

The impact of COVID-19 on Italy's healthcare graduates: Psychological reactions and organizational adaptations

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Abstract. *Background and aim:* The COVID-19 pandemic 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:* A total of 396 students voluntarily completed the questionnaire, most of whom were Radiographers (61.71%). The survey results showed that there were significant disruptions in practical training for new graduates with 54.66% of students interrupting their internship for at least three months. Graduates also reported changes in their attitudes to patient care with 62.97% of students noting changes in approach with a score of 3 or more on a 5-point Likert scale. A significant number had difficulty finding work that matched their gained abilities; in fact, 48.11% of those who completed the questionnaire stated that they did not feel prepared to confront the world of work, with a 5-point Likert score of 3 or below. *Conclusions:* This study underscores the need for universities and healthcare institutions to adapt training programs and support structures to address the unique challenges faced by health profession students during pandemics. Key recommendations include maximizing practical training opportunities, enhancing mental health support services, and offering comprehensive career counseling. These measures are crucial for successful workforce transitions. Universities and healthcare institutions must proactively acknowledge and mitigate the challenges faced by new graduates to ensure their preparedness for the workforce and the delivery of high-quality patient care. (www.actabiomedica.it)

Key words: healthcare undergraduates, education, covid-19, survey, healthcare graduates, psychological impact, organizational challenges, italy, health professionals, pandemic response, medical education

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 (8-11). 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 (12). Trauma is frequently brought on by being alone, doing dangerous jobs, and coming into touch with contagious individuals (13). 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 (14). 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 (15-22). 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

A cross-sectional study was carried out. The online survey (Table 1) was created in an anonymous format using Google Modules, and it was sent between 24 September 2021 and 7 July 2022.

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). 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. 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". Collected

Survey					
Questions (Q)	Answers				
2.8 Since the start of the COVID-19 pandemic, has your approach to the patient changed?	1 (not at all)	2	3	4	5 (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 (not at all)	2	3	4	5 (a lot)
2.11 Did the COVID-19 pandemic delay your graduation?	1 (not at all)	2	3	4	5 (a lot)
3.1 Do you feel ready to face the labour market?	1 (not at all)	2	3	4	5 (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 (not at all)	2	3	4	5 (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 (not at all)	2	3	4	5 (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 (not at all)	2	3	4	5 (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 (not at all)	2	3	4	5 (a lot)
4.4 After the onset of the COVID-19 pandemic, did you experience anxiety during your clinical training?	1 (not at all)	2	3	4	5 (a lot)
4.5 After the onset of the COVID-19 pandemic, did you go through depressive states during your placement?	1 (not at all)	2	3	4	5 (a lot)
4.6 After the start of the COVID-19 pandemic, did you regret taking a college course in the Health Professions?	1 (not at all)	2	3	4	5 (a lot)

data were entered and statistically processed with the R statistical program. Socio-demographic information of the student population was presented as numbers and percentages for categorical variables. Furthermore, to evaluate the statistical significance among the answers obtained grouped by age groups, by degree course and by year of attendance course, both the Chi² test and One-Way ANOVA test were - including the

Post Hoc Tukey's HSD (honestly significant difference) procedure for pairwise comparisons - used for the IES-R scale. When a statistically significant difference is highlighted, a p-value lower than 0.01 and a significance level of 0.01 are always taken into consideration. Taking into account the year of graduation, 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). In subsequent statistical evaluations Health Care Assistants, Cardiocirculatory Pathophysiology and Cardiovascular Perfusion Technicians, Psychiatric Rehabilitation Technicians, Dietitian were merged into the "other" class to obtain a number of classes that are easier to handle. Each student participated voluntarily in the study and his data were treated in respect of their privacy, specifying that the data has been collected in compliance with the General Data Protection Regulation 679/16 of the Italian state (EC Regulation, European Parliament 27/04/2016 no. 679). The participation to the on-line questionnaire contains an explicit consent; anonymity was ensured by the large number of participants, the non-recording of data such as geographical origin and the collection of age grouped in classes. A convenience sample was used in recruiting the students who responded to the questionnaire.

Results

Tables 2 and 3 provide all of the survey findings; 396 students freely filled out the questionnaire, of which two thirds were women (Q 1.2). The majority of responders were between the ages of 18 and 24 (Q 1.1), Radiographers or Radiotherapy Technicians (Q 1.3), and graduated in 2020-2021 and 2021-2022 (Q 1.4). Online training replaced less than 10% of clinical placement hours for 71.54% of students (Q 2.2). When considering the difference in terms of replies among graduates by 2021, they demonstrate that they have usually endured more interruptions but are more concentrated in the 10% range (Figure 1).

