The Relationship between COVID-19 Anxiety and Student Nurses' Perceived Health, Sleep Quality, and Psychological Well-being

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ABSTRACT

Objectives. To determine the level of COVID-19 anxiety among Filipino nursing students and its predictors, and its associations with their perceived health, sleep quality, and psychological wellbeing

Methods. The study employed a cross-sectional design that administered a survey among selected nursing students in the Central Philippines through purposive sampling. We used self-report questionnaires, such as the COVID-19 Anxiety Scale, the Perceived Stress Scale, and the Psychological Well-Being Scale, and one-item measures for perceived health and quality of sleep.

Results. Out of 261 participants, more than half reported dysfunctional anxiety symptoms. Multiple regression analyses revealed that being of male sex and in the fourth-year level in the Nursing program was associated with lower COVID-19 anxiety. Further, nursing students who rated high in perceived health, sleep quality, and psychological wellbeing were more likely to report lower COVID-19 anxiety levels.

Conclusion. Nursing students' levels of COVID-19 anxiety indicate that the COVID-19 pandemic has psychologically affected this vulnerable group. COVID-19 anxiety can lead to poor sleep quality and psychological wellbeing. Nursing education authorities must formulate measures and strategies to protect the psychological welfare of nursing students against COVID-19.

Keywords: nursing students, COVID-19, anxiety, sleep quality, psychological wellbeing, stress

INTRODUCTION

After emerging in Wuhan, China, sometime in December 2019, the COVID-19 virus spread rapidly and exponentially across the globe. The World Health Organization (WHO) declared the outbreak an international public health emergency on January 30, 2020.[1] SARS-CoV-2, the causative agent of this disease, primarily targets the respiratory system and results in acute respiratory infection. Infected individuals with comorbidities face a higher risk of severe infection and even death. In addition to physical problems, the COVID-19 pandemic has caused significant mental and social consequences. Because of its unpredictable duration, unknown cure, novelty, and restrictive effects on various activities of daily living, the pandemic produced varying levels of stress and other adverse reactions among people across the world.[2]

Several studies have investigated the psychological impact of the COVID-19 pandemic on the general

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population and in specific groups across the globe. Studies in the Italian population revealed the prevalence of poor sleep quality, psychological distress, and signs and symptoms of anxiety and depression.[3,4] Psychological problems were more apparent among individuals who had been exposed to COVID-19 and among those with friends or acquaintances who had been infected. A study in the US showed significant levels of mental health problems during the pandemic among those with pre-existing and suspected mental health conditions, such as anxiety, depression, and post-traumatic stress disorder.[5] In South Korea, the public's psychological responses, including perceived susceptibility to COVID-19, were low, but the perceived severity was high. These psychological responses further implicate behavioral responses that impact the public's preparedness in health emergencies.[6] Individuals in Nepal reported stress from COVID-19, and the results there indicated that stress levels were likely to increase as the period of lockdown continued.[7] In China, where this infectious disease originated, people reported psychological problems, such as anxiety, depression, impaired sleep patterns, stress,[2,8] and even somatization symptoms.[9] The COVID-19 pandemic has also impacted people's mental health in other parts of the world, including the United Kingdom,[10] Spain,[11] Germany,[12] and Iran,[13] where study participants exhibited symptoms of anxiety or depression.

Nursing students face an even greater risk than the general population of experiencing psychological consequences related to the COVID-19 pandemic. Even during normal times, nursing education has—because of heavy academic workloads, hectic schedules, rigorous examinations, and study pressures—been associated with mental health problems, such as stress, anxiety, and depression.[14] In a recent study in Israel, nursing students, especially female nursing students, reported high anxiety levels during the COVID-19 pandemic. The study further demonstrated the association of mental disengagements, such as alcohol use, overeating, and sedative use, with higher levels of anxiety.[15] Nursing students in Spain also reported reduced sleep quality during the COVID-19 lockdown.[16] Fear of becoming infected and fear of exposure to clinical settings even after the pandemic, and anxiety related to social distancing measures and stringent public health measures were prevalent in a qualitative study of student nurses in Croatia.[17] In addition, several recent studies also highlighted university students' COVID-19-related mental health burdens. In France, students reported psychological distress—emphasized by increasing stress and anxiety levels—since the beginning of the lockdown period.[18] The lockdown measures in the United Kingdom likewise altered students' psychological well-being and physical activities by increasing perceived stress and sedentary behavior.[19] Depression has been prevalent among college students in China, where female students develop higher depressive symptoms than males.[20] Studies have attributed the negative emotions many college students experienced during the COVID-19 pandemic to various factors, such as physical separation from friends and partners, difficulty accessing counseling services, the sudden end of the semester, the abrupt transition to remote learning, disturbances in academic routines, the termination of clinical internships, the threat of delayed graduation, and the threat of infection.[21]

