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Italy and SARS-CoV-2: How Did the Newly Graduates in Health Professions React? Organizational Aspects and Psychological Implications

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Abstract

Introduction: The COVID-19 pandemic has had a significant impact on Italian new graduates in the health professions. This study investigated the impact of the pandemic on graduates' experiences with anxiety, depression, clinical placements, and employment readiness.

Methods: An anonymous online survey was conducted with 200 new graduates in the health professions. The survey collected data on graduates' experiences with anxiety, depression, clinical placements, and employment readiness.

Results: The survey results showed that there were significant disruptions in practical training for new graduates. Graduates also reported changes in their attitudes to patient care, and a significant number had difficulty finding work that matched their gained abilities.

Conclusion: The study findings suggest that universities and healthcare institutions need to adapt their training programs and support structures to accommodate the particular challenges that students in the health professions face during a pandemic. To assist effective transitions into the workforce, practical training opportunities should be maximized, mental health support services should be improved, and career counselling should be offered.

Implications for practice: The findings of this study have implications for the practice of teaching and supporting new graduates in the health professions. Universities and healthcare institutions need to be aware of the challenges that these graduates face, and they need to take steps to mitigate these challenges. By providing comprehensive support to new graduates, universities and healthcare institutions can help to ensure that these graduates are well-prepared to enter the workforce and to provide high-quality care to patients.

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Introduction

A new viral illness known as Coronavirus disease (COVID-19), which first appeared in China in December 2019, has since spread quickly over the world until the World Health Organization proclaimed it to be a pandemic [1]. Italy is among the several nations that have taken urgent public health measures because of the epidemic's quick expansion and mortality, which are proving to be higher than in prior outbreaks [2][3].

Those with a teaching mission confront the additional issue of combining the educational requirements and safety of trainees with those of providing patient care as healthcare systems are ready to care for a wave of afflicted patients. Health professions schools frequently delay classroom instruction and clinical rotations due to concerns about student wellbeing [4]. Italian universities have urged training programs to provide graduating students flexibility if they may have been excluded from clinical rotations due to safety considerations [5].

Previous research has demonstrated that the population has gone through times of dread and panic with a subsequent

psychological impact in the cases of severe acute respiratory syndrome (SARS) in 2003 and H1N1 flu in 2009. Previous SARS and H1N1 outbreaks have shown how health care professionals, especially those who are at the frontline of patient treatment, are the most impacted subjects in the field of their psychological well-being [6][7]. Depression, stress, and worry are common emotional responses to a pandemic [8].

Psychological distress among medical professionals during severe acute respiratory syndrome (SARS) developed gradually. Fear and anxiety appeared right away and subsided in the early stages of the epidemic, but depression, psycho-physiological symptoms, and post-traumatic stress symptoms persisted for a long time, having profound effects [9]. Trauma is frequently brought on by being alone, doing dangerous jobs, and coming into touch with contagious individuals [10].

However, when looking at the university setting, emergency response receives minimal focus during basic education, and faculty members express feeling unprepared to instruct students on this subject [11].

First-line responders treating COVID-19 patients include healthcare students and professionals, who run a significant risk of infection due to exposure to exhausting, lengthy shifts required to achieve daily health standards. Numerous studies on the mental health of medical and nursing students have been carried out in various nations, but there has so far been little information on the issues that the health professions faced during the COVID-19 pandemic in Europe [12][13][14][15][16][17][18][19].

Therefore, the goal of this study was to assess how COVID-19 affected new graduates in the health professions by measuring the severity of anxiety and depressive symptoms and their effects on clinical placement.

Material and Methods

Descriptive observational research was carried out. The online survey (Table 1) was created in an anonymous format using Google Modules, and it will be sent between 24 September 2021 and 7 July 2022.

Table 1. Full text of the survey

Survey	
Questions (Q)	Answers
1.1 Age range	20-24
	25-30
	31-35
	36-40
	>40
1.2 Gender	Female

	Male
<p>1.3 Degree Course in Health Professions:</p>	<p>Cardiocirculatory Pathophysiology and Cardiovascular Perfusion Technician</p> <p>Dietitian</p> <p>Health Care Assistant</p> <p>Medical Laboratory Technician</p> <p>Physiotherapist</p> <p>Psychiatric Rehabilitation Technician</p> <p>Radiographer or Radiotherapy Technician</p> <p>other</p>
<p>2.1 Academic year of graduation</p>	<p>2018-2019</p> <p>2019-2020</p> <p>2020-2021</p> <p>2021-2022</p> <p>2022-2023</p>
<p>2.2 Since the start of the COVID-19 pandemic, how many hours of practical training have been replaced by online training (online courses, synchronous and asynchronous FADs, etc.)?</p>	<p>None</p> <p>Less than 10%</p> <p>25% - 50%</p> <p>50%</p> <p>50% - 75%</p> <p>75% - 100%</p>
<p>2.3 Since the start of the COVID-19 pandemic, how long has the practical training been interrupted?</p>	<p>Never</p> <p>Less than 1 month</p> <p>1-2 months</p> <p>2-3 months</p> <p>3-4 months</p> <p>4-5 months</p> <p>5-6 months</p> <p>More than 6 months</p> <p>1 year</p> <p>More than a year</p>
	<p>1 2 3 4 5</p>

2.4 Since the start of the COVID-19 pandemic, has time spent at home helped you manage the study?	1 2 3 4 5 (not at all) (a lot)
2.5 How much did the COVID-19 pandemic affect your university career?	1 2 3 4 5 (not at all) (a lot)
2.6 Have you ever contracted the SARS-COV-2 virus?	Yes No I don't know
2.7 Did you get vaccinated against SARS-COV-2?	Yes No I haven't had the chance yet
2.8 Since the start of the COVID-19 pandemic, has your approach to the patient changed?	1 2 3 4 5 (not at all) (a lot)
2.9 Since the start of the COVID-19 pandemic, have you had a molecular swab and / or serological test regularly?	Yes No
2.10 After the start of the COVID-19 pandemic, has the mentoring activity by Clinical Tutors / Placement Guides changed?	1 2 3 4 5 (not at all) (a lot)
2.11 Did the COVID-19 pandemic delay your graduation?	1 2 3 4 5 (not at all) (a lot)
3.1 Do you feel ready to face the labour market?	1 2 3 4 5 (not at all) (a lot)
3.2 Did you found a job requiring the skills acquired with the degree?	Yes No Yes, but I was afraid of contracting the SARS-COV-2 virus and I refused Yes, but I was afraid of contracting the SARS-COV-2 virus and / or infecting friends and family, so I refused Yes, but I prefer a job position away from the healthcare world missing