Internship disruptions typically lasted fewer than four months (Q 2.3). There is no clear general trend in the responses to the questions about whether time spent at home helped in the management of the study (Q 2.4), the impact of the pandemic on the University career (Q 2.5), and whether any changes in the approach to the patient occurred as a result of the pandemic events (Q 2.8) (Figure 2).

Three-quarters of those interviewed had not caught the SARS-COV-2 virus (Q 2.6), whereas all

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

Characteristics	396 (100%)
Q 1.1 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%)
Q 1.2 Gender:	
Female	264 (66.50%)
Male	132 (33.50%)
Q 1.3 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%)
Q 1.4 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%)

students who responded to the questionnaire had received the vaccination (Q 2.7). A substantial number of respondents did the molecular swab and/or serological test on a regular basis (Q 2.9). There seems not to be any significant changes in the behaviour of trainee guides (Q 2.10), and the pandemic does not appear to have impacted the timetable of graduation (Q 2.11). Students expressed additional concerns about their preparedness for the job market (Q 3.1) (Figure 3).

Approximately one-third of the students said that they had found a job that used the abilities obtained via their degree (Q 3.2). When the percentages are broken down by academic year of graduation, they shift

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

	None	< 10%	25%-50%	50%	50%-75%	75%-100%	> 6 m	1 y	> 1 y
Q.2.2	123 (30.98%)	161 (40.55%)	69 (17.38%)	12 (3.02%)	10 (2.52%)	22 (5.54%)			
Q.2.3	43 (10.83%)	34 (8.56%)	62 (15.62%)	78 (19.65%)	51 (12.85%)	39 (9.82%)	5-6 m	1 y	15 (3.78%)
	Yes	No	I don't know						
Q.2.6	73 (18.39%)	304 (76.57%)	20 (5.04%)						
	Yes	No							
Q.2.7	397 (100.00%)	0							
Q.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			Missing
Q.3.2	144 (36.36%)	186 (46.97%)	0	0	6 (1.52%)		3 (0.76%)		57 (14.39%)
	1 (a little)	2	3	4	5 (a lot)				
Q.2.4	75 (18.89%)	45 (11.34%)	112 (28.21%)	102 (25.69%)	63 (15.87%)	0			
Q.2.5	39 (9.82%)	78 (19.65%)	124 (31.23%)	105 (26.45%)	51 (12.85%)	0			
Q.2.8	69 (17.38%)	78 (19.65%)	146 (36.78%)	81 (20.40%)	23 (5.79%)	0			
Q.2.10	104 (26.20%)	120 (30.23%)	106 (26.70%)	45 (11.34%)	22 (5.54%)	0			
Q.2.11	240 (60.45%)	63 (15.87%)	39 (9.82%)	38 (9.57%)	14 (3.53%)	3 (0.76%)			
Q.3.1	20 (5.04%)	75 (18.89%)	96 (24.18%)	134 (33.75%)	72 (18.14%)	0			
Q.3.3	34 (8.56%)	92 (23.17%)	99 (24.94%)	106 (26.70%)	66 (16.62%)	0			
Q.4.1	78 (19.65%)	87 (21.91%)	123 (30.98%)	65 (16.37%)	41 (10.33%)	3 (0.76%)			
Q.4.2	37 (9.32%)	47 (11.84%)	83 (20.91%)	117 (29.47%)	108 (27.20%)	5 (1.26%)			
Q.4.3	17 (4.28%)	43 (10.83%)	142 (35.77%)	141 (35.52%)	54 (13.60%)	0			
Q.4.4	168 (42.32%)	130 (32.75%)	56 (14.11%)	28 (7.05%)	15 (3.78%)	0			
Q.4.5	243 (61.21%)	66 (16.62%)	54 (13.60%)	16 (4.03%)	18 (4.53%)	0			
Q.4.6	324 (81.61%)	27 (6.80%)	31 (7.81%)	9 (2.27%)	6 (1.52%)	0			

