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Association between COVID-19 Health Knowledge, Self-Efficacy and Preventive Behaviors among Nursing Students

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This is to certify that the doctoral dissertation by

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Walden University
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Abstract

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MSN, Hunter College, 1996

BSN, Central Philippine University, 1979

Dissertation Submitted in Partial Fulfillment

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Doctor of Philosophy

Public Health

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Abstract

Nursing students possess valuable public health knowledge to prevent the spread of COVID-19 infection. They can provide health education to the public with reliable information and adequate resources. To better understand the role nursing students can take in prevention efforts, the purpose of this quantitative correlational study was to examine the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among undergraduate nursing students. The health belief model was the theoretical framework that guided this study. The primary research questions assessed (a) if there was a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students, and (b) if there was a statistically significant association between self-efficacy and preventive behavior among nursing students. Using 283 surveys taken by nursing students from 11 CUNY colleges, a series of statistical analyses were conducted including a Shapiro-Wilk test, Spearman's correlation analysis, and linear regression. Spearman's correlation analyses were conducted to determine whether there was an association between COVID-19 health knowledge, self-efficacy, and preventive behavior variables. Key findings revealed that both COVID-19 knowledge and self-efficacy were positively correlated with behavioral intention, which was further confirmed by linear regression analyses. This study can positively impact social change by leading to the implementation of a more focused and cohesive information-sharing system which prioritizes best practices in preventive behaviors among health care workers.

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Dedication

I dedicate my dissertation work to my family and many friends. A special feeling of gratitude to my loving parents who work so hard in raising me and whose words of encouragement still ring in my ears.

I also dedicate this work to all the nursing students who participated in this study and to all my colleagues in academia who supported me throughout this process. I will always appreciate your support that enabled me to push through this long and winding journey.

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I would also like to give special thanks to my husband, Alan, and my family as a whole for their continuous support and understanding during this journey.

Finally, I would like to thank God, for letting me through all the trials and difficulties I have experienced during this journey. I will keep on trusting You forever more.

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Chapter 1: Introduction to the Study

As a highly contagious respiratory disease, COVID-19 has caused unprecedented state of emergency worldwide. The rapid dissemination and high transmissibility of COVID-19 and its variants have compelled countries to initiate strict control measures to contain the spread of the disease (Albaqawi et al., 2020). The disease presents a serious health risk to healthcare professionals owing to their frequent exposure to the virus in infected patients (Haider et al., 2020). In this regard, health knowledge concerning the disease and preventive behaviors among nursing students, who have essential role in educating the public on COVID-19 protection, is critical. Self-efficacy is also important in enhancing the nursing students' motivation to prevent the spread of COVID-19 (Alshdefat et al., 2021). Self-efficacy in this context involves personal health behaviors and beliefs as they relate to the attainment of set health goals.

Nursing students have valuable health knowledge, including knowledge of universal infection prevention practices such as hand washing and the use of personal protective equipment (Zhong et al., 2021). To enhance the health care capacity during the COVID-19 pandemic, many countries have allowed final-year medical and nursing students to voluntarily join the frontline healthcare workforce. These students have played a significant role in educating the public and in implementing safety measures in compliance with current guidelines (Gohel et al., 2021). In addition to nursing students' knowledge of COVID-19 and preventive measures, the self-efficacy of nursing students is essential in their new role of combating the spread of novel coronavirus in the public (Sun et al., 2020). This quantitative study focused on examining the association between

the health knowledge of COVID-19, self-efficacy, and preventive measures among nursing students. The results of this study may contribute to positive social change as increased public knowledge of COVID-19 preventive behavior can directly improve public health and the quality of lives of the individuals, families, and populations served by health care workers.

In this chapter, I introduce the study and justify its potential contribution to positive social change. The background of the research is presented with a summary of related literature on the topic and the knowledge gap to be filled by the research findings. This chapter also contains the research problem, the purpose of the study, the research questions and hypotheses, and a summary of the guiding theoretical framework. Other key areas covered in this section include the definitions of operational terms, assumptions, scope, limitations, and delimitation of research. The chapter concludes with a summary and transition to the next chapter.

Background

The COVID-19 disease was declared a global pandemic in March 2021 by the World Health Organization (WHO; Haider et al., 2020). The disease, which is thought to have started in the Chinese city of Wuhan, has spread to every part of the world, prompting strict containment measures from governments. As of December 2, 2022, COVID-19 infection stood at 644,159,822 cases and 6,638,125 deaths worldwide (John Hopkins University Corona Virus Resource Center, n.d.). The United States had 98, 923, 388 COVID-19 cases and 1,081,000 deaths as of December 2, 2022. The gravity of the disease has drawn a lot of attention from scholars aimed at containing, preventing,

treating, and vaccinating people against the deadly virus (Iacuzzi et al., 2020). Studies have focused on the health knowledge of COVID-19 and prevention measures including signs and symptoms associated with the disease (Albaqawi et al., 2020; Iacuzzi et al., 2020; Patelarou et al., 2020).

Numerous studies have been conducted on self-efficacy in the prevention of COVID-19 infection (Mukhtar, 2020; Tsai et al., 2021). Albaqawi et al. (2020) found that Saudi nursing students had good perceptions of their health knowledge about COVID-19 and its prevention. Albaqawi et al also observed, however, that the nursing students' health knowledge was lowest concerning the mode of viral transmission; therefore, they concluded that this should be an area of focus for nursing education. Similarly, Gohel et al. (2021) found that a positive perception of COVID-19 prevention and control measures existed among health care workers in India, but they had inadequate levels of health knowledge. Iacuzzi et al. (2020) highlighted health knowledge management strategies applicable in educational institutions to address COVID-19 infection and plan for the new normal. Furthermore, another study found that nursing students preferred to receive information on COVID-19 from valid sources rather than social media (Patelarou et al., 2020). Hence, valid and reliable tools are needed to gain knowledge of COVID-19 among nursing students.

Some studies on prevention behaviors among health care workers against infectious respiratory diseases have been documented. Choi and Kim (2016) found that attitudes and risk perception were critical factors influencing preventive behaviors of Korean nurses against infectious diseases such as the novel coronavirus. Alshdefat (2021)

found that Omani nursing students had adequate and satisfactory health knowledge and positive attitudes about COVID-19 prevention. However, Antezana et al. (2020) reported that nursing students did not maintain sufficient practice of preventive measures, making them vulnerable to infection. It was also observed that nursing students and recent graduates exhibited a high level of stress and low health knowledge of COVID-19 infection (Medina et al., 2021). The presence of high stress and low health knowledge predicted fear regarding COVID-19 which may have affected their ability to contain the spread of disease.

A systematic review by Goni-Fuste et al. (2021) identified the experiences and challenges of nursing students during the outbreak of infectious disease. These experiences included gaining health education and knowledge of the disease, and willingness to work during the pandemic. Some of the challenges encountered by the nursing students were concern about risk and preventive behavior, emotional impact, and ethical dilemmas associated with the disease. Goni-Fuste et al. called for nursing students to receive adequate education on the prevention and control of infection and to gain skills, knowledge, and attitudes that enable them to provide care to the patient with infectious diseases. Despite such findings in the literature, the association between COVID-19 health knowledge, self-efficacy, and preventive behaviors has not yet been examined among nursing students in the United States (Patelarou et al., 2020).

Self-efficacy is essential to nursing students' success in containing the spread of COVID-19 infection. A cross-sectional survey by Xiong et al. (2020) emphasized the important role of psychological status and self-efficacy for nurses involved in the

prevention and treatment of COVID-19. A related study by Yıldırım and Güler (2020) also found that COVID-19 severity, self-efficacy, health knowledge, preventive behaviors were linked to mental health in Turkey. Self-efficacy was identified as an important factor in the prevention, treatment, containment, and control of the COVID-19 pandemic in Pakistan (Mukhtar, 2020). In a different study, Tsai et al. (2021) found a significant relationship between nursing students' COVID-19 knowledge and health beliefs, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, self-efficacy, and behavioral intention. Studies such as these constitute a basis within the literature for key constructs of the present research, including health knowledge of COVID-19, self-efficacy, and preventive measures.

Purpose of the Study

The purpose of this quantitative correlational study was to examine the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among nursing students. The independent variables in this research were COVID-19 health knowledge and self-efficacy while preventive behavior was the dependent variable. The health knowledge of nursing students regarding COVID-19 illness in terms of symptoms, signs, and methods for preventing the spread of the virus is vital in educating the community to gain practice prevention and health promotion strategies to contain the spread of the disease (Saqlain et al., 2020). Nursing students possess valuable public health knowledge to provide health education to the public with reliable information and adequate resources to prevent the spread of COVID 19 infection (Escalera-Antezana et al., 2021). Not only the knowledge, but also the self-efficacy of

these students is important to becoming successful public health agents in the fight against this deadly respiratory disease (Xiong et al., 2020).

To this end, studies on the association existing among COVID-19 health knowledge, self-efficacy, and preventive behaviors for COVID-19 are important to aid policy formulation and defend the use of final year medical and nursing students in the fight against the pandemic (Patelarou et al.,2020).

Research Questions and Hypothesis

Research Question 1 (RQ1): Is there a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students?

$H_0$1o: There is no statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students.

H_a1: There is a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students.

Research Question 2 (RQ2): Is there a statistically significant association between self-efficacy and preventive behavior towards COVID-19 among nursing students?

$H_0$2: There is no statistically significant association between self-efficacy and preventive behavior towards COVID-19 among nursing students.

H_a2: There is a statistically significant association between self-efficacy and preventive behavior towards COVID-19 among nursing students.

Theoretical Framework for the Study

The health belief model (HBM) was developed in the early 1950s as a framework for exploring why some people who are illness-free take actions to avoid illness, whereas

others fail to take preventive actions (Rosenstock, 1960). The model is broadly used to understand health behaviors. This model suggests that individual belief in personal threat of disease alongside his or her belief in the recommended health behavior or action predict the likelihood of adopting and following the recommended health behavior and action.

Based on the growing global impact of COVID-19, the HBM was utilized to understand the COVID-19 health knowledge, self-efficacy, and preventive behaviors of nursing students towards COVID-19. The HBM is based on a link between beliefs and actions. For example, if a person considers themself as susceptible to a condition, they believe that condition would potentially have serious consequences. They also believe that recommended or available courses of action or health behaviors would be beneficial in reducing either their susceptibility to or severity of the condition. They further believe that the anticipated benefits of taking recommended actions outweigh the barriers or costs of these actions. Therefore, they are likely to take action that they believe will reduce their risks (Chapman & Skinner-Skugg, 2008). It is one of the most used models in guiding programs for health promotion and disease prevention.

Application to Research

The expectation that this model can be employed to assess whether nursing students are implementing and promoting personal health beliefs, self-efficacy, and preventive behaviors in their daily lives was investigated in this study. (Mukhtar, 2020). It is the responsibility of nursing educators to prepare nursing students with thorough knowledge about COVID-19, and accurate health beliefs about the perceived

susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, self-efficacy, and behavioral intention to prevent the spread of this infectious disease both locally and globally (Mukhtar, 2020). The model was recently applied by Daragmeh and Zéman (2021) focusing on the use of E-wallet as a mode of the transaction during COVID-19 pandemic. The adoption of E-wallet facilitated social distancing, and the pivotal factor affecting its continued use is based on consumer's self-efficacy.

Nature of Study

To address the research questions, the specific research design was a quantitative, correlational, cross-sectional design (see Frankfort-Nachmias & Nachmias, 2008). I recruited nursing students across different types of program types (associate or bachelor) to examine the association between the health knowledge of COVID-19, self-efficacy, and preventive behaviors. There is a valid and reliable 42-item survey questionnaire used by nursing faculty at National Taiwan University that I was permitted to use to collect students' data on the association between knowledge of COVID-19, self-efficacy, and preventive behaviors towards COVID-19. The following factors of preventive personal behaviors were measured through the self-reported questionnaire: (a) wearing the mask, (b) washing hands, (c) social distancing, and (d) staying home when sick. The survey questionnaire mentioned above included all the required variables, namely knowledge of COVID-19, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. The 42 items contained in the questionnaire included knowledge about COVID-19 (Items 1–11), and relationships between the HBM constructs of perceived susceptibility (Items 12–16), perceived severity (Items 17–22),

perceived benefits (Items 23–28), perceived barriers (Items 29–34), self-efficacy (Items 35–38), and behavioral intention (Items 39–42). Items 1 to 11 on the questionnaire were answered by "true" and "false" responses, while a five-point Likert-type scale was used for items 12 to 42. The self-reported questionnaire was used to collect data on student demographics, COVID-19 health knowledge and health status, method of obtaining COVID-19 information, self-efficacy, and preventive behavior among nursing students.

Data were collected from nursing students from across 11 City University of New York (CUNY) Colleges within associate and bachelor's nursing programs. CUNY is a public university with 25 campuses across the five boroughs of New York City. The 11 CUNY Colleges with the nursing program have a central email database. An email was sent inviting the nursing students to participate. After CUNY IRB approval and informed consent were obtained, an online survey without nursing student identifiers was conducted using Qualtrics XM. Purposive sampling was used to select the sample. G-power analysis software (2010) was used to determine sample size.

Definition of Terms

COVID-19: refers to an infectious respiratory disease caused by a recently discovered coronavirus (Pal et al., 2020). The disease is transmitted primarily through droplets that cause sneezing, coughing, and shortness of breath in an affected person.

Health knowledge: denotes information, facts, and skills gained through education, experience, as well as the practical and theoretical understanding of a subject related to health and health care (Samerski, 2019).

Novel coronavirus: a severe acute respiratory syndrome coronavirus (SARS-CoV-2 formally known as 2019-nCoV (Pal et al., 2020). This virus was first discovered during an outbreak of respiratory illness case in the Chinese city of Wuhan.

Personal protective equipment: PPEs are various types of equipment and device worn for purposes of reducing exposure to hazards likely to cause serious injuries at the workplace (WHO, 2020). In the context of this research, PPE refers to protective gear such as masks are worn to guard against COVID-19 infection.

Preventive health behavior: PHB describes different types of activities used by a healthy individual for purposes of preventing disease (Ayandele et al., 2021). For COVID-19, preventive health behaviors include social distancing, hand hygiene, and masking.

Self-efficacy: Self-efficacy refers to an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1977, 1986, 1997). Self-efficacy reflects confidence in the ability to exert control over one's own motivation, behavior, and social environment.

Universal infection prevention practice: This refers to standard health precautions against disease infection (Sands et al., 2021). These practices include hand hygiene, patient sterilization and disinfection, and quarantine.