3.3 After the start of the COVID-19 pandemic, were you afraid of contracting the SARS-COV-2 virus?	1 2. 3 4 5 (not at all) (a lot)
4.1 After the start of the COVID-19 pandemic, were you afraid of contracting the SARS-COV-2 virus during your clinical training practice?	1 2. 3 4 5 (not at all) (a lot)
4.2 After the start of the COVID-19 pandemic during the placement, were you afraid to transmit the SARS-COV-2 virus to friends and / or family?	1 2. 3 4 5 (not at all) (a lot)
4.3 After the onset of the COVID-19 pandemic, did the PPE make available by the healthcare facility / degree course make you feel safe in the relationship with colleagues and patients?	1 2. 3 4 5 (not at all) (a lot)
4.4 After the onset of the COVID-19 pandemic, did you experience anxiety during your clinical training?	1 2. 3 4 5 (not at all) (a lot)
4.5 After the onset of the COVID-19 pandemic, did you go through depressive states during your placement?	1 2. 3 4 5 (not at all) (a lot)
4.6 After the start of the COVID-19 pandemic, did you regret taking a college course in the Health Professions?	1 2. 3 4 5 (not at all) (a lot)

To achieve the study's goal, we investigated how COVID-19's health emergency affected students enrolled in Bachelor of Health Professions degree programs (except nurses and obstetricians).

The questionnaire is made up of four parts. The first part of the questionnaire collected sociodemographic information, namely: gender, age divided into 5 age classes, Degree Course attended, academic year of graduation. The second part contains questions about professional internship as hours of practical training interrupted or replaced by online training, how the pandemic affects university career, approach to the patient or mentoring activities by Placement Guides. The third part investigates the level of preparation to face the labour market and whether the possible recruitment coincided with the skills acquired. The fourth part investigated the psychological aspects regarding the fear of infecting oneself or friends / family, the degree of anxiety and depression felt and the possible repentance in choosing a course in the health professions. The closed-ended questions included a 5-point scale, where the value "0" indicates "never" and "5" indicates "a lot".

Only university students attending the third year or recent graduate in Health Professions in Italy, were invited to this survey. The questionnaire was advertised by the authors through their Facebook and Instagram pages in different public groups.

Collected data were entered and statistically processed in an Excel sheet. Socio-demographic information of the student population were presented as numbers and percentages for categorical variables, while differences existing according to the gender and different Degree Course in Health Professions were assessed with the t-test for independent samples. Furthermore, to evaluate the statistical significance among the answers obtained grouped by age groups, by degree course and by year of attendance course, the Kruskal-Wallis test and the Chi2 test were used for the IES-R scale.

Each student participated voluntarily in the study and his data were treated in respect of their privacy.

The participation to the on-line questionnaire contains an explicit consent.

Results

All the results of the survey are shown in Table 2 and Table 3; 396 students answered the online survey, of which 66.50% are female (Question 1.2). 83.88% of the students are aged up to 24 years, 13.10% between 25 and 30 years, 0.76% are respectively aged 31-35 years and 36-40 and 1.51% are older than 41 years (Q 1.1). 245 are Radiographers or Radiotherapy Technician students, 56 are Physiotherapists, 39 are Medical Laboratory Technicians, 18 are Health Care Assistants, 6 are respectively Psychiatric Rehabilitation Technicians and Cardiocirculatory Pathophysiology and Cardiovascular Perfusion Technicians, 2 are a Dietitians while 25 were part of other professional profiles. 4.53% of the respondents attend the academic year of graduation in 2018-2019, 21.16% in 2019-2020, 36.27% in 2020-2021, 34.26% in 2021-2022 and 3.78% students graduated in the 2022- 2023 academic year (Q 1.3).

Table 2. Socio-demographic characteristics of students (Question 1.1-2.1)

Characteristics	n; (%)
Gender:	
Female	264 (66.50%)
Male	132 (33.50%)
Class of Age (years):	
20-24	333 (83.88%)
25-30	52 (13.10%)
31-35	3 (0.76%)
36-40	3 (0.76%)
>41	6 (1.51%)
Degree Course:	
Radiographer or Radiotherapy Technician	245 (61.71%)
Physiotherapist	56 (14.11%)
Medical Laboratory Technician	39 (9.82%)
Health Care Assistant	18 (4.53%)
Psychiatric Rehabilitation Technician	6 (1.51%)
Cardiocirculatory Pathophysiology and Cardiovascular Perfusion Technician	6 (1.51%)
Dietitian	2 (0.50%)
Other	25 (6.30%)
Academic year of graduation:	
2018-2019	18 (4.53%)
2019-2020	84 (21.16%)
2020-2021	144 (36.27%)
2021-2022	136 (34.26%)
2022-2023	15 (3.78%)

Table 3. Answers to the survey (Question 2.2-4.6)

	None	< 10%	25%-50%	50%	50%-75%	75%-100%					
2.2	123 (30.98%)	161 (40.55%)	69 (17.38%)	12 (3.02%)	10 (2.52%)	22 (5.54%)					
	Never	< 1 m	1-2 m	2-3 m	3-4 m	4-5 m	5-6 m	> 6 m	1 y	> 1 y	
2.3	43 (10.83%)	34 (8.56%)	62 (15.62%)	78 (19.65%)	51 (12.85%)	39 (9.82%)	34 (8.56%)	26 (6.5%)	15 (3.78%)	15 (3.78%)	
	Yes	No	I don't know								
2.6	73 (18.39%)	304 (76.57%)	20 (5.04%)								
	Yes	No									
2.7	397 (100.00%)	0									
2.9	298 (75.06%)	99 (24.94%)									
	Yes	No	Yes. but I was afraid of contracting the SARS-COV-2 virus and I refused		Yes. but I was afraid of contracting the SARS-COV-2 virus and / or infecting friends and family, so I refused		Yes. but I prefer a job position away from the healthcare world		Missing		
3.2	144 (36.36%)	186 (46.97%)	0		6 (1.52%)		3 (0.76%)		57 (14.39%)		
	1 (a little)	2	3	4	5 (a lot)	Missing					
2.4	75 (18.89%)	45 (11.34%)	112 (28.21%)	102 (25.69%)	63 (15.87%)	0					
2.5	39 (9.82%)	78 (19.65%)	124 (31.23%)	105 (26.45%)	51 (12.85%)	0					
2.8	69 (17.38%)	78 (19.65%)	146 (36.78%)	81 (20.40%)	23 (5.79%)	0					
2.10	104 (26.20%)	120 (30.23%)	106 (26.70%)	45 (11.34%)	22 (5.54%)	0					
2.11	240 (60.45%)	63 (15.87%)	39 (9.82%)	38 (9.57%)	14 (3.53%)	3 (0.76%)					
3.1	20 (5.04%)	75 (18.89%)	96 (24.18%)	134 (33.75%)	72 (18.14%)	0					
3.3	34 (8.56%)	92 (23.17%)	99 (24.94%)	106 (26.70%)	66 (16.62%)	0					
4.1	78 (19.65%)	87 (21.91%)	123 (30.98%)	65 (16.37%)	41 (10.33%)	3 (0.76%)					
4.2	37 (9.32%)	47 (11.84%)	83 (20.91%)	117 (29.47%)	108 (27.20%)	5 (1.26%)					
4.3	17 (4.28%)	43 (10.83%)	142 (35.77%)	141 (35.52%)	54 (13.60%)	0					
4.4	168 (42.32%)	130 (32.75%)	56 (14.11%)	28 (7.05%)	15 (3.78%)	0					
4.5	243 (61.21%)	66 (16.62%)	54 (13.60%)	16 (4.03%)	18 (4.53%)	0					
4.6	324 (81.61%)	27 (6.80%)	31 (7.81%)	9 (2.27%)	6 (1.52%)	0					

