



Research article

Anxiety and coping strategies among nursing students returning to university during the COVID-19 pandemic

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ABSTRACT

Background: Despite the continued expand of the coronavirus disease 2019 (COVID-19) pandemic, nursing students are returning to on-campus learning and training in clinical settings. The COVID-19 pandemic might constitute a new source of anxiety that increases the already high anxiety levels of nursing students. This study aimed to assess the COVID-19 infection-related anxiety and coping strategies among nursing students returning to university campuses during the COVID-19 pandemic in Jordan.

Methods: A cross-sectional study was conducted on a sample of 282 nursing students who returned to campus during the summer semester of the academic year 2019/2020. The returning students were invited to complete an online questionnaire consisting of three parts: 1) sociodemographic variables and infection-related information, 2) the Generalized Anxiety Disorder 7 (GAD-7) Scale, and 3) the Brief-Coping Behavior Questionnaire (Brief-COPE).

Results: Of the participating students, 70.6% reported mild to severe anxiety levels. Female students and students who had fears of becoming infected with COVID-19 were found to be at higher risk of anxiety than were other students. A positive correlation was found between students' anxiety levels and their dysfunctional coping strategies, which included denial, behavioral disengagement, venting, and self-blame. Students who had chosen to study nursing willingly used coping planning. Further, other sociodemographic variables and infection-related information were associated with dysfunctional and emotion-focused coping strategies.

Conclusions: The participating nursing students showed significant COVID-19-related anxiety upon returning to on-campus learning. Unfortunately, the students were found to use some dysfunctional coping strategies which were associated with increased levels of anxiety. The results highlight the important role of universities and nursing faculty members in supporting students emotionally and ensuring their personal safety inside the classroom and in clinical settings.

1. Introduction

The novel coronavirus disease 2019 (COVID-19) was declared by the World Health Organization (WHO) as a public health emergency of international concern and a global pandemic [1]. The pandemic resulted in severe consequences to most sectors in many countries around the world, including the economic, healthcare, and education sectors [2]. Schools and universities in more than 191 countries were shut down and more than 1.57 billion students transitioned to distance learning [3]. Jordan's schools and universities were not an exception. However, healthcare

students, including nursing students, were made to resume their training in university laboratories and clinical settings, which placed them and their families at higher risk of contracting COVID-19.

Anxiety levels among nursing students are known to be high under normal circumstances [4, 5]. The psychological problems experienced by nursing students may have negative impacts on their quality of life, learning, academic performance, and clinical practice performance [4, 6]. During the COVID-19 pandemic, 25% to more than 60% of university students experienced anxiety levels ranging from mild to severe [5, 7, 8]. In Jordan, the mean anxiety score among university students during the

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pandemic on the General Anxiety Disorder-7 (GAD-7) scale was 8.4, which indicates mild anxiety levels [9]. In a study conducted to assess anxiety levels among nursing students who had answered the call to bridge the nursing shortage in hospitals in Israel, about 61% of the students expressed moderate to severe anxiety levels [5]. During the pandemic, higher anxiety levels have been reported among female students [5, 9, 10], students who live alone, students who live in rural areas [7], students with unstable family income [7, 9], and students with a relative or acquaintance infected with COVID-19 [7].

Nursing students have reported many sources of anxiety under normal circumstances, including the complicated structure of nursing courses, fear of failing exams, and lack of faculty support. Furthermore, clinical training, working with sick people, facing life and death events, and inflexible schedules are considered unique sources of anxiety and stress for nursing students and other healthcare professionals [11, 12]. However, returning to on-campus learning and training in clinical settings during the pandemic is expected to create a new source of anxiety related to fear of COVID-19 infection and to create feelings of insecurity among students. During the SARS outbreak in 2003, nursing students in Hong-Kong perceived themselves to be at higher risk than other students of infection [13]. Similarly, in 2016, healthcare students in Saudi Arabia expressed their reluctance to work in healthcare facilities due to the shortage in MERS infection control isolation policies [14].

