensive Predictor mean scores regardless of timeframe compared to non-first generation students, while the Covid-19 pandemic had no effect on those scores.

Table 2

ANOVA Summary First Gen and COVID-19 Timeframes

Tests of Between-Subjects Effects						
Variable	*Comprehensive Predictor Scores*					
	Type III Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*
First Gen	*.023*	*1*	*.023*	*5.085*	*.024*	*.006*
COVID-19	*.004*	*1*	*.004*	*.957*	*.328*	*.001*
*First Gen*COVID-19*	*.004*	*1*	*.004*	*.985*	*.321*	*.001*

Discussion

Interpretation

The findings of my study extend knowledge in the discipline of nursing education by making an original contribution to the study of the possible effects of the COVID-19

pandemic on first generation and non-first generation nursing students via the outcomes of their nursing education. First generation students are considered to be a vulnerable student population as a result of the factors for this status (Cromley & Kunze, 2021). Researchers found that an estimated one-third of college students were first generation college in 2018 (Cataldi et al., 2018) however; in my research forty eight percent of students were first generation. The findings of my study showed that the first generation nursing students had lower mean Comprehensive Predictor Exam scores compared to the non-first generation students in both the prepandemic and during pandemic timeframes. These outcome based findings confirm the challenges first generation students experience compared to non-first generation students. My study shows evidence that first generation student struggles exists which support the need for action to better support this vulnerable population (Redford & Hoyer, 2017). Barber et al. (2021) found the COVID-19 pandemic forced an unprecedented shift to remote instruction across higher education, magnifying inequities faced by first-generation and underrepresented minority college students. This contrasts my findings that the COVID-19 pandemic did not cause a difference for first generation students, rather the difference is sustained throughout both timeframes. The mean score for first generation students remained the same in both timeframes suggesting added challenges, such as a pandemic, did not compound those disparities already faced.

This study aligns with Malcolm Knowles's (1980) theory of andragogy. As adult learners, both first generation and non-first generation nursing students are self-directed and expected to take responsibility for their own learning. First generation student

attributes such as first to college in the family, economic disparities, lack of support, and demographics (Wagner et. al., 2020) could contribute to a level of self-direction that differs from a non-first generation student. In Knowles's proposed steps of self-directed learning including diagnosing learning needs, formulating learning goals, implementing appropriate learning strategies, and evaluating learning outcomes (Bair, 2019) it is possible that first generation students are less prepared to succeed. First generation status could also contribute to a different level of taking responsibility for one's own learning. Differences in self-direction and taking responsibility for one's own learning could contribute to the difference in means for first generation student Comprehensive Predictor Exam scores.

Limitations

The results of this study should be interpreted in considering the following limitations. The usefulness of this study for the broader group of prelicensure nursing education is somewhat limited because I used data from one institution and from only an ASN group. Therefore, findings from my study cannot be generalized to students in a BSN program. Generalizing the findings to first generation students in other areas of study is also limited. Finally, generalizing the findings of this study to additional localities, regions, and states could also be limited.

Implications

This research contributes original findings in the discipline of nursing education. The COVID-19 pandemic and its effects on nursing education are now readily seen in nursing literature (Jackson, 2022). The results of studies into the effects of COVID-19

(Heilferty et al., 2021) could guide future practice and decisions on how to navigate pandemics as well as other challenges. Results from this and other studies showing that the pandemic did not negatively affect aspects of nursing education, such as Comprehensive Predictor exam scores (Weston & Zauche, 2021), could demonstrate resiliency from nursing education in the face of adversity. Results confirming the vulnerability of first generation students with lower performance on key outcomes build on existing evidence (Barber et al., 2021). This confirms the need to support first generation students to a greater extent regardless of worldwide events.

When research aides disadvantaged groups in receiving what they need to succeed in challenging environments and circumstances positive social change has occurred. First generation students, as the first to college in their families are disadvantaged compared to non-first generation students (Cromley & Kunze, 2021). This study contributes evidence to support the need for continued research into where first generation students are struggling and enables the positive social change that comes with this knowledge. Supporting first generation nursing students is paramount in nursing education to continue contributing diverse and successful new graduate nurses to the profession.

Recommendations

Recommendations for further research include replicating this study at multiple institutions providing both ASN and BSN education. The findings of these replicated studies could aid nursing education in identifying areas of concern for the vulnerable population of first generation nursing students. Future studies could include different variables such as changing the dependent variable to nursing program passing scores to

determine if the first generation vulnerable student population is struggling to succeed before they reach the level of the Comprehensive Predictor Exam. In the event of future pandemics, challenges, or world events future research could be conducted using this study as a guide on the timeframes of pre and during challenge with first generation and non-first generation students. I recommend qualitative research to find themes among first generation students and their perception of the challenges they face.

Conclusion

This study's findings expanded nursing education research by considering first generation students as a vulnerable segment of the nursing student population and exploring if these students were affected by the Covid-19 pandemic on the Comprehensive Predictor educational outcome. This study showed a significant effect of first generation status on Comprehensive Predictor scores but did not show a significant difference between the prepandemic and during COVID-19 pandemic timeframes. I suggest further exploration of first generation students and nursing education outcomes in a variety of institutions and for other challenges in addition to COVID-19. This exploration is essential to identification of areas of struggle for the first generation nursing students in order to aide this population in overcoming challenges and successfully entering practice as new graduate nurses.

