



Research article

Reinforcement during the COVID-19 pandemic: Perception of nursing students and impact on intention to drop-out of nursing education

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ABSTRACT

Background: Although the COVID-19 pandemic's impact on students has already been studied, its impact on nursing students' perception of their training and their conception of their future profession is unknown.

Aims: To describe nursing students' perception of their involvement in reinforcement during the COVID-19 pandemic and the impact of working as reinforcement staff during the COVID-19 pandemic on nursing students.

Design: Cross-sectional, comparative case/non-case study.

Setting: nurse training institutions in France.

Participants: "Cases" defined as nursing students who worked as reinforcement staff during the COVID-19 pandemic; "non-cases" defined as people who were in final year of nursing studies in 2018–2019 or 2019–2020 and so did not work as reinforcement staff during their nursing studies.

Methods: questionnaire about representations of the nursing profession, role of the nurse in society, previous thinking of dropping out of nursing education.

Results: 534 subjects included (310 cases; 214 non-cases). Cases reported feeling useful (38.6%) or very useful (25.7%) as reinforcement workers, while 91.5% concurred that nurses had an important role in the management of COVID-19 patients. Cases more frequently reported that the nursing profession is one where you save lives (61.5% vs 52.5%, $p = 0.05$). The desire to work as a nurse for a whole life had been more frequently expressed by cases (45.3% vs 34.8%, $p = 0.05$). Nursing education drop-out has been considered by 63.4% of subjects, without difference between "cases" and "non-cases" ($p = 0.63$). Subjects who considered dropping out of nursing education were younger ($p = 0.01$) and less often prone to think that the nursing profession was a profession personally rewarding ($p = 0.01$) and a life-saving profession ($p = 0.03$).

Conclusion: The majority of nursing students reported feeling useful during the pandemic, and underlined the importance of the nurse's role in management of COVID-19 patients. Participation

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in reinforcement staff during the pandemic had no influence on dropping out of nursing education.

1. Introduction

Healthcare systems in western countries are experiencing a relative shortage of nurses [1]. It is a major challenge to train sufficient numbers of professional nurses. The number of students accepted into nurse training programmes is generally sufficient to cover public health needs. However, it is challenging to ensure that students do not drop-out of their nursing education before qualification [2], and further, to ensure that they actually enter the nursing profession after graduation.

The worldwide healthcare crisis brought on by the COVID-19 pandemic has affected the professional identity of nursing students. Indeed, it has polarized the depth of feeling among students in nurse training programmes, towards either an increased motivation to continue, or an increased determination to drop-out. Increased levels of anxiety and impaired sleep have been reported, especially in those in the earliest years of training (first-year students), and may negatively influence the students' desire to continue their studies [3,4]. The lack of personal protective equipment and fear of being infected were shown to be significantly associated with higher levels of anxiety [5]. More generally, healthcare professionals expressed the feeling that the public did not adequately acknowledge the personal sacrifices made by the healthcare professions during the pandemic [6]. In addition, triaging of patients, difficulties providing end-of-life care, and having to deal with frequent deaths were all factors that took their toll on the motivation of nursing students [7]. The impact of the COVID-19 pandemic on students has been studied from various angles: online courses during confinement [8], isolation [9], a study of internships during the pandemic which showed no difference in terms of student commitment to their studies [10], and finally a study of the resilience of student nurses during this period [11].

In France, during the first wave of the COVID-19 pandemic (from 6 April to June 30, 2020), students enrolled in nurse training programmes were allowed to participate in the bolstering of the healthcare services by working as reinforcement staff; i.e. they were put to work in healthcare establishments to help to face the massive influx of patients and to cover for absent staff. Staff reinforcement is understood to mean support work for care teams entrusted to student nurses, such as: reception and orientation, information and guidance for the public, location of care assistants (depending on the level of study), assistance with daily care (washing, feeding, personal hygiene and hygiene of the premises), stretchering, monitoring of clinical parameters, clinical surveillance. This work activity was taken into account for their training in lieu of the clinical rotations included in the training programme and which form a key element in maintaining motivation among trainee nurses [12]. The mentoring of students during their clinical rotations is a fundamental contributor to retention of student nurses. The mentors and teachers encountered during these placements play a central role in rendering the students autonomous as nurse professionals, thereby contributing to their academic success [13,14]. The feeling of being welcomed by and related to the professional team [10], supervision of the student's work and provision of psychological support [15] are all teaching behaviours that tend to minimize dropouts.

