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Research article

Pre-registration nursing students' anxiety and academic concerns after the second wave of COVID-19 pandemic in Italy: A cross-sectional study☆

Dania Comparcini[a,b,1], Marco Tomietto[c,d,e,1,*], Giancarlo Cicolini[f], Geoffrey L. Dickens[c,g], Katlego Mthimunye[c], Stefano Marcelli[h], Valentina Simonetti[f]

[a] Politecnica delle Marche University of Ancona, Ancona, Italy
[b] Azienda Ospedaliera Universitaria "Ospedali Riuniti" di Ancona, Ancona, Italy
[c] Department of Nursing, Midwifery and Health, Faculty of Health and Life Sciences, Northumbria University, Newcastle upon Tyne, United Kingdom
[d] Adjunct Professor, Research Unit of Nursing Science and Health Management, University of Oulu, Oulu, Finland
[e] Visiting Professor, Università degli Studi di Bari "Aldo Moro", Bari, Italy
[f] Department of Biomedical Science and Human Oncology, Università degli Studi di Bari "Aldo Moro", Bari, Italy
[g] Adjunct Professor, Western Sydney University, Australia
[h] Politecnica delle Marche University, Ascoli Piceno, Italy

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ABSTRACT

Background: The pandemic and its related social restrictions have led to many uncertainties in nurse education, including the fear of infection in clinical learning settings and the challenge of remote learning. The modification of clinical and academic environments generated anxiety and academic concerns among nursing students.
Objectives: To explore the main determinants of anxiety related to the clinical and classroom environments in nurse education after the second wave of the COVID-19 Pandemic.
Design: Multicentre cross-sectional study.
Settings: Ten universities offering nursing bachelor programs in central and southern Italy.
Participants: A convenience sample of 842 nursing students.
Methods: From April to July 2021, the Self-Rating Anxiety Scale and the Altered Student Study Environment Tool were administered to assess, respectively, students' anxiety and their concerns about the study environment. A regression model was tested.
Results: Most of the nursing students were female (76.6 %), living with family (70.9 %), and full-time students (85.7 %); 44.6 % were third-year of Bachelor in Nursing students. The majority of the participants (88.5 %) showed a level of anxiety. The statistically significant predictors of anxiety levels were concerns about grade attainment (β=0.42, $p < 0.001$) in the total sample, and, among the first-year students, the completion of clinical placement (β=0.14, $p = 0.047$).
Conclusions: Results suggest a need for the redesign of teaching activities and clinical learning experiences to ensure academic outcomes and to preserve students' psychological well-being. Models of learning environments' dynamic adaptation and ongoing psychological support should be implemented to develop tailored interventions.

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* Corresponding author at: Department Nursing, Midwifery and Health, Faculty of Health and Life Sciences, Northumbria University, Newcastle upon Tyne, United Kingdom.

E-mail addresses: dania.comparcini@staff.univpm.it (D. Comparcini), marco.tomietto@northumbria.ac.uk (M. Tomietto), giancarlo.cicolini@uniba.it (G. Cicolini), geoffrey.dickens@northumbria.ac.uk (G.L. Dickens), katlego.mthimunye@northumbria.ac.uk (K. Mthimunye), s.marcelli@staff.univpm.it (S. Marcelli), valentina.simonetti@uniba.it (V. Simonetti).

[1] These authors equally contributed.

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1. Introduction

The impact of the COVID-19 pandemic and the related virus containment strategies including social restrictions, mandatory isolation, and school closures, has been examined worldwide. Some systematic reviews have reported high prevalence rates of psychological distress and mental disorders during the pandemic both among healthcare providers (Ching et al., 2021) and the general population (Xiong et al., 2020). A study has recently demonstrated the high prevalence of acute stress disorder (40 %), anxiety (30 %), burnout (28 %), depression (24 %), and Post Traumatic Stress Disorders (13 %) among the healthcare professionals during the pandemic (Serrano-Ripoll et al., 2020).