Assumptions

Certain assumptions must hold to be true even without evidence in the research. Example of these assumptions include methodological assumptions connected to research such as the chosen method, design, sampling technique, collection, and analysis of data,

which require correct and accurate information (Yilmaz, 2013). In this study, I assumed that information gathered from nursing students was honest, truthful, and accurate, and relevant to the research. Nursing students were presumed to be willing to participate in the research and provide the required data and information on COVID-19 health knowledge, self-efficacy, and prevention behaviors to answer the research questions. This assumption was vital because self-reporting data has the potential to cause bias and misrepresentation which can affect the credibility and validity of the study outcomes.

In this study, it was also assumed that nursing students involved in COVID-19 pandemic prevention and treatment provided reliable and adequate research data. Quantitative methods and descriptive cross-sectional design were appropriate in answering the research questing and hypothesis testing. In addition, the purposive sampling method was a presumed relevant technique for selecting a representative sample of the study population for the study. Furthermore, an existing valid and reliable questionnaire from the nursing faculty at National Taiwan University was presumed to be an appropriate tool for collecting required data for the research. Overall, the selected research methodology and design for guiding the conduct of this research was appropriate in answering the research questions and test the study hypothesis.

Scope and Delimitations

Scope and delimitations are the boundaries of research (Diego, 2020). The institutional scope of this research is the City University of New York (CUNY), a public university with 25 campuses across the five boroughs of New York City. The participant pool was limited to nursing students enrolled in associate and bachelor's nursing

programs from across 11 of the 25 CUNY campuses. The methodology was limited to quantitative descriptive cross-sectional study and purposive sampling methods for obtaining a representative sample for the study. The theoretical framework was limited to the HBM to measure the nursing students' preventive personal behaviors, namely wearing a mask, washing hands, social distancing, and staying home when sick. Therefore, no other theory or model was used to guide the research.

Limitations

A potential challenge in this study was the ability to recruit participants during the pandemic to reach the required power sample size. A potential limitation was generalizing its results because I only planned to recruit participants from the 11 CUNY campuses that have nursing programs. Another potential limitation of this study was that evaluating behavior by self-reporting can cause bias and misrepresentation. There was also the possibility that participants may not have been forthcoming with answers to the survey questions.

Significance

This study may be significant in that findings from this study can guide the health care profession regarding its role in health promotion and disease prevention. Given that the main responsibilities of health care professionals include promoting health and preventing diseases, the findings may guide the creation of a health education program on COVID-19 and future pandemics. Although this study was conducted among nursing students, the result of this study might be used as basic information for infection prevention and education programs for new health care workers in hospital and

community settings. At the outbreak of any global pandemic, health care workers need to be provided with information or knowledge (Patelarou et al., 2020). However, it is also crucial to help them recognize that active preventive behavior can help them avoid acquiring the disease and prevent its spread both in hospital and community settings. The major health care challenges brought by the COVID-19 pandemic require a knowledgeable healthcare workforce with the passion and skills to advocate for public policies that improve health and health equity (Xiong et al., 2020). The result of this study may contribute to a positive social change as increased knowledge in preventive behavior directly affects the lives of the individuals, families, and populations served by health care workers.

Summary

Chapter 1 has covered an introduction and background of the study. An introduction section justified the study and positive social change whereas the background presented a summary of related literature on the topic and knowledge gap to be filled by the research findings. This study investigated the lack of knowledge on the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among nursing students. The purpose of this quantitative study was to examine the association between COVID-19 health knowledge, self-efficacy, and preventive measures for COVID-19. A quantitative, correlational, cross-sectional design was used to answer the research questions. Research data was collected from nursing students from across 11 CUNY Colleges with associate and bachelor's nursing programs. Sampling was by purposive technique to select a representative sample of the nursing student population to

participate in the study. The result of this study could contribute to a positive social change because increased public knowledge of COVID-19 preventive behavior will directly improve public health and the quality of lives of the individuals, families, and populations served by health care workers.

Chapter 2: Literature Review

To prepare for this research study, the available literature was reviewed to establish its context. This literature review includes the research designs, methodologies, and findings of other relevant studies regarding the current knowledge, health beliefs, and practices towards COVID-19. I also identified some of the suggestions for further research and gaps in the literature. The first section includes additional background information pertaining to the impact of the COVID-19 pandemic. The second section includes a review of studies that were conducted regarding knowledge, attitudes, and practices concerning COVID-19 among the public and health service providers. The third section focused on studies regarding the application of the HBM constructs of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. This chapter ended with a unifying summary of the materials reviewed.

Literature Review Coverage and Search Strategy

To identify peer-reviewed articles related to COVID-19 knowledge, beliefs, and practices among nursing students, I conducted a detailed search using Walden University's digital library. I used Thoreau as the primary scholarly database to obtain relevant peer-reviewed articles that were relevant to the study. The databases I used also included PubMed, SAGE Journals, and CINAHL Plus with Full Text, EBSCOHost, Elsevier, and Google Scholar. In addition, I used government websites of organizations such as the WHO and the CDC to access relevant information. General search terms that I used as the basis for inquiries were *COVID 19, pandemic, nursing students, health*

knowledge, health beliefs, perceptions, practices, prevention and control, psychology, risk reduction behavior, and *health belief model.*

My search involved studies that were primarily conducted within the last 5 years between 2017 and 2021. I used studies from across the globe that were relevant and in alignment with the research topic because there were no studies on this precise topic done in the United States. Because COVID 19 is relatively new disease, I have included other pandemic studies involving SARS and MERS, although some of these studies were more than 5 years old. Furthermore, I consulted the references in the articles found to identify the additional relevant sources.

Background of the COVID-19 Pandemic

COVID-19 is a global public health pandemic. It is caused by the SARS-CoV-2 virus, which causes severe acute respiratory syndrome (Fauci et al., 2020, Ruan, 2020). It was declared a public health emergency of worldwide concern by the WHO on January 30, 2020. In response to this situation, the WHO urged all countries to work together to prevent COVID-19's rapid spread. Oral and nasal droplets, as well as contact with infected surfaces, were found to be the primary modes of transmission. The disease takes 6.6 days to incubate on average (Backer et al., 2020). The virus can also persist for 14 days on some surfaces (Lauer et al., 2020; Xiao et al., 2020).

Controlling the sources of infection was the most effective strategy to combat the disease (Choi & Kim 2016; Tao et al., 2020). Early diagnosis, reporting, quarantine, and supportive therapies were all effective control tactics. Additional precautions include avoiding close and direct contact with patients, wearing a face mask, washing hands often

with soap and water, and avoiding unprotected contact with household animals (Tao et al., 2020).

The implementation of public health policies to prevent the virus's transmission, such as social distancing, hand washing, and lockdown procedures caused widespread public outrage and terror, especially among populations who perceived themselves to be biologically unaffected (Roy et al., 2020). Many countries had not experienced similar outbreaks like SARS or MERS, and many public health systems were not prepared for COVID-19. The breadth and speed with which COVID-19 spread via infected people who were either mildly sick or asymptomatic underscored the public's need to recognize signs of illness and ways to prevent its spread. Official measures included school closures, office closures for 30 days, prohibitions on leaving home after 6 p.m., and legal punishment against those who did leave in some countries (Lambert et al., 2020).

Transmission of infection from asymptomatic patients was also possible (Zhou et al., 2020) In these scenarios, the potential of spreading a disease to healthcare professionals was unavoidable, which posed a major hazard to nursing students. As such, nursing students became increasingly aware of their infection risk (Zhong et al, 2020). In Italy, for example, almost 15,000 health personnel were infected with COVID-19 by mid-April of 2020 and more than 19,000 tested positive in Spain during that same time (WHO, 2020).

Nursing students may serve as a direct link between families, hospitals, and universities, and therefore, they have the potential to spread infections to large, vulnerable populations even if asymptomatic (Stirling & Harmston, 2015). Conversely,

the possibility of patients spreading disease to healthcare professionals was high, which posed a significant hazard to nursing students (Han & Yang, 2020; Stirling & Harmston, 2015). These facts were highly stressful for students, which may have significantly affected their academic performance and psychophysical health (Al-Rabiah, 2020). As a result, colleges must act continually and responsibly to protect their students by taking preventative measures.

Promotion of the public's knowledge, attitude, and behavior regarding COVID-19 can aid in the development of healthy behaviors and promote public adherence to medical advice to prevent the spread of the disease (Ajilore et al., 2017; Zhong et al., 2020). However, public acceptance was required because the effectiveness of such measures was dependent on people's knowledge, attitudes, and practices regarding COVID-19 (Ajilore, 2017). Therefore, assessing the public health knowledge and attitudes towards COVID-19 was the first step before the implementation of public health policy to prevent the spread of this disease.

Public Knowledge about COVID-19

Knowledge of a condition can influence an individual's attitude and intention, and intention directly influences action. As a result, a lack of understanding and even with a positive attitude might lead to incorrect practice and infection (McEachan et al., 2016). Currently, one of the essential steps in preventing a national epidemic was to provide the necessary effective instructions to enhance awareness (Adab et al., 2016). Therefore, it is necessary to assess the public knowledge about COVID- 19; since nursing students can play an important role in educating the public and implementing safety measures in

compliance with the current guidelines (Gohel et al., 2021). There have been a few studies on knowledge and attitudes during epidemics, but most of these studies were conducted in other countries. Lack of knowledge and poor attitudes about infectious diseases have been linked to severe panic and other emotional reactions among the Chinese population, complicating efforts to prevent disease spread there (Tao, 2013). Furthermore, inadequate knowledge and negative attitudes regarding the disease, as demonstrated by the incidence of SARS in 2003 and MERS in 2012, resulted in fear of the disease and of societal labeling of sufferers. This fear may make it more difficult to combat the disease's spread. As a result, awareness-raising activities to enhance attitudes and practices of medical workers and the public were required (Kim, 2017; Zhou et al., 2020). During the epidemics of chikungunya, zika, and dengue fever in Latin America, Beckwick et al. (2016) found inadequate levels of engagement and commitment to the imposed control measures among populations.

Geldsetzer (2020) performed an online survey of COVID-19 knowledge and perceptions among inhabitants in the United Kingdom and the United States. Although participants had a strong understanding of the major mechanism of disease transmission and typical symptoms, the survey revealed some important misconceptions about how to prevent COVID-19 infection, including beliefs in false information from social media. Clements (2020) investigated COVID-19 effects on self-reports of buying more items than usual, going to large gatherings, and wearing medical masks. Clements discovered that while the general understanding of COVID-19 was high, there were disparities in knowledge based on age, gender, education, income, race, and political party. There were

studies done during the early days of the pandemic and these studies reviewed supported the importance of giving the public accurate and reliable information during pandemics such as COVID-19 (Clements, 2020). However, when inaccurate information is disseminated, people are sometimes not able to effectively differentiate between fact and fiction and they may allow unreliable information to influence their behaviors.

In terms of health prevention and promotion, knowledge, attitude, and practice are critical cognitive factors. These factors entailed a variety of ideas regarding the disease's etiology and exacerbating variables and the identification of symptoms, treatment options, and repercussions (Szymona-Palkowska et al., 2016). COVID-19 beliefs stem from various sources, including misconceptions about other viral infections, government data, and personal experience (Zhou et al., 2020). The degree to which these ideas were considered valid may influence different preventative behaviors and that may differ across the community. The lack of knowledge or the misinterpretation of medical issues might pose a public health risk a risk in many circumstances (Zhou et al., 2020). Although the concepts of preventive measures were no longer new to nursing students, experiencing a pandemic is a unique experience. Therefore, it is necessary to investigate whether there were gaps in their health knowledge and practice regarding preventive behaviors.

Research has shown that cultural and social norms played a significant role in health knowledge and preventive behavior. One of the first investigations of COVID-19 attitudes and knowledge was conducted in Hubei, China, and it found out that attitudes toward government officials were negative (Zhong et al., 2020). Higher levels of

information and education were linked to more positive attitudes on COVID-19 prevention activities (Roy et al. 2020; Zhong et al., 2020). During worldwide epidemic outbreaks, perception of risk was also a major determinant in commitment to prevention (Corrin et al., 2017; Roy et al., 2020). A study conducted in Iran to assess the knowledge, attitudes, and preventive behaviors of inhabitants of Hormozgan towards COVID-19 found that participants had a reasonably high level of knowledge, a positive attitude, and practiced preventive behavior regarding COVID-19 which resulted in lower rates of infection (Shahabi et al., 2020).

When Ferdous et al. (2020) investigated the Bangladesh population's knowledge of COVID 19 following the immediate lockdown, and during the rapid increase period of the COVID-19 outbreak, their findings revealed significant disparities in knowledge and attitudes, and practices towards the pandemic. Their findings pointed to the necessity for targeted health education programs aimed at boosting COVID-19 knowledge.

In a study conducted in Malaysia, most participants were optimistic about the successful management of COVID-19 and the government's ability to battle the disease (Azlan et al., 2020). Further, Gudi et al. (2020); performed a prospective, web-based online survey among the public in India. They discovered that while the public's awareness and views about universal safety precautions in India were encouraging, long-term educational interventions were required because the dynamics and severity of COVID-19 have been constantly and rapidly changing.

The studies that were reviewed above: Azlan et al. (2020); Corrin et al. (2017); Ferdous et al. (2020); Gudi et al. (2020); Roy et al. (2020); Shahabi et al. (2020) and

Zhong et al. (2020) were all performed in foreign countries. This was significant because variables such as culture and level of education may contribute to preventative behavior during a pandemic. There were disparities in knowledge and preventive behavior among diverse cultural groups, which necessitates investigating these variables related to nursing students' preventive behavior and self-efficacy.

Health Care Practitioner's Knowledge and Behavior towards COVID-19

Nurses and other healthcare professionals play an important role in the fight against COVID-19. They treated people who were infected with this highly contagious virus. To protect themselves and to successfully control and prevent disease, healthcare practitioners must have a good understanding of COVID-19 and use appropriate practices (Gan et al., 2020). Furthermore, assessing nurses' present knowledge, attitudes, and practices can identify their educational needs. Limited research has been done to investigate the knowledge of COVID 19 among healthcare practitioners. To understand medical students' knowledge, attitudes, and practices regarding the COVID-19 epidemic, Olum et al. (2020) conducted an online descriptive cross-sectional survey with medical students in Uganda. They discovered that Ugandan medical students had sufficient knowledge of COVID-19 and were prepared to provide a substantial health care response when the need arises.