Dropouts during nursing education are frequent [16,17]. In France, around 20% of those who enter nurse training programmes dropout before completion. The factors associated with dropouts in nursing studies have been widely investigated. Individual factors identified include emotional burnout, which is reinforced by the practice of care with COVID-19 patients [18], and not having any family members in the health professions who could provide emotional or instrumental support [19,20], or financial support [21]. Further factors include a poor understanding of the outset of what the nursing profession factually entails [22], a poor understanding of the nurse's role in contemporary society [15,23], a mismatch between student expectations of their future profession and the reality of professional activity [22]. Individual factors related to the physical or mental characteristics of the students have also been shown to have an impact on the pursuit of nursing studies, such as the ability to manage stress or stressors related to the mode of learning [24, 25], self-esteem [26], a propensity towards pessimism [27], work conditions that are too physically or mentally demanding [26], burnout [28] and personal health problems [9,29]. Other factors, related to the educational institution and the delivery of the nursing education have also been implicated in dropouts, such as the feeling of not being valued, communication and operational factors [30], satisfaction with the teaching, interest in the course [31], frequent exposure to violence [32], and working conditions that the students find difficult [33].

The importance of a balanced training between theory and practice was particularly highlighted during the COVID-19 pandemic, where nursing students faced unprecedented challenges, demonstrating the need for thorough and rigorous preparation to handle complex care situations. The aims of this study were therefore to describe perception of nursing students concerning reinforcement during the pandemic and the impact of working as reinforcement staff during the pandemic on their perception of nursing profession and on their thinking of dropping out of nursing education.

2. Methods

2.1. Study design and population

We performed a cross-sectional, observational, descriptive and comparative case/non-case study in 7 nurse training institutions (Instituts de Formation en Soins Infirmiers, IFSI) in the Champagne-Ardenne region of France between 1st April and May 30, 2021.

Cases (i.e. those who worked as reinforcement staff during the pandemic) were defined as nursing students who were in their second or third year of nursing during the 2020–2021 academic year, who were registered in one of the 7 participating nursing schools,

who had worked as reinforcement staff during the first wave of the pandemic whatever the sector they worked in, and who accepted to participate in the present study. Nursing students who were in their first year of nursing in the 2020–2021 academic year, nursing students who did not work as reinforcement staff during the first wave of the COVID-19 pandemic and nursing students who did not agree to participate in the study were not included.

Non-cases (i.e. those who did not work as reinforcement staff while still students) were defined as nursing students who were in their last year of studies (whether they graduated or not) in the 2018–2019 or 2019–2020 academic years (who were therefore no longer nursing students during the COVID-19 pandemic) from the same 7 participating nursing schools, and who accepted to participate in the present study. Participation in the study was proposed regardless of professional activity performed during the COVID-19 pandemic and regardless of professional status at the time of the study (non-cases could or could not be practicing nurses at the time of the study). Non-cases who did not agree to participate in the study were not included.

The nursing education system in France, organized within Nursing Training Institutes (Instituts de Formation en Soins Infirmiers, IFSI), is characterized by an equal division of hours between theoretical teachings and clinical internships, over the three years of the program. Candidates, primarily high-school graduates (or equivalent), are selected on the basis of their academic record and personal motivational for a diverse and targeted admission. The curriculum, incorporating various disciplines such as nursing sciences, biology, and human, social, and legal sciences, is designed to develop a comprehensive understanding of the many facets of the nursing profession. The clinical internships, evenly balanced with theoretical teachings, allow students to apply their knowledge in practice and become familiar with the professional environment. This education is strengthened by a close partnership with universities, granting the State Diploma in Nursing at bachelor's degree level. This academic dimension ensures recognition and valorization of the nursing pathway, aligning France with international standards for nursing education.

2.2. Data recorded

Each nursing school provided the list of eligible participants (i.e. cases and non-cases). A questionnaire was sent to all eligible participants by email, with automatic reminders at 2 and 4 weeks. The study questionnaire was composed of questions devised by a team of nurses, nursing teachers, health economists, public health physicians and a data manager/statistician, based on the literature and own professional and personal experience. The questionnaire was comprised of four closed questions about the individual (gender, age, highest diploma obtained), six closed questions about their work as reinforcement staff during the COVID-19 pandemic (for cases only; namely the sector they worked in, the feeling of personal utility, and the general feeling of utility among nurses during the pandemic); three closed questions about their representations of the nursing profession and the role of the nurse in society; one closed question about whether or not they had previously considered dropping out of their studies; and two closed questions about their future career plans.