123 students reported no change in the load of in-person internship hours, 161 flagged up that less than 10% of practical internship hours had been replaced by online internships, 69 respondents report a percentage between 25 and 50%, 12 report a percentage of 50%, 10 students state that the percentage was between 50% and 75%, and 22 students state that all practical training was conducted online (Q 2.2; Fig. 1). For 43 students there were no pauses in practical training, while 34 respondents reported suspensions of shorter than a month. 62 and 78 students report 1-2 month and 2-3 months internship activity gaps, respectively. 51 and 39 respondents reported interruptions of 3-4 months and 4-5 months, respectively, while 34 and 26 students reported disruptions of 5-6 months and more than 6 months. 15 respondents say the practical internship was suspended for a year and 15 students say it lasted longer (Q 2.3).

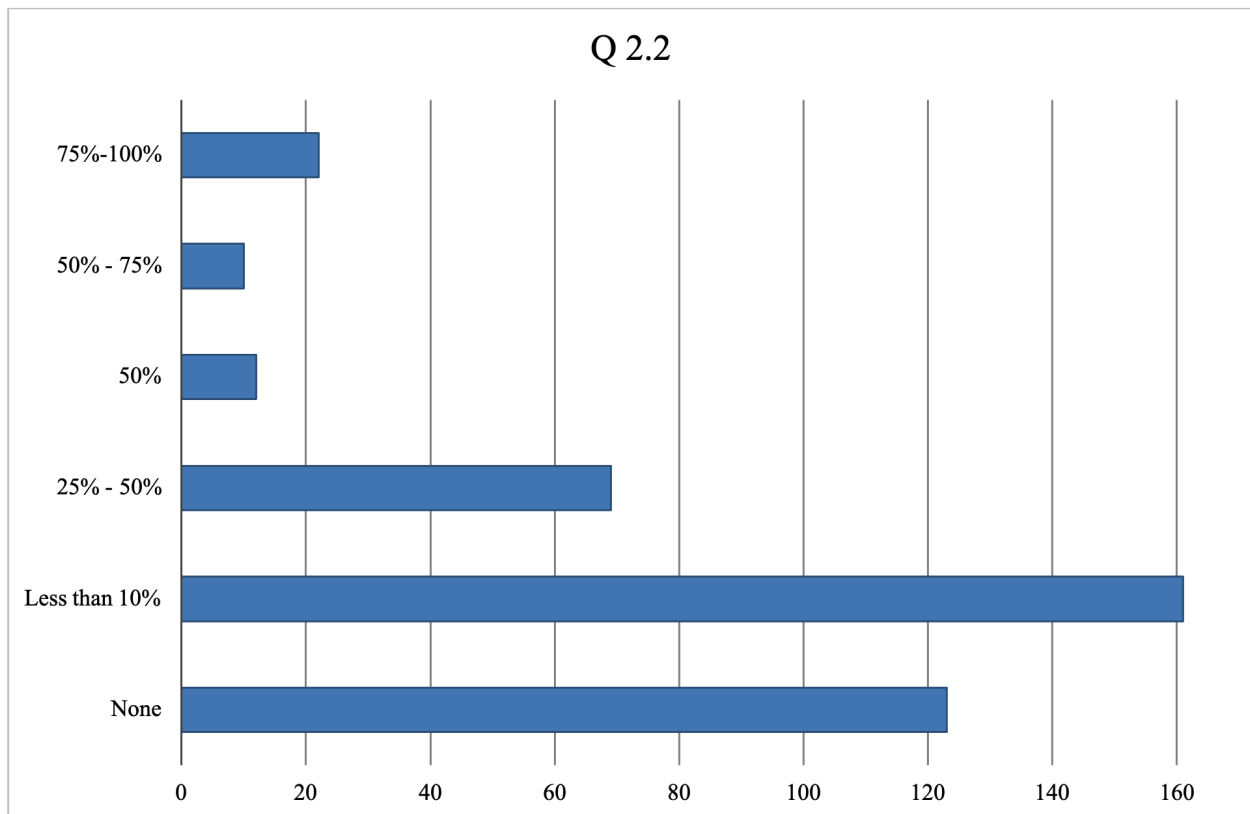


Figure 1. Answers to question 2.2. More than 70% of students report less than 10% of practical training have been replaced by online training; on the other hand, a non-negligible number (5.54%) reports conversion over 75%.

The time spent in lockdown or semi-lockdown did not help 18.94% of the students who identified with a minimum value of 1 on a Likert scale of 1 to 5; 11.34%, 28.21% and 25.76% of the interviewees report scores of 4, 3, and 2 respectively; 15.91% of the students say they have found benefit from the obligation to stay at home (Q 2.4). The COVID-19 pandemic has had a significant impact on the university careers of 51 students; values of 4, 3, and 2 on the scale were reported by 105, 124 and 78 interviewees, respectively, while 39 students do not believe that their academic career is affected by pandemic events (Q 2.5).

Among those interviewed, 18.14% have caught the SARS-COV-2 virus, 77.27% have not, and 4.55% were unsure (Q 2.6), despite the fact that all respondents had been immunized against SARS-COV-2 as required by Italian regulations (Q 2.7). The COVID-19 epidemic has significantly altered the approach of 24 students; values of 4, 3, and 2 on the scale were reported by 78, 146 and 78 interviewees, respectively, while 69 did not mention changes in their approach to the patient (Q 2.8).

Since the start of the COVID-19 pandemic, 75.00% of the students have done the molecular swab and/or serological test on a regular basis, whereas 24.94% have done it occasionally or never (Q 2.9).