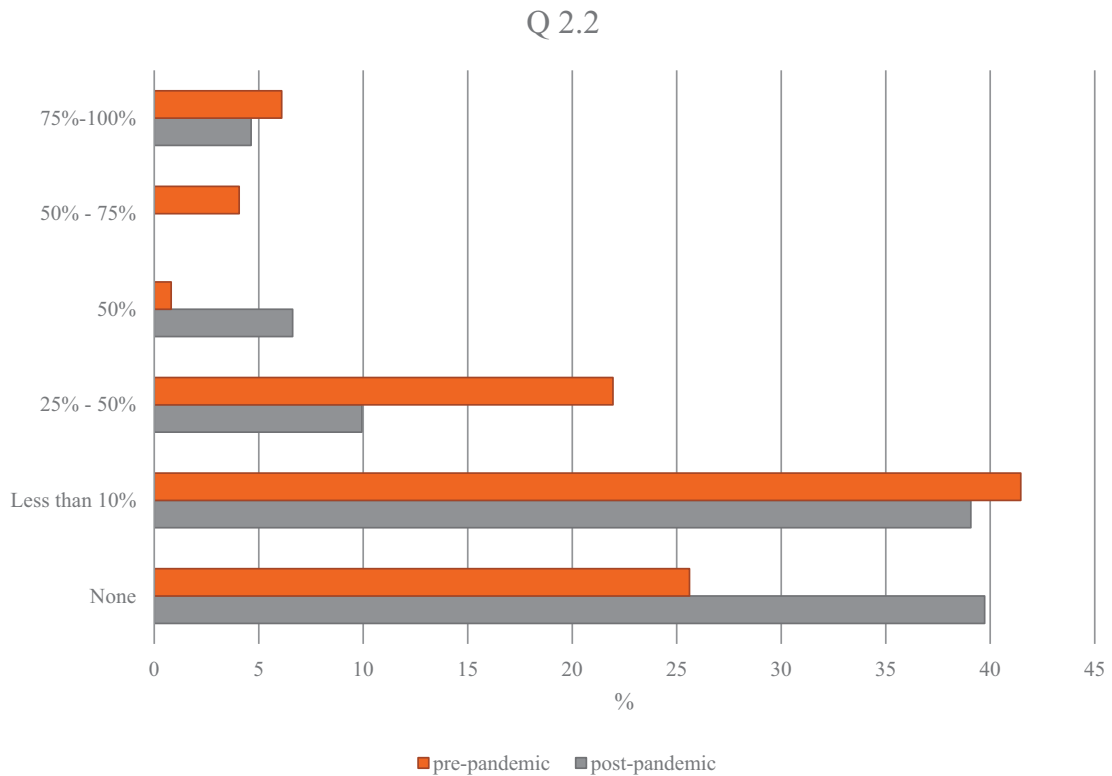


Figure 1. Percentage of training hours replaced by online training (online courses, synchronous and asynchronous FAD, etc.) with a breakdown between students who also had experience before the pandemic and students who attended University only when the emergency was already underway expressed in percentage of respondents (Q 2.2).

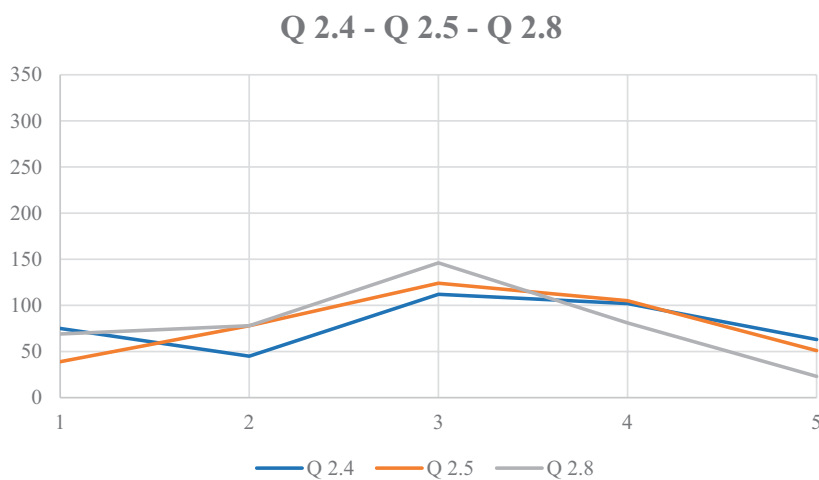


Figure 2. Distribution of responses on a 5-point Likert scale where 1 represents ‘not at all’ and 5 represents ‘a lot’ on: the chance that the increased time spent at home contributed to the management of the study (Q 2.4); influence of the pandemic on the University course (Q 2.5); possible change of approach with the patient following the pandemic events (Q 2.8).