2.3. Ethical considerations

Participation in the study was voluntary, and subjects had to agree to take part (by answering "yes" to the question "I agree to participate in the study") in order to complete the questionnaire. The questionnaire was prepared using the LimeSurvey® platform, and data were stored at the University of Reims Champagne-Ardenne (France). All data were anonymous. Data management was in compliance with current French legislation and the European General Data Protection Regulation (GDPR), as well as the French national data privacy commission (loi Informatique et Libertés du 6 Janvier 1978 modifiée en 2018). As the study was based on anonymized data and purely observational, it was exempt from Institutional Review Board approval according to the French Public Health Code (L1121-1, law 2012–300, March 5, 2012). The study was registered with the public Health Data Hub under number F20211011112718.

2.4. Statistical analysis

Quantitative data are described as mean \pm standard deviation and categorical variables as number and percentage. Cases and non-

Table 1

– Characteristics of the 534 student nurses included in the study, according to whether they worked (cases) or did not work (non-cases) as reinforcement staff during the COVID-19 pandemic.

Variables	All N = 524	Non-Cases N = 214	Cases N = 310	Test statistic	p
Male	47/524 (9.0)	20/214 (9.3)	27/310 (8.7)	$\chi = 0.06$	0.80
Age, years (mean \pm SD)	27.3 \pm 7.2	28.7 \pm 7.2	26.3 \pm 7.1	t = 3.96	<0.0001
High school diploma				$\chi = 1.07$	0.78
– Professional baccalaureate	45/524 (8.6)	16/214 (7.5)	29/214 (9.3)		
– Technological baccalaureate	194/524 (37.0)	80/214 (37.4)	114/214 (36.8)		
– General baccalaureate	254/524 (48.5)	107/214 (50.0)	147/214 (47.4)		
– None	31/524 (5.9)	11/214 (5.1)	20/214 (6.4)		

Data presented as number (%) unless otherwise indicated.
SD, standard deviation.

cases were compared using the Student t-test, chi square or Fisher's exact test, as appropriate. Factors associated with the intention of dropping out of nursing education were investigated with univariate analysis (using Student t-tests and chi-square tests) and multivariate analysis (using logistic regression model including variables that yielded a value of $p < 0.20$ in univariate analysis). Using students with no intention of dropping out of nursing education, the odds ratios (ORs) with their corresponding 95% confidence intervals (Cis) were derived from the model as effect size. A p-value < 0.05 was considered statistically significant.

All analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC).

3. Results

Among a total of 664 eligible students across the 7 participating nursing schools (393 cases and 278 non-cases), a total of 524 (78.9%) accepted to participate and completed the questionnaire (310 cases and 214 non-cases). The characteristics of the respondents are described in Table 1. The majority were female (91.2%) and had obtained a general (47.6%) or technological (36.3%) high-school diploma. Non-cases were older than cases (28.7 ± 7.2 years versus 26.3 ± 7.1 ; $t = 3.96$, $p < 0.0001$).

Concerning the cases' work as reinforcement staff during the pandemic (Table 2), the majority (60.1%) worked on COVID-19 wards and had felt useful (38.6%) or very useful (25.7%) during their work stint. Overall, 91.5% of cases concurred that nurses played an important role in the management of COVID-19 patients, and 50.2% of them felt that they had personally played an important role.

The majority of cases (95.8%) expressed an intention to work as nurses after qualification. Among the non-cases, 96.0% of them were working as nurses at the time of the study. Regarding the representations of the nursing profession (Table 3), the majority of subjects thought that the nursing profession was a profession that is useful for society (78.0%), and personally rewarding (73.4%), while 54.0% agreed that nurses were sure to find a job; there was no significant difference between cases and non-cases ($\chi = 0.59$, $p = 0.44$, $\chi = 0.12$, $p = 0.73$ and $\chi = 1.78$, $p = 0.18$ respectively). Only a minority believed the nursing profession to be lucrative (4%) and valued by society (4%), with no difference between cases and non-cases ($\chi = 0.06$, $p = 0.80$ and $\chi = 0.75$, $p = 0.39$ respectively). Cases more frequently reported that nursing is a profession where one saves lives (61.5% vs 52.5% among non-cases, $\chi = 3.75$, $p = 0.05$). Society's view of the nursing profession and the position of nurses compared to other health professionals were both felt to be predominantly stable (59.8% and 66.7% respectively), with no difference between cases and non-cases ($\chi = 0.44$, $p = 0.80$ and $\chi = 2.49$, $p = 0.29$ respectively for society's view and the comparison of nurses to other health professionals). Forty percent of participants reported that they would like to work as nurses for their whole life; cases more frequently expressed this desire than non-cases (45.3% vs 34.8%, $\chi = 5.11$, $p = 0.02$). Half of all respondents (50.3%) reported that they had plans to progress in their career; this was more frequent among cases than among non-cases (57.0% versus 41.4% respectively; $\chi = 10.98$, $p = 0.0009$).