In the Philippines, the initial rise of COVID-19 cases occurred in early March, prompting the nationwide, mandatory suspension of classes and closures of public and private universities, colleges, schools, and other learning institutions.[22] The government released various memoranda, guidelines, and advisories to prevent and control the further spread of infection. These directives mandated strict social distancing, prohibited mass gatherings, imposed different levels of community quarantines according to the degree of spread in each area, restricted non-essential movement, enforced curfew hours and travel restrictions, and necessitated flexible work arrangements and enhanced procedures for the management of the COVID-19 situation. These abrupt modifications of routines produced significant mental health consequences among students. In fact, the literature has identified students as among the most vulnerable populations during infectious disease outbreaks. However, no studies have examined COVID-19 anxiety, sleep quality, stress, health, and psychological well-being among Filipino nursing students. Recent studies in the Philippines have been conducted in investigating mental health issues during the COVID-19 pandemic but involved the general population,[23] adult individuals,[24] senior high school students,[25] professional nurses,[26] patients with rheumatoid arthritis or systemic lupus erythematosus,[27] and children.[28] Thus, this study aims to provide baseline data and help nursing educators, nursing schools, and nursing education regulators devise activities, procedures, and policies to promote students' psychological well-being and address anxiety, stress, sleep disturbances, and other manifestations of psychological distress during the COVID-19 pandemic and future pandemics.

This study sought to determine the level of COVID-19 anxiety among Filipino nursing students and the predictors of COVID-19 anxiety and the associations between that anxiety and student nurses' perceived health, sleep quality, and psychological well-being. The researchers tested the following hypotheses:

1. Nursing students' demographic factors can serve as predictors of COVID-19 anxiety.
2. COVID-19 anxiety is a significant predictor of student nurses' psychological outcomes.

MATERIALS AND METHODS

Before the study, the researchers secured ethical clearance from the local ethics board in the Central Philippines (RES-CON-01). Each school's administrator granted approval via a communication letter. A cover letter and written consent were included on the front page of the online survey sent to the participants.

Study Design and Participants

This study utilized a cross-sectional study design. A survey was conducted online via Google Forms. Twelve nursing schools in the Central Philippines were selected for this study. The sample size determination was made using the GPower application at 0.07 anticipated effect size, statistical power of 0.08, and a probability level of 0.05. We identified 250 as the required minimum number of participants. —identified through purposive sampling. Participants included Bachelor of Science in Nursing (BSN) students aged 18 years old and above within the first-year to fourth-year levels in the Central Philippines. The inclusion criteria required that students be enrolled in the BSN program of a nursing school/college recognized by the Commission on Higher Education (CHED), the Philippine government's regulatory body for higher education, during the period of data collection from May to July 2020.

Instruments

A six-part self-report questionnaire was used to gather the data. The first part employed a checklist to determine the participants' demographic information, including age, gender, year level, type and location of nursing school, readiness and willingness to care for COVID-19 patients, and attendance at COVID-19 training.

The second part assessed the participants' COVID-19 anxiety using Lee's COVID-19 Anxiety Scale (CAS).[23] The CAS is a five-item questionnaire to determine participants' dysfunctional anxiety related to the COVID-19 crisis. Respondents rated each item on a five-point Likert scale from 0 (Not at all) to 4 (Nearly every day). A total CAS score of ≥ 9 signifies possible dysfunctional anxiety related to the pandemic. This tool has been found highly reliable as a cluster ($\alpha = 0.93$).[29] The composite reliability of this tool to the current study is also good ($\alpha = 0.88$).

