

Clinical activities suspended: How the COVID-19 affected the self-confidence of Italian dental students

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Abstract

Introduction: COVID-19 emergency caused several effects on the dental educational system, especially affecting courses including practical activities. The study aims to evaluate the impact of the suspension of dental clinical activities on the Italian dental students' self-confidence. Furthermore, the other purpose of the research is to find an integrative didactics solution to improve the clinical training of dentistry during the COVID-19 pandemic.

Materials and Methods: A questionnaire was administered to evaluate the impact of the suspension of clinical activities on dental students' self-confidence. A 67-questions survey tested the students' self-confidence in several dental disciplines (Conservative Dentistry, Endodontics, Oral Surgery and Dental Emergency). The study reached a sample of 193 dental students and the answers from 9 different Italian dental schools were analysed.

Results: The degree of students' self-confidence for all the dental disciplines investigated was found statistically different between the periods before and after the interruption of clinical activities. The students proposed, as a potential solution to improve their practice during the COVID-19 pandemic, to combine the use of a video tutorials and dental simulators.

Conclusion: The interruption of the training in clinical practice significantly affected the educational career and the self-confidence of students. An alternative teaching method involving the use of video tutorials as support in teaching clinical procedures deserves to be considered.

KEYWORDS

COVID-19, dental students, dental training, learning, undergraduate program

1 | INTRODUCTION

The COVID-19 pandemic has become a major public health challenge in the 21st century that reached all the countries around the world.

The severity of the situation has led governments and institutions to take drastic measures, like the quarantine and in many countries has been necessary the lockdown of some areas. The social-distance measures, adopted to reduce the virus's diffusion, were a challenge

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for all the educational system, especially for the courses including practical stages and activities as dental schools are. In these terms, the Universities had to face some problems, like the impossibilities to carry on the face-to-face education. The educators had to come up with innovative solutions to resume dental education remotely.¹ Different online platforms were used for didactic teaching and learning as well as for students' assessment and examination.² However, the real challenge was to find an alternative educational solution to deal with the interruption of clinical training.³ Clinical learning has also shifted to virtual learning, dental faculties set up a variety of tools to teach operative dental procedures, such as lecture slides, schematic representations, and live and video recorded demonstrations. This kind of solution was a compromise, indeed any virtual session cannot replace the close experience with patients.⁴ Direct patients care is a key component of the dental curriculum, actually, during the clinical training the students not only improve their manual skills but also learn how to take care of the patients and the way to speak with them.⁵ Self-confidence in dental practice is an important issue for young dental students approaching patients during clinical training and for their long-term education.⁶ Obviously, this skill is subject to continuous training for people who do not have experienced competencies in clinical practice. Considering that clinical practice is usually carried out for three years during studies to acquire competencies and self-confidence, one can imagine that one year of interruption of practical activities could severely affect the skills and self-confidence of young students and it could be interesting to evaluate the impact of the suspension of all practical training.

With this in mind, the present study aims to evaluate the impact of the suspension of clinical activities on the Italian dental students' self-confidence.

2 | MATERIALS AND METHODS

2.1 | Data collection

A cross-sectional analytical study was carried out on a sample of dental students, from different Italian Universities, in order to estimate the impact of the COVID-19 on their self-confidence in clinical practice.

The students of the first and second year of the undergraduate program were excluded from the survey because their study program usually does not include clinical training.

The questionnaire was created using Google Forms (Alphabet Co.), the survey was electronically answered and the answers were linked to an author's Google Account. To ensure data security, results were not made public. The survey required approximately 10 min to complete. It was completely anonymous and no sensitive data were asked.⁷

Dental students were invited via institutional e-mail, sent on 2 December 2020, to anonymously participate in completing a survey. The survey was named "Impact of suspension of clinical training on your self-confidence."

The study protocol and the questionnaire have been approved by the review board of the Dental School of Verona (University of Verona, Italy). Ethical Committee approval was not asked for because the respondents and their personal data were protected by anonymity. Not even the person who analysed the data could link information to a specific person, furthermore, people could not be recognised by the answers given.⁷ The validity of a questionnaire is determined by analysing whether the questionnaire measures what it is intended to measure. The content validity was assessed by a panel of Researchers of the Dental School of Verona (Review Board) as done in a previous work.^{8,9}

The questionnaire was available from 2 December 2020 to 31 May 2021, in order to allow participating in the survey also the students that resumed the clinical training later than the others.

The entire questionnaire is reported in the Appendix section (Appendix S1).

The introduction of the questionnaire defined the purpose and objectives of the study. The authors also stated clearly that participation was completely voluntary with no penalties associated with refusal or withdrawal from participation. The questionnaire (Appendix S1) was composed of three main themes/sections.