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Part 3: Summary

Integration of the Studies

The purposes of this three manuscript dissertation were to determine the effect of the COVID-19 pandemic on nursing student's predicted NCLEX-RN passing scores and nursing program passing scores, and first generation college students predicted NCLEX-RN passing scores. I conducted a quantitative study to compare the scores in the timeframes of before the COVID-19 pandemic and during the COVID-19 pandemic in each of the three manuscripts. I analyzed the independent variable of first generation status. Secondary data were analyzed and used to answer the three research questions. If the COVID-19 pandemic had a negative effect on nursing students nursing program passing scores, the students that scored below the passing mark may not reach the stage of taking the predictor exam. Therefore, the COVID-19 pandemic may have affected nursing students at different phases in their nursing education.

My findings also showed that for the students that were able to achieve passing scores in their nursing programs and therefore be eligible to take the predictor exam, COVID-19 had no impact on the students' scores. My findings showed no impact of COVID-19 on first generation nursing students, though those in the first generation group had lower scores on the predictor exam in both the before and during COVID-19 time periods.

Theoretical Context

The research findings of each of the three studies supported the principles and assumptions of Knowles's theory of andragogy (1980) which describes adult learners as

self-directed and therefore expected to take responsibility for their own learning. The second study showed these adult learners struggled to pass their nursing programs with passing scores during the COVID-19 pandemic. The attribute of taking responsibility for own's own learning was evident in that if a student did achieve passing scores in their nursing programs they were likely to pass their predictor exams as well. The assumptions of Knowles' theory that adults need to know why they need to learn something, adults learn best when the topic is of immediate value, adults approach learning as problem solving, and adults learn experientially (Knowles's, et al., 2005) were supported by the research findings. The COVID-19 pandemic did change the learning experiences that were available to students, such as increased online content and delivery, increased simulation, and online clinicals, and this change could have contributed to the results in the second study. COVID-19 did not affect Knowles's assumptions of adults needing to know why they need to learn, the approach to learning as problem solving, or adults learning best when the topic is of immediate value which could explain the results in the first study. The andragogical principles of planning, experience, relevance, and content in nursing education were disrupted by the COVID-19 pandemic by social distancing and sheltering in place and could contribute to the research findings in a theoretical context.

Implications for Positive Social Change

The study's findings supported the importance of guiding nursing students through challenges, such as the COVID-19 pandemic, and that supporting vulnerable populations of students is of great importance regardless of world events. Strong students persevere through challenges using their strengths and resilience. Likewise, strong

nursing education programs also persevere through challenges relying on their resilience and strengths. Identifying where there is a need for extra support, resources, time, and effort is vital to help support students that may be more at risk of failing. Positive social change in nursing education arises when quality research provides the evidence to support the success of all nursing students especially those of vulnerable populations. Harnessing this positive social change to reduce nursing student failures and not successfully completing nursing programs may increase the numbers of nurses in the profession and help to lessen the nursing shortage.

Future Research

This research focused on secondary data acquired from one nursing education institution in an ASN program. While the findings could be indicative of other ASN programs' student outcomes, further research is recommended in using more nursing programs and including other types of nursing programs such as BSN. Future research could focus on studying the first generation population's nursing program passing scores to see if there are differences between the first generation population and others. Future research into the qualities that successful nursing programs exhibit, such as resiliency, could be valuable to improvements necessary for unsuccessful nursing programs.

Lessons Learned

I learned from this research the importance of quantitative analysis to support the discovery of nursing student, program, and educational strengths and weaknesses on outcomes. Investigating the effects of great challenges, or lack thereof, is important for growth and development as well as confirmation of resiliency. I learned that the findings

relating to vulnerable populations help guide positive social change. From this research I learned that challenges can be overcome individually and as groups, and that nursing education is prepared to transcend the COVID-19 pandemic and continue to send successful new graduate nurses into the workforce thus combating the nursing shortage.

Conclusion

This research yielded one statistically significant difference, a decrease in the nursing program passing scores of nursing students, during the COVID-19 pandemic. The research did not yield a statistically significant difference in the NCLEX-RN predictor (Comprehensive Predictor) exam scores of nursing students during the COVID-19 pandemic, nor for first generation nursing students. The research did however yield significantly different NCLEX-RN predictor (Comprehensive Predictor) exam scores for first generation nursing students regardless of timeframes before or during the COVID-19 pandemic. These research findings contribute to the nursing education literature as to the effects of the COVID-19 pandemic on nursing education outcomes. The integration of these studies in the three manuscript dissertation serve as a springboard to positive social change supporting at risk and vulnerable population nursing students, and as recommendations for future research.

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Appendix A: Data Table

ID	*Term*	*Cohort Year*	*Final Grade*	*First Gen (no=0, yes=1)*	*Gender (m=0, f=1)*	*Comprehensive Predictor Exam Score*