The third part measured the participants' stress levels using a tool developed by House and Rizzo.[30] Participants were asked to respond by signifying—on a five-point scale from 1 (Strongly disagree) to 5 (Strongly agree)—the degree to which each statement applied to them. Recent studies have revealed the tool's good internal consistency reliability using Cronbach's alpha ($\alpha = 0.87$).[31]

The fourth part was a single item that measured participants' perceived health during the COVID-19 pandemic via the following question: "Taking everything into consideration, how would you rate your health, in general, these days?" Response options ranged from 1 (Poor) to 5 (Excellent). A single-item scale makes the measure more holistic and increases its validity. Because the measure provides a Likert scale response, its analysis is statistically robust at the item level.[32,33]

The fifth part was a single item developed by Snyder et al.[34] to assess participants' sleep quality: "During the past seven days, how would you rate your sleep quality overall?" The response options, which ranged from 0 (Terrible) to 10 (Excellent), were interpreted via five categories: 0 (Terrible), 1–3 (Poor), 4–6 (Fair), 7–9 (Good), and 10 (Excellent). The tool's developers reported favorable measurement characteristics with a test-retest reliability score of 0.62 to 0.74 intraclass correlation coefficient.[34]

The sixth part measured the participants' psychological well-being using a tool developed by Diener et al.[35] The tool asked participants to rate eight items on a seven-point scale ranging from 1 (Strongly disagree) to 7 (Strongly agree). In a previous study, the tool's internal consistency reliability was good, with a Cronbach's alpha of 0.88 to 0.95.[36]

Data Collection Process

The researchers selected the nursing schools and colleges and secured a letter granting administrative approval from each dean or head to include their students in the study. After the researchers received administrative approval, faculty members and program heads at the participating schools were instructed to distribute the link for the survey questionnaire to their nursing students through Google Forms. Included in the link was a cover letter explaining to the students that proceeding to complete the online survey indicated their consent to participate in the study. The students also received information, ensuring the confidentiality and anonymity of their responses throughout the study. In addition, the students were encouraged to ask questions and clarifications before completing the survey by contacting the researchers via the phone numbers or e-mail addresses provided in the letter. While completing the survey, students selected their choices by tapping the corresponding response for each item in the survey form. The online survey required approximately 20–30 minutes to complete. Participants could not proceed to the next part of the survey without completing their current page. At the end of the survey, the participants received a message of gratitude.

Data Analysis

The researchers used SPSS version 23 software (IBM Corp., Armonk, NY, USA) for statistical analysis. Descriptive statistics included frequency counts, percentages, weighted arithmetic means, and standard deviations. Inferential statistics, including the independent t-test, analysis of variance (ANOVA), Pearson's r moment correlation coefficient, and multiple regression analysis, were applied to test the hypotheses. The level of significance was set at < 0.05. To test hypothesis 1, we employed multiple regression analysis to determine predictors of increased COVID-19 anxiety among the nursing students. To test hypothesis 2, we examined the correlation between COVID-19 anxiety and the student nurses' psychological outcomes. We also used multiple regression analysis to determine the influence of COVID-19 anxiety on student nurses' psychological outcomes.

RESULTS

From the 280 questionnaires that were sent out, 261 nursing students (93.2% response rate) participated in the study. The majority were women (81.2%), with a mean age of 20.70 years (SD 2.59 years), who were studying at the second-year level (38.3%) in public nursing schools (67.8%) located in urban areas (68.6%). Most of the participants have not attended COVID-19 training (85.8%), felt somewhat unprepared to care for COVID-19 patients (41.8%), and were unsure if they were willing to care for COVID-19 patients (40.6%). More than half of the respondents (57.9%) reported a COVID-19 anxiety score ≥ 9, which indicates probable dysfunctional anxiety. Table 1 summarizes the characteristics of the participants.

Table 2 presents the mean (SD) scores for the key variables: COVID-19 anxiety (8.68, SD 4.06), perceived health (3.84, SD 0.84), sleep quality (2.74, SD 2.09); psychological wellbeing (5.37, SD 0.93), and perceived stress, (3.01, SD 0.82).