The sample size was calculated using Raosoft sample size calculator, which uses the following formula:

$$n = Nx / ((N - 1)E^2 + x),$$

whereby: n = sample size, N = population size, E = margin of error, $x = 1.962r(100 - r)$, r = fraction of responses.

With a collective population size of 400 interviewed, the number of respondents needed to achieve a confidence level of 95% with a margin of error of 5% was 196.¹⁰

2.1.1 | Section 1

It was designed to investigate the general information of the students, demographic data, University affiliation, undergraduate year attended, clinical activities during the undergraduate course and clinical disciplines trained. Furthermore, questions about relatives enrolled in the dental field and visiting activity to a dental office during the COVID-19 period were proposed.

2.1.2 | Section 2

Questions about the self-confidence of the students, before and after the suspension of clinical activities, in the operative sequences related to some dental disciplines (Conservative Dentistry, Endodontics, Oral Surgery and Dental Emergency), were interviewed. To avoid students answering questions related to the internship of a dental speciality not included in their annual study path, before each subsection was asked the students whether they had attended the specific clinical activity.

The self-confidence assessment was scored from 1 (minimum) to 5 (maximum) for each question asked.

Specific operative procedures were chosen for each dental speciality, to assess students' self-confidence. In particular, for Conservative Dentistry were analysed:

- the ability to diagnose various carious lesions,
- the ability to perform isolation of operative field with rubber-dam,
- the ability to remove properly the carious tissue and perform cavity preparation,
- the execution of a direct composite restoration with congruous anatomy.

For Dental Emergency were analysed:

- the ability to investigate accurately the medical history,
- the ability to diagnose oral pathologies,
- the ability to diagnose pulp's pathologies,
- the execution of loco-regional anaesthesia,
- the execution of inferior alveolar nerve block,
- the execution of a dental pulpotomy,
- the execution of a simple extraction.

For Endodontic Dentistry were analysed:

- clinical and radiographic diagnostic phase,
- the execution of a pulpectomy,
- the capability to shape and fill the root canals,
- the execution of a post-endo direct restoration.

For Oral Surgery were analysed:

- the execution of a syndesmotomy and dislocation of the dental element,
- the execution of a simple extraction of a tooth,
- the placement of sutures.

2.1.3 | Section 3

The final sections investigated the students' attitudes during the suspension of clinical activities, in particular, the authors rated the quality of students' educational experience and collected suggestions about the potential alternative to the clinical practice through open-ended questions.

2.2 | Statistical analysis

Data were statistically analysed as follows:

- Descriptive analyses were performed to evaluate the distribution of answers among the population interviewed and the

demographic data; open-ended answers were described in the results.

- Self-confidence (ranged between 1 and 5) before and after interruption of clinical training in different disciplines (Conservative Dentistry, Endodontics, Oral Surgery and Dental Emergency) was tested by using paired samples Wilcoxon test.
- The differences between answers from different Universities were analysed using the Chi-square test (for categorical variables, e.g., Yes or Not), and the Kruskal-Wallis test (for ordinal variables, e.g., scoring 1-5).

3 | RESULTS

Thirteen different universities were reached by the questionnaire, however, to perform a representative statistic, only the universities that participated with at least 10 students in the questionnaire were considered.

A total of 197 answered questionnaires were received with a response rate of 49%; however, 7 of these answers were incomplete and excluded from the analysis.

Therefore, a total of 190 students from 8 universities were taken into account for the analysis. 100 (52.6%) were female, and 90 (47.4%) were male. The study sample was composed of 29 students of the third year of the undergraduate program (15.3%), 32 attending the fourth year (16.9%), 71 the fifth year (37.3%) and 58 the sixth (30.5%).

The answers obtained from the questionnaire were statistically analysed to compare whether there were any differences between the various universities involved in the study.

Therefore, the universities considered as sample study were 8 as follows:

- University of Verona (52 answers)
- University of Brescia (32 answers)
- University of Padova (19 answers)
- University of Torino (16 answers)
- University of Trieste (21 answers)
- University of Palermo (24 answers)
- University "La Sapienza" of Rome (16 answers)
- University "G D'Annunzio" of Chieti (10 answers)

The comparative analysis highlighted a difference in all dental specialities between the various universities.

Forty-seven dental students (24.7%) answered that have attended as visitors to a dental office.