Students may use coping strategies in order to deal with the impacts that COVID-19 has on their psychological well-being. Coping refers to the individual's efforts to deal with stressful situations that exceed his/her resources [15]. Coping strategies can be divided into three main categories: a) problem-focused, b) emotion-focused, and c) avoidant/dysfunctional coping strategies [16, 17]. Problem-focused coping is focused on finding solutions for the problem and/or taking action to change a situation, whilst emotion-focused coping is focused on regulating the emotions related to a stressful situation. Finally, dysfunctional/avoidant coping is focused on distancing the individual from the stressful situation. Problem-focused coping is considered the most effective type of coping [16, 17]. Effective coping strategies may play an important role in university students' ability to manage stressful situations. On the other hand, using dysfunctional coping strategies may predict higher levels of stress, anxiety, and depression [18]. However, according to Cao et al. [19] and Huang et al. [10], university students do not usually cope maturely or positively with the pressures caused by public emergencies. For example, Huang et al. [10] found that in comparison to hospital nurses, nursing students are less capable of using problem-focused coping strategies, including active coping, planning, and use of instrumental support. In the study of Sheroun et al. [20], the majority of the participating nursing students were found to use maladaptive coping strategies to cope with stress during the lockdown. Further, substance use was found to increase during the pandemic among Russian, Belarusian, and Israeli university students [21, 22]. In the study of Savitsky et al. [5], mental disengagement coping, including the consumption of alcohol, use of sedative drugs, and excessive eating, was used by nursing students with moderate to severe anxiety levels. However, the same study found that students who perceived themselves to have high self-esteem and who used humor (emotion-focused) coping strategies were able to cope and reduce their anxiety levels. Also, nursing students' use of problem-solving coping mechanisms has been documented in many studies that have investigated the strategies used by nursing students to cope with academic- and clinical-related stress [23, 24]. These discrepancies in the literature make it crucial to investigate the strategies used by nursing students in order to cope with anxiety related to the COVID-19 pandemic, as the findings would bridge a gap in the literature.

The aim of the current study was to assess the levels of COVID-19-related anxiety and use of coping strategies among nursing students who had returned to on-campus learning and training in clinical settings. The findings of this study may guide the establishment of programs aimed at helping nursing students cope with stress and anxiety during the pandemic.

Studies in the literature have reported several psychological impacts of the COVID-19 pandemic on the general population [25, 26], healthcare workers [10, 25, 27, 28, 29], and university and college students who have transitioned to distance learning [7]. However, to our knowledge, few studies have assessed mental health and coping strategies among nursing students returning to on-campus learning and/or training in clinical sites during the COVID-19 pandemic. The present study was guided by the following research questions: 1) What are the levels of COVID-19-related anxiety among nursing students who returned to university campuses and clinical settings during the COVID-19 pandemic? 2) Is there a relationship between sociodemographic variables and infection-related information and student' levels of COVID-19-related anxiety? 3) Which coping strategies are used by nursing students to deal with COVID-19-related anxiety? and 4) Is there a relationship between sociodemographic variables and infection-related information and the coping strategies students use?

2. Methods

2.1. Sample, design, and setting

The present study used a cross sectional, descriptive design. The study sample consisted of 282 nursing students from Jordan University of Science and Technology (JUST). All nursing students who enrolled in the practicum courses during the second semester of the academic year 2019/2020 and who had to return to the university campus and/or clinical settings in the summer semester in order to fulfill the requirements of these courses were invited to participate in the study (i.e., 800 students). Students who had left the country during the pandemic and therefore could not return during the summer semester and/or who had dropped out during the second semester were excluded from the study. Note: no practicum courses were offered during the summer semester of the academic year 2019/2020, and all other courses were delivered online.

2.2. Procedure

Institutional review board approval to conduct the study was obtained from Jordan University of Science and Technology (IRB #2020/519). An online survey using "Google Forms" was sent to the students via email two weeks after their return to school on July 19th, 2020. The participating students were given a week to complete and return the survey. The study purpose, procedures, and outcomes were explained on the front page of the survey. Also, a message was included to assure the participants that their identities would be kept anonymous, that their participation was voluntary, and that they had the right to withdraw from the study at any time without consequences. Prior to commencing the survey, the potential participants were asked to express their willingness to participate by checking the appropriate agreement box. The participants were asked to return the survey by clicking the "submit" button at the end of the survey. The researchers' contact information was provided in case the participants had any questions or concerns.