In particular, nursing care has been affected by the pandemic, as evidenced by the high prevalence of psychological disturbances among nurses caring for patients with COVID-19 (Simonetti et al., 2021). This situation is not only due to the fear of infection in everyday practice, or by physical fatigue, but also due to the need to re-think professional roles and team relationships (Arcadi et al., 2021). The pandemic also challenged the meaning of nursing as nursing is a caring profession rooted in the close relationship with the patient, touch, and body proximity to deliver effective nursing care (Tomietto et al., 2020). Nurse education was affected by the epidemiological situation because the COVID-19 pandemic ushered in a new reality of uncertainty accompanied by the fear of infection and the challenge of remote learning (Savitsky et al., 2020).

2. Background

Interventions to ensure nurse education during a pandemic are crucial if students are to complete their degrees in a safe environment that promotes psychological well-being (Kochuvilayil et al., 2021). Academic institutions' concerns about the virus's spread lead most to postpone all campus events, including face-to-face teaching, workshops or conferences, and sports (Sahu, 2020). In several countries, clinical placements were suspended, leading to nurse education disruption (Carolan et al., 2020; Tomietto et al., 2020) and subsequent repercussions for students' achievement of nursing competencies (O'Flynn-Magee et al., 2021). Students expressed concern that these interruptions would interfere with their competence and future career achievements (O'Flynn-Magee et al., 2021).

Furthermore, traditional face-to-face teaching has been replaced with distance teaching, mostly online, adopting digital technologies such as massive open online courses (MOOCs) to expand academic accessibility (Stathakarou et al., 2018). Thus, an altered study environment was created for many students, with consequences on their sense of isolation and, in cases of disadvantaged socioeconomic backgrounds, real inequities caused by poor access to technology platforms and devices (Carolan et al., 2020).

The above factors could have contributed to an increase in the levels of anxiety and stress of nursing students, a population typically considered at greater risk of developing these conditions (Rafati et al., 2017). Evidence indicates that both the clinical and academic environments are the main sources of stress for students (Savitsky et al., 2020). Key clinical stressors include complex interpersonal relationships with colleagues and educators, challenges of the clinical environment (Chen et al., 2015), and the emotional burden involved when dealing with patient suffering, trauma, or death (Sancar et al., 2018). Academic stressors include heavy study loads, rigorous exams, and constant pressure to achieve a high-grade point average (Bhurtun et al., 2021).

The added challenges of unexpectedly and rapidly introduced online nurse education at the onset of the COVID-19 pandemic may have aggravated an already known situation (Savitsky et al., 2020). Students' concerns regarding the impact of online learning on their academic progression and their fear of being infected with COVID-19 during their clinical placements should not be ignored. While students should endeavour to manage their stress and anxiety, to avoid influencing their health status, academic performance, and their role expectations as future nurses (Rafati et al., 2017), it is also incumbent upon educators, health services, and regulators to examine the situation, identify risks and, where appropriate, introduce and evaluate mitigating interventions.

A recent study conducted by Kochuvilayil et al. (2021) investigated the impact of the COVID-19 pandemic in terms of knowledge, anxiety, academic concerns, and preventative behaviours between two groups of undergraduate nursing students in India and Australia. The authors suggested that culture plays an important role in how nursing students experience and cope with the "new normal" represented by the pandemic. The study findings provided some insight into how additional support from universities could help undergraduate nursing students to adapt themselves to a new lifestyle and to achieve academic success. However, further research is required to identify the main determinants of anxiety related to the study environment in nurse education, in order to inform the design both of teaching activities and clinical learning experiences in nurse education which support students' learning and well-being.

Thus, this study aimed to explore the main determinants of anxiety in nurse education, by taking into account the main factors of the study environment at the classroom and clinical level after the second wave of the COVID-19 Pandemic.

3. Methods

3.1. Research question

The research question of this study is: what are the main determinants of anxiety in nurse education considering the clinical and the classroom learning environments, after the second wave of the COVID-19 Pandemic?