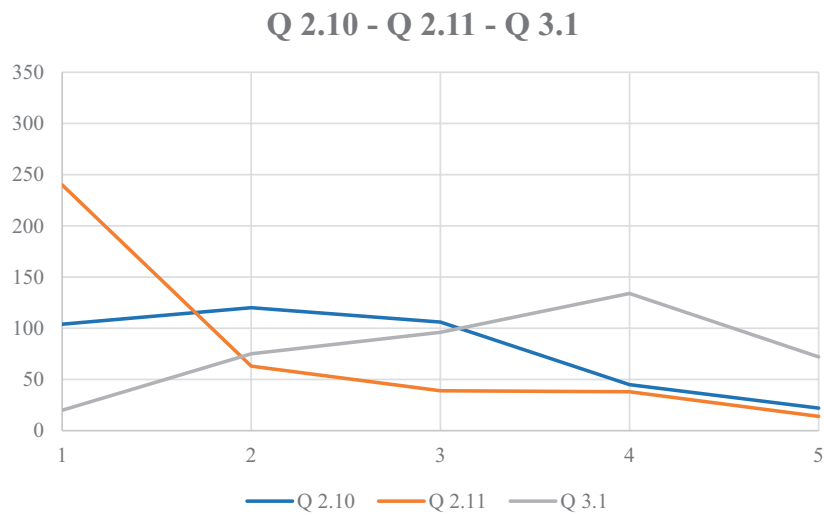


Figure 3. Distribution of responses on a 5-point Likert scale where 1 represents 'not at all' and 5 represents 'a lot' on: changes in mentoring by placement guides (Q2.10); delay in graduation (Q2.11); perceived preparedness to face the labour market (Q3.1).

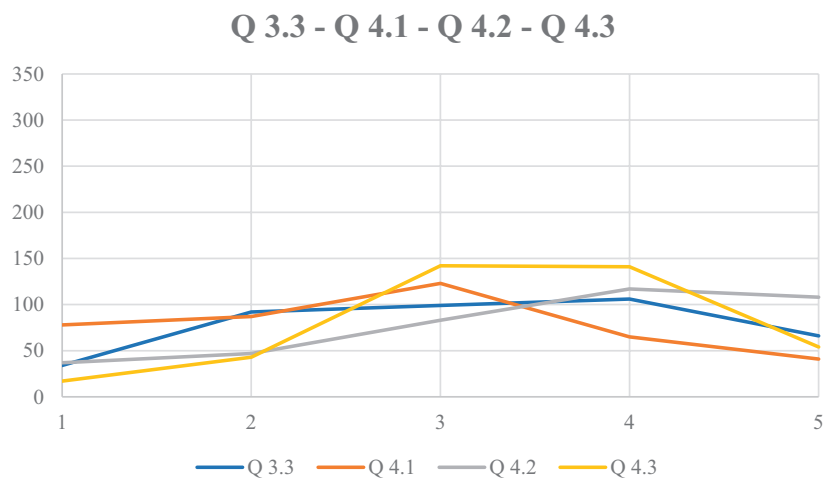


Figure 4. Distribution of responses on a 5-point Likert scale where 1 represents 'not at all' and 5 represents 'a lot' on: fear of contracting the SARS-COV-2 virus (Q 3.3); fear of contracting the SARS-COV-2 virus during internship (Q 4.1); fear of transmitting the virus to friends and/or family (Q 4.2); safety in dealing with colleagues and patients through the use of the PPE provided (Q4.3).

significantly; 51.63% of graduates by 2021 found a job in their field of study, while the ratio lowers to 19.21% for those who graduated later. While there was considerable fear about getting the SARS-COV-2 virus (Q 3.3), less concern was expressed if the context of potential infection was connected to the internship setting (Q 4.1).

Fear of transferring the illness to friends and/or family was significantly more common (Q 4.2), despite the fact that students felt safer working with colleagues and patients because to the PPE given (Q 4.3) (Figure 4).