Table 3 shows that the multiple regression model was statistically significant (F = 4.028; P = 0.004) and explained 5.5% of the variance in the nursing students' COVID-19 anxiety. In particular, male students (β = -1.541, 95% *CI*: -2.789 to -0.292, P = 0.016) at the fourth-year level (β = -2.458; 95% *CI*: -4.164 to -0.751, P = 0.005) were more likely to report low scores on the COVID-19 Anxiety Scale. Thus, the data partially supported hypothesis 1.

Table 4 shows that nursing students who demonstrated to have COVID-19 anxiety were more likely to report high scores in perceived stress (r = 0.280; $P \leq 0.001$) but were less likely to report high scores in sleep quality (r = -0.180; $P \leq 0.01$). Moreover, nursing students who reported to have high perceived stress scores were less likely to report high scores in perceived health (r = -0.458, $P \leq 0.001$), sleep quality (r = -0.121, $P \leq 0.001$), and psychological well-being (r = -0.260, $P \leq 0.001$). Those who reported high scores in perceived health were more likely to report high scores in sleep quality (r = 0.156, $P \leq 0.05$) and psychological wellbeing (r = 0.514; $P \leq 0.001$). Those students who reported high scores in sleep quality were more likely to report high scores in psychological well-being (r = 0.164, $P \leq 0.01$). Thus, the data partially supported hypothesis 2.

Table 5 shows that student nurses who rated high on COVID-19 anxiety measures were more likely to report low scores for sleep quality (β = -0.093, 95% *CI*: -0.155 to -0.031, P = 0.003) and high scores for psychological distress (β = 0.057, 95% *CI*: 0.033 to 0.081, P = 0.001).

Table 1. Nursing students' characteristics (n=261)

Categories	Mean	SD
Age (18–35)	20.70	2.59
	N	**%**
Gender		
Male	49	18.8
Female	212	81.2
Year level		
1st year	65	24.9
2nd year	100	38.3
3rd year	65	24.9
4th year	31	11.9
Type of nursing school		
Private	84	32.2
Public	177	67.8
Location of nursing school		
Urban	179	68.6
Rural	82	31.4
Attendance at COVID-19 trainings		
Yes	37	14.2
No	224	85.8
Readiness to care for COVID-19 patients		
Unprepared	45	17.2
Somewhat unprepared	109	41.8
Somewhat prepared	97	37.2
Prepared	10	3.8
Willingness to care for COVID-19 patients		
Absolutely not	10	3.8
Probably not	31	11.9
Unsure	106	40.6
Probably yes	83	31.8
Absolutely yes	31	11.9
COVID-19 anxiety		
> 9	**151**	**57.9**
< 8.9	110	42.1

DISCUSSION

The purpose of this study was 1) to determine the level of COVID-19 anxiety among Filipino nursing students, 2) to identify the predictors of COVID-19 anxiety in this group, and 3) to explore the associations between that anxiety and student nurses' outcomes. The literature has demonstrated the effects of pandemics on individuals' psychological wellbeing.[6,29] In our study, more than half of the participants reported a CAS score of 9 or above. This indicates dysfunctional anxiety linked to the COVID-19 crisis. Every item in the CAS scale indicated distressing bodily symptoms,[29] which means that at some point during the COVID-19 pandemic, our participants experienced

Table 2. Descriptive statistics of the key study variables

Scale/Subscale	N	Min	Max	Mean	SD
COVID-19 anxiety	261	5.00	25.00	8.68	4.06
Perceived health	261	1.00	5.00	3.84	0.84
Sleep quality	261	0.00	10.00	2.74	2.09
Psychological well-being	261	1.00	7.00	5.37	0.93
Stress	261	1.00	5.00	3.01	0.82

Table 3. Predictors of COVID-19 anxiety among student nurses

Independent variables	B	SE	β	t	P-values	95% CI
(Constant)	9.691	.504		19.232	.000	8.699 to 10.684
Gender (R: Female)						
Male	**-1.541**	**.634**	**-.148**	**-2.431**	**.016**	**-2.789 to -.292**
Year Level (R: First)						
Second	-.942	.634	-.113	-1.485	.139	-2.190 to .307
Third	-.256	.697	-.027	-.367	.714	-1.628 to 1.117
Fourth	**-2.458**	**.867**	**-.196**	**-2.836**	**.005**	**-4.164 to -.751**