3.2. Design and setting

A cross-sectional multicentre study was carried out from April to July 2021, after the second wave of the COVID-19 pandemic, by disseminating an online survey among Italian nursing students from ten universities in central and southern Italy and islands.

3.3. Study population

Participants were recruited with a convenience sampling approach involving formal and informal student networks. A snowball sampling approach was adopted to further disseminate the online survey among other nursing students. Inclusion criteria were nursing students attending the first, second, and third year of the Bachelor of Nursing. Overall, $n = 842$ nursing students participated in the study.

3.4. Ethical considerations

National and European laws (The European Parliament and the Council of the European Union EU, 2016) have been adopted to ensure data confidentiality. The online survey was designed according to the Code of Ethics of the American Association for Public Opinion Research (AAPOR, 2021). Participation was voluntary and in compliance with the standards of informed consent, data confidentiality, and anonymity (The European Parliament and the Council of the European Union EU, 2016). Due to the type of data collected, the data collection approach, and the design of the study, neither administrative nor ethical approvals were necessary (Ministero della Salute, 2013). Administrative authorizations were obtained from the participating universities. The survey platform was password protected and access also involved two-step authentication. Participants received details about the study's aim, procedure, and information on how their data would be handled.

3.5. Study procedures and data collection

An online survey approach was implemented in LimeSurvey. A CAPTCHA system was adopted to prevent inappropriate access to the survey by internet-bots; a cookies recording system was adopted to prevent duplicated or multiple imputations from the same user's device (Dillman et al., 2009).

The survey was disseminated in May 2021, two reminders were sent to the target population fifteen and thirty days after the first survey dissemination.

3.6. Instrument description

A 37-items questionnaire was designed including the following sections:

i. *Characteristics of the sample*: gender, age, geographical area, year of education. Students were also asked to provide information on their living arrangements and ~~on~~ their state of employment.
ii. *Anxiety levels*: The Self-Rating Anxiety Scale (SAS), a 20-item self-report frequency scale was adopted. The original version of the scale has been tested as a 1-factor scale (Zung, 1971). Some authors reported a 4-factor structure, so the latter was also tested (Olatunji et al., 2006). Items were rated on a 4-point Likert-scale ranging from 1="none or a little of the time" to 4="most or all of the time". Items included both negative and positive experiences, with the latter being reverse scored (items 5, 9, 13, 17 and 19). Less anxious individuals had lower total scores. The score was then converted to the "Anxiety Index" score as described in the original study: scores equal to 38 or above indicate anxiety (Dunstan and Scott, 2020).
iii. *Concerns about the altered study environment*: The 11-item Altered Student Study Environment Tool (ASSET) (Kochuvilayil et al., 2021) was used. ASSET comprises three subscales: attending clinical placement (3 items); completion of clinical placement (4 items); grade attainment (4 items). Items were rated on a Likert scale of agreement ranging from one (totally agree) to five (totally disagree). Items were reversed according to the author's guidelines to ensure that higher scores reflected greater concerns. The internal consistency for the total ASSET was $\alpha = 0.83$ and for the three factors "attending clinical placement", "completion of clinical placement" and "grade attainment" was 0.92, 0.77 and 0.71, respectively (Kochuvilayil et al., 2021).

3.7. Content validity

A forward and backward translation process has ensured the content validity of the research instruments. The original English versions of the SAS and ASSET scales were translated into Italian by two researchers. The researchers reached a common agreement on the Italian translation of the original versions; no cultural adaptation of the items or deletion was necessary. The preliminary Italian version was blindly back-translated into English by a native English speaker. Finally, the original English version and the English back-translated version were blindly compared by another researcher. A panel of four Italian expert nurses and five nursing students independently verified the content equivalence of the two versions and thus the content validity of the Italian translation (Maneesriwongul and Dixon, 2004).