The introduction of COVID has had no effect on the clinical tutoring activities of 105 students: 120, 105 and 45 respondents report Likert scale scores of 4, 3, and 2 correspondingly. 22 students consider that the Internship Guides' approach to the student has changed a lot, 45, 106 and 120 (Q 2.10). Among the interviewees, 15 (3.79%) report that the

COVID-19 pandemic has delayed graduation; 39 (9.82%), 36 (9.09%) and 63 students (15.91%) assigned the question a score of 4, 3 and 2 respectively.

For 240 students (60.61%) the events did not have an impact on the timescales for obtaining the degree. 3 people (0.76%) did not complete the answer (Q 2.11).

72 students (18.18%) felt ready to face the world of work; 136 (34.34%), 96 (24.18%) and 75 students (18.94%) assigned the question a score of 4, 3 and 2 points respectively on the scale. 18 students (4.55%) did not consider themselves sufficiently prepared to approach the working landscape (Q 3.1).

After graduation, 144 students (36.36%) found a job within the skills acquired; 6 respondents (1.52%) found it but, being afraid of contracting the SARS-COV-2 virus and/or of infecting friends and relatives, refused. 3 people (0.76%), despite having found a job, preferred a job far from the healthcare world. 186 recent graduates (46.97%) did not find employment in the acquired profile. None of the respondents (0.00%) selected the option "Yes, but I was afraid of contracting the SARS-COV-2 virus and I refused". 57 (14.39%) students did not answer the question (Q 3.2). After the start of the COVID-19 pandemic, 33 respondents (8.33%) felt no fear of contracting the SARS-COV-2 virus. 93 (23.48%), 99 (24.94%) and 105 (26.45%) and 66 students (16.67%) respectively expressed their fear with a value equal to 2, 3, 4 and 5 (Q 3.3).

If the previous question is placed in the reality of internship the answers are respectively: 78 (19.65%) for the value 1, 87 (21.91%) for the 2, 120 (30.23%) for the 3, 66 (16.62%) for 4 and 39 (9.82%) for 5. 6 respondents (1.52%) did not answer (Q 4.1). During the practical training activity, 108 students (27.27%) were afraid of transmitting the SARS-COV-2 virus to friends and/or family members. 117 (29.47%), 78 (19.65%) and 48 interviewees (12.12%) expressed their fear respectively with a value equal to 4, 3 and 2; 36 (9.09%) report that they have not felt concern in this sense. 9 people (2.27%) did not fill in the answer (Q 4.2). After the start of the COVID-19 pandemic, 15 people (3.79%) did not feel safe in the relationship with colleagues and patients using personal protective equipment (PPE) made available by the health facility or by the Course of study. 45 (11.34%), 141 (35.61%) and 141 (35.61%) and 54 respondents (13.64%) expressed their insecurities respectively with a value equal to 4, 3, 2 and 1 (Q 4.3). Among the answers, 15 students (3.79%) declare that they have experienced states of anxiety during their practical training. 27 (6.82%), 57 (14.39%) and 129 people (32.58%) respectively expressed these feelings with a value equal to 2, 3 and 4. 168 respondents (42.42%) did not report no state of anxiety (Q 4.4). If the previous question refers to depressive states, the answers are respectively: 243 (61.36%) for the value 1, 66 (16.62%) for the 2, 54 (13.64%) for the 3, 15 (3.79%) for the 4 and 18 (4.55%) for the 5 (Q 4.5). 324 students (81.82%) did not regret having undertaken a university course in the field of Health Professions. 27 (6.82%), 30 (7.58%) and 9 people (2.27%) respectively expressed these feelings with a value of 2, 3 and 4. 6 students (1.52%) experience feelings of regret for the choice of university career taken (Q 4.6).

Discussion

Most students who replied to the questionnaire were under 24 years of age (83.88%), in line with the data available on

AlmaLaurea for the year 2021 ^[20]. Women represent 66.50% of the total, comparable to the national one^[20].

Most of the questionnaires (61.71%) were completed by Radiographers; Physiotherapists and Medical Laboratory Technicians were 14.11% and 9.82% respectively. In subsequent statistical evaluations Health Care Assistants (4.53%), Cardiocirculatory Pathophysiology and Cardiovascular Perfusion Technicians (1.51%), Psychiatric Rehabilitation Technicians (1.51%), Dietitian (0.50%) were merged into the "other" class (6.30%) which therefore leads to several 57 (14.36 %).

A large part (70.53%) of the students who answered the questionnaire graduate in 2020-21 and 2021-22; these are therefore students who have lived most of their university experience during the pandemic. However, 38.04% of the interviewees have not yet graduated at the time the answers are compiled; this may affect some questions asked later, particularly Q 3.2. 4.53% experienced the pandemic only marginally, if they graduated in the spring graduation session of the 2018-'19 academic year. For statistical analysis, it was determined to separate the students into those who also had pre-pandemic experience (2018-2019,2019-2020, and 2020-2021) and those who hadn't (2021-2022 and 2022-2023).

The amount of internship hours converted into 'distance learning' was generally kept below 10% (71.54%) while just 11.08% claimed to have replaced more than 50% of the hours worked. Taking into consideration the year of graduation, students who graduated before 202-2021 demonstrate slightly higher percentages of total hours converted to online mode (calculated average 18,59 VS 13,05). (Fig. 1)

The first pandemic wave (February-May 2020) was temporally placed in a period in which internship activities were often planned; it is therefore foreseeable that it may have greatly influenced the amount of training carried out by students in the second semester of the 2019-2020 Academic Year.

Interruptions of less than 3 months (54.66%) are justifiable by the initial bilateral reluctance in organizing the practical internship before knowing the pandemic in detail. The second wave (September-December 2020), the third (December 2020-May 2021), and the continuation of the pandemic should have found the Study Programs and the host Healthcare Structures ready to welcome the students; an interruption of more than one year is reported in only 15 cases (3.78%). The students had the right to study properly and, not a negligible consideration, these practitioners find themselves facing the healthcare world without the indispensable skills that can be acquired during practical training. (Fig. 2)