R^2 = 5.5%; F = 4.028; P = 0.004

Table 4. Correlations between COVID-19 anxiety and student nurses' outcomes

Variables	1	2	3	4	5
COVID-19 anxiety	1				
Perceived health	-.049	1			
Sleep quality	**-.180****	**.156***	1		
Psychological well-being	-.091	**.514*****	**.164****	1	
Stress	**.280*****	**-.458*****	-.121	**-.260*****	1

**P ≤ 0.05; **P ≤ 0.01; ***P ≤ 0.001*

Table 5. Regression analysis on the influence of COVID-19 anxiety on student nurses' outcomes

Independent variables	B	SE	β	t	P-values	95% CI
Sleep quality	**-.093**	**.032**	**-.180**	**-2.951**	**.003**	**-.155 to -.031**
Psychological distress	**.057**	**.012**	**.280**	**4.697**	**.001**	**.033 to .081**
Perceived health	-.010	.013	-.049	-.795	.427	-.036 to .015
Psychological well-being	-.021	.014	-.091	-1.469	.143	-.049 to .007

β, Standardized regression coefficient; SE, Standard error; CI, Confidence interval

dizziness, sleep disturbance, tonic immobility, appetite loss, nausea, or abdominal distress. Proper health education and mental health services are thus necessary to combat the effects of the pandemic. While a similar recent study utilizing the same tool for COVID-19 anxiety revealed fewer participants with CAS scores of 9 and above,[37] participants included front-line hospital nurses who likely possessed more advanced information about COVID-19, including updated treatment, prevention, and control measures. The literature has also found that even in normal situations, nursing students are particularly susceptible to anxiety. On top of this "normal" anxiety, the anxiety nursing students reported in the current study was likely driven by the abnormal conditions of the COVID-19 pandemic, which included rigorous measures of isolation and infection containment, such as physical distancing, overwhelming media reports regarding COVID-19 cases, sudden changes in social activities, and the abrupt shift from an on-campus to a virtual learning environment. Beyond these factors, COVID-19 is a novel disease. Although nursing students learned about various diseases and infections in their coursework, they likely knew less about COVID-19, which might have further heightened their anxiety. In addition, the high transmissibility and mortality of COVID-19 might have increased the students' anxiety. However, further studies need to be conducted to investigate other psychosocial issues and factors that may affect students' anxiety during the pandemic, like personal life, family problems, or previous experiences with mental health problems.

The mean scores for participants' perceived sleep quality were poor. Previous studies also reported decreased sleep quality as an effect of various factors related to the lockdown.[16] Our study also revealed that student nurses experienced increased stress amid the pandemic. This finding aligns with previous studies, which indicated that students' stress must be understood as a consequence of academic factors and as a direct result of lockdown measures, restrictions, and sedentary behavior patterns.[19] On the contrary, during the pandemic, the participants' perceived health and psychological well-being were positively correlated. This indicates that students who reported high scores in perceived health were more likely to report high scores in psychological well-being. In addition, empirical evidence showed that the relationship between perceived health and psychological wellbeing is reciprocal. Very likely, lowered perceived health status is associated with psychological distress.[38] Moreover, a previous study with similar findings suggested that students demonstrated strength and resilience, which derived primarily from their connectedness and the availability of support systems.[39] A previous study also noted that the level of self-reported

health conditions was associated with the development of anxiety.[40] Thus, a poor general health condition may indicate a greater risk of developing mental health problems.[41]

In our study, male students were less likely to report high levels of COVID-19 anxiety than female students. This can be attributed to anxiety being increased in women compared to men. Several previous studies demonstrated similar findings.[3,4,42,43] The literature has also shown that females are more vulnerable to developing distress and post-traumatic symptoms.[44] In contrast, a study in China revealed that the male sex was significantly associated with higher anxiety scores.[8] In addition, our study showed that students at the highest level in the nursing program were more likely to report low anxiety levels. These findings depart from those of previous studies, which revealed that students in the higher levels of their schooling were more likely to report increased levels of anxiety[42,45], perhaps because of the uncertainty of the COVID-19 pandemic and their impending graduation. Our divergent findings, however, might suggest that students in the fourth-year level had developed better coping mechanisms, better understood situational crises, such as the COVID-19 pandemic. They were also better able to apply related concepts and principles from psychiatric nursing, general psychology, psychosocial management, and behavioral nursing, which they had learned throughout nursing school. Moreover, in general, fourth-year level students are likely to be more mature and have more experience to better handle difficult situations.