3.8. Sample size

To properly perform data analyses, it was recommended to achieve a participant-to-item ratio from 10:1 to 20:1 (Kline, 2015). Accordingly, the required sample size ranged from 310 to 620 participants. The ASSET and SAS scale's items were compulsory to fill so as to maximize statistical power and avoid missing data management.

3.9. Data analysis

Data were analyzed with Stata v12 (StataCorp, 2011). Descriptive statistics were calculated to describe sample, scales' items, and factors. A comparison of the mean values (ANOVA) across the years has been performed to identify possible statistical differences. A linear regression model was performed to identify the main determinants of anxiety by considering the three factors of the ASSET. The regression model was, then, performed also for each year of study, to detect any difference in the determinants of anxiety for each specific nursing student year group. The statistical significance was set at a p-value <0.05.

3.9.1. Psychometric testing: reliability and validity

Cronbach's alpha was adopted to test scales' reliability. Values >0.90 are considered excellent, values >0.70 and ≤ 0.90 good, values >0.60 and ≤ 0.70 acceptable, and values ≤ 0.60 non-acceptable (DeVellis, 2016). Construct validity has been tested by performing a Confirmatory Factor Analysis (CFA). Fit indices were calculated to confirm the model's validity. Those indices are considered acceptable for RMSEA (root mean square error of approximation) and SRMR (standardized root mean residual) <0.08, and based on a CFI (comparative fit index) and TLI (Tucker-Lewis Index) >0.90 (Byrne, 2016).

4. Results

4.1. Characteristics of the sample

The participants ($n = 842$) were located in the centre (54.9 %) and the south or islands (45.1 %) of Italy and were mainly female (76.6 %) with a mean age of 22.7 ± 4.0 years. Table 1 summarizes the sample's characteristics.

4.2. Nursing students' anxiety levels

Descriptive statistics for the SAS scale revealed a mean total raw SAS score of 39.97 ± 9.25 and a mean value of 50.07 ± 11.57 for the "Anxiety Index" in the whole sample. Overall, 745 students (88.5 %) reported an Anxiety Index equal to or over the threshold. No statistical differences were identified across the year levels for either the SAS score or the anxiety index (respectively $p = 0.46$ and $p = 0.45$). Table 2 reports the descriptive statistics for the scales.

Cronbach's alpha value of 0.88 was reported for SAS scale reliability. The CFA supported both the 1-factor and 4-factor structure for the SAS

Table 1
Overall characteristics of the sample.

Characteristics	N (%)
Overall sample	842 (100.0)
Mean age ± SD	22.7 ± 4.0
Gender	
Male	197 (23.4)
Female	645 (76.6)
Year	
1st	223 (26.5)
2nd	243 (28.9)
3rd	376 (44.6)
Geographical area	
Centre	462 (54.9)
South or islands	380 (45.1)
Living arrangements	
Alone	53 (6.3)
With family	597 (70.9)
In a house with other students	182 (21.6)
In university accommodation	10 (1.2)
Employment status	
Not employed student	722 (85.7)
Part-time student	94 (11.2)
Full-time student	26 (3.1)

Table 2
Descriptive statistics – scales' scores (overall and by year).

Scale	Overall (n = 842)	1st year (n = 223)	2nd year (n = 243)	3rd year (n = 376)	ANOVA by year
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	F, p-value
SAS – total	39.97 ± 9.25	39.92 ± 8.79	40.55 ± 9.93	39.61 ± 9.05	F = 0.77 p = 0.46
Anxiety index	50.07 ± 11.57	50.00 ± 10.99	50.83 ± 12.45	49.62 ± 11.32	F = 0.81 p = 0.45
ASSET – total	2.96 ± 1.30	2.90 ± 0.67	3.02 ± 0.65	2.94 ± 0.72	F = 1.81 p = 0.17
• Factor 1: attending clinical placement	2.43 ± 1.07	2.38 ± 0.95	2.39 ± 1.07	2.48 ± 1.13	F = 0.78 p = 0.46
• Factor 2: completion of clinical placement	3.57 ± 0.96	3.47 ± 0.94	3.67 ± 0.97	3.56 ± 0.97	F = 2.74 p = 0.07
• Factor 3: grade attainment	2.74 ± 0.85	2.74 ± 0.88	2.85 ± 0.86	2.68 ± 0.82	F = 2.80 p = 0.06