Kumar et al. (2020) surveyed Pakistanis by interviewing health care workers using a questionnaire that included basic demographic information as well as knowledge, attitude, and practices related to the usage of surgical face masks to decrease COVID-19 exposure. They discovered that while the subjects had a good attitude toward the use of

face masks, they lacked understanding about how to use them properly. Saqlain et al. (2020) did a survey to examine COVID-19 knowledge, attitude, and practice among other groups of Pakistani health care personnel. They discovered that while Pakistani healthcare providers had a strong understanding, there are places where gaps in knowledge and practice existed. In India, Gohel et al. (2020) investigated the medical and allied health science students' understanding and perceptions of COVID-19. They discovered that students had a good attitude about COVID-19 prevention and control, with just a few incorrect replies relating to the use of herbal treatments or garlic. About half of those polled correctly believed that antibiotics and vaccines were necessary.

An observational study was conducted among medical assistants who attended a conference on SARS-CoV-2/COVID-19 in February 2020, before and after the conference. The study was conducted simultaneously in 41 cities across Bolivia and Colombia, to assess basic knowledge on COVID-19 epidemiology, symptoms, and disease prevention. After the conference, there was a substantial rise in knowledge about transmissible diseases in Colombia (Escalera- Antenzana et al., 2020). The findings from these studies among medical students with diverse backgrounds revealed disparities in health knowledge and preventive behavior that substantiate investigating amongst nursing students.

Given that COVID-19 is a novel virus, a review of the literature uncovered only a few studies that detailed nursing students' concurrent perceptions and experiences. Existing studies, primarily qualitative, have examined nursing students' perspectives, perceptions, and experiences with the Middle East Respiratory Syndrome coronavirus

(MERS-CoV) in 2012 in Saudi Arabia (Centers for Disease Control and Prevention (CDC), 2012). The findings revealed that students from Saudi Arabia's Al-Ghad International College for Applied Medical Sciences regarded coronavirus as a very lethal virus threatening humanity for which isolation precautions were required (Hassan, 2016). They also believed that MERS-CoV is a lethal disease and that healthcare workers were at significant risk of contracting it. In two additional Arab studies students arrived at the same conclusions (Assad et al., 2019; Al Hazmi et al., 2018).

Additionally, students at Qassim University believed that disease transmission can be stopped by adopting WHO's universal guidelines (Tork & Mersal, 2018). On the other hand, nursing students frequently discover that the public was uninformed about the viral infection’s propagation and the severity of the problem and did not follow the doctors' advice (Hassan, 2016; Tork & Mersal, 2018).

According to the findings of a Korean study, there was a link between nursing students' views about infection control methods and the frequency with which they were used (Kim, 2017). Moreover, relevant research by Al-Rabiah et al. (2020) and Tork and Mersal (2018) explained sources and methods for informing students during the outbreak and any resulting difficulties. As a result, they found that students frequently seek knowledge from the Internet, television, and radio for information purposes (Tork & Mersal, 2018). They also obtained information from college sources, official health authority statements (Al- Rabiah, 2020), or friends and family (Stirling & Harmston, 2015). According to WHO, the world is currently afflicted by a massive "infodemic (info [rmation] + [epi] demic)", or an overabundance of information (Zorocostas, 2020).

Fakhri et al. (2020) investigated Moroccan nursing students' knowledge, attitudes, and practices on COVID-19. The findings revealed that most of the nursing students who took part in the survey had a proficient level of knowledge, highly favorable attitudes, and acceptable practices when it came to COVID-19. However, to increase their preventative measures, public awareness and education efforts were required. Further, Albaqawi et al. (2020) evaluated the knowledge, perceptions, and preventative behavior of nursing students in Saudi Arabia towards COVID-19 infection. Their findings revealed that nursing students had favorable views of the COVID-19 knowledge and prevention and favorable views of the government and Ministry of Health's response to the COVID-19 situation. The mode of transmission obtained the lowest knowledge score and should be the focus of nursing education.

Similarly, Alshdefat et al. (2021) investigated Omani nursing students' knowledge, attitude, and practice towards the COVID-19 pandemic. Their findings demonstrated that nursing students had adequate knowledge and positive attitudes towards preventive measures in preventing the spread of COVID -19. However, they did not maintain proper practice measures. These few studies revealed that there were disparities in health knowledge and preventive behavior among nursing students in other countries. There were no published studies to investigate nursing students' health knowledge and preventive behavior in the United States, which justified the need for this study.

In the context of emerging infectious disease epidemics or pandemics caused by zoonotic viruses, Goni-Fuste et al. (2020) conducted a comprehensive review of forty-

eight studies involving nursing students. Five themes were identified namely: knowledge, concern about risk and preventive behavior, the desire to work during a pandemic outbreak, experiences and emotional impact, and ethical difficulties. In addition, it was recommended that there is a need to enhance nursing education to ensure that students have adequate education in infection prevention and control. Furthermore, nursing students should be given the opportunity to develop the skills and attitude which justified the need for this study.

Impact of COVID-19 on Mental Health

Pandemics, such as the one caused by COVID-19, impact the mental health of individuals for a variety of reasons; uncertainty, poor prognosis, financial loss, instability, uncertainty, emotional isolation, stigma, school/work closure, insufficient resources for medical response, and insufficient distribution of essentials were all factors to consider. As a result, people suffered from various emotional issues such as stress, insomnia, frustration, and irritability, all of which have negative consequences. These could lead to psychiatric disorders like depression, anxiety, behavioral changes (substance abuse), and post-traumatic stress disorder in later stages (Pfefferbaum et al., 2020; Torales et al., 2020). Even in non-pandemic times, health care workers face highly stressful work daily, often caring for traumatized people. They were frequently witnessing death and dying and operating in crowded care settings with the possibility of frequent re-exposure to potentially traumatic situations (Carmassi et al., 2020).

New York City (NYC) was the epicenter of the COVID 19 outbreak in the United States, with a daily case count of 12,274 on April 4, 2020 (nyc.gov/data). Frontline health

care workers (FHCWs) in New York City and around the world have been subjected to an extreme and sudden increase in daily work-related stressors. These individuals witnessed severe illness and death at unprecedented rates while also facing threats to their safety, raising serious concerns about the psychological impact of this crisis on this population. In this regard, Feingold et al. (2020) investigated the magnitude of, and factors associated with mental health outcomes among frontline health care workers (FHCWs) providing care during the spring 2020 COVID-19 pandemic surge in New York City. Pre-pandemic burnout and leadership support were identified as the most highly associated factors in this large sample of FHCWs providing care during the 2020 NYC pandemic surge. The report showed that 39 percent experienced symptoms of COVID-19-related posttraumatic stress disorder (PTSD), major depressive disorder (MDD), and generalized anxiety disorder (GAD). These findings suggested that interventions aimed at reducing burnout and increasing support from hospital leadership may be appropriate targets to reduce the risk of developing further psychopathology in this population and others working during pandemic crisis.

In several countries, the COVID-19 pandemic had a considerable influence on socioeconomic activities. As a result of the rapid spread of the virus, deaths, and related anxiety/stress, companies and organizations have closed. Furthermore, lockdowns and stay-at-home orders have been issued, social distancing, self-isolation, and travel restrictions have been imposed (Nicola et al., 2020). The CDC recommended that schools in the United States close in March 2020.

Since the COVID-19 epidemic, public health professionals have recommended a variety of health-related measures to reduce the virus's spread, including social distancing, masking, and quarantine (CDC, 2020). New norms and regulations have limited socializing on university campuses to virtual interactions or small groups, as well as social separation. The experiences of impromptu gatherings which served as stress relievers to students were missing. According to research, the impact and influence of social and physical distance vary depending on the individual. For example, Brooks et al. (2020) undertook a review of the literature to determine the psychological effects of quarantine. The findings revealed that post-traumatic stress symptoms, rage, anxiety, and fears of infection are just a few of the psychological impacts of isolation and social separation. This finding was consistent with other previous studies on the effect of quarantine due to epidemic by Reynolds et al. (2008), which involved a sample of 1,057 people who were quarantined in Canada in 2003 due to a severe acute respiratory syndrome (SARS) outbreak. The authors discovered that 60.6 percent of the subjects felt isolated, while 38.5 percent felt lonely.

Due to travel limitations, international students also had to deal with the uncertainty of not knowing if or when they would be able to return to their home countries. By the end of March, nearly 14 million college students in the United States had been affected by coronavirus-related school closures (Son et al., 2020). Universities were forced to convert most of their course offerings to an online format in the aftermath of the campus closure order. At this time, Son et al. (2020) conducted a survey to evaluate COVID 19's impact on college students. Four out of five students regarded their

institutions as reliable COVID-19 information providers. To cope with the present COVID-19 situation, four out of five students said that they must make significant life changes. Even though they are digital natives, most students were wary of an all-online learning environment (Olum et al., 2020).

Since the outbreak of the COVID-19 pandemic, there has been a considerable increase in the number of concurrent users of online learning platforms, particularly in higher or post-secondary education, according to the World Economic Forum (WEF, 2020). Students have expressed worries about a variety of related difficulties, such as technology challenges, because of the shift to online learning and its associated rigor. Students' experienced undue anxiety and mental health issues have increased because of these changes (WEF, 2020).

Although not a new concept, online learning is not suitable for all students. College students who must perform internships, labs, or fieldwork face much pressure. Furthermore, college students were exposed to the uncertainties brought on by socioeconomic changes that followed the pandemic outbreak, such as job loss and activity restrictions/isolation, all of which are potentially harmful (Salimi et al., 2020). Previous research on college students has also found that students who took online classes were more socially isolated than those who attend traditional schools (Ozogul, 2018). Increased psychological suffering and student turnover have been linked to social isolation and loneliness (Ozogul, 2018). There is also evidence that students were more likely to acquire anxiety, sadness, and high levels of stress due to COVID-19-related social isolation. COVID-19-related social isolation causes concentration and memory

issues, hindering study comprehension and decision-making (Limon-Vazquez et al., 2020).

Impact of COVID-19 on Nursing Students' Mental Health

As the frontline warriors in any pandemic, healthcare workers' mental health is profoundly impacted, necessitating urgent intervention to restore and preserve mental health. Research on sources of anxiety among health professionals demonstrated the need to be heard, prepared, and supported (Shanafelt et al., 2020). Fear, stress, and knowledge about COVID-19 in nursing students and recent graduates in Mexico were researched by Medina- Fernandez et al. (2021). Nursing students and recent graduates experienced high levels of tension and panic and a lack of information about COVID 19. Fear of COVID-19 is predicted by the presence of excessive stress and a lack of knowledge.

In Croatia, Lovric et al. (2020) conducted a qualitative study to learn more about how nursing students understand the COVID-19 pandemic and their own experiences while learning during the global epidemic. According to the findings, students had mixed feelings about the effectiveness of state institutions and their information policies. All the students were describing the spread of misinformation through social networks and seek to use only relevant sources. During the COVID-19 crisis, most students identify the general public's high-risk behavior. Fear of infection and care for family members were frequent among nursing students, which was why they follow state-issued recommendations and continue to adopt steps to prevent infection transmission. Most of them realized their obligation to the community during the crisis and recognized the importance of the nursing profession, Students were only mildly concerned about

becoming infected during classroom instruction, but they were extremely concerned about future visits to the clinical setting. Participants described a lack of enthusiasm, poor focus, and major learning difficulties because of the crisis.

During the first month of confinement due to the COVID-19 pandemic, Ramos-Morcillo et al. (2020) investigated the learning experiences, and expectations of nursing students enrolled in the Bachelor's and Master's degree programs of two Spanish public universities considering the abrupt change from face-to-face to e-learning education. Their findings demonstrated that e-learning imposed restrictions on older students, those who live in remote areas, those who have employment and family responsibilities, and those who have limited access to electronic resources. These restrictions affected their ability to learn and thus caused undue anxiety and stress.

Additionally, Hong et al. (2020) used online questionnaires to perform a multicenter, cross-sectional survey of frontline nurses in China. Depression, anxiety, somatic illnesses, and suicidal ideation symptoms were assessed. The findings revealed that during the COVID-19 pandemic, frontline nurses' mental health was typically poor, and various impact factors connected with nurses' psychological health were discovered. More research is required to determine whether training and support measures can effectively reduce psychological morbidity.

The COVID-19 epidemic had a significant influence on our society, particularly in the healthcare sector. On the one hand, this extraordinary circumstance provided nursing students with unprecedented learning possibilities. On the other side, this circumstance may jeopardize the learning trajectory of nursing students. A study

conducted by Ulenaers et al. (2021) investigated nursing students' clinical placement experiences in Belgium during the COVID-19 pandemic. According to the study, students noted deficiencies in psychosocial support, establishing regular communication with their clinical placement supervisor, awareness of the tough work circumstances, and the need for greater room to work.

Further, Sheroun et al. (2020) evaluated the reported stress and coping techniques of all batches of BSc Nursing students in India in relation to COVID 19 lockdown and the relationship between stress and coping and demographic characteristics. According to the findings, 76.58% of participants had moderate coping strategies, 18.5% had strong coping strategies, and 4.92% had low coping strategies.

A review of literature on the impact of COVID 19 on mental health was essential to understand a person's adaptive and coping skills during a pandemic. The findings of these studies revealed that there were protective and risk factors that affect coping strategies. Most of the nursing students suffered psychological suffering. It is worth investigating its impact on the self-efficacy and preventive behavior of nursing students regarding the COVID 19 pandemic.

Nursing Students Self-Efficacy and Preventative Behavior towards COVID-19

Introduced by Albert Bandura in 1977 in his social learning theory, the self-efficacy theory explains how self-efficacy is developed, how it can be altered, and how it impacts change of behavior, accomplishments, performance, and personal well-being (Lippke, 2020). It refers to belief in an individual’s ability to perform various tasks effectively. In this regard, self-efficacy makes a difference in the way people feel, think,

and behave. With regards to feeling, a person with low self-efficacy is prone to helplessness, anxiety, stress, and depression, among other psychological health issues. In terms of thinking, a person with high self-efficacy possesses strong cognitive processes. Further, self-efficacy influences the choice of behavior in different situations and increases motivation to face challenging situations.

With the emergence of COVID 19 came a wide range of preventative measures put in place to arrest the spread of infections. Such measures included travel bans, the establishment of isolation units, mass quarantine, self-isolation, and lockdowns (Rubin & Wessely, 2020; Xiang et al., 2020; Yıldırım et al., 2021). However, recent studies have found out that notwithstanding all the preventative measures put in place, the epidemic still brought about adverse psychological implications on people's health (Yıldırım & Güler, 2020).