Students reported minimal levels of anxiety (Q 4.4) and no apparent depressed states throughout

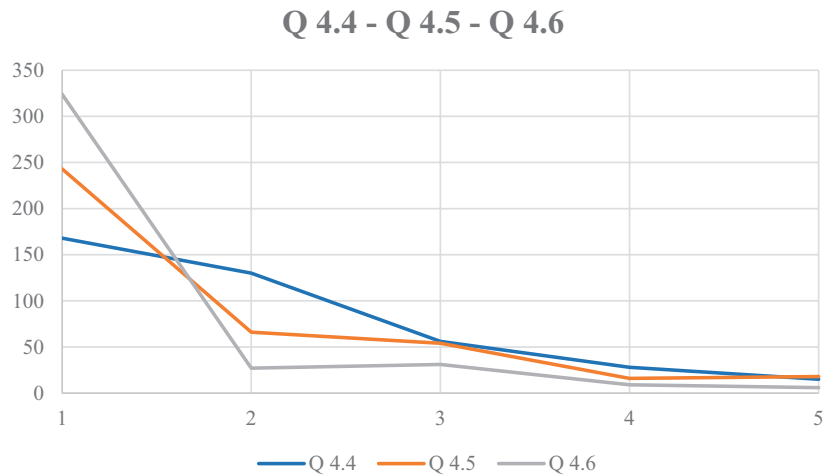


Figure 5. Distribution of responses on a 5-point Likert scale where 1 represents ‘not at all’ and 5 represents ‘a lot’ on: states of anxiety during the placement (Q 4.4); states of depression during the internship (Q 4.5); feelings of regret at taking a college course in the Health Professions (Q 4.6).

practical training (Q 4.5). Feelings of regret for pursuing a university course in the health professions weren’t found to have affected a specific number of respondents (Q 4.6) (Figure 5).

Limitations of the study were choosing a convenience sample and not collecting the geographical area of the University where the students were enrolled; the latter could have correlated with some of the results obtained.

Discussion

The predominant age and gender are in line with the Italian population of students on the Degree Courses surveyed (23). Although it is not possible to relate the individual data to the provincial contingent situations of prevalence and incidence of SARS-COV-2 infection, it seems difficult to justify the conversion percentages and the periods of suspension of internship activities since the ministerial guidelines have been adopted by all Universities. One would expect that the organizational difficulties of internships would have been more evident among the group of respondents who graduated by 2021, and although a higher percentage of conversion to online activities is

noted, this is, after all, only slightly higher than the cohort of subsequent graduates (calculated average 18,59 VS 13,05) (Figure 1). Interruptions in practical training are also reported in the literature with widely varying ranges from area to area (24, 25); 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 (26). A majority of respondents (76.57%) did not contract SARS-CoV-2. This rate exceeds some literature values, likely due to stricter Italian health surveillance (26). While higher than the general population (60.46%), this rate may reflect more diligent adherence to containment measures by healthcare students (27, 28). 100% of respondents were vaccinated against SARS-COV-2 due to the Italian 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% (29, 30). The majority of responders experienced frequent COVID-19 testing, most likely as part of workplace surveillance; molecular swabs were more commonly used by Medical Laboratory Technicians. While students evaluated home study positively (mean 3.08), the influence on study management remains

uncertain. Those who began their training during the pandemic rated home study more favourably (mean 3.28) than those with pre-pandemic experience (mean 2.76). Studies suggest that technology-enabled learning can enhance student performance (31). However, research also indicates a negative association between the pandemic and academic performance, especially in younger students (32). While remote learning may have initially burdened students (33), they generally adapted their time management (33). However, individual characteristics likely influence this ability, with female students demonstrating better time management and performance (mean 3.14 vs. 2.98) (34). The pandemic's impact on university careers varied, with no significant differences among most subgroups except for profession. Physiotherapists and Medical Laboratory Technicians reported a greater influence than Radiographers or others; in particular, there is a significant Post Hoc Tukey HSD for the group pair Radiographers-Physiotherapists and for the group pair Physiotherapists-Other Professions (mean of Physiotherapists 3.66, mean of Medical Laboratory Technicians 3.15, mean of Radiographers 3.04 and other professions 2.96). Student interactions with patients were significantly affected by the pandemic, with a mean score of 3; women reported greater changes in their approach (mean 2.86 vs. 2.61). 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. Physiotherapists reported significant differences compared to Radiographers, other professions, and especially Medical Laboratory Technicians. In particular, there is a significant Post Hoc Tukey HSD for Medical Laboratory Technicians compared to every other group (mean of Physiotherapists 3.04, others 2.88, Radiographers 2.82 and mean of Medical Laboratory Technicians 2.00), however, it should be noted that Italian Medical Laboratory Technicians have little patient involvement. One in two students saw modest changes in trainee guide attitudes, whereas just 16.88% indicated considerable changes (scoring 4-5). However, before the pandemic, students evaluated trainee guides somewhat higher (mean of those who also had pre-pandemic experience 2.43 VS mean of those who had not 2.34).