Statistically significant differences were highlighted in terms of self-confidence before and after the suspensions of clinical training. The results from the analyses of the answers from the second section of the questionnaire were herein reported:

- Conservative Dentistry (Figure 1) ($p = .018$). In particular, the operative procedures considered were clinical and radiographic

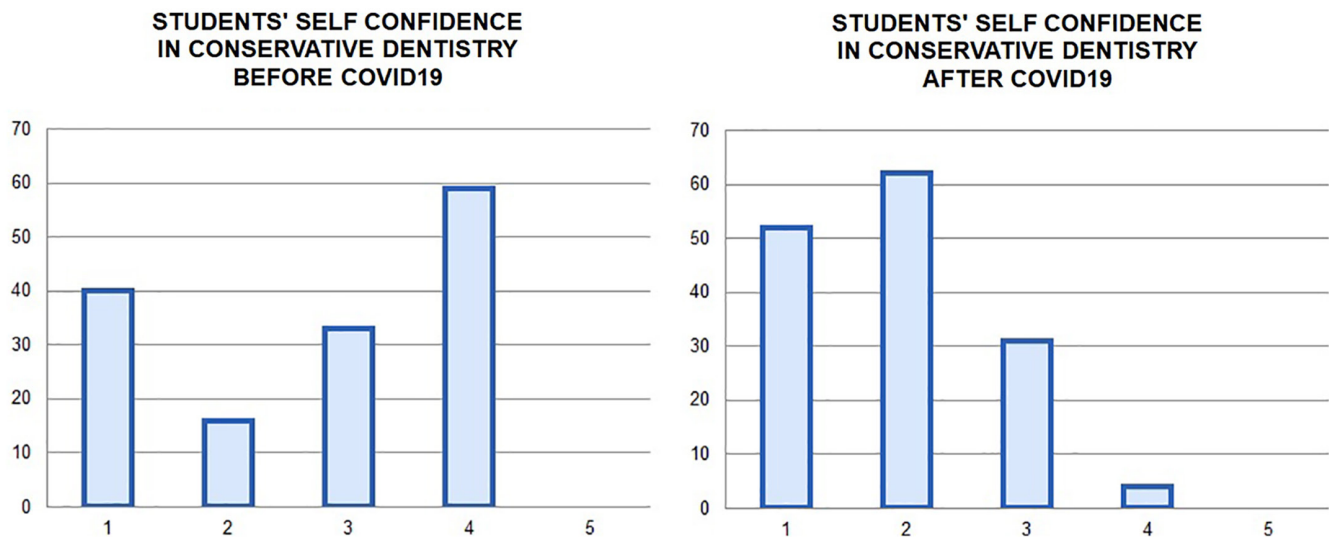


FIGURE 1 Students' self-confidence in conservative dentistry before and after COVID-19.

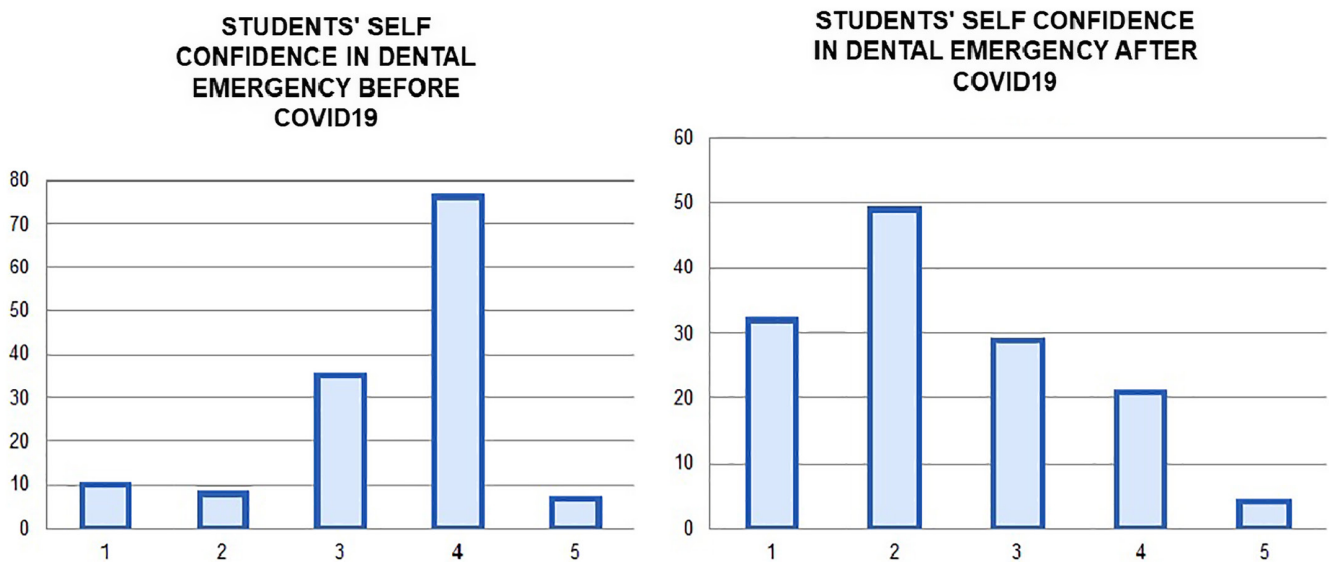


FIGURE 2 Students' self-confidence in dental emergency before and after COVID-19.