Dropping out of nursing education has been considered by 298 subjects (63.4% (95% CI, 60.0–68.7)), without significant difference between cases and non-cases (173/310 (65.3%) vs 125/214 (63.1%) respectively, $\chi = 0.23$, $p = 0.63$). Associated factors with intend to drop-out of nursing education are presented in Table 4. In multivariate analysis, subjects having considered to drop-out of nursing education were younger (26.7 ± 6.8 versus 28.1 ± 7.5 years, OR = 0.97 (0.94–0.99); $p = 0.01$) and thought less often that the nursing profession was a profession personally rewarding (69.8% versus 80.0%; OR = 0.56 (0.35–0.89); $p = 0.01$) and that nursing was a profession where one saves lives (54.7% versus 63.0%; OR = 0.63 (0.42–0.92); $p = 0.03$).

4. Discussion

The aim of this study was to describe the impact for nursing students, of working as reinforcement staff during the COVID-19 pandemic, as this abrupt and unanticipated professional experience was unprepared by either the students or the units that welcomed them. Our working hypothesis was that work experience acquired in such unprepared conditions might engender

Table 2
Description of the type of work performed as reinforcement staff during the pandemic and students' presentations.

Variables	Cases N = 310
Sector	
– Medico-social	125/271 (46.1)
– Medical sector – intensive care unit	24/271 (8.9)
– Medical sector – medical ward	111/271 (41.0)
– Rehabilitation/long-term care	11/271 (4.1)
COVID-19 ward	164/273 (60.1)
Feeling during COVID-19 pandemic	
– Not useful at all	11/272 (4.0)
– Slightly useful	32/272 (11.8)
– Moderately useful	54/272 (19.8)
– Useful	105/272 (38.6)
– Very useful	70/272 (25.7)
Intend to work as a nurse after qualification	254/265 (95.8)
Nurses generally had an important role in the management of COVID-19 patients	249/272 (91.5)
I personally had an important role in the management of COVID-19 patients	136/271 (50.2)

Data presented as number (%).

Table 3

Comparison of representations of the nursing professional and career plans between nursing students who worked (cases) or did not work (non-cases) as reinforcement staff during the COVID-19 pandemic.

Variables	All N = 524	Non-Cases N = 214	Cases N = 310	Test statistic	p
Intend to drop out of nursing education	298/463 (63.4)	125/198 (63.1)	173/265 (65.3)	$\chi = 0.23$	0.63
Representations of nursing profession					
– Useful for society	361/463 (78.0)	151/198 (76.3)	210/265 (79.2)	$\chi = 0.59$	0.44
– Personally rewarding	340/463 (73.4)	147/198 (74.2)	193/265 (72.8)	$\chi = 0.12$	0.73
– Lucrative profession	20/463 (4.3)	8/198 (4.0)	12/265 (4.5)	$\chi = 0.06$	0.80
– Valued by society	17/463 (3.7)	9/198 (4.5)	8/265 (3.0)	$\chi = 0.75$	0.39
– Profession where you are sure to find work	250/463 (54.0)	114/198 (57.6)	136/265 (51.3)	$\chi = 1.78$	0.18
– Profession where you save lives	267/463 (57.7)	104/198 (52.5)	163/265 (61.5)	$\chi = 3.75$	0.05
Position of the nursing profession in society				$\chi = 0.44$	0.80
– Has changed for the worse	74/463 (16.0)	33/198 (16.7)	41/265 (15.5)		
– Stable	277/463 (59.8)	120/198 (60.6)	157/265 (59.2)		
– Has changed for the better	112/463 (24.2)	45/198 (22.7)	67/265 (25.3)		
Position of the nursing profession vis-à-vis other healthcare professionals				$\chi = 2.49$	0.29
– Has changed for the worse	54/463 (11.7)	23/198 (11.6)	31/265 (11.7)		
– Stable	309/463 (66.7)	139/198 (70.2)	170/265 (64.1)		
– Has changed for the better	100/463 (21.6)	36/198 (18.2)	64/265 (24.1)		
Intend to work as a nurse all my life				$\chi = 5.11$	0.02
– Yes	189/463 (40.8)	69/198 (34.8)	120/265 (45.3)		
– No	274/463 (59.2)	129/198 (65.1)	145/265 (54.7)		
I plan to progress my career	233/463 (50.3)	82/198 (41.4)	151/265 (57.0)	$\chi = 10.98$	0.0009