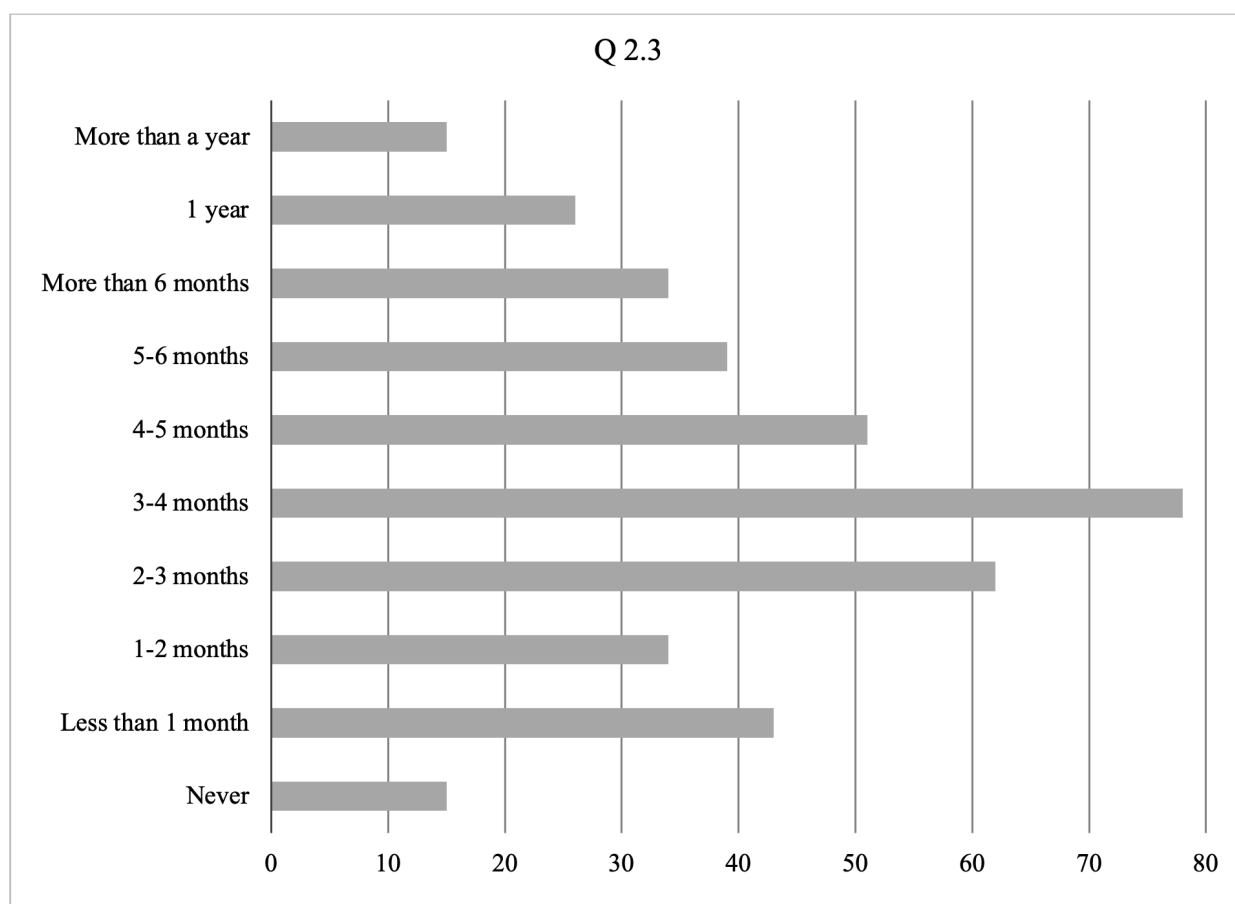


Figure 2. Answers to question 2.3. The interruptions in practical training have been different; they were of various sizes with a generally Gaussian trend settling around the central value of 3-4 months.

Interruptions in practical training are also reported in the literature with widely varying ranges from area to area ^{[21][22]}; on some occasions, clinical training has been replaced or supplemented with simulation/virtual laboratory experiences in hospital or university settings or with online activities in varying percentages ^[23].

Most of the respondents (76.57%) did not contract the SARS-CoV-2 virus; this value appears to be slightly higher than some of the data found in the literature, which, however, only consider the possibility of being infected during the period of clinical training, prevalence of infection that were extremely different and where health surveillance systems were less stringent than in Italy ^[24]. This percentage appears slightly higher than the Italian population (60.46%)^{[25][26]}; this can be traced back to a more careful application of the containment measures, even if the exposure of the students of the Health Professions Courses is certainly greater than the general population.

100% of respondents were vaccinated against SARS-COV-2 due to the Italian vaccination obligation for healthcare workers; in other legislative contexts, students have been found to be more reluctant to be vaccinated, with percentages of potential adherence varying widely, generally exceeding 50% ^{[23][27]}.

75.06% of respondents carried out the molecular swab and/or serological test regularly, probably because they attended health facilities where close surveillance of employees was carried out. It should be noted that 87% of Medical Laboratory Technicians regularly had a molecular swab compared to 79% of Radiographers, 63% of Physiotherapists and 61% of

other professions.

Even though students evaluated it quite high (mean 3.08), there is no apparent trend as to whether spending more time at home may have contributed to studio management. Those who have lived all their training experience during the pandemic appear to benefit slightly more from time spent at home (2.76VS 3.28, $\text{Chi}^2=24.7134$ p-value=0.000057 significance level of 0.01). (Fig. 3) It is reported in the literature that students could occasionally feel overloaded with work during semesters attended remotely but were still able to organise their time for teaching activities [28]; the data does not seem to detect a precise trend, as for the sample we analysed, suggesting how individual student characteristics may influence their time management ability. Between our respondents, female students are better able to manage their time and performance (3.14VS 2.98, $\text{Chi}^2=13.8449$ p-value=0.007807 significance level of 0.01) [29].

Analysing how much the pandemic seems to have affected the university career of the interviewees, the data seem to have a Gaussian trend (mean 3.13) with no substantial differences between the various subgroups except for the professional profile where Physiotherapists and Medical Laboratory Technicians seem to have been more influenced than Radiographers and other professions (3.66-3.15-3.04-2.96, $\text{Chi}^2=54.9446$ p-value<0.00001 significance level of 0.01). (Fig. 3)