2.3. Instruments

The students responded to a survey consisting of three parts: 1) a sociodemographic variables and infection-related information sheet developed by the author, 2) the General Anxiety Disorder-7 (GAD-7) scale [32], and 3) the Brief-Coping Behavior Questionnaire (Brief-COPE) [17]. The sociodemographic variables included age, gender, academic year, place of residency, reason for studying nursing, and stability of family income (i.e., whether the student's family income had decreased during the pandemic). Further, the participants were asked to report some infection-related information, including their frequency of applying preventive measures during the pandemic (i.e., gloves, mask, hand hygiene, etc.), infection with COVID-19 (whether the student had

been infected), infection of any relatives or acquaintances with COVID-19, and fear of infection upon returning to the university campus.

The GAD-7 scale [32] was used to assess the students' levels of anxiety in the two weeks preceding data collection (data were collected two weeks after the students had returned to on-campus learning and training in clinical settings). The instrument consists of 7 items which describe the core symptoms of anxiety, and which are scored on a 4-point Likert scale, with 0 = *not at all*, 1 = *several days*, 2 = *more than half the days*, and 3 = *almost every day* [32, 33]. The level of measurement for the scale is interval. The total possible score ranges from 0 to 21, with scores classified as follows: 0–4 indicates no anxiety, 5–9 indicates mild anxiety, 10–14 indicates moderate anxiety, and a score equal to or above 15 indicates severe anxiety [34]. The scale showed excellent internal inconsistency (Cronbach = .92) and criterion, construct, factorial, and procedural validity [32].

The Brief-COPE [17], which is the shortened version of the COPE inventory developed by Carver et al. [35], was used to assess the coping skills used by the students. The Brief-COPE consists of 28 items divided between 14 factors of 2 items each. The items are scored on a 4-point Likert scale ranging from 0 = *I haven't been doing this at all* to 3 = *I've been doing this a lot*. The internal consistency of the instrument was 0.83 [17]. The 14 coping strategies in the Brief-cope instrument have been divided by Carver [17] into problem-focused, emotion-focused, and dysfunctional coping strategies. Problem-focused coping strategies include active coping, instrumental support, and planning, whilst emotion-focused coping strategies include acceptance, emotional/social support, humor, positive reframing, and religion. Dysfunctional coping strategies include behavioral disengagement, denial, self-distraction, self-blaming, substance use, and venting.

2.4. Statistical analysis

Descriptive statistics were used to describe the study sample, the students' anxiety levels, and the coping strategies used. Univariate analysis (Mann-Whitney and Kruskal-Wallis nonparametric tests) and ordinal logistic regression were used to assess the relationship between COVID-19-related anxiety levels, the sociodemographic variables, and infection-related information. Spearman's correlation was used to explore the relationship between anxiety and coping strategies, and an ordinal logistic regression was used for further investigation of that correlation. One-way ANOVA with Tukey's HSD was used to examine any between-groups differences in coping strategies across the students' sociodemographic variables and infection-related information. To test the assumptions of ordinal logistic regression, the Variance Inflation Factor (VIF) and the Brant Test were checked to rule out multicollinearity and any violation of the proportional odds assumption respectively. The assumptions of the One-way ANOVA test were checked using the Shapiro-Wilk test for normality of the dependent variables and Levene's test to confirm homogeneity of variances.

3. Results

3.1. Demographic variables

Although the study survey link was accessed by 400 nursing students, only 282 students completed the questionnaire, leading to a response rate of 70.5%. Only completed questionnaires were included in the analysis, the rest of the questionnaires were excluded for severe missing data. Of the participating students, 74.1% were female, 39.4% were in their second academic year, 77.3% had a stable family income, and 67.7% has chosen to study nursing willingly. Also, the majority of the participants had not previously been infected with COVID-19 (98.9%), 90.5% were applying preventive measures, and 69.1% were not afraid of contracting the virus (see Table 1).

3.2. Anxiety levels among the nursing students during the pandemic

Of the participating students, 70.6% reported mild to severe anxiety levels. Table 2 illustrates the frequencies at each level. Univariate

analysis (Mann-Whitney test and Kruskal-Wallis test) was used to reveal the differences in anxiety levels among the students based on their sociodemographic variables and infection-related information. Significant differences were found in the total anxiety scores of the students based on gender and fear of contracting the virus. Further, anxiety levels were significantly higher among female students (median = 8.00, IQR = 6.00) than among male students (median = 6.00, IQR = 7.00) ($p = 0.001$). Also, anxiety levels among students who had fear of contracting the virus were higher (median = 9.00, IQR = 6.00) than among students who did not have that fear (median = 7.00, IQR = 8.00) ($P = 0.006$). Table 1 illustrates the results of the univariate analysis of the nursing students' COVID-19-related anxiety.