According to Xiang et al. (2020), various aspects of COVID 19, such as health effects (fever, cough, shortness of breath, vomiting), contact tracing, and the mandatory 14-day quarantine can heighten possibilities of psychological effects. Further, a study conducted by Brooks et al. (2020) indicated that COVID 19 increased mental health challenges, including anxiety, fear, anger, depression, boredom, indecisiveness, distress, suicide intentions, and nervousness. Similarly, in a study by Lai et al. (2020), patients diagnosed with or suspected to be infected by the virus experienced psychological trauma.

People's perceptions of the risks associated with a pandemic such as the COVID 19 epidemic are the essential factors influencing their participation in preventative

measures (Shahin & Hussien, 2020). According to Yıldırım and Güler (2020), heightened public awareness and early knowledge were crucial to assist populations in coping with the associated mental factors during a pandemic. With the availability of essential information, the public may perceive the risks differently, leading them to make informed decisions and take preventative measures. People take the necessary actions to be involved in preventative behavior if they perceive that the disease is severe and has a high risk of contractions (Mukhtar, 2020). Thus, people took the necessary actions to engage in preventative behavior through increased rates of confirmed cases and deaths.

Research has indicated a strong association between self-efficacy and mental health, which affects preventative behavior (Hu et al., 2020). In this regard, directly experiencing a pandemic increases self-efficacy, which leads to precautionary behavior. Further, the concept of self-efficacy is an important variable when promoting intentions and behaviors related to health.

As discussed earlier, the COVID- 19 epidemic has exposed frontline nurses to challenging situations leading to mental health problems. The nurses are the largest constituent of health care workers susceptible to infections due to constant direct contacts during containment efforts (Hu et al., 2020). In this regard, the increasing number of confirmed infections and death, inadequate personal protective equipment, lack of specific treatment criteria, feelings of inadequacy, overwhelming workload, and limited support from stakeholders contribute to feelings of the mental burden by these health care workers. Similar findings were associated with the 2003 SARS outbreak, where healthcare workers feared contracting the infection and spreading it to their family and

friends. Thus, these workers felt stigmatized, and there were increased reports of reluctance to attend to patients, with many nurses thinking about resignation (Lai et al., 2020). Similarly, concerns are arising about the mental health of nurses, recovery of care, and psychological advancements associated with COVID -19.

While current studies on the psychological impacts of COVID-19 on nurses are limited, previous studies have examined how nurses can experience acute stress disorders due to overwhelming work situations. A significant factor contributing to psychological distress is the nurse's coping self-efficacy which refers to the confidence to cope effectively with stressful events (Shahrour & Dardas, 2020). Self-efficacy is a prerequisite for effective self-evaluation of ones' ability to manage a threatening situation. Moreover, self-efficacy can produce various changes or results when nurses are under pressure and are more likely to survive with high self-efficacy (Pragholapati, 2020). Studies have shown that higher levels of coping self-efficacy are associated with low levels of stress and reduces long-term possibilities of experiencing acute stress disorder in times of traumatic occurrences such as COVID-19 (Shahrour & Dardas, 2020). Through enhanced coping self-efficacy, an individual can appraise their capabilities positively and reduces stress reactions.

Additionally, the pandemic exposed healthcare workers to excessive workload, including long shifts leading to exhaustion to manage the increased health emergencies and deal with the shortage of healthcare professionals, especially nurses. According to Simonetti et al. (2021), the pressure from such workloads can lead to adverse safety outcomes, including morbidity and mortality rates for patients, and adverse outcomes

such as low job satisfaction, intention to leave, fatigue, and burnout for health professionals. As a result, other productive factors of the healthcare professionals were impacted, such as quality of sleep which increases the probability of suffering from psychophysical health symptoms. Psychological symptoms include memory loss, irritability, and low reactivity. According to Lai et al. (2020), more than 70% of healthcare providers in China were diagnosed with psychological issues, including anxiety, insomnia, and depression, during the COVID-19 pandemic.

According to Hu et al. (2020), 40 to 45 percent of frontline healthcare nurses experienced stress-related psychological issues such as anxiety and depression. Further, the report indicated that these psychological issues were associated strongly with the nurses' willingness to voluntarily care for patients diagnosed with COVID-19. Further, psychological issues are negatively correlated to resilience and self-efficacy (Hu et al., 2020). This means that if nurses have better resilience and self-efficacy, they are likely to experience fewer mental health problems. Additionally, having a stronger sense of self-efficacy impacts positively on disaster preparedness and resilience can help manage the adverse impacts of work-related stress preventing poor health outcomes among nurses. As a result, organizational resources and individual attributes should be geared towards building self-efficacy, which will improve the mental health of the nurses.

To investigate the impact of acute stress on student nurses' response to the profession and self-efficacy during the COVID-19 outbreak in China, Wang et al. (2020) evaluated the social identification of students before and after the outbreak. The research found out that despite the fears and anxiety, the nursing students still held a positive

professional identity, and they were willing to continue with their studies to become nurses even after the traumatic event. Additionally, Wang et al. (2020) found out that over 50% of the sample size participants held a strong self-efficacy sense, positively influencing their reactions to acute stress. Previous studies supported the findings of the study by Wang et al. (2020). For instance, a small survey study conducted by (Priesack & Alcock 2015) reported that general well-being and self-efficacy were essential to nursing education. Consequently, Bodys-Cupak et al. (2016) found self-efficacy to significantly affect the nursing students' reactions to stressful workplace circumstances.

The COVID-19 pandemic has brought to the attention of nursing educators the need to prepare students for similar occurrences by equipping them with sufficient knowledge about perceived susceptibility, perceived benefits, perceived severity, perceived barriers, cues to action, and behavioral intentions (self-efficacy; Tsai et al., 2021). In this context, self-efficacy will enhance personal effectiveness promoting nursing students to use the induced health beliefs and behaviors to achieve better health goals in their everyday life. With high self-efficacy, the nurses will believe that through individual efforts, they can achieve the desired health results effectively (Wang et al., 2020). In this regard, self-efficacy is critical to nursing students because they work in an environment prone to heighten psychological challenges in their attempt to cultivate healthy behaviors (Tsai et al., 2021). Thus, with self-efficacy, they can transverse the health barriers, persist, have confidence and willpower to reinforce their health beliefs, and implement practical actions such as cultivate a preventative behavior to reach the desired health goal.

Theoretical Foundation

The adoption of health regimens, particularly during the period of acclimating to new habits, is difficult. The population must adjust their behavior and habits as soon as possible, per WHO guidelines and each country's health authorization. Although a new habit has been established and health rules have been institutionalized, the transmission rate of COVID-19 still tends to be high (Yastica et al., 2020). Theories have long been used to explain and predict a person's intentions and behavior concerning their health. In health behavior research, the HBM and Theory of Planned behavior (TPB) are the most well-known theories. The HBM proposes that people's beliefs about health problems be altered to decrease or prevent sickness, whereas the theory of planned behavior is concerned with predicting behavior (Yastica et al., 2020).

The HBM and TPB are two health psychology approaches that can used to understand the fundamental reasons for negative health behavior related to controlling the spread of disease (Baudouin et al., 2020; Tarkang & Sotor, 2020). TPB is a continuation of the Theory of Reasoned Action (TRA). According to TRA, a person's purpose toward a behavior is formed by two factors, namely: attitude toward behavior and subjective norms Fischbein & Ajzen, (1975), while in TPB one more factor is added, namely perceived behavioral control (Ajzen, 1991).

The HBM is a theoretical model that describes the change process and its relationship to health behavior, resulting in determining a person's ability and motivation to improve their health status (Tarkang & Sotor, 2020). HBM and TPB are closely related, and some studies that will be reviewed will contain the application of both

theories. However, studies that have utilized the HBM as their theoretical foundation were emphasized in order to understand the association of health knowledge, self-efficacy, and preventive behaviors of nursing students towards COVID-19.

Theory of Planned Behavior

Initially established as the theory of reasoned action in 1980, the TPB is used to predict the intention of an individual to engage in a behavior at a specific time and place. TPB explains behaviors over which people possess the ability to apply self-control with the key components of this theory postulated as behavioral intent. TPB illustrates that an individual's behavior intentions are influenced by their attitude towards the likelihood that a behavior will lead to an expected outcome and is subject to individual evaluation of associated risks and benefits (Ajzen, 2020). In this regard, TPB comprises six constructs that represent an individual's control over their behaviors. These constructs are attitude, behavioral intention, subjective norms, social norms, perceived power, and perceived behavioral control.

Attitude is defined as the extent to which an individual makes a favorable or unfavorable evaluation of a specific behavior. According to Ajzen (2020), attitude towards a behavior is determined by the accessible beliefs regarding the possible consequences of a behavior, referred to as behavioral beliefs. In this regard, behavioral beliefs (an individual's subjective probability that following through with a certain behavior of interest will provide a specific experience) are assumed to lead to either a positive or negative attitude towards the specific behavior. Behavioral intention is the motivational factor influencing a particular behavior. In this regard, the stronger the

motivation, the more likely an individual will perform the behavior. According to Hadadgar et al. (2016), if a positive outcome is attributed to behavior, then it is more likely that an individual will decide to act.

Subjective norms are the perceived beliefs of whether or not people approve of certain behavior. Ajzen (2020) describes two types of subjective norms, descriptive and injunctive. Injunctive normative belief is associated with the approval or disapproval of behavior by ones' peers, including family, friends, coworkers, spouse, etc. On the other hand, descriptive normative beliefs illustrate the probability that the peers are highly likely to behave similarly. Thus, subjective norms are the peer pressures that drive an individual to perform a specific behavior. Social norms are the accepted code of conduct by a group of people or a larger cultural context.

Further, perceived power is the perceived availability of factors that may facilitate or hinder the performance of a certain behavior (Ajzen, 2020). Similarly, perceived control is an individual's view of the ease or difficulty associated with performing a task. These control factors include but are not limited to the availability of finances, time and other resources, and cooperation by other participants, among other factors (Hadadgar et al., 2016). When these constructs are combined, they result in the formation of an intention and planned behavior.

Health Belief Model

The HBM has been the most widely used conceptual framework in health behavior research to explain the change and the maintenance of health-related behaviors (Champion & Skinner, 2008). During its inception by the United States Public Health

Service social psychologists in the 1950s, HBM explained the population's failure to participate in programs to help with disease detection and prevention. Later, HBM was extended to study the population's responses to symptoms and adherence to medical directions when diagnosed with an illness.

According to Green et al. (2020), HBM described some primary concepts that are likely to predict how people will behave to prevent, screen for, and control disease infections. These concepts included susceptibility, severity, benefits, barriers, cues to action, and self-efficacy. Perceived susceptibility is the belief regarding the possibility of being infected by a certain illness condition. Perceived severity refers to the personal feelings on clinical and medical consequences of contracting an illness and outcomes if left untreated. Perceived benefits are described as the individual beliefs that a behavior change will lead to reduced threat or risks of contracting a particular disease. Further, perceived barriers are the hindrances or the potential adverse outcomes to a recommended course of action. Such negative outcomes include affordability and possible adverse side effects. Cues to action refer to the trigger actions, and self-efficacy is the individual conviction that certain behavior can be executed successfully to produce the desired outcomes (Barakat & Kasemy, 2020).

According to Sulat et al. (2018), HBM variables have been proved to be essential predictors of behavioral change in varying degrees. In this regard, perceived benefits and perceived barriers are the strongest behavior predictors, while perceived severity is the weakest predictor. However, an individual is the most crucial variable in disease prevention and health maintenance (Barakat & Kasemy, 2020). In this regard, the right or

wrong behavior in the face of an epidemic is influenced by personal habits, values, and beliefs. Therefore, perceptions of the accrued benefits of a suggested preventative behavior are essential. Thus, healthcare providers and other stakeholders should increase such perceived benefits by creating communication strategies that are customized to various groups (Barakat & Kasemy, 2020). This will emphasize how a change of behavior can lead to positive health outcomes, enhancing engagement in actions geared towards protecting health.

Jones et al. (2015) indicated that HBM would achieve the targeted behavior change if messages communicated effectively target the various HBM dimensions. Thus, individuals will be more likely to take preventive actions if they believe they are likely to contract a condition and if they believe the condition leads to profound consequences. If individuals believe that the suggested course of action will reduce the likelihood of being infected, these individuals will accept the suggested health action.

Additionally, the belief that it is possible to complete a suggested action effectively despite the barriers included informs behavior. Consequently, a study conducted by Patterson et al. (2018) on preventing Chagas disease in South Ecuador indicated that standardization of campaign messages presented to the public is crucial for disease prevention. In this regard, messages forwarded to the public should be more informative about the protective nature of the behavior change suggested and how to overcome perceived barriers, and emphasize factors facilitative of preventive behavior, such as protection of families and interest in better quality life. A different but similar study on the importance of effective communication based on HBM by Yang et al.

(2018) posited that effective communication on risks of diseases and reduction methods could improve the public's accurate perception of diseases hence endorse preventative behaviors.

Conceptual Framework

TPB and HBM have been widely utilized in a variety of countries and disciplines, including health, work safety, and others, to measure preventive behavior. TPB was used by Baudouin et al. (2020) to anticipate the intention of junior high school pupils in Thailand to prevent sexual behavior. TPB was used in a study by Siuki et al. (2019) in Iran to look at health education interventions for HIV/AIDS preventative behavior. Tarkang and Zotor (2020) reviewed the literature on the use of HBM in Ghana to prevent HIV infection. In addition to the studies stated above, Prasetyo et al. (2020) researched the implementation of the extended TPB to evaluate the effectiveness factors of COVID-19 preventative interventions in the Philippines. To strengthen the predictive capabilities of the TPB model, it was extended by including pertinent external factors. Furthermore, Shahnazi et al. (2019) investigated the use of extended HBM to measure COVID-19 preventative health practices in Iran. Extended-HBM was created by including additional elements into a framework for determining health.

Several studies have used the TPB and HBM techniques to examine public health behavior, particularly in Indonesia (Alberta et al., 2020; Yanti et al., 2020). Those studies used TPB or HBM methodologies. Furthermore, these studies did not focus on COVID-19 illness prevention in the recent past. When the COVID -19 pandemic happened in

early 2020, Yastica et al. (2020) used the HBM and TPB to investigate COVID-19 prevention practices among the population in Indonesia.