Data presented as number (%).

dissatisfaction and stifle motivation among nursing students, thus exacerbating the desire to drop-out. Indeed, mentoring and supervision of nursing students was much less attentive and intense during the pandemic than it would be during traditional clinical rotations in non-pandemic times. The mentoring and supervision provided to trainee nurses during their work placements have been highlighted as a key element in the decision of nursing students to continue or drop-out [10], and this finding is mirrored in international literature on the subject [14]. Our study did not provide evidence in support of the hypothesis that the work experience would have negative consequences, since we did not observe any difference between cases and non-cases in the number of students who had thought about dropping out ($p = 0.63$). This lack of difference could be explained by the positive feelings experienced by cases about their role during the crisis. Indeed, 91.5% of them highlighted the importance of nurses in the management of COVID-19 patients, and more than half of them felt that they had personally been useful or very useful during their time working.

The motivation to enter the nursing profession is mainly intrinsic, and this is in line with the literature reporting that hospital nurses were more strongly motivated by intrinsic than by extrinsic factors [34]. In our study, the most frequently reported representations of the nursing profession were that it is a profession that is useful for society (78.0%), and a rewarding profession on a personal level (73.4%), and these opinions were irrespective of whether or not the students had worked as reinforcement staff during the pandemic. Students who did work during the pandemic (cases) tended to report more frequently that the nursing profession is one where you save lives. This may be explained by their experience working with severe COVID-19 patients. Indeed, almost 60% of the students who worked during the pandemic were on COVID-19 wards, where they likely witnessed many highly complex cases. Job security was also a factor cited by more than half of our participants, with no difference between cases and non-cases. This idea that nursing is a profession where qualified persons are sure to find work is reassuring for young adults who are trying to build their professional and personal lives. Extrinsic motivations to enter the nursing profession were limited, regardless of whether students had worked or not during the pandemic.

In our study, students who worked as reinforcements during the pandemic more frequently expressed the intention to work as nurses for all their lives, as compared to their non-case counterparts (45.3% vs 34.8%). This difference could be explained by the fact that the work experience gained during the pandemic enabled the students to improve their knowledge of the profession, and become aware of their important role in the patient's care pathway, in a pluri-disciplinary approach that is exclusively focused on their specific profession. Indeed, students working as reinforcement staff were frequently called upon to change jobs, as if they were already qualified, because there were staff shortages across the board, and the human resources for mentoring, supervision and teaching were in short supply.

The fact that students in training have a stronger desire to progress in their careers with further training could be explained by the fact that they are younger, likely with fewer family constraints. It is more difficult to take up new studies with a view to a career change when one is already working, with a family to care for, than it is to simply pursue higher studies when one is still a student [35].

The factors associated with the desire to drop-out of nursing studies did not depend on whether they participated in reinforcement or not during COVID-19 but on age. This factor may suggest an error of orientation or factors relating to the representation of the nursing profession. Two factors are intrinsic: the fact that they think they are going to save lives, which calls into question the image they had of the profession before starting training, and the fact that the profession is not personally rewarding, which calls into question the way in which these individuals seek personal fulfilment in their work.

The strengths of this study include the high rate of participation, both among cases and non-cases, and the comparison between

Table 4
Associated factors with intend to drop-out of nursing education.