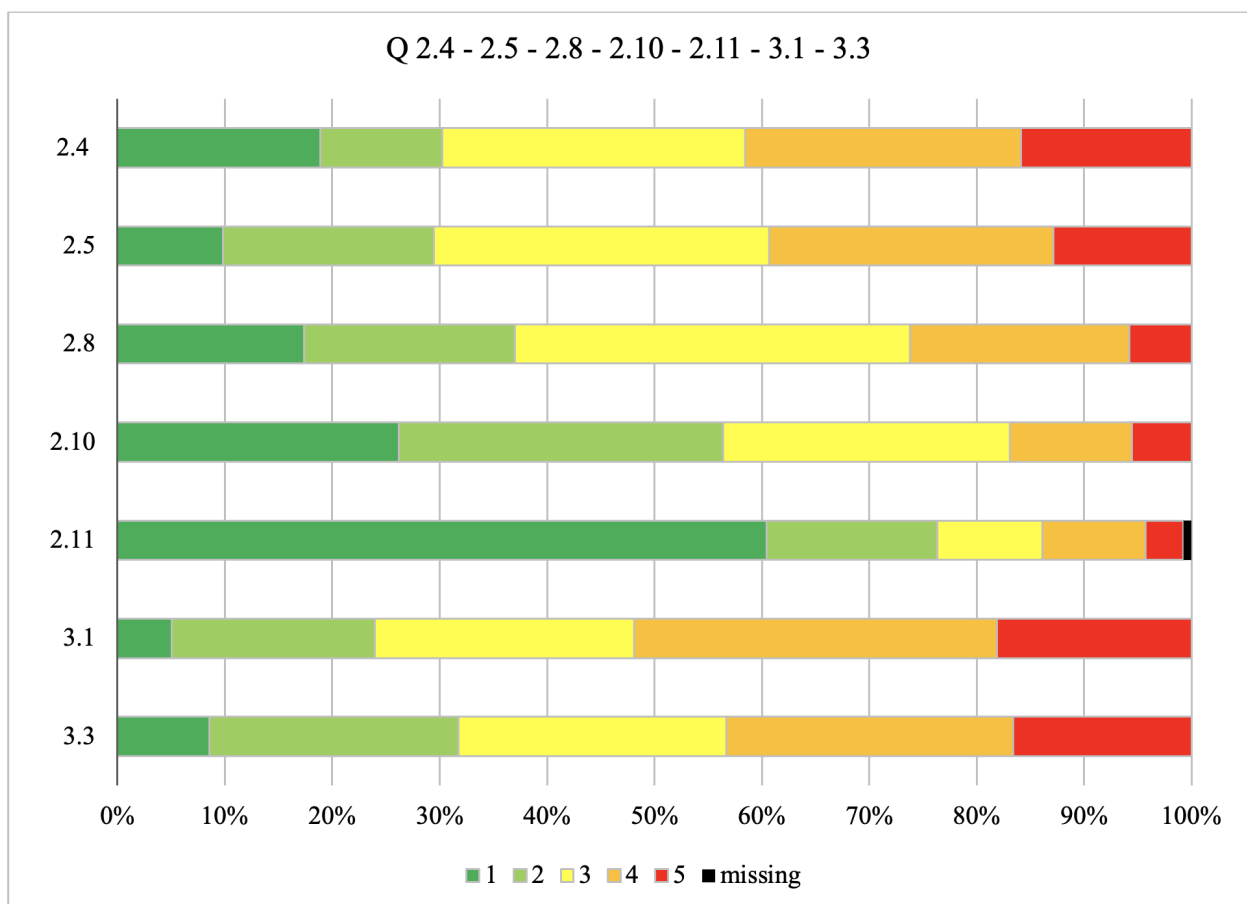


Figure 3. Answers to questions 2.4 - 2.5 - 2.8 - 2.10 - 2.11 - 3.1 and 3.3. It should be noted that the maximum value of the scale [5] is rather rarely assigned; the evaluations for item 2.10 (relationship with the traineeship guides) and 2.11 (delay in completing the course) were particularly low.

Observing the change in approach with the assisted person since the beginning of the pandemic, the answers seem to settle around a value of 3 and have a normal trend. It is therefore undeniable that some students perceived a change in their overtures; physical contact or even the mere co-presence in the same room had to be heavily reduced to minimize the contagion. Women showed some more changes (2.86VS 2.61, $\text{Chi}^2=26.8243$ p-value=0.000022 significance level of 0.01). Physiotherapists report significant differences in the approach to the assisted person compared to Radiographers and other professions but above all to Medical Laboratory Technicians (3.04-2.88-2.82-2.00, $\text{Chi}^2=40.2967$ p-value=0.000064 significance level of 0.01), however, it should be noted how sporadic are the opportunities for Italian Medical Laboratory Technicians to meet patients. (Fig. 3)

The changes in attitude by the trainee guides were perceived as minimal (values 1 and 2) for 56.42% of the interviewees; only 16.88% reported important changes (scores 4 and 5). However, if we take into consideration the two statistical classes, we detect statistically significant differences; students who started their academic career in the pre-pandemic era have a little higher average assessment of the item (2.43VS 2.34, $\text{Chi}^2=42.2194$ p-value<0.00001 significance level of 0.01). The professional profile also shows a statistically significant trend of difference; in particular, the average is significantly lower for the Medical Laboratory Technicians and the Radiographers compared other professions and Physiotherapists (2.31-2.38-2.44-2.48, $\text{Chi}^2=67.0391$ p-value<0.00001 significance level of 0.01). (Fig. 3)

Only for 13.10% of the interviewees (value 4 and 5) the pandemic seems to have had a major impact on the timing of graduation. Pre-pandemic enrolled students seem to have delayed less (1.57VS 2.11, $\text{Chi}^2=33.8062$ p-value<0.00001 significance level of 0.01). (Fig. 3)

Overall, the students felt quite ready to face the world of work (23.93% valued the item 2 or less), data comparable with those in the literature for radiographers and nurses ^{[30][31]}. It would be interesting to compare this data with the level prior to the advent of COVID-19 but Italian data in this sense are not found in the literature. The male students felt more prepared to face the working reality (3.25VS 3.74, $\text{Chi}^2=44.4631$ p-value<0.00001 significance level of 0.01).

Physiotherapists feel less ready than other professions and Radiographers but especially compared to Medical Laboratory Technicians who feel significantly more confident (2.75-3.37-3.49-3.95, $\text{Chi}^2=48.9633$ pvalue< 0.00001 significance level of 0.01). (Fig. 3)

48.36% of the interviewees did not find a job within the skills acquired during their studies; this outcome is certainly invalidated by graduates following the completion of the questionnaire. Therefore, taking into consideration and commenting on the data excluding these classes, 51.63% of the interviewees found a job within the skills acquired during their studies while 36.59% reports that they are unemployed. Only one student reports that they refused because they were afraid of contracting the SARS-COV-2 virus and/or of infecting friends and relatives; only one interviewee prefers a job far from the healthcare world, demonstrating the strong motivation of students to become healthcare professionals. Nobody answered that they had refused a job in the professional profile because they were concerned about the idea of contracting the SARS-COV-2 virus themselves. (Fig. 4)