Several studies examined the use of HBM and TPB for a variety of public health behaviors, particularly for illness or risk prevention, such as HIV/AIDS prevention Tarkang and Zotor (2015); Siuki et al. (2019); Logo et al. (2018), alcohol consumption prevention Delpia et al. (2016), and involvement in injury prevention programs (Gabriel et al., 2019). Other prevention programs include COVID-19 prevention Prasetyo et al. (2020); Shahnazi et al. (2019); Yanti et al. (2020), sexual behavior prevention intention Baudouin et al. (2020), and health risk prevention behavior among tourists (Huang et al., 2020).

Various research used extended HBM and TPB from these investigations. Gabriel et al., (2019) used TPB and HBM scales to assess attitudes and perceptions of injury in a prevention participation program. The findings revealed that the use of these scales had a considerable impact on preventative behavior among program participants.

Understanding COVID-19 perceived vulnerability and severity had a substantial effect on the intention to follow, which directly affected real behavior for preventing COVID-19 in the Philippines (Prasetyo et al., 2020). Female gender, perceived barriers, perceived self-efficacy, fatalistic beliefs, perceived benefits, and residing in the city were found to have the greatest impact on preventive behavior against COVID- 19 in a recent study in Iran (Shahnazi et al., 2020). COVID-19's perceived threat is expected to significantly impact preventive behaviors and mental health because it motivates people to protect themselves against threats (Mukhtar, 2020). People engage in preventive

behaviors when they perceive a high risk and severity of disease (Bandura, 1990), which can be exacerbated by an increase in the number of confirmed cases and deaths, rumors, and strangeness. In this context, protection motivation theory proposes that public perception of disease severity is influenced by physical harm to health (Rogers, 1975). Furthermore, there are persistent rumors about the severity of the disease, which are either downplayed or exaggerated.

Further, Trifiletti et al. (2021) investigated the psychological aspects (attitudes, social norms, perceived behavioral control, intentions, and risk perception) linked to two highly recommended behaviors: frequent hand washing and social distancing (i.e., staying at home except for essential reasons). The researchers discovered that attitudes, social norms, and perceived behavioral control were linked to hand washing and social distancing through intentions. Risk perception, but not hand washing, was found to be a significant predictor of social distancing. These findings indicate the need for intervention and communication initiatives to encourage preventive actions during the Covid-19 pandemic.

Application of HBM constructs in Nursing Studies

The HBM is a popular model for assisting people in improving their health-related behaviors. According to this belief, if someone believes in something, they will carry out specific activities. As a result, HBM is a model that explains why some people who are not ill should take precautionary measures to avoid illness. The HBM is strongly recommended for reducing anxiety, fear-inducing behaviors, and changing individual beliefs based on previously received facts to improve self-efficacy (Mukhtar, 2020).

HBM's perceived benefits reflect an individual's confidence in the benefits of the methods recommended to reduce the risk of developing the disease and involvement in behavior to improve health (Narendran, 2020).

Tsai et al. (2021) used the HBM to examine the associations between COVID-19 knowledge, perceived susceptibility, and perceived severity, perceived benefits, perceived barriers, and cues to action, self-efficacy, and behavioral intention among Chinese nursing students. They discovered that all nursing students' health beliefs were associated with good healthy beliefs regarding COVID-19 knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, self-efficacy, and behavioral intention for all items on the mean scores.

The HBM was used by Kurnia et al. (2021) to investigate factors associated with COVID-19 prevention activities among Indonesian nursing students. They discovered that cues to action had a positive and significant relationship with COVID-19's preventive behavior. Cues to action had a positive and significant relationship with perceived self-efficacy and benefit. Furthermore, perceived self-efficacy had a positive relationship with perceived severity and perceived benefit, but a negative relationship with the perceived barrier. Benefit perception was inversely proportional to barrier perception. Cues to action were linked to COVID-19 preventive behavior among nursing students in this study. As a result, nursing students should practice more COVID-19 prevention strategies.

Elgzar et al. (2020) investigated the impact of a health belief model (HBM)-based educational intervention on nursing students' COVID-19 awareness and health beliefs. In

Saudi Arabia, the nursing college at Najran University used a true-experimental study design. HBM helped nursing students to become more aware of COVID-19. It also made them more aware of the benefits of certain health behaviors. It also increased their self-efficacy in overcoming perceived barriers to implementing protective and preventive measures while dealing with COVID-19.

Rosenthal and Shmeueli (2021) investigated behavioral-related factors influencing intention to acquire a COVID-19 vaccine among medical and nursing students in Israel. They used an integrated model combining the HBM and the TPB. The findings demonstrated that both models (HBM and TPB) were useful for predicting medical and nursing students' intention to receive a COVID-19 vaccine and that combining components from both models can help better guide intervention programs.

Self-efficacy is a broad concept that refers to the degree to which people believe they can deal with tasks or stressors (Bandura, 2006). It necessitates skills and a strong belief in one's own ability to exert control over motivations and behaviors. People's beliefs about their abilities directly impact what they do, how hard they push, and how long they resist taking precautionary measures (Bandura, 1990). Self-efficacy influences how people feel, think and act when engaging in risky behaviors (Wong & Yang, 2020).

Few studies have examined the relationship between COVID-19 severity, self-efficacy, and mental health. Higher severity and lower self-efficacy have been linked to poor mental health (Yldrm & G€uler, 2020). Another study discovered a link between general self-efficacy and psychological distress during the COVID-19 pandemic (Shacham et al., 2020). Existing research suggested that direct exposure to an outbreak

increases self-efficacy, which leads to participation in precautionary measures (de Zwart et al., 2009). Furthermore, studies have shown that self-efficacy is an important factor in promoting health-related intentions and behaviors (Sheeran et al., 2016).

According to Pragholapati (2020), self-efficacy has been shown to play a significant role in a variety of human endeavors. Nurses who have a high sense of self-efficacy are more likely to survive failure. When a nurse with low self-efficacy encounters difficulties, stress and anxiety may arise. Stress and anxiety can impair performance and reduce self-efficacy even further. On the other hand, people with high self-efficacy are more able and comfortable taking on threatening tasks, where they may frequently fail because they are not overcome by anxiety. They are confident in their ability to overcome adversity.

In a study, Costa (2020) investigated the validity and reliability of a ratio scale with verbal anchors in a health belief model-based questionnaire to assess risk perception in a new coronavirus infection that causes COVID-19 in Brazil. These findings showed that a health belief model-based questionnaire with a ratio scale with verbal anchors is an important tool for understanding the public's perception of coronavirus infection risks in a quantitative manner, much more detailed and informative than commonly used questionnaires and psychological metrics like Likert-type ordinal scales. This was an important study to rationalize the use of quantitative methods to investigate COVID 19 health knowledge and preventive behavior among nursing students. From the findings of these studies reviewed, it is plausible to affirm that there was the adequacy of works of

literature on key constructs of research; health knowledge of COVID-19, self-efficacy, and preventive measures.

Summary

In conclusion, this chapter consisted of a review of literature that highlighted a need to investigate the association between the COVID 19 health knowledge, self-efficacy, and preventive behavior among nursing students. Most studies reviewed on the public health knowledge towards COVID 19 revealed that there are significant disparities in knowledge, attitudes, and practices towards the pandemic among health care workers and nursing students. Few studies investigated the relationship between COVID-19 severity, self-efficacy, and preventive behavior among nursing students. Furthermore, many of these studies were done outside the United States. From the studies reviewed, it is plausible that the constructs of the Health Belief Model can be utilized to understand the health beliefs, self-efficacy, and preventive behaviors of nursing students towards COVID-19.

Chapter 3: Research Methods

In Chapter 1, the specific research problem on the lack of understanding of an association between COVID-19 health knowledge, self-efficacy, and preventive behavior among nursing students was highlighted. In Chapter 2, existing literature on COVID-19 health knowledge, self-efficacy, and preventive behavior was presented. Supporting literature was used to support the need for conducting this study. The purpose of this quantitative correlational study was to examine the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among undergraduate nursing students. The independent variables in this research included COVID-19 health knowledge and self-efficacy, while preventive behavior constituted the dependent variable. Preventive behaviors included wearing a mask, washing hands, social distancing, and staying home when sick. Students' health knowledge regarding COVID-19 illness in terms of symptoms, signs, and methods for preventing the spread of the virus is vital in educating the community to gain practice prevention and health promotion strategies to contain the spread of the disease (Saqlain et al., 2020).

Nursing students possess valuable public health knowledge to provide health education to the public with reliable information and adequate resources to prevent the spread of COVID 19 infection (Escalera-Antezana et al., 2021). The knowledge and self-efficacy of these students are also crucial to gaining self-belief to become successful health agents in fighting this deadly respiratory disease (Xiong et al., 2020). Studies to investigate if there is a statistically significant association between COVID-19 health knowledge, self-efficacy, and preventive behaviors among nursing students are essential

to aid in policy formulation regarding utilization of nursing students as front-line workers during the pandemic (Patelarou et al., 2020). Chapter 3 includes the following topics: the research design and rationale, methodologies used to investigate the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among nursing students, data collection and management, data analysis and ethical procedures, data security, and confidentiality.

Research Design and Rationale

A quantitative, correlational, cross-sectional design was employed to examine the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among nursing students in New York City. Quantitative methods are routinely used to determine the strength and direction of the respective relationship between variables (Barnham, 2015; McNabb, 2015; Rutberg & Bouikidis, 2018). As the objective of this study was to measure the statistical association between identified variables, quantitative methods were appropriate. A qualitative approach was considered but was not selected because qualitative research does not entail measuring the strength of relationships (McNabb, 2015). Instead, qualitative methodology is used to ascertain a deep understanding of a specific phenomenon, typically through participants' lived experiences (McNabb, 2015; Rutberg & Bouikidis, 2018). The qualitative researcher answers the why of a research phenomenon by collecting robust data and using integrative strategies (Barnham, 2015).

The specific research design included a correlational cross-sectional design (see Frankfort-Nachmias & Nachmias, 2008). The correlational design involves data

collection from a large sample at a single time to examine potential relationships between variables. The focus of a correlational design was to examine relationships of variables in the data collected to address the research questions. For this study, bivariate statistical analyses such as correlation analyses were conducted to determine the association between the variables of COVID-19 health knowledge, self-efficacy, and preventive behavior. A survey questionnaire using prevalidated measures was used to operationalize the constructs considered in the study.

A nonexperimental design was considered for the study because there was no manipulation of variables or interactions with research participants. There was no intervention involved in the study. Moreover, participants were not randomly assigned to groups. Participants were asked to respond to the survey questionnaire based on their current perceptions and experiences. Therefore, a quantitative, nonexperimental, cross-sectional, correlational design was deemed as most appropriate for the study.

Methodology

Population

The target population for this study included nursing students. Specifically, data were collected from nursing students from across 11 CUNY Colleges with associate and bachelor's nursing programs. CUNY is a public university with 25 campuses across the five boroughs of New York City. The inclusion criteria for the study included being 18 years old and above and a nursing student currently enrolled in the nursing program within the CUNY Colleges.

Sampling and Sampling Procedures

A convenience sampling technique was used to gather CUNY Colleges' nursing students. A convenience sampling technique is a nonprobability sampling technique wherein all prospective participants were invited to the study and those who are willing and available to participate are included as participants. G*power analysis software was used to determine sample size. G*Power (Faul et al., 2007) was created as a stand-alone power analysis application for regularly used statistical tests in social and behavioral research. G*Power 3 has better effect size calculators and graphic options, making it useful for calculating the minimum sample size for a variety of statistical tests. A medium effect size with a significance level at .05, and a power of 80%, was used to calculate the necessary sample size for a correlation analysis. Medium effect size indicates that a difference between the means of two groups that is less than .5 standard deviations will be considered negligible, even if significant (Field, 2013). Based on the sample size calculation, at least 82 participants were necessary to obtain a significant result for this study.

Procedures for Recruitment, Participation, and Data Collection

As mentioned previously in the sampling procedure, an email invitation was sent to nursing students using the CUNY central data base. Upon accessing the survey, the participants were directed to an informed consent form. In the informed consent form, the purpose of the study, activities for participants, and the risks and benefits involved in the study were stated. Participants were asked to read and agree to the informed consent

form. Only participants who have agreed to the consent form electronically were directed to the survey questionnaire.

Data Collection

Following receipt of Walden University IRB approval on March 18, 2022, # 03-18-22-0066656 and obtaining approval from CUNY as research partner on April 13, 2022, the Survey Tool was mounted in Qualtrics XM. In coordination with seven CUNY nursing programs that consented to have their nursing students participate, an email invitation was sent using the CUNY central data base. The survey was open from April 29, 2022, to May 29, 2022. Participants were asked to respond to the survey tool developed by Tsai et al. (2021) to explore nursing students' relationships between COVID-19 knowledge, health beliefs, cues to action, self-efficacy, and behavioral intention. A total of 414 participants participated in the survey. However, after data cleaning involving removal of duplicate observations and irrelevances, a total of 283 participant’s data were included in the analyses.

Instrumentation and Operationalization of Constructs

As mentioned above, the independent variables in this study were COVID-19 health knowledge and self-efficacy, and the dependent variables were preventive behaviors. The personal preventive behaviors that were used were wearing a mask, washing hands, social distancing, and staying home when sick. The confounding variables were demographics, namely age, education level, gender, and marital status. Other confounding variables collected were religious beliefs, health status, dietary status,

exercise status, smoking status, reading relevant information about COVID-19, and COVID -19 source of information.

The survey tool was developed by Tsai et al. (2021) in Taiwan to explore nursing students' relationships between COVID-19 knowledge, health beliefs, cues to action, self-efficacy, and behavioral intention. I was permitted to use this tool by the authors. All the HBM variables, namely knowledge of COVID-19, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy were measured. Tsai's (2021) survey questionnaire was comprised of 42-items. The items on the questionnaire included the following areas of inquiry: knowledge about COVID-19 (items 1–11); relationships between perceived susceptibility (items 12–16); perceived severity (items 17–22); perceived benefits (items 23–28); perceived barriers (items 29–34), self-efficacy (items 35–38); and behavioral intention (items 39–42). Items 1 to 11 on the questionnaire were answered by "true" and "false" responses, while a 5-point Likert-type scale was used for items 12 to 42. The questionnaire was tested for validity and reliability. The content validity index of the questionnaire was determined to be strong and ranged from .85 to .92. The reliability score was determined to be adequate and ranged from .71 to .96. The culmination of these results indicated that the questionnaire is reliable and valid in measuring the constructs of the study.