Additionally, Medical Laboratory Technicians and Radiographers rated trainee guides lower than other professions and Physiotherapists (mean corresponding respectively to 2.31 2.38 2.44 and 2.48). Only 13.10% of learners had significant delays in graduation because of the SARS-COV-2. Pre-pandemic students had less delays (mean 1.57 vs. 2.11). Overall, students felt quite well-prepared to enter the job market (76.07% scored 3 or above), which is consistent with research on 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. Male students reported more preparedness than female students (mean 3.74 vs. 3.25). Physiotherapists felt less ready than others and Radiographers (mean respectively 2.75 3.37 and 3.49), particularly Medical Laboratory Technicians, who felt notably more confident (mean 3.95). Almost half of respondents were unable to locate jobs that corresponded with their degrees; this result is certainly affected by those who graduated after completing the questionnaire. However, taking into consideration and commenting on the data excluding these students, more than half found suitable work, while around one in three remained unemployed. Only one student turned down a job due to COVID-19 concerns related to friends and family, while another picked a non-healthcare position, demonstrating the strong motivation of students to become healthcare professionals. 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 (24; 26; 29; 33). Fear of contagion during practical training was minimal (score 5 drops to 10.33%), compared to previous studies (29). Other professions and Radiographers felt more at risk than Physiotherapists or Medical Laboratory Technicians (average response value of 2.87 2.86 2.45 2.15; Tukey's HSD significant for all group pairs). The difference in answers to these two questions (Q 3.3 and Q 4.1) is statistically significant; the fear of contracting the virus outside the training environment was significantly higher, demonstrating how much PPE and the organization of internships made them feel safer than the

environment outside the healthcare context. Students under 25 years of age were more concerned than older about transmit the virus to friends and/or family members. Comparing concern about infecting themselves versus their loved ones, respondents were significantly more anxious in the latter case. Even in the literature, the worry of infecting friends and/or family rather than oneself has been reported as a recurring element (24, 26, 29, 33-35). 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; this can also find expression in the infection rate noted at the beginning of the questionnaire. The data are in line (24) if not even denotes greater tranquillity (20) compared to the PPE made available to students in other national contexts. Students indicated minor anxiety throughout practical training, which was mostly due to a concern of infecting loved ones. Depression was much less prevalent, with 91.44% giving it a 3 or below. While our findings indicate modest levels of anxiety and depression in students, other research reveal higher rates (24, 29, 34, 36-39). COVID-19 may not be the only source of difficulty for healthcare students. Further research is required to determine the exact variables influencing this group. Despite the hurdles, 81.82% of our respondents are extremely content with their future employment decision, with only 1.52% strongly regretting it. The literature provides varied results, with some research indicating increased discontent among healthcare students (26, 33).

Conclusion

This research looked at the effects of COVID-19 on newly healthcare graduates. Significant results include changes in patient care techniques, interruptions in practical training with conversion rates to online activities suggesting that internship have not been completely reorganised to accommodate pandemic conditions. While most graduates felt prepared for employment, many struggled to find work that fit their gained abilities. Despite worries regarding viral transmission, anxiety and depression feelings were rather modest, consistent with the literature. Universities

and healthcare companies should change their support systems and courses of instruction to properly handle the particular requirements and difficulties current students experience. Future research should look into the pandemic's long-term impact on mental health and professional development.

Ethic Approval: After reading the informed consent and expressing their agreement, the participants filled out the questionnaire. Given that we collected no personal information, participants were adult and completely anonymous, and participation was voluntary, Ethic Committee Approval was not required in accordance with national laws (40).

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

Authors Contribution: Drafting the work or revising it critically for important intellectual content: Angie Devetti and Andrea Demeco. Conceived the study and was involved in the formulation of the measures: Gioele Santucci, Irene Gertrud Rigott and Francesca Giannachi. Was involved in the formulation of the measures: Angelo Di Naro, Antonella Paccone, Elisa Vetti, Rosa Rendina, Alessandro Tombolesi, Marco Nicolò, Altin Adraman, Cristian Bonelli, Oscar Brazzo, Antonio Dore, Andrea Spedicato, Marco Vecchietto, Ruben Foresti and Cosimo Costantino. Revising the work critically for important intellectual content: Chiara Martini

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