Our findings also revealed that participants who reported high scores in COVID-19 anxiety were less likely to report high scores in sleep quality and more likely to report high scores in the perceived levels of stress. Further, those participants who reported high scores in the perceived stress level were less likely to report high scores in sleep quality. Although the study was conducted a few months after the lockdown, our study thus clearly demonstrates the psychological consequences of the COVID-19 pandemic. A recent study highlighted that emergency remote learning, financial constraints, uncertainty about COVID-19, and the lockdown measures were significant stressors demonstrated by the students even during the early period of the pandemic.[46] COVID-19 is a new infectious disease, and public preventive measures of social distancing and lockdowns are unusual for everyone. The novelty of this situation likely caused worry and anxiety, which might have affected respondents' sleeping patterns. A previous study likewise revealed that anxiety mediated the association between stress and sleep quality,[47] and the literature has also long highlighted the influence of sleep quality on the level of nursing students' stress.[48] These findings confirm ours, indicating that participants who enjoyed good quality sleep were more likely to report reduced stress levels. In addition, our findings suggest that fear of COVID-19 negatively influences sleep quality and predisposes individuals to psychological distress. Fear is often considered an adaptive mechanism for survival, but if fear is disproportionate to the threat, it becomes harmful and may contribute to psychological problems or psychiatric disorders.[49] Sleep quality, perceived health, and psychological wellbeing is negatively associated with stress. Good quality sleep is crucial to psychological well-being, while sleep disturbances cause distress and diminish psychological well-being.[50] Hence, sleep quality, health, and psychological well-being must be fostered and maintained for an individual to function normally and combat the ill effects of stress.

Our study reveals that the effects of COVID-19 are not just physical but also psychological. Indeed, the nursing students who participated in our survey experienced significant psychological consequences due to the COVID-19 pandemic. Our study thus entails practical policy implications for developing appropriate programs and strategies to combat the psychological effects of COVID-19 among nursing students and even among students in general. Because this novel disease remains unpredictable, it is necessary to design effective mental healthcare systems to protect and promote students' psychological and physical wellbeing, especially if the outbreak worsens. Relevant psychological measures and strategies to combat the psychological effects of COVID-19 can be better implemented if strengthened by existing policies, guidelines, and procedures. As the pandemic continues, education authorities must enhance alternative means of delivering instruction, such as virtual or blended learning, while carefully considering these alternatives' psychological welfare and learning impact on their students. Meanwhile, health agencies and government authorities must continuously provide accurate information about the disease and work to increase public awareness of the most updated and effective COVID-19 prevention and treatment measures. Providing accurate information and educating the public regarding appropriate preventive measures can reduce the negative psychological impact of an outbreak.[8]

Limitations of the Study

Despite its contributions, our study entails some limitations. First, this study employed a cross-sectional design, which cannot determine causal relationships between the variables being studied. Second, because of the lockdown, we were restricted to gathering data online through purposive sampling, which may limit the generalizability of our results. Further studies with larger and random samples are needed. Thirdly, the study has been limited to assessing students' anxiety during the early period of the COVID-19 pandemic. Additional assessment measures must be done if students have been treated sometime in the past for anxiety or not, which could be a significant variable that may affect the findings. Despite these limitations, our study offers the public invaluable information as one of the first empirical examinations of nursing students' psychological welfare amidst the COVID-19 pandemic.

CONCLUSION

This study's findings underscored the psychological consequences of the COVID-19 outbreak on nursing students. More than half of nursing students reported dysfunctional anxiety symptoms. The study highlighted the predictive roles of the male sex and fourth-year level in the nursing program in the development of COVID-19 anxiety. Finally, it linked COVID-19 anxiety with decreased sleep quality, perceived health, psychological well-being and increased distress.

Statement of Authorship

All authors contributed in the conceptualization of work, acquisition and analysis of data, drafting and revising and approved the final version submitted.

Author Disclosure

All authors declared no conflicts of interest.

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