The purpose of the questionnaire development by Tsai et al. (2021) was to use the HBM to elucidate nursing students' relationships between knowledge about COVID-19, perceived susceptibility, perceived severity, benefits, barriers, cues to action, self-efficacy, and behavioral intention. The framework of the development of the

questionnaire included gathering data on demographic characteristics of participants such as in terms of the school system, gender, age, and marital status., Other data collected were religious beliefs, health status, diet, and reading of COVID-19 information. The result of Tsai et al (2021) study determined that nursing educators can increase COVID-19 knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy for nursing students as effective health promotion strategies. Doing so will improve their behavioral intention and prevent the spread of COVID-19 locally and globally.

Mahmu et al. (2021) also employed the HBM to examine the intention to receive the COVID-19 vaccine. A cross-sectional survey design was used to examine the predictors of accepting a COVID-19 vaccine among a sample of 1,387 people in Saudi Arabia. The survey was administered to the sample between February and March 2021 to detect the intention to obtain the vaccine when offered. Results of the study found that the intent to vaccinate was most strongly associated with the perceived benefit of the vaccine as well as perceived susceptibility to COVID-19 (Mahmu et al., 2021).

Conversely, perceived barriers as measured by the HBM showed a negative association with vaccination intent. Healthcare workers, people over the age of 50 years old, and people who received the flu vaccine, were the most likely to report positive intent to receive the vaccine. Moreover, the study found that individuals would be more likely to report positive intent to vaccinate after being provided comprehensive information about the vaccine (Mahmu et al., 2021).

Numerous studies have used survey questionnaires to assess self-efficacy in preventing infectious measures (Kurnia et al., 2021l; Mukhtar, 2020; Tsai et al., 2021). Albaqawi et al. (2020) found that Saudi student nurses had good perceptions of their COVID-19 health knowledge and its prevention. Fakhri et al. (2020) investigated Moroccan nursing students' knowledge, attitudes, and practices on COVID-19. The findings revealed that most of the nursing students who took part in the survey had a proficient level of knowledge, highly favorable attitudes, and acceptable practices when it came to COVID-19. The culmination of this research indicated that few studies have demonstrated disparities in health knowledge and preventive behavior among nursing students in other countries. The lack of studies investigating nursing students' health knowledge and preventive behavior in the United States solidifies the need for this study through quantitative methodology.

Research Questions and Hypotheses

Research Question 1 (RQ1): Is there a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students?

$H_0$1o: There is no statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students.

H_a1: There is a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students.

Research Question 2 (RQ2): Is there a statistically significant association between self-efficacy and preventive behavior towards COVID-19 among nursing students?

$H_0$2: There is no statistically significant association between self-efficacy and preventive behavior towards COVID-19 among nursing students.

H_a2: There is a statistically significant association between self-efficacy and preventive behavior towards COVID-19 among nursing students.

Data Analysis Procedures

Quantitative analysis was employed for all data analyses. The Statistical Package for the Social Sciences (SPSS, v. 23) was used to analyze data in this study. Demographic characteristics were presented using frequencies and percentages. The data on COVID-19 health knowledge, preventive behavior, and self-efficacy scores were presented using measures of central tendencies such as mean, standard deviation, and range values. To address the research questions posed in the study, correlation analysis was conducted.

Prior to conducting the correlation analysis, the normality of data was tested using Shapiro-Wilk's Normality test. If data were normally distributed, Pearson's correlation analysis would have been utilized. Otherwise, Spearman's correlation analysis would have been used to determine whether there were significant relationships between variables. To further analyze the data, a linear regression analysis was performed with the preventive behavior towards COVID-19 scores as the dependent variable and self-efficacy and COVID-19 health knowledge scores as predictor variables. The R-squared formula determined the variance in the dependent variable explained by the predictor variables. A significance level of .05 was used for the analyses. A p-value less than .05 determined a significant relationship between the predictors and the dependent variable.

Threats to Validity

Validity refers to how accurately a method measures what it is intended to measure. There are four components of validity. They are construct validity which means that the test measures the concept that it's intended to measure. Content validity which means that the test fully represents of what it aims to assess. Face validity which means that the test is suitable to its aims and lastly criterion validity which means that the test accurately measures the concrete outcome that they are designated to measure.

Validity is the ability of the questionnaires to provide true and accurate responses, and it is important to identify factors that can compromise study validity and minimize them (Creswell, 2014). Pretesting and testing of questionnaires address tool-related factors, including the appropriate placing or ordering of questions (Creswell, 2014). The purpose of the pretests, tests, and modifications is to ensure a common understanding of the questions across respondents and geographies and that responses are stable and consistent (Creswell, 2014).

There is a valid and reliable survey questionnaire/tool used by nursing faculty at National Taiwan University. It was self-designed by Tsai et al (2021) using the Health Belief Model as its foundation. The content validity index of the questionnaire on the 7-part measure including the COVID -19 knowledge, perceived severity, perceived benefits, perceived barriers, self-efficacy, and behavioral intentions was 0.85 to 0.92 as established by five faculty experts. The reliabilities of the preliminary test on the 7-part measure (n=83) were as follows: COVID-19 knowledge had a Kuder- Richardson reliability -20 of 0.38; perceived susceptibility had a Cronbach alpha of 0.71; perceived

severity had a Cronbach alpha of 0.84; perceived benefits had a Cronbach alpha of 0.94; perceived barriers had a Cronbach alpha of 0.92 self-efficacy had a Cronbach alpha of 0.96, and behavioral intention had a Cronbach alpha of 0.96. The reliabilities of the 7-part measure (n=361) were as follows: COVID-19 knowledge had a Kuder-Richardson Formula 20 reliability of 0.46; perceived susceptibility had a Cronbach alpha of 0.61; perceived severity had a Cronbach alpha of 0.84; perceived benefits had a Cronbach alpha of 0.96; perceived barriers had a Cronbach alpha of 0.91; self-efficacy had a Cronbach alpha of 0.96, and behavioral intention had a Cronbach alpha of 0.96.

Ethical Considerations

This researcher used an online survey platform to collect the data from the questionnaires. The questionnaire is anonymous, and the information requested is known only to me, and the processed information will be used collectively and anonymously. Data collected was managed in a manner where no other person can gain online access to the students' data. All electronic data will be kept in a password-protected computer and maintained for a minimum of 7 years.

This researcher is a nursing faculty at one of the CUNY community colleges. This may lead to a conflict of interest; however, after consultation with Walden IRB, I was assured that I might invite my own students to participate for as long as study-related activities are done outside of normal class hours. Nursing students' participation is voluntary, and no reward was given for participation in the study. Consultation with CUNY IRB was done and was approved on April 13, 2022, and IRB approval was obtained. on March 18, 2022, # 03-18-22-0066656.

Summary

The purpose of this quantitative correlational study was to examine the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among nursing students. The independent variables in this research included COVID-19 health behaviors and self-efficacy, while preventive behavior constituted the dependent variable. A quantitative correlational design was used to achieve the purpose of the study. A sample of nursing students from CUNY community colleges was included in the study. Participants were asked to complete an online survey using Qualtrics. Data were analyzed using frequencies and percentages, measures of central tendencies, correlation analysis, and linear regression analysis. All data analysis used a significance level of .05.

In this chapter, I presented the research methodology for this study as well as how the data was collected and analyzed. Chapter 4 will be structured around the research questions addressed in this study and will report the findings related to each question.

Chapter 4: Results

The purpose of this quantitative correlational study was to examine the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among undergraduate and associate nursing students. The independent variables in this research included COVID-19 health knowledge and self-efficacy, while preventive behavior constituted the dependent variable. Preventive behaviors included wearing a mask, washing hands, social distancing, and staying home when sick. This study was conducted because nursing students' health knowledge regarding COVID-19 illness in terms of symptoms, signs, and methods for preventing the spread of the virus is vital in educating the community on prevention and health promotion strategies to contain the spread of the disease (Saqlain et al., 2020).

The following research questions and hypotheses were addressed in the analyses for this study:

Research Question 1 (RQ1): Is there a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students?

$H_0$1o: There is no statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students.

H_a1: There is a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students.

Research Question 2 (RQ2): Is there a statistically significant association between self-efficacy and preventive behavior towards COVID-19 among nursing students?

$H_0$2: There is no statistically significant association between self-efficacy and preventive behavior towards COVID-19 among nursing students.

H_a2: There is a statistically significant association between self-efficacy and preventive behavior towards COVID-19 among nursing students.

This chapter includes a discussion of the descriptive statistics and assumptions testing conducted to analyze the data. This chapter also includes a presentation of the results of the statistical analyses conducted to address the research questions and to test the hypotheses posed in this study. This chapter ends with a summary of the key findings of the statistical analyses performed for this study.

Sample Characteristics and Demographics

The purpose of this quantitative correlational study was to examine the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among undergraduate and associate nursing students. Therefore, the target population for this study was undergraduate nursing students enrolled in the nursing programs at the CUNY. The email addresses of these students were provided by their respective colleges. Baseline demographics were collected using the first section of the survey tool. These included age, gender, marital status, and religious beliefs. In addition, the students were asked where they obtained COVID-19 related information. The independent variables in this research included COVID-19 health knowledge and self-efficacy, while preventive behavior constituted the dependent variable.

Table 1 presents the demographic characteristics of participants. The names of the colleges that participated were not included to protect privacy. Most of the participants

were enrolled in the associate's nursing program (*n* = 269, 95.1%). In terms of gender, most of the participants were females (*n* = 229, 80.9%). There was a total of 172 unmarried participants (60.8%) and 111 married participants (39.2%). Most participants were inclined to a religious belief (*n* = 204, 72.1%). For the health status of participants, 116 participants had normal health status (41%), while 88 participants had good health status (31.1%). With regards to dietary status, 199 participants ate three meals a day (70.3%). For the exercise status, 171 participants had no regular exercise (60.4%), while 111 participants did regular exercise (39.2%). Most of the participants were nonsmokers (*n* = 240, 84.8%) and were reading relevant information about COVID -19 (*n* = 220, 77.7%). Moreover, participants received COVID-19 related information from websites (*n* = 96, 33.9%), TV media (*n* = 74, 26.1%), newspaper and magazine (*n* = 30, 10.6%), and other sources.

Table 1

*Frequencies and Percentages of Demographic Characteristics (*N = *283)*

		Frequency	Percent
Type of Nursing Program	Associate degree	269	95.1
	Bachelor's degree	13	4.6
	Missing Value	1	0.4
	Total	283	100.0
Gender	Female	229	80.9
	Male	54	19.1
	Total	283	100.0
Marital Status	Married	111	39.2
	Unmarried	172	60.8
	Total	283	100.0
Religious Belief	Has religious belief	204	72.1
	No religious belief	78	27.6
	Missing Value	1	0.4
	Total	283	100.0
Health Status	Good	88	31.1
	Normal	116	41.0
	Not good	8	2.8
	Very bad	3	1.1
	Very good	67	23.7
	Missing Value	1	0.4
	Total	283	100.0
Dietary Status	Not eating a regular three-meal diet	83	29.3
	Regular three-meal diet	199	70.3
	Missing Value	1	0.4
	Total	283	100.0
Exercise Status	No regular exercise	171	60.4
	Regular exercise	111	39.2
	Missing Value	1	0.4
	Total	283	100.0
Smoking	Not smoking	240	84.8
	Smoking	13	4.6
	Smoking in the past, but not now	30	10.6
	Total	283	100.0
Reading relevant information about COVID	No	62	21.9
	Yes	220	77.7
	Missing Value	1	0.4
	Total	283	100.0
COVID 19 information sources	From school	11	3.9
	Medical staff	27	9.5
	Newspaper and magazine	30	10.6
	Other	23	8.1
	Posts	16	5.7
	Public vehicles	1	0.4
	Radio stations	2	0.7
	TV media	74	26.1
	Website	96	33.9
	Missing Value	3	1.1
	Total	283	100.0

Data Analysis

Data analysis was performed using the independent and dependent variables described in the four hypotheses being investigated in this study. Descriptive statistics were summarized and organized as the first step of statistical analyses. Table 2 presents the descriptive statistics of study variables based on items 1-11 of the Tsai Survey Tool. The mean score was calculated as the average of participants' responses on each scale. The COVID-19 knowledge had a mean of 7.96 (*SD* = 1.21) with a range of 4 to 11. The perceived susceptibility of participants had a mean of 18.93 (*SD* = 3.12) with a range of 8 to 25. The perceived severity of participants had a mean of 20.44 (*SD* = 3.16) with a range of 10 to 30. The perceived benefits of participants had a mean of 20.81 *(SD* = 3.66) with a range of 6 to 30. The perceived barriers of participants had a mean of 13.94 (*SD* = 4.22) with a range of 6 to 27. The self-efficacy and behavioral intention of participants were also measured in the survey. The self-efficacy of participants had a mean of 17.72 (*SD* = 2.64) with a range of 6 to 20, while the behavioral intention score had a mean of 17.46 (*SD* = 2.60).

Table 2

Descriptive Statistics of Study Variables Based on Items 1-11 of the Tsai Survey Tool

Study Variables	Items	Minimum	Maximum	Mean	*SD*
COVID 19 Knowledge	11	4.00	11.00	7.96	1.21
Perceived Susceptibility	5	8.00	25.00	18.93	3.12
Perceived Severity	6	10.00	30.00	20.44	3.16
Perceived Benefits	6	6.00	30.00	20.81	3.66
Perceived Barriers	6	6.00	27.00	13.94	4.22
Self-efficacy	4	6.00	20.00	17.72	2.64
Behavioral Intention	4	8.00	20.00	17.46	2.60

Note. $N = 283$.

Prior to conducting the statistical analyses to test the hypotheses, Shapiro-Wilk's test of normality was conducted to determine whether the data followed a normal distribution. The results of the Shapiro-Wilk's test are presented in Table 3. As observed, all the variables were not normally distributed. Therefore, the nonparametric counterpart of Pearson's correlation analysis called Spearman's correlation analysis was conducted.

Table 3

Shapiro-Wilk's Normality Test of Study Variables

	Shapiro-Wilk		
	Statistic	*df*	Sig.
COVID 19 Knowledge	0.940	283	0.000
Perceived Susceptibility	0.971	283	0.000
Perceived Severity	0.982	283	0.001
Perceived Benefits	0.980	283	0.001
Perceived Barriers	0.977	283	0.000
Self-efficacy	0.803	283	0.000
Behavioral Intention	0.854	283	0.000

Table 4 presents the results of the Spearman's correlation analysis. The variables considered in the analyses were COVID-19 knowledge and self-efficacy as independent variables and behavioral intention as the dependent variable. COVID-19 knowledge was positively correlated with behavioral intention (Spearman's Rho = .127, $p = .033$), as was self-efficacy (Spearman's Rho = .499, $p < .01$). The results of the correlation analysis indicated that there was a significant positive relationship among self-efficacy, COVID-19 knowledge, and behavioral intention of participants. Therefore, it is plausible to conclude that there is a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students. Also, there is a statistically

significant association between self-efficacy and preventive behavior among nursing students.