Gender and fear of contracting the virus were included in the ordinal regression analysis. The test showed a significant improvement in fit of the final model over the null model [$X^2(2) = 21.415, p < 0.000$]. The test of proportional odds indicated non-significance ($p = 0.339$) and good model fit within the observed values. Gender was found to contribute to the model, whereby being male was found to decrease the risk of having anxiety [OR = 0.981, SE = 0.257, Wald = 14.599, $p < 0.000$, 95%CI = -1.484- -0.478]. Students who were not afraid of contracting the virus after returning to campus during the pandemic were at lower risk of having anxiety compared to students who were afraid [OR = 0.609, SE = 0.236, Wald = 6.660, $p = 0.01$, 95%CI = 0.146-1.071].

3.3. Coping strategies among the students

The descriptive statistics of the students' coping strategies are presented in Table 3. Correlation analysis was performed on the students' anxiety scores and the 14 coping strategies. As illustrated in Table 3, the results indicated that anxiety correlated positively with denial ($p = 0.02$), behavioral disengagement ($p < 0.000$), venting ($p = 0.01$), and self-blame ($p < 0.000$). Also, an ordinal logistic regression was carried out to further reveal the correlation between anxiety and the different coping strategies. A good fit model was obtained, giving the significant model test [$X^2(14) = 40.576, P < 0.000$] and the non-significant test of parallel lines ($P = 0.142$). Behavioral disengagement and self-blame were found to be the coping strategies which contributed to the model. The likelihood of students using behavioral disengagement and self-blame as coping strategies was found to increase as the severity of the students' anxiety increased.

The results of the regression were [OR = 0.211, SE = 0.083, Wald = 6.482, $p = 0.011$, 95%CI = 0.049-0.373] and [OR = 0.162, SE = 0.072, Wald = 5.046, $p = 0.025$, 95%CI = 0.146-1.071] for the two coping strategies, respectively.

3.4. Coping strategies, students' sociodemographic variables, and infection-related information

One-way ANOVA was conducted to investigate any differences in the coping strategies used among the student groups. The results showed significant differences in coping strategies based on some sociodemographic variables. Table 4 illustrates the results.

4. Discussion

The findings of this study indicate that most nursing students experience mild to severe anxiety upon returning to on-campus learning during the COVID-19 pandemic. Higher anxiety levels were reported by female nursing students and students who had fear of contracting the virus than reported by their counterparts. The higher prevalence of anxiety among female students could be attributed to the fact that females comprise the majority of our sample. Further, the changes to everyday life during the pandemic, including social isolation, economic instability, the challenges and stress of distance learning, and the fear of becoming infected, impact female nursing students more than they do male students [5, 12]. COVID-19 infection-related anxiety was found to

Table 1. Students' sociodemographic variables, infection related information, and univariate analysis of the COVID 19 anxiety levels.