- diagnosis of carious lesion ($p = .032$), isolation with rubber-dam ($p = .018$), removal of carious tissue and cavity preparation ($p = 0.024$), direct composite restoration with congruous anatomy ($p = 0.028$).
- Dental Emergency (Figure 2) ($p = .035$). The operative procedures that showed a statistically difference were: the ability to perform an accurate remote and proximate medical anamnesis ($p = .046$), diagnosis of oral pathologies ($p = .039$), diagnosis of pulp's pathologies ($p = .048$), the execution of loco-regional anaesthesia ($p = .045$), the execution of Inferior Alveolar nerve block ($p = .045$), the execution of a dental pulpotomy ($p = .032$) and the execution of simple extraction ($p = .24$).
 - Endodontics (Figure 3; $p = .026$). All the phases of root canal treatment revealed statistical differences before and after the suspension of clinical training in terms of self-confidence. There were differences in the following operative procedures: clinical and radiographic endodontic diagnostic phase ($p = .048$), pulpectomy

($p = .034$), shaping and obturation of root canals ($p = .006$) and post-endo direct restoration ($p = .036$).

- Oral surgery (Figure 4) ($p = .032$). All the procedures necessary to carry out a simple extraction were statistically different in terms of self-confidence: sindesmotomy and dislocation of the tooth ($p = .039$), simple extraction of a tooth ($p = .034$) and execution of sutures ($p = .027$).

The third section highlighted the impact of lockdown and training suspension period for dental education. Indeed, 180 students (94.7%) agreed that the interruption of clinical activities created a serious discontinuity in their study path.

Clinical training was considered the most-affected experience during lockdown for 153 students (80.5%).

When the authors asked about the material used to increase the knowledge related to clinical practice during clinical activities'

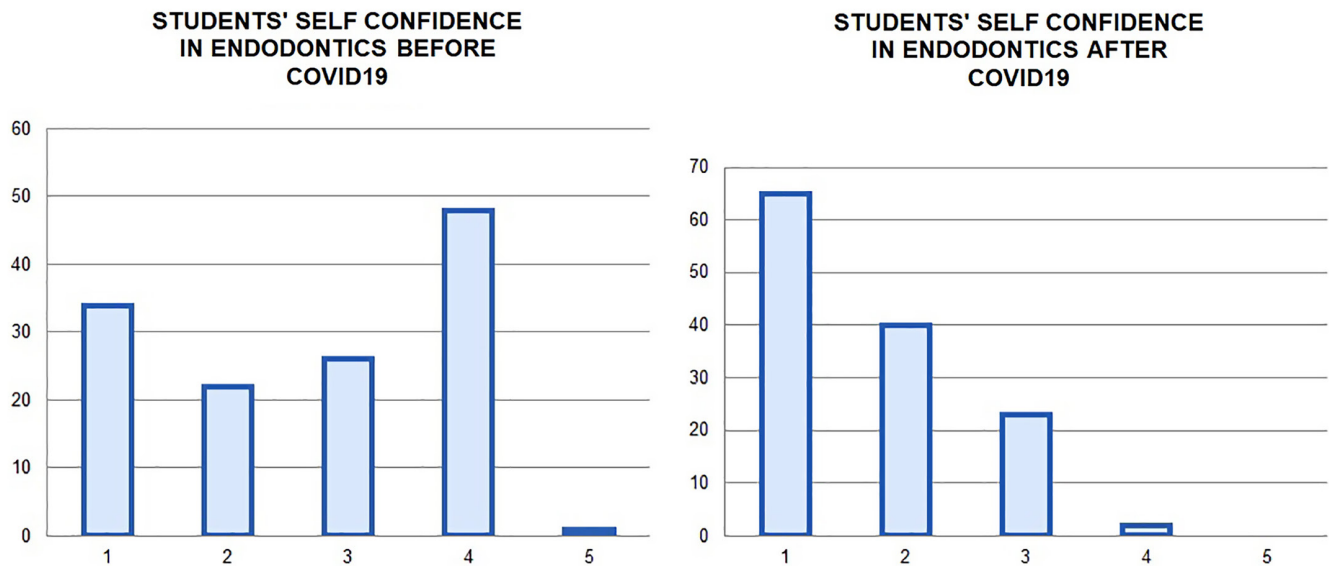


FIGURE 3 Students' self-confidence in endodontics before and