scale's validity to a similar extent. The former showed the following fit indices: RMSEA = 0.097, SRMR = 0.062, TLI = 0.734, CFI = 0.762. The 4-factor structure: RMSEA = 0.088, SRMR = 0.062, TLI = 0.784, CFI = 0.814.

4.3. Nursing students' concerns about the altered study environment

Descriptive statistics revealed an overall mean value for the ASSET scale of 2.96 ± 1.30. The highest mean score, indicating greatest concerns, was detected for the "completion of clinical placement" factor (3.57 ± 0.96), while the lowest mean score was reported for the "attending clinical placement" factor (2.43 ± 1.07). Participants reported a mean score of 2.74 ± 0.85 in the "grade attainment" factor. Descriptive statistics revealed higher scores for both the ASSET scale and its factors among the 2nd year students. Only the "attending clinical placement" factor showed higher scores among the 3rd year students. No significant statistical difference was identified between the years (Table 2).

The overall internal consistency for the ASSET scale was 0.82 and the Cronbach's alpha values for subscales ranged from 0.76 to 0.91.

The results of the CFA supported the multifactorial structure of the ASSET scale. The 3-factor model was tested and verified by fit indexes: RMSEA = 0.082 (90%CI = 0.073–0.091), SRMR = 0.054, TLI = 0.933, CFI = 0.950.

4.4. Nursing students' anxiety determinants related to the study environment

Consistent with the main aim of the study and the similar fit indexes of the SAS scale, the 1-factor structure and the "Anxiety Index" score have been adopted as dependent variable for the regression model. The linear regression model revealed that 19 % of the variance in anxiety was explained by nursing students' academic concerns relating to the altered study environments ($R^2 = 0.19$, $F_{3,838} = 64.37$, $p < 0.001$). The factor "grade attainment" was a positive and highly significant predictor of nursing students' anxiety (β=0.42, $p < 0.001$) in the total sample. "Grade attainment" was also a highly significant determinant of anxiety in each year: first-year students reported a beta-value of 0.30 ($p < 0.001$), second-year students of 0.54 ($p < 0.001$) and third-year students of 0.37 ($p < 0.001$) students. "Completion of clinical placement" was statistically significant only for first-year students (β=0.14, $p = 0.047$) (Table 3).

5. Discussion

This study highlighted the need to manage concerns about altered study environments and promote the psychological well-being of nursing students. In detail, we identified the "grade attainment" factor as the main predictor of students' anxiety across the years and in the overall sample. Furthermore, the first-year students also reported "completion of clinical placement" as a determinant of anxiety.

5.1. Nursing students' anxiety levels

Nursing students represent a population at increased risk of anxiety (Savitsky et al., 2020). A fair level of stress is motivating (Bodys-Cupak et al., 2019), whereas high levels of anxiety undermine the learning, clinical practice and quality of life (Rafati et al., 2017).

Students who perceive their learning environment negatively employ a surface approach to learning (Kyndt et al., 2014). It is, therefore, crucial to create a positive educational environment that promotes a deep approach to learning (Cano et al., 2018).

Regarding nursing students' anxiety levels, in this study a large proportion of students (88.5 %) experienced anxiety. Previous findings (Zukhra et al., 2021), reported that 35.3 % of the students demonstrate anxiety. Anxiety is a multi-faceted phenomenon, and it covers a variety of symptoms, both psychological and somatic. Previous research has shown that nursing students employ several coping strategies both positive and negative, depending on their circumstances (McCarthy et al., 2018), such as talking with friends, playing sports, crying, ignoring stress, and alcohol use.