Variable	N (%)				Statistics	P value
	No anxiety	Mild anxiety	Moderate anxiety	Sever anxiety		
Age Mean = 20.08 (SD = 1.08)						
Gender					5584.50 ^a	0.001
Male	73 (25.9)	33 (45.2)	24 (32.9)	13 (17.8)	3 (4.1)	
Female	209 (74.1)	50 (23.9)	76 (36.4)	47 (22.5)	36 (17.2)	
Academic year					3.501 ^b	0.321
First year	67 (23.8)	16 (23.9)	26 (38.8)	14 (20.9)	11 (16.4)	
Second year	111 (39.4)	31 (27.9)	38 (34.2)	28 (25.2)	14 (12.6)	
Third year	65 (23.0)	20 (30.8)	23 (35.4)	14 (21.5)	8 (12.3)	
Fourth year	39 (13.8)	16 (41.0)	13 (33.3)	4 (10.3)	6 (15.4)	
Place of residency					.110 ^b	0.946
The city where the university located	93 (33.0)	27 (29.0)	33 (35.5)	21 (22.6)	12 (12.9)	
The villages of the university's city	99 (35.1)	35 (35.4)	28 (28.3)	22 (22.2)	14 (14.1)	
Other cities	90 (31.9)	21 (23.3)	39 (43.3)	17 (18.9)	13 (14.4)	
Family financial status					5927.00 ^a	0.067
Stable	281 (77.3)	71 (32.6)	77 (35.3)	37 (17.0)	33 (15.1)	
Unstable	64 (22.7)	12 (8.8)	23 (35.9)	23 (35.9)	6 (9.4)	
How did you choose Nursing as a Major?					0.723 ^b	0.697
Willingly	191 (67.7)	56 (29.3)	70 (36.6)	41 (21.5)	24 (12.6)	
Unified admission	77 (27.3)	23 (29.9)	26 (33.8)	16 (20.8)	12 (15.6)	
Family pressure	17 (5.0)	4 (28.6)	4 (28.6)	3 (21.4)	3 (21.4)	
Using infection preventive measures (Hand washing, Masks, gloves....)					0.670 ^b	0.716
Never	27 (9.6)	10 (37.0)	6 (22.2)	6 (22.2)	5 (18.5)	
Sometimes	155 (55.0)	43 (27.7)	52 (33.5)	40 (25.8)	20 (12.9)	
Always	100 (35.5)	30 (30.0)	42 (42.0)	14 (14.0)	14 (14.0)	
Have you been infected with COVID-19 virus?					253.00 ^a	0.238
Yes	3 (1.1)	0 (0.0)	1 (33.3)	1 (33.3)	1 (33.3)	
No	279 (98.9)	38 (29.7)	99 (35.5)	59 (21.1)	38 (13.6)	
Do you have a family member, a relative, or acquaintances have been infected with COVID 19 virus					2071.00 ^a	0.212
Yes	19 (6.7)	2 (10.5)	10 (52.6)	2 (10.5)	5 (26.3)	
No	263 (93.3)	81 (30.8)	90 (34.2)	58 (22.1)	34 (12.9)	
Are you afraid of being infected with COVID 19 virus as you are returning to campus?					6732.50 ^a	0.006
Yes	87 (30.9)	17 (19.5)	34 (39.1)	18 (20.7)	18 (20.7)	
No	195 (69.1)	66 (33.8)	66 (33.8)	42 (21.5)	21 (10.8)	

^a Mann-Whitney test.

^b Kruskal-Wallis test.

correlate positively with the coping strategies denial, behavioral disengagement, venting, and self-blame.

Certain coping strategies correlated significantly with certain socio-demographic variables and infection-related information of the students. More specifically, students who had never taken measures to prevent infection with COVID-19 relied more significantly on substance use, behavioral disengagement, self-blame, denial, acceptance, and humor to

Table 2. Anxiety levels among nursing students.

Anxiety level	n	%
No anxiety	83	29.4
Mild anxiety	100	35.5
Moderate anxiety	60	21.3
Sever Anxiety	39	13.8
N = 282		

Table 3. Descriptive statistics for the coping strategies and their correlation with Anxiety.

Coping strategy	M(SD)	Anxiety	P value
Self-distraction	5.60 (1.65)	-0.006	0.92
Active coping	5.88 (1.46)	-0.020	0.74
Denial	4.68 (1.99)	0.139*	0.02
Substance use	2.77 (1.56)	0.033	0.58
Emotional support	5.08 (1.86)	-0.038	0.53
Use of informational support	5.35 (1.83)	0.079	0.19
Behavioral disengagement	4.44 (1.79)	0.225*	<0.000
Venting	5.15 (1.62)	0.190*	0.001
Positive reframing	5.87 (1.69)	-0.112	0.06
Planning	5.99 (1.52)	-0.057	0.34
Humor	4.81 (1.82)	0.076	0.20
Acceptance	5.49 (1.39)	0.035	0.56
Religion	6.66 (1.51)	0.087	0.14
Self-blame	4.87 (1.99)	0.223*	<0.000

Table 4. Results of One-way ANOVA test.