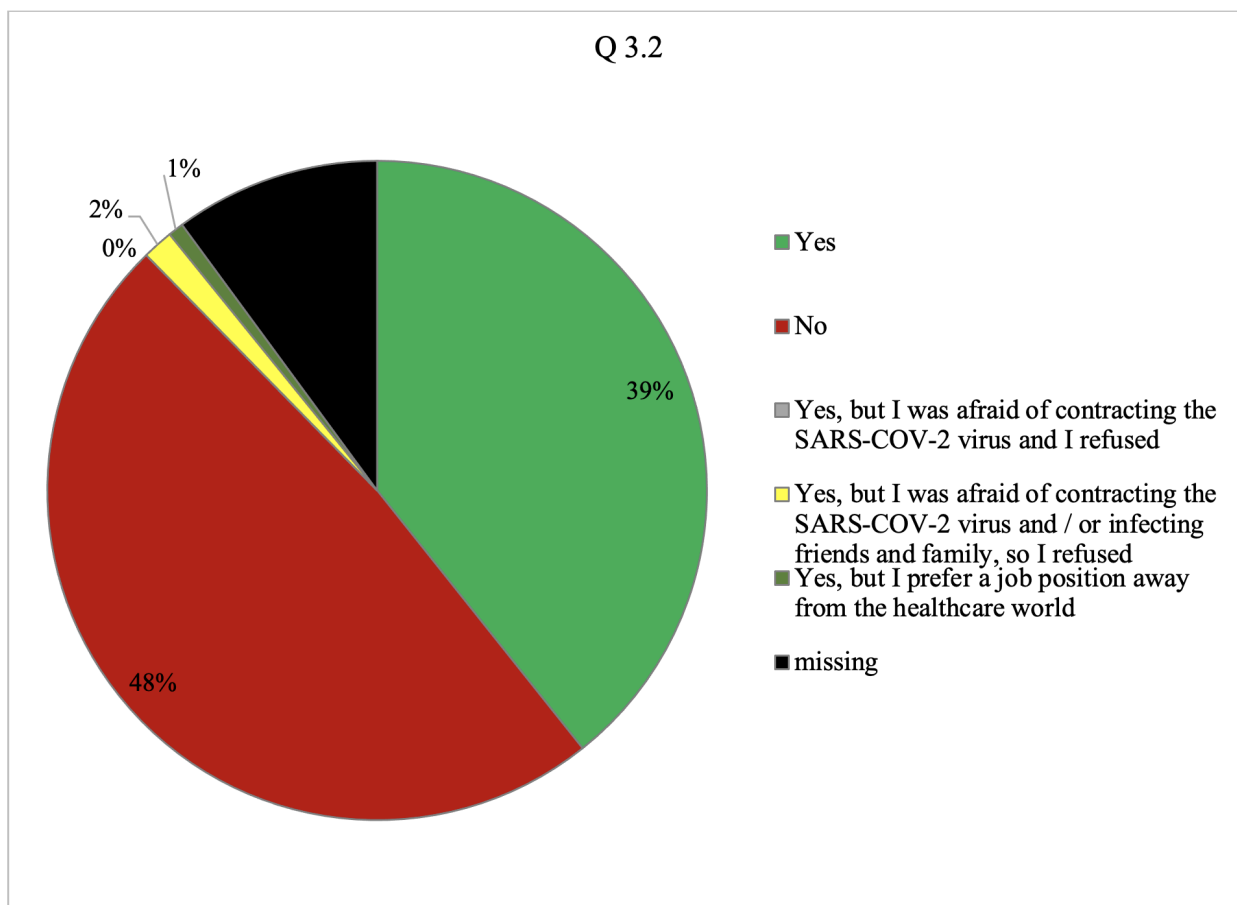


Figure 4. Answers to question 3.2. Half of the students did not find a job after completing their training. Only a minimal number found it but preferred to give it up because they were frightened by the hypothesis of infecting their loved ones or because they chose to move away from the healthcare world. However, despite the pandemic experience as students, a good portion of them decided to exercise the chosen professional profile.

As expected, the students turned out to be quite intimidated by the possibility of contracting the SARS-COV-2 virus; 16.62% considered themselves extremely worried, the data collected is not always found in the literature where extremely discordant percentages are reported [21][23][24][28]. If, on the other hand, the fear of contagion during practical training is taken into consideration, the percentages vary significantly as 10.33% considered themselves very concerned although with lower percentages of concern than other previously analysed samples [23]. Other professions and Radiographers feel more at risk compared to Physiotherapists and Medical Laboratory Technicians (2.87-2.86-2.45-2.15, Chi2=46.7021 p-value<0.00001 significance level of 0.01). The difference in answers to these two questions is statistically significant; the fear of contracting the virus outside the training environment was significantly higher (3.20VS 2.76, Chi2=35.6806 p-value<0.00001 significance level of 0.01), demonstrating how much PPE and the organization of internships made them feel safer than the environment outside the healthcare context. Students proved that they were afraid of transmitting the virus to friends and/or family members with 27.20% of those interviewed feeling extremely worried. Younger students were more concerned than older ones in this regard (3.59VS 3.03, Chi2=41.153 p-value<0.00001 significance level of 0.01). Comparing concern about infecting themselves versus their family members or friends, respondents were significantly more anxious in the latter case (2.76VS 3.50 Chi2=79.3048 p-value<0.00001 significance level of 0.01). (Fig.

5) Even in the literature, the worry of infecting one's loved ones rather than oneself has been reported as a recurring element [21][23][24][28][29][30].