Variables	Intend to drop out of nursing education		Test statistic	Crude p	Adjusted OR ^a (95% CI)	Adjusted p
	Yes N = 298	No N = 165				
Male	25/298 (8.4)	17/165 (10.3)	$\chi = 0.47$	0.49	–	–
Age, years (mean \pm SD)	26.7 \pm 6.8	28.1 \pm 7.5	t = 1.98	0.04	0.97 (0.94–0.99)	0.01
High school diploma			$\chi = 1.76$	0.62	–	–
– Professional baccalaureate	28/298 (9.4)	14/165 (8.5)			–	–
– Technological baccalaureate	115/298 (38.6)	56/165 (33.9)			–	–
– General baccalaureate	138/298 (46.3)	87/165 (52.7)			–	–
– None	17/298 (5.7)	8/165 (4.9)			–	–
Representations of nursing profession						
– Useful for society	229/298 (76.8)	132/165 (80.0)	$\chi = 0.61$	0.43	–	–
– Personally rewarding	208/298 (69.8)	132/165 (80.0)	$\chi = 5.66$	0.02	0.56 (0.35–0.89)	0.01
– Lucrative profession	16/298 (5.4)	4/165 (2.4)	$\chi = 2.23$	0.13	NS	NS
– Valued by society	13/298 (4.4)	4/165 (2.4)	$\chi = 1.13$	0.29	–	–
– Profession where you are sure to find work	166/298 (55.7)	84/165 (50.9)	$\chi = 0.98$	0.32	–	–
– Profession where you save lives	163/298 (54.7)	104/165 (63.0)	$\chi = 3.02$	0.08	0.63 (0.42–0.95)	0.03
Position of the nursing profession in society			$\chi = 4.40$	0.11	–	NS
– Has changed for the worse						
– Stable	51/298 (17.1)	23/165 (13.9)				
– Has changed for the better	184/298 (61.7)	93/165 (56.4)				
Position of the nursing profession vis-à-vis other healthcare professionals	63/298 (21.1)	49/165 (29.7)	$\chi = 1.30$	0.52	–	–
– Has changed for the worse	37/298 (12.4)	17/165 (10.3)			–	–
– Stable	201/298 (67.4)	108/165 (65.4)			–	–
– Has changed for the better	60/298 (20.1)	40/165 (24.1)			–	–
Worker as reinforcement staff during the COVID-19	176/298 (58.0)	92/165 (55.8)	$\chi = 0.23$	0.63	–	–

Data presented as number (%) unless otherwise indicated. CI = confidence interval; NS = non-significant; SD, standard deviation.

^a Factors with a p-value <0.20 in univariate analysis were included in a multivariate logistic regression model.

both groups, rather than a simple description of the students' experiences. However, as with all case/non-case studies, our study has some limitations. Firstly, the choice of non-cases was difficult. It was not possible to constitute a control group comprised of students from the same years who did not work as reinforcement staff, since practically all the students worked as reinforcements, and this would have resulted in a very small control group, thereby precluding robust comparison. We therefore chose to use as a control group the students from the two prior years of education, which may leave potential for bias. Indeed, the professional experience gained by the non-cases since they qualified undoubtedly influenced their responses. Even, they were the youngest to have dropped out of their studies, whether they are graduates or not, and they were instructed to respond regarding the representations they held at the time they were studying.

5. Conclusion

To meet healthcare needs during the first wave of the COVID-19 pandemic in France, student nurses were employed as reinforcement staff in French hospitals. This decision was made as an emergency response to the crisis and did not allow the welcoming wards to prepare adequately for receiving these students, as they would do for student nurses doing rotations in ordinary times.

Evaluating the motivation of nursing students to continue their nursing education and work in the nursing profession after qualification is of fundamental importance for health systems around the world. The healthcare crisis brought about by the COVID-19 pandemic, and the employment of student nurses as reinforcement staff to deal with the pandemic, does not appear to have significantly impacted their desire to continue or drop-out of their nursing education. However, students who worked as reinforcement staff during the pandemic appear to be able to better envisage their future career in nursing, as they more frequently reported the desire to work as nurses all their lives.

One of the main ways of reducing the attrition of nursing students is through guidance in higher education, to ensure that candidates for training are as fully informed as possible about the reality of professional nursing practice. A second point specifically related to the situation experienced by students on COVID-19 back-up would be to prepare students for the management of health crises and their consequences.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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CRediT authorship contribution statement

Maxime Thorigny: Writing – original draft, Formal analysis, Data curation, Conceptualization. **Pascal Didelot:** Supervision, Formal analysis, Conceptualization. **Leïla Bouazzi:** Formal analysis. **Bach-Nga Pham:** Writing – review & editing. **Coralie Barbe:** Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.heliyon.2024.e29316>.

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