Sociodemographic Characteristics	Substance use		Behavioral disengagement		Self-blame		Denial		Acceptance		Planning		Religion		Humor	
	M(SD)	F	M(SD)	F	M(SD)	F	M(SD)	F	M(SD)	F	M(SD)	F	M(SD)	F	M(SD)	F
Gender		15.85***		2.232		3.012		.130		.617		.314		12.399**		1.386
Male	3.38 (1.88)		4.71 (1.61)		5.22 (1.87)		4.75 (1.97)		5.60 (1.23)		6.08 (1.42)		6.14 (1.72)		5.027 (1.83)	
Female	2.56 (1.38)		4.35 (1.84)		4.75 (2.02)		4.66 (2.00)		5.45 (1.44)		5.97 (1.55)		6.85 (1.39)		5.45 (1.44)	
Academic year		1.174		2.755** ^d		1.167		.390		.651		1.922		.231		.646
First	2.54 (1.37)		4.34 (1.83)		5.07 (2.05)		4.91 (2.09)		5.48 (1.43)		6.22 (1.42)		6.61 (1.47)		4.88 (1.80)	
Second	2.80 (1.55)		4.52 (1.80)		4.86 (2.01)		4.62 (1.93)		5.52 (1.39)		5.88 (1.58)		6.70 (1.46)		4.81 (1.90)	
Third	3.03 (1.80)		4.80 (1.68)		4.98 (1.96)		4.60 (2.00)		5.62 (1.43)		5.75 (1.49)		6.57 (1.59)		4.95 (1.82)	
Fourth	2.67 (1.46)		3.80 (1.75)		4.36 (1.86)		4.59 (2.00)		5.23 (1.25)		6.33 (1.49)		6.79 (1.64)		4.46 (1.59)	
Financial status		2.559		2.968		6.812**		.002		.939		.005		.021		2.470
Stable	2.69 (1.44)		4.34 (1.74)		4.706 (1.950)		4.68 (2.00)		5.45 (1.35)		6.00 (1.47)		6.66 (1.50)		4.72 (1.81)	
Unstable	3.05 (1.91)		4.78 (1.92)		5.44 (2.04)		4.67 (2.12)		5.64 (1.51)		6.00 (1.69)		6.69 (1.56)		5.13 (1.83)	
Choosing nursing education		1.843		2.407		2.461		.848		2.254		4.813** ^e		.498		2.204
Willingly	2.56 (1.42)		4.33 (1.77)		4.70 (1.93)		4.64 (1.99)		5.49 (1.32)		6.16 (1.41)		6.63 (1.56)		4.70 (1.77)	
Unified admission	2.99 (1.82)		4.81 (1.80)		5.29 (2.07)		4.65 (2.04)		5.64 (1.51)		5.55 (1.68)		6.79 (1.44)		5.17 (1.89)	
Family pressure	3.21 (1.76)		4.00 (1.88)		5.00 (2.15)		5.36 (1.78)		4.79 (1.42)		6.21 (1.53)		6.43 (1.34)		4.43 (1.91)	
Using preventive measure		3.826** ^{a,b}		5.822** ^{a,b,c}		3.730** ^a		4.043** ^{a,b}		4.116** ^a		1.439		.216		5.209** ^a
Always	2.70 (1.53)		4.03 (1.68)		4.65 (2.10)		4.54 (2.12)		5.27 (1.39)		6.16 (1.56)		6.96 (1.56)		2.70 (1.53)	
Sometimes	2.68 (1.41)		4.57 (1.71)		4.85 (1.91)		4.59 (1.81)		5.53 (1.33)		5.86 (1.42)		6.68 (1.49)		4.91 (1.74)	
Never	3.56 (2.24)		5.22 (2.26)		5.82 (1.86)		5.70 (2.27)		6.11 (1.55)		6.19 (1.86)		6.48 (1.50)		5.63 (1.93)	

* $p < .05$, ** $p < .01$, *** $p < .000$.

^a the difference between the students who never applied preventive measures and the students who applied them all the time.

^b the difference between the students who had never applied preventive measures and the students who applied them intermittently.

^c the difference between the students who applied measures intermittently and who applied them all the time.

^d the difference between the students in the third and fourth years.

^e the difference between students who chose nursing willingly and students who admitted through the unified admission.

cope with their COVID-19-related anxiety than did students who took preventive measures all of the time and/or intermittently. Further, substance use was significantly higher among male students than among female students, behavioral disengagement was significantly higher among third-year students than among fourth-year students, and self-blame was higher among students with a stable family income than among students with an unstable family income. The results also showed the use of religion as a coping strategy to be significantly higher among female students than among male students. Meanwhile, the use of planning as a coping strategy was higher among students who had chosen to study nursing willingly than among students who had been admitted to nursing by the unified admissions program.