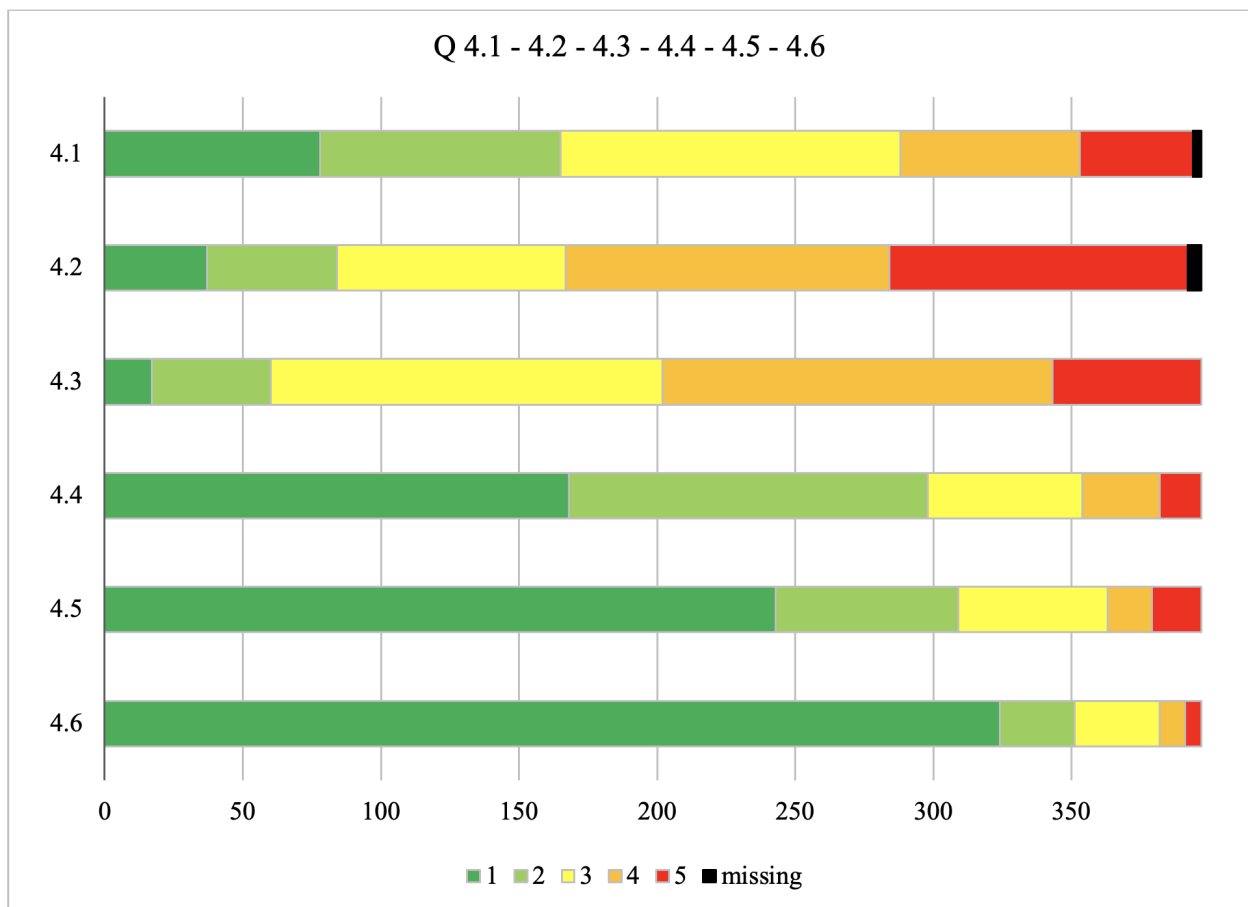


Figure 5. Answers to questions 4.1 – 4.2 - 4.3 - 4.4 - 4.5 and 4.6. Quite high results are highlighted in terms of fear of infecting loved ones (4.2) and safety in the relationship with colleagues and patients using the PPE made available (4.3). At the opposite extreme, the responses at the top of the scale in terms of depression states (4.5) and repentance for the professional choice made (4.6) were infrequent.

As regards the level of safety perceived during the internship in the relationship with colleagues and patients in the light of the PPE used, the students are proven to be quite safe as only 15.15% expressed a score equal to or lower than 2. It is comforting to know that Healthcare facilities and study courses have made available PPE capable of making trainees feel safe; this can also find expression in the infection rate noted at the beginning of the questionnaire. (Fig. 5) The data are in line [21] if not even denotes greater tranquillity [17] compared to the PPE made available to students in other national contexts.

If we analyse the state of anxiety perceived during the practical training, the students did not prove to be particularly anxious; the state of anxiety can be traced back, from our data, mainly to the fear of infecting friends and/or family. On the other hand, examining the feeling of experiencing a state of depression during practical training, the percentages are further reduced with 91.44% with a score equal to or less than 3. Taking into consideration the state of anxiety versus depression, the latter was rated as much less frequent by the students who responded to the questionnaire, although the

scores are still very low in both cases (0.99VS 0.87 Chi2=38.1659 p-value<0.00001 significance level of 0.01). (Fig. 5) In other publications, students proved to be decidedly more stressed, anxious and/or depressed than the sample we analysed [21][23][29][32][33].

Particularly significant is the last question which investigates the possible repentance of having undertaken a university course in the field of Health Professions. Even with the experience, as many as 81.82% of those interviewed are still extremely convinced that they have taken the right path while only 1.51% strongly regretted the choice made. (Fig. 5) the comparative data in the literature outline a discordant picture where, in some cases, students have strongly questioned the choice of this type of career [24][28] while, in other publications, the results are substantially comparable to what detected in our sample [23].

Conclusion

The influence of the COVID-19 pandemic on new graduates in the health professions was investigated in this study. The findings highlighted changes in patient care techniques and interruptions in practical training. While most graduates felt prepared for the workforce, a substantial percentage of them failed to find work that fit their gained abilities. Although there were concerns about viral transmission, overall levels of anxiety and despair remained rather low.

The study emphasizes the need of universities and healthcare organizations adapting their curriculum and support structures to accommodate the problems that health profession students experience.

Efforts should be directed at improving practical training possibilities, mental health assistance, and job counselling. Future study should look at the long-term impact of the epidemic on the mental health and professional development of graduates.

To summarize, identifying and managing the pandemic's impact on new health profession graduates is critical. Stakeholders may better prepare graduates for the developing healthcare landscape and post-pandemic problems by introducing appropriate measures and assistance.

Statements and Declarations

Ethical Statement

After reading the informed consent and expressing their agreement, the participants filled out the questionnaire. Given that we collected no personal information, participant were adult and completely anonymous, and participation was voluntary, Ethic Committee Approval was not required in accordance with national laws. [34]

Authors' contributions

- **Angie Devetti:** Drafting the work or revising it critically for important intellectual content.
- **Andrea Demeco:** Drafting the work or revising it critically for important intellectual content.
- **Gioele Santucci:** conceived the study and was involved in the formulation of the measures.
- **Irene Gertrud Rigott:** conceived the study and was involved in the formulation of the measures.
- **Angelo Di Naro:** was involved in the formulation of the measures.
- **Antonella Paccone:** was involved in the formulation of the measures.
- **Francesca Giannachi:** conceived the study and was involved in the formulation of the measures.
- **Elisa Vetti:** was involved in the formulation of the measures.
- **Rosa Rendina:** was involved in the formulation of the measures.
- **Alessandro Tombolesi:** was involved in the formulation of the measures.
- **Marco Nicolò:** was involved in the formulation of the measures.
- **Ruben Foresti:** was involved in the formulation of the measures.
- **Cosimo Costantino:** Revising the work critically for important intellectual content.
- **Chiara Martini:** Revising the work critically for important intellectual content.

Conflict of Interests

The authors declare no conflict of interest.

Data

The authors declare that they had full access to all the data in this study and the authors take complete responsibility for the integrity of the data and the accuracy of the data analysis.

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