Therefore, interventions to address nursing students' anxiety should be aimed at treating anxiety symptoms at different levels. In this regard,

Table 3
Linear regression model: ASSET's factors on Anxiety. Overall parameters and by year of attendance.

Year	ASSET factors[a]	β	CI 95 %	SE	t	p-Value	R^2 – F *p-value* (model)
Overall (n = 842)	Factor 1: attending clinical placement	0.01	−0.01–0.03	0.01	0.42	0.677	$R^2 = 0.19$
	Factor 2: completion of clinical placement	0.03	−0.01–0.07	0.02	0.98	0.325	$F_{3,838} = 64.37$
	Factor 3: grade attainment	0.42	0.38–0.46	0.02	12.50	<0.001	$p < 0.001$
1st year (n = 223)	Factor 1: attending clinical placement	0.03	−0.03–0.09	0.03	0.53	0.594	$R^2 = 0.15$
	Factor 2: completion of clinical placement	0.14	0.08–0.20	0.03	1.99	0.047	$F_{3,219} = 13.11$
	Factor 3: grade attainment	0.30	0.24–0.36	0.03	4.37	<0.001	$p < 0.001$
2nd year (n = 243)	Factor 1: attending clinical placement	−0.09	−0.13 to −0.05	0.02	−1.69	0.092	$R^2 = 0.30$
	Factor 2: completion of clinical placement	0.02	−0.04–0.08	0.03	0.28	0.780	$F_{3,239} = 34.72$
	Factor 3: grade attainment	0.54	0.48–0.60	0.03	9.75	<0.001	$p < 0.001$
3rd year (n = 376)	Factor 1: attending clinical placement	0.10	0.06–0.14	0.02	1.92	0.056	$R^2 = 0.16$
	Factor 2: completion of clinical placement	−0.01	−0.05–0.03	0.02	−0.17	0.866	$F_{3,372} = 23.24$
	Factor 3: grade attainment	0.37	0.32–0.42	0.03	7.13	<0.001	$p < 0.001$

Dependent variable: Anxiety Index (SAS scale).
[a] Independent variables.

telepsychology, delivered through telephones, interactive videoconferencing, and virtual forums (Joint Task Force for the Development of Telepsychology Guidelines for Psychologists, 2013), could be used to ensure continuous support to nursing students. Indeed, a growing body of evidence supports the effectiveness of digital technologies for anxiety management, enabling diagnostic screening, treatment and psychoeducation (Zhou et al., 2020). These kinds of interventions are consistent with promoting coping strategies to manage psychological symptoms (Rafati et al., 2017).

5.2. Nursing students' concerns about the altered study environment

The COVID-19 pandemic has forced rapid remodelling of classroom and clinical learning environments (Sahu, 2020), raising concerns among nursing students about their academic progression (Kochuvilayil et al., 2021). As regards the nursing students' concerns about the altered study environment, this study reports different levels of concern according to the different years and factors of the ASSET scale, especially for the second- and third-year students. Participants reported low concerns about attending clinical placement, confirming the results of a previous study (Carolan et al., 2020), which showed that nursing students decided to take risk of being exposed to the infection in order to complete their studies. The value of clinical placements should be commensurate with nursing students' safety and the ethical issue of exposing them to the risk of COVID-19 infection.

Instead, the greatest concern was for the completion of clinical placement, which is a mandatory requirement for academic progression. Clinical experience plays a pivotal role in the learning process of nursing students, as it enables the application of theoretical knowledge in a real environment, the development of technical skills and patient-nurse relationships, as well as the professional identity and role modelling (González-García et al., 2020).

Nursing students also showed concerns about the impact of the Pandemic on grade attainment, this finding is consistent with previous research (Son et al., 2020). This concern could stem from the awareness that academic performance is crucial to students' future success (Shirazi and Heidari, 2019). Academic success is a complex construct (Mthimunye and Daniels, 2019), encompassing achievement of the academic and learning outcomes, which was compromised by the Pandemic (Elsalem et al., 2021).