Our findings regarding the existence of COVID-19-related anxiety among nursing students are consistent with studies in the literature, although there are variations in anxiety rates. The anxiety levels among our sample of nursing students are higher than the levels reported in the study of Cao et al. [7], whereby 21.3% of the undergraduate students at a medical college in China reported mild anxiety, 2.7% moderate anxiety, and .09% severe anxiety. On the other hand, the levels of moderate and severe anxiety among 224 nursing students during the third week of a national lockdown in Israel were 42.8% and 18.1%, respectively [5]. These differences can be attributed to variations in the source(s) of anxiety. The absence of interpersonal communication between people during quarantine was the main source of anxiety in the study of Coa et al [7], whilst fear of infection with COVID-19 due to the lack of personal protective equipment was the main source of anxiety for undergraduate nursing students in Israel. In the present study, the main source of anxiety for students was fear of infection due to non-adherence to preventive measures.

Our findings regarding females being at higher risk than males of experiencing anxiety are congruent with the findings of other studies. For example, in the study of Özdin and Bayrak Özdin [36] on the levels and predictors of depression and anxiety during the COVID-19 pandemic, being female was a significant predictor of and risk factor for anxiety. Anxiety-related gender differences were also reported among undergraduate nursing students during the COVID-19 pandemic. Using the GAD-7 on a sample of 224 students, Savitsky et al. [5] found moderate and severe anxiety to be significantly higher among female students than among male students. Anxiety disorder during the COVID-19 pandemic has been found to be three-fold higher among women than among men [37]. This has been attributed to gender traits, whereby women are more sensitive and emotionally fragile in comparison to men [38]. Women also attach more importance than men to their inner experiences and perceptions, making them more vulnerable to psychological distress, anxiety, and depression [38]. During the SARS outbreak, more women than men required psychological counseling, and the content of their consultations was mainly emotional [38]. This indicates that gender differences exist in the levels of psychological distress during public health emergencies.

In the present study, the anxiety levels of the participating students correlated positively with the use of dysfunctional coping strategies, which specifically included behavioral disengagement, denial, venting, and self-blame. In line with these results, mental disengagement coping strategies (i.e., alcohol consumption, use of sedative drugs, and excessive eating) were associated with moderate to severe anxiety levels among nursing students during the COVID-19 pandemic in the study of Savitsky et al. [5]. Further, university students in the study of Gritsenko et al. [21] reported an increase in their use of substances (i.e., tobacco, alcohol, cannabis, Ritalin, pain relievers, and sedatives) due to the COVID-19 pandemic. The association between anxiety and dysfunctional coping has received considerable attention and has been widely reported in the literature [39, 40, 41]. Dysfunctional coping has been previously linked to anxiety and is predictive of functional impairment (e.g., Kohn et al. [42]; Ravindran et al. [43]). In particular, behavioral disengagement, venting, and self-blame have been associated with increased levels of

anxiety, depression, and distress in both nonclinical (e.g., Aldao et al. [44]) and clinical samples (e.g., Ravindran et al. [43]).

Our findings regarding the association of students' sociodemographic variables and infection-related information with the coping strategies they use showed that students who never took measures to prevent infection with COVID-19 used dysfunctional and emotion-focused strategies compared to students who used preventative measures intermittently or constantly. The coping strategies of these students included behavioral disengagement, self-blame, substance use, denial, acceptance, and humor. Students who do not take preventative measures are at higher risk of becoming infected with COVID-19, which may increase their fears of infection and thus lead them to use ineffective coping strategies. In the study of Lee and colleagues [45], fear of becoming infected with COVID-19 was associated with dysfunctional coping, which included the use of drugs and consumption of alcohol. In a recent study which investigated the coping strategies used by nurses and nursing students in China during the COVID-19 outbreak, nursing students were found to use emotion-focused coping strategies more often than did hospital nurses to cope with COVID-19-related fear and anxiety [10].

In the current study, substance use was higher among male nursing students than among female nursing students. The study of Gritsenko et al. [21] found that during the COVID-19 pandemic, tobacco and cannabis use increased more significantly among male university students in Russia and Belarus than among female students. Similar results were reported by another study, which showed an increase in alcohol use among male university students in Israel and Russia during the pandemic [22]. Our study finding may be attributed to the fact that the use of some types of substances (i.e., tobacco) by males is more socially acceptable than the use of the same substances by females [46]. Moreover, the financial hardships imposed by the strict quarantine may have increased the stress levels of male students in Jordan, many of whom may be responsible for paying for their own tuition fees, securing their personal needs, and helping their families financially. According to Osman et al. [46] and Yehudai et al. [22], substance use is a common dysfunctional coping mechanism with accumulative stressors among youth.