Table 4

Spearman's Correlation Analysis Results

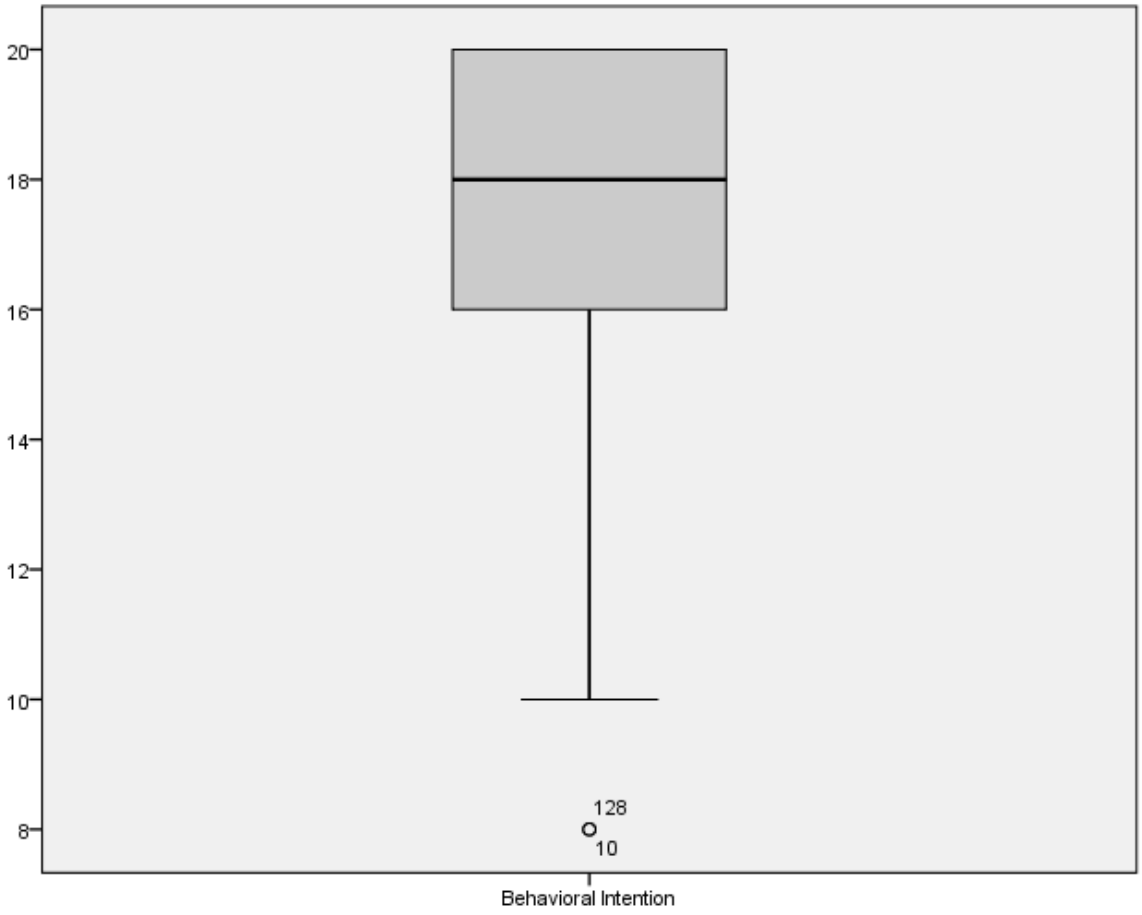
			COVID 19 Knowledge	Self-efficacy	Behavioral Intention
Spearman's rho	COVID- 19 Knowledge	Correlation Coefficient	1.000	0.045	.127*
		Sig. (2-tailed)		0.456	0.033
		N	283	283	283
	Self-efficacy	Correlation Coefficient		1.000	.499**
		Sig. (2-tailed)			0.000
		N		283	283
	Behavioral Intention	Correlation Coefficient			1.000
		Sig. (2-tailed)			
		N			283

Note. * Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

A linear regression analysis was conducted to determine whether predictor variables COVID-19 knowledge and self-efficacy predict the preventive behavior of participants. The assumptions of a linear regression analysis were also tested prior to conducting the analysis. A boxplot was used to determine whether there were significant outliers in the behavioral intention variable. From the boxplot presented in Figure 1, it is evident that points 10 and 128 are outliers. To handle the outlier, these points were changed to a value of 10 which was considered to be more representative of the data set (Creswell, 2014).

Figure 1

Boxplot of Behavioral Intention



A linear regression analysis also considers the assumption of multicollinearity. Multicollinearity occurs when there is a high correlation between two or more independent variables. The variance inflation factor (VIF) was used to determine whether the assumption of multicollinearity was met. A VIF of 1.003 indicated that the predictors were not highly correlated. Therefore, the assumption of multicollinearity was met.

Table 5

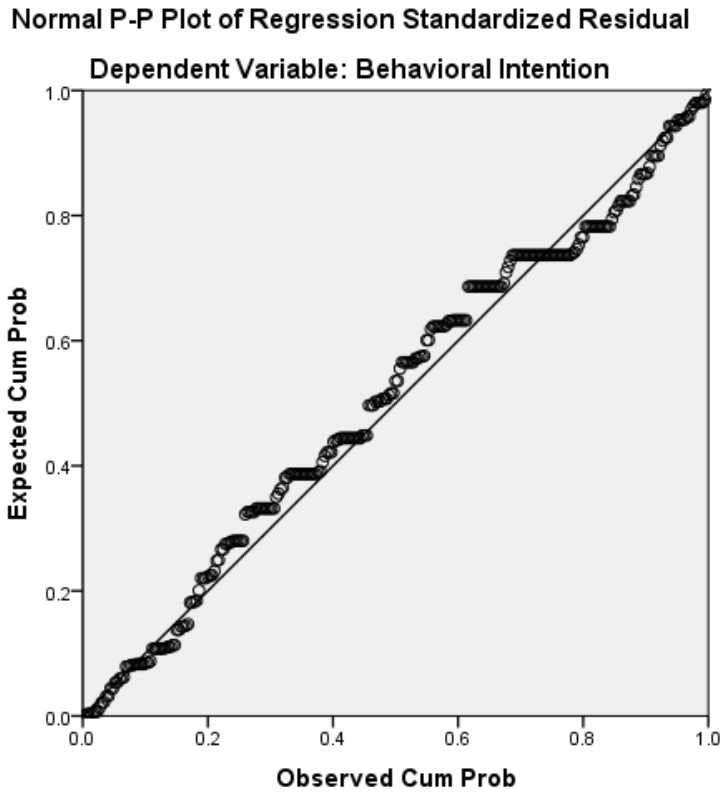
Collinearity Statistics

	Collinearity Statistics	
	Tolerance	VIF
COVID 19 Knowledge	0.997	1.003
Self-efficacy	0.997	1.003

Figure 2 presents the normal P-P plot of residuals to determine whether the residuals were normally distributed. The P-P plot indicated that the residuals were normally distributed as the points lied along the line. Therefore, the assumption of normality of residuals was met.

Figure 2

Normal P-P Plot of Residuals



After testing the assumptions, the linear regression analysis was conducted considering COVID-19 knowledge and self-efficacy as predictors and behavioral intention as the dependent variable. The results of the linear regression analysis indicated that both COVID-19 knowledge (B = .315, p = .003) and self-efficacy (B = .508, p < .01) were significant predictors of behavioral intention. An increase of one unit in COVID-19 knowledge resulted in an increase of .315 in behavioral intention score, while one unit of increase in self-efficacy resulted in an increase of .508 in behavioral intention score. Thus, self-efficacy had a stronger impact on the behavioral intention score than COVID-19 knowledge. The model was determined to be significant (F (2,282) = 62.008, p< .01) in predicting behavioral intention. The predictors also explained 30.2% of the variance in the behavioral intention variable. Based on the results of the linear regression analysis, there was sufficient evidence to reject the null hypotheses which stated that there was no statistically significant association between COVID-19 health knowledge and preventive behavior and between self-efficacy and preventive behavior among nursing students.

Table 6

Linear Regression Analysis of Behavioral Intention

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	*t*	Sig.
1	(Constant)	5.968	1.169		5.104	0.000
	COVID 19 Knowledge	0.315	0.105	0.149	2.987	0.003
	Self-efficacy	0.508	0.048	0.525	10.538	0.000

Note. Dependent Variable: Behavioral Intention; F (2,282) = 62.008, p< .01, Adj. R-squared = .302.

Findings

Based on the results of the data analysis and hypothesis testing, the following were found for each research questions in this study:

RQ1 asked: Is there a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students? Based on the Spearman's correlation analysis, the variables considered in the analyses were COVID-19 knowledge as independent variable and behavioral intention as dependent variable. COVID-19 knowledge was positively correlated with behavioral intention (Spearman's Rho = .127, p = .033).

RQ2 asked: Is there a statistically significant association between self-efficacy and preventive behavior among nursing students? Based on the Spearman's correlation analysis, the variables considered in the analyses were self-efficacy as independent variable and behavioral intention as dependent variable. Self-efficacy was positively correlated with behavioral intention (Spearman's Rho = .499, $p < .01$).

Based on the results of the correlation analyses, higher COVID-19 knowledge and self-efficacy resulted in increased behavioral intention of participants. The linear regression analysis reconfirmed the relationship between the predictor variables COVID-19 knowledge and self-efficacy and the dependent variable preventive behavior.

Therefore, there was a statistically significant association between COVID-19 health knowledge and preventive behavior and between self-efficacy and preventive behavior among nursing students.

Summary

The purpose of this quantitative correlational study was to examine the association between COVID-19 health knowledge, self-efficacy, and preventive behavior among undergraduate and associate nursing students. Spearman's correlation analyses were conducted to determine whether there was an association between COVID-19 health knowledge, self-efficacy, and preventive behavior variables. The results of the correlation analyses determined that there was a significant positive relationship between COVID-19 knowledge and preventive behavior as measured by behavioral intention as well as between self-efficacy and preventive behavior as measured by behavioral intention. The linear regression analysis reconfirmed the relationship between the predictor variables COVID-19 knowledge and self-efficacy and the dependent variable preventive behavior.

Chapter 5 discusses the correlation between the theoretical and conceptual framework and research underpinnings from the literature review. Chapter 5 also includes a discussion of how the results compare with existing literature. The implications of the positive relationship between COVID-19 knowledge and preventive behavior and self-efficacy are also discussed in detail. The findings obtained from this study expanded the body of knowledge regarding addressing COVID-19 among nursing students. Moreover, limitations of the study and implications of the results are applied to make recommendations for positive social change and research going forward.

Chapter 5: Discussion, Conclusions, and Recommendation

The ongoing COVID-19 pandemic continues to pose serious challenges to both healthcare institutions and society at large. The ubiquitous nature of the pandemic has given rise to serious questions about the nature of healthcare belief, and the effects of those beliefs on health behaviors, especially among healthcare workers. This study examined the relationship between COVID-19 health knowledge, self-efficacy, and preventive behavior among undergraduate and associate nursing students. The research set out to answer the following questions:

RQ1: Is there a statistically significant association between COVID-19 health knowledge and preventive behavior among nursing students?

RQ2: Is there a statistically significant association between self-efficacy and preventive behavior among nursing students?

The study involved a survey taken by 414 participants from 11 CUNY colleges, and a series of statistical analyses including a Shapiro-Wilk test, Spearman's correlation analysis, and linear regression were performed on the data, which after cleaning included only 283 suitable participant surveys. Using COVID-19 knowledge as an independent variable and behavioral intention as the dependent variable, the study found that COVID-19 knowledge is positively correlated with behavioral intention. Furthermore, based on the Spearman's correlation analysis, self-efficacy was positively correlated with behavioral intention. Both findings were confirmed by linear regression.

The rest of this chapter is organized into five parts. The first section includes an interpretation of these results while considering prior research along with the conceptual

and theoretical frameworks. The second section highlights limitations of the study. Recommendations for future research are presented in the third section, and the social change implications are outlined in the fourth section. The concluding section provides closing comments regarding this study.

Interpretation of Findings

The HBM asserts that beliefs about the efficacy of a given action affect the likelihood that an individual will or will not perform that action (Azjen, 2020). For the purposes of this study, the HBM was used to evaluate the connection between healthcare behaviors, behavioral intent, COVID-19 knowledge, and self-efficacy. If individuals are convinced that a given action will be effective at achieving a certain aim, they are more likely to employ the behavior to this end. As a model, the HBM is effective in explaining the behavior of nurses. This study has shown a strong correlation between belief about COVID-19 and behavioral intent. Nursing students demonstrated that the more they were informed about best practices in combating infection and spread of the virus, the more likely that they use this knowledge in their nursing practice. The findings of the current study have indicated that the more nursing students were knowledgeable about COVID-19, the more likely they were to employ the knowledge in their daily lives and, critically, believe these measures to be effective.

This study has supported the findings of previous researchers on the connection between health knowledge and health behavior. The assertion that there is a significant connection between COVID-19 beliefs and healthy behaviors has been made by previous researchers. For example, more educated and highly informed individuals have been

shown to have a more positive view of preventive measures (Roy et al., 2020; Zhang et al., 2020). However, these studies were conducted on the general population, while this study focused on nursing students. Nursing students have been taught infection control practices, are exposed to the latest health research and best practices and observe the ill-effects of disease and illness on a regular basis (Glum et al., 2020). These factors play a significant role in the nursing community compared to the general population. As future nurses, these nursing students have both a financial as well as a societal obligation to employ best practices inside and outside the workplace. This study has shown that nursing students have taken this responsibility seriously, believing in and employing preventive behaviors at a high rate.

Although nursing students are better informed than their nonmedically trained neighbors, there are weaknesses in the way they gain professional information. Nursing students have access to a wide variety of professional information and have the technical skills to understand and interpret it (Al-Rabiah, 2020). Despite these advantages, health authorities such as the CDC produce a huge volume of information that is overwhelming for readers (Zorocostas, 2020). Thus, many nurses turn to popular sources such as TV, radio, and social media (Tork & Mersal, 2018; Clements, 2020), and the current study showed that the nursing students got their information from a wide variety of sources, including websites from which 33.9% of the respondents reported getting their information. Websites range in quality of information significantly.