5.3. Nursing students' anxiety determinants related to the study environment

This study also provided some results on the main determinants of anxiety related to the study environment. The largest contribution to anxiety was from concerns about grade attainment and the completion of the clinical placement. However, differences emerged across the three years of the course: in addition to concerns about grade attainment, exclusively for first-year students, the completion of the clinical placement was a significant determinant of anxiety and this result is similar to other research findings (Rafati et al., 2017). It is important to underline that, at the time of the data collection, nursing students have not yet started their clinical placement, so they were likely to be more worried about the opportunity to achieve their learning outcomes. This is not surprising given that the first-year students need clinical placement to adjust into their role as future nurses, and, in particular, their first clinical experience represents a relevant moment for their professional role modelling (Tomietto et al., 2020).

Instead, for the second- and third-year students, only the "grade attainment" factor was a significant predictor of anxiety levels. In particular, for second-year students, the "grade attainment" factor predicted a greater impact on anxiety levels, compared to third-year students. The higher perception of anxiety among second-year students is supported by previous findings, as the second-year is perceived as being the most challenging (Mthimunye and Daniels, 2020). Overall, the uncertainty about how long this pandemic will last increases the focus on promoting the nursing students' well-being. The recent challenges on the development of new educational conditions in a "new normal" environment, must consider the students' anxiety and academic concerns, and manage these conditions in a structured and continuous manner.

5.4. Strengths and limitations

First, convenience sampling was used, therefore, the generalization of results should be considered with caution. Second, the data were collected from a sample of Italian students, so they could be biased by national epidemiological context and national regulations. Furthermore, the cross-sectional design support associations between variables, but do not allow the determination of a causal effect.

Nevertheless, the strength of this multicenter study is the large sample size that allows good representativeness of Italian nursing students. The online mode and conducting the study at the same time as the second wave of COVID-19 mitigated any recall bias, allowing student perceptions to be captured in real-time.

It is possible to further develop this research area by focusing on the specific factors of anxiety, so to develop tailored interventions and support for students.

6. Conclusions

The results of this study showed a high prevalence of anxiety and academic concerns among nursing students during the pandemic. Findings suggested that concerns related to altered classroom and clinical environments predict nursing students' psychological well-being. In order to promote academic progression, even in unexpected and destabilizing situations such as a pandemic, nursing educators should design teaching activities and clinical learning experiences so to allow the dynamic adaptation of the learning environments to the context and plan contextual interventions to ensure students' well-being and clinical learning.

6.1. Relevance to nurse education

This study highlights the core elements to support nursing educators in promoting nursing students' clinical learning. Nursing students face considerable challenges in their academic journey, amplified by destabilizing situations such as the pandemic. Recognizing the roots of nursing students' anxiety is a crucial step in addressing effective interventions to ensure academic success and students' well-being. It might be useful to plan a smooth transition to clinical learning environments by providing pre-clinical activities, such as virtual reality and simulation-based learning.

The academic institutions together with the healthcare organizations should contribute to seeking strategies that preserve clinical learning environments from possible further disruptions, for example by arranging educational wards or identifying those clinical competencies in which simulation could safely replace actual clinical learning environments.

Future efforts should be oriented towards the integration of continuous psychological support models such as telepsychology.

Declaration of competing interest

The authors have no conflict of interests to declare.

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Author contributions

Conceptualization, Methodology: Valentina Simonetti, Dania Comparcini and Giancarlo Cicolini. Software and data analysis: Marco Tomietto. Data curation, Writing, Original draft preparation: Valentina Simonetti and Dania Comparcini, Data collection: Stefano Marcelli. Visualization, Investigation: Giancarlo Cicolini. Supervision: Marco Tomietto, Geoffrey L. Dickens and Katlego Mthimunye. Writing: Valentina Simonetti and Dania Comparcini. Reviewing and Editing: Marco Tomietto, Geoffrey L. Dickens and Katlego Mthimunye.

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