Self-blame as a coping strategy was more frequently used by students with a stable family income than by students with an unstable family income. In order to explain this finding, we conducted further analysis and found a negative correlation between family income status and the use of preventive measures ($r = -.14, p = .02$). Students with a stable family income criticized themselves for not taking preventive measures despite being financially able to do so. On the other hand, students with an unstable family income may be more concerned about securing food, tuition fees, and the costs of distance learning (i.e., internet service, electronic device, etc.). The study of Baloran [47] reported that 62.64% of 530 students felt anxious about food costs and financial resources during the COVID-19 pandemic.

The findings of the present study indicated that in comparison to fourth-year nursing students, third-year students relied significantly on behavioral disengagement as a strategy for coping with their COVID-19 infection-related anxiety. This may be attributed to the improvement of students' emotional and cognitive maturation over the years of study [48, 49]. Furthermore, the nursing curriculum for fourth-year students at JUST comprises components of psychology and psychiatric nursing that students can benefit from. Fourth-year students are also more clinically prepared to be more independent and are more experienced in dealing with stress and anxiety.

Our findings showed that female students were more likely than male students to use religion as a strategy for coping with their COVID-19 infection-related anxiety. This finding is consistent with the findings of previous studies, which have shown women to be more likely than men of being religious (e.g., Gundlach [50], Hvidtjorn et al. [51]). For example, Salman et al. [52] and Salman et al. [53] found that female university students and healthcare workers were significantly more likely than their male counterparts to use religion as a coping strategy during

the COVID-19 pandemic. Hvidtjorn et al. [51] conducted a study on 3000 Danish men and women between 20 and 40 years of age and found women to be more religious than men in terms of cognition, practice, and perception of the importance of religion. In comparison to males, females tend to pray and attend religious services more often and to assign more importance to religion in their lives [54, 55]. This gender gap in religiosity is very widespread, and some religious scholars have even suggested that women may be biologically predisposed to be more religious [56, 57, 58]. Other studies have attributed this gender gap to differences in the ways males and females view God. Women have a more positive perception of God as loving and caring, whilst men view God to be more controlling and punishing [59, 60].

Planning as a coping strategy was the only problem-focused coping strategy used by the students. It was used more by students who had chosen to study nursing willingly than by students who had been admitted to nursing by the unified admissions program. Students who are passionate towards nursing are more likely to apply what they have learned over the years to avoid contracting the virus. Also, in comparison to students who are not studying nursing willingly, students who are studying nursing out of choice have been found to experience lower stress and anxiety levels [61, 62]. According to Ganesan et al. [63], experiencing decreased stress levels usually results in students choosing more effective coping strategies. Moreover, Chai [64] studied the relationship between personality, coping, and stress among university students in Malaysia and found that increased levels of psychological stress were associated with the use of avoidant coping strategies.

5. Limitations

This study is considered the first in Jordan to investigate nursing students' anxiety related to the risk of becoming infected with COVID-19 and the coping strategies used by students returning to on-campus learning. However, this study is not without limitations. This study is descriptive and cross-sectional in nature and relied on measuring anxiety and coping strategies using a self-administered survey. Another limitation was that the study was conducted in a single university in one geographical area, which limits the generalizability of the findings. Further multisite studies which employ different research methodologies (i.e., qualitative or mixed methods designs) to examine this phenomenon are recommended.

6. Conclusion

Our findings have indicated that nursing students experience significant COVID-19 infection-related anxiety upon returning to on-campus learning. Dysfunctional coping strategies were associated with increased levels of anxiety. Female students and students who did not take personal protective measures to prevent infection with the virus reported higher anxiety levels than did male students and students who were not afraid of infection. Nursing faculties can take a leading role in implementing stress-reduction strategies for nursing students through providing the needed emotional support for students to ensure their mental well-being. Nursing faculties also need to take an active role in ensuring the personal safety of their students inside the classroom and in clinical settings by working closely with university administrations to secure and provide personal safety measures which ensure the physical safety of students and reduce their risk of COVID-19 infection.

Declarations

Author contribution statement

Dina Masha'al: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Ghada Shahrour: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Mohammed Aldalaykeh: Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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