Risk perceptions have been previously shown to play a role in taking preventive measures. Predictably, the higher risk assessment of a given health threat, the higher the

implementation of preventive measures (Corrin et al., 2017; Roy et al., 2020). The public discourse around the COVID-19 pandemic has heightened the perceived threat profile of the disease and prompted nurses to undergo interventions to adopt best practices regarding limiting the spread of infection.

Based on HBM, knowledge and self-efficacy were not completely determinant in predicting preventive behavior, suggesting other variables. These missing variables would provide a more complete picture and enable researchers to predict public health behaviors more accurately. The answer may lie in previous studies, which have suggested that questions of identity, political party, race, and socioeconomic status play a role in determining beliefs about the COVID-19 pandemic (Clements, 2020). Indeed, the pandemic has been extensively politicized and public health messages have been marred by a mixture of misinformation, stemming from social media (Geldsetzer, 2020). Given the confused information environment, nursing students displayed significant resilience to the politicized discourse, employing best practices at work and in their daily lives.

Limitations

There were two main limitations to this research. The first had to do with the sample collected. Because of travel restrictions during the pandemic, data collection was done through online survey only. The respondents were collected from the City University of New York only. While the sample size was adequate, the scope of the sample could raise some issues with the validity. New York has its own social and political context, and the statewide decisions made by leaders as well as social context could affect the perspectives of the students.

The second limitation is that this study relied on self-reporting. The subjects reported their health beliefs as well as actions. These reports are highly contingent on the subjects themselves, whether they are truthful or have an accurate perception of their own actions. Subjects could falsely report or have a skewed perspective of their own actions, introducing a level of uncertainty into the data. Furthermore, the COVID-19 pandemic and especially the public health measures taken by the state to combat the spread of the virus have been politically controversial among certain subsets of the population. The study participants may have felt pressured to answer in certain ways to avoid the scrutiny of their peers.

Recommendations

The current study prompts several new directions of research regarding healthcare beliefs, healthcare measures, and COVID-19. This study has established the observations about the effects of healthcare beliefs and self-efficacy on preventive measures as held by nursing students during the pandemic. However, given the unique characteristics of the ongoing health crisis there are more insights to be gained from investigating further.

A study into the downstream effects of media consumption on health beliefs would illuminate further how individuals in general or healthcare workers specifically develop their beliefs. The current study has shown that healthcare workers have varied information sources, ranging from academic sources, public authorities, online media, and television. Do these various sources of information demonstrably affect their beliefs (and, by extension, actions) around healthcare?

Another area of interest is whether there are differential effects between healthcare professionals and the general population with regards to the correlation of preventive measures and healthcare beliefs. The current study established a strong connection between healthcare beliefs, self-efficacy, and preventive measures. Other studies have shown similar connections between the variables among different populations. However, there is no research comparing the differences between the two populations. A comparative study could illuminate the differences between healthcare beliefs and actions comparing healthcare workers to others.

Finally, this research focused on the healthcare beliefs and behaviors specifically surrounding COVID-19. As a novel virus, little was known about its characteristics in early 2020, and some of its long-term effects remain unclear. Given this changing information space, COVID-19 best practices are not like well-established protocols surrounding more well-known illnesses. COVID-19 has also been highly politicized, unlike, say, the common cold. Therefore, the effects of beliefs on practice may be different for this pandemic compared to other diseases.

Implications

The current study has several implications for healthcare policy. First, it shows that nursing students' beliefs have a significant impact on their health-related actions and preventive measures. It has also shown that nursing students consume information from a wide variety of sources, some of which are less reliable than others. A more focused and cohesive information-sharing system which prioritizes best practices could have a significant impact on the behavior of nursing students. Nurses are also a crucial point of

contact with the general population and often operate as a source of information for those seeking care; improving the information environment of nurses would also impact the information environment of the public.

Conclusion

The COVID-19 pandemic has exposed weaknesses in the healthcare system, public trust, and our information environment. The need to disperse accurate, actionable, and timely information about effective preventive measures to healthcare professionals and the general population has proven difficult for national institutions. Nurses play a critical role in this process. On the one hand, they function as a point of contact between the healthcare system and the population at large. While their primary function is not as educators, they are nonetheless often called upon to communicate best practices to the public. Acting as an information conduit is predicated on having access to and understanding up-to-date information about the pandemic.

More importantly, nurses use this information in their work lives. Their beliefs about the pandemic have a direct and demonstrative effect on their actions both within and outside the hospital environment. Their behavioral intent is to maximize their efficacy in preventing infection and spread of the virus. The information dissemination environment is critical in increasing the public knowledge in dealing with any future pandemic.

The major health care challenges brought about by the COVID-19 pandemic require a knowledgeable healthcare workforce with the passion and skills to advocate for public policies that will improve health and health equity. The significant finding of the

current study that COVID-19 health knowledge and self -efficacy are associated with preventive behavior has opened an opportunity for continued exploration and future research. Nurse educators have responsibility to increase the nursing students' self-efficacy and may foster independence and confidence. If students believe in their capabilities, they will use their maximal efforts in different situations. Students should be encouraged to act independently and under indirect supervision of clinical educators when they reached to a certain level of competency.

Implementing positive social change in nursing education is the first step in preparing the nurses as front-line workers during public health crises such as the COVID-19 pandemic. This means updating the nursing curriculum and processes while utilizing new technologies to ensure nursing students and faculty have the skills to flourish in a changing world. As individuals, nurses directly influence the health and wellbeing of patients every day. Through frequent contact, nurses are best placed to encourage lifestyle changes in communities and offer education on healthy living, particularly to the most vulnerable in society.

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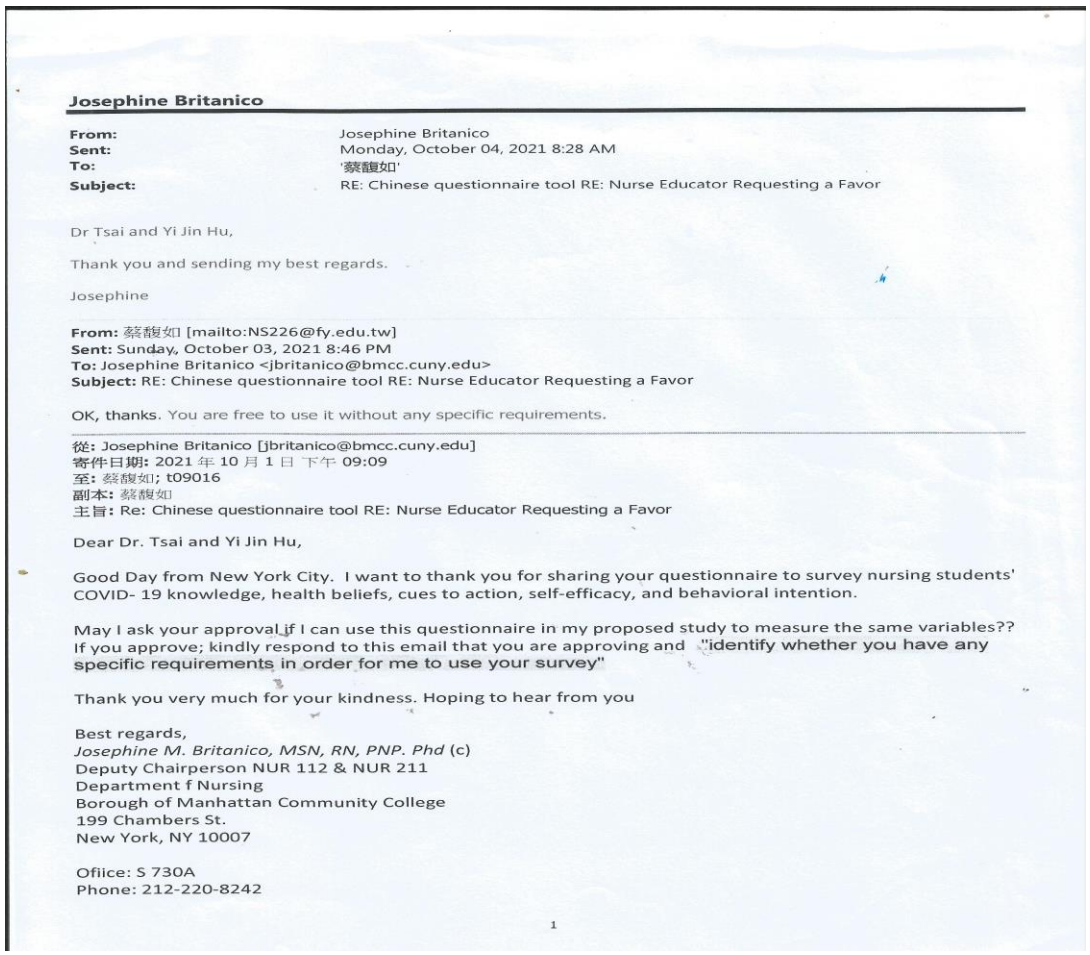
Appendix A

Approval Letter



Josephine Britanico

From: Josephine Britanico
Sent: Monday, October 04, 2021 8:28 AM
To: '蔡馥如'
Subject: RE: Chinese questionnaire tool RE: Nurse Educator Requesting a Favor

Dr Tsai and Yi Jin Hu,

Thank you and sending my best regards.

Josephine

From: 蔡馥如 [mailto:NS226@fy.edu.tw]
Sent: Sunday, October 03, 2021 8:46 PM
To: Josephine Britanico <jbritanico@bmcc.cuny.edu>
Subject: RE: Chinese questionnaire tool RE: Nurse Educator Requesting a Favor

OK, thanks. You are free to use it without any specific requirements.

從: Josephine Britanico [jbritanico@bmcc.cuny.edu]
寄件日期: 2021 年 10 月 1 日 下午 09:09
至: 蔡馥如; t09016
副本: 蔡馥如
主旨: Re: Chinese questionnaire tool RE: Nurse Educator Requesting a Favor

Dear Dr. Tsai and Yi Jin Hu,

Good Day from New York City. I want to thank you for sharing your questionnaire to survey nursing students' COVID- 19 knowledge, health beliefs, cues to action, self-efficacy, and behavioral intention.

May I ask your approval if I can use this questionnaire in my proposed study to measure the same variables?? If you approve; kindly respond to this email that you are approving and "identify whether you have any specific requirements in order for me to use your survey"

Thank you very much for your kindness. Hoping to hear from you

Best regards,
Josephine M. Britanico, MSN, RN, PNP. Phd (c)
Deputy Chairperson NUR 112 & NUR 211
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Borough of Manhattan Community College
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Appendix B

Survey Instrument

Health Belief Model-Covid-19's Questionnaire on Health Belief, Self-efficacy, and Preventive Behavior

Demographics

A. Type of Nursing Program: 1. Bachelor's degree 3. Associate 's degree
B. Gender: 1. male 2. female 3. Other
C. Age-
D. Marital Status ： 1. Unmarried 2. married
E. Religion ：1. no religious belief 2. Has religious belief
F. Health status: 1. Very bad 2.not good 3. normal 4. Good 5. Very good
G. Dietary status: 1. Not eating regular three-meal diet 2. Regular three-meal diet
H. Exercise status: 1. No regular exercise 2. Regular exercise
I. Smoking: 1. Not smoking 2. Smoking 3. Smoking in the past, but not now
J. Reading relevant information about COVID-19: 1. No 2. Yes
K. COVID-19's related sources :1.TV media 2. Radio stations 3. Newspaper and magazine 4. Website 5. medical staff 6. Posts 7. from school 8. Public vehicles 9. Other

Please select your response to the following questions:

Number		TRUE	FALSE
1	The Pathogen of COVID-19 is coronavirus		
2.	Covid-19 is typical pneumonia		
3.	COVID-19 pandemic is severe, even if the test is negative, the person still needs to stay home quarantine for 14 days after returning from other country.		
4.	Only patients with chronic diseases can get Covid-19		
5	Medical staff is high risk for contacting Covid-19		
6	People need to wear N95 masks during the Covid-19 pandemic		
7.	Covid-19 hot line in NYC is 311		
8.	During the Covid-19 pandemic, it is safe to shake hands and hug each other		

9	Bleaching water dilution method for prevention of Covid-19 is 100cc bleach water: 1 liter water		
10	During Covid-19 pandemic, all events of more than 500 people will be restricted		
11	During the pandemic, if the person is required to stay home quarantine, but does not comply can get maximum monetary fine and jail time		

		Strongly disagree	disagree	neutral	agree	Strongly agree
12	At present, Covid-19 is a pandemic, I think I have a high chance of contracting it					
13	During Covid-19 pandemic, avoiding public places can reduce the possibility of contracting Covid-19					
14.	During Covid-19 pandemic, not taking public transportations can reduce the possibility of contracting Covid-19					
15	During Covid-19 pandemic, not visiting a hospital can reduce the possibility of contracting Covid-19					
16	If I have a classmate who got Covid-19, I think I may also get Covid-19					
17	I think the Covid-19 pandemic is severe, I have reason to be scared					
18	I think it is terrible to be isolated in a negative pressure room if I get infected of Covid-19					
19	I think the daily activities will be restricted if people are infected from Covid-19					

20	I think being infected of Covid-19 means that death is a possibility					
21	I think being infected from Covid-19 will cause troubles for family and friends					
22	I think being infected from Covid-19 will be viewed differently by others					
23	Measuring body temperature every day, is a safe action to prevent Covid-19					
24	Washing hands diligently every day is effective way to prevent Covid-19					
25	Wearing a mask every day is beneficial to avoid being infected from Covid-19					
26	Eating more vegetables and fruits every day is beneficial to prevent being infected of Covid-19					
27	Drinking hot water is beneficial to prevent and treatment of Covid-19					
28	Regular exercise every day, is beneficial for prevention and treatment of Covid-19					
29	I must measure my temperature every day, which will cause inconvenience in my life					
30	I wash my hands repeatedly, which will cause inconvenience in my life					
31	I need to wear a mask, when necessary, which will					

	cause inconvenience to my life					
32	I must avoid going out in large activity events, which will cause inconvenience to my life					
33	I must keep 1 meter from people, which will cause inconvenience to my life					
34	I must avoid eating out, which will cause inconvenience to my life					
35	I can really master the principle of washing my hands					
36	I can really master the steps of washing my hands					
37	I know when to wash my hands					
38	I know how to dry my hands after washing my hands					
39	I am willing to cooperate to measure my body temperature and prevent Covid-19 pandemic					
40	I am willing to cooperate washing my hand frequently and prevent Covid-19 pandemic					
41	I am willing to cooperate to wear masks to prevent Covid-19 epidemic					
42	I am willing to cooperate with home isolation for 14 days to prevent Covid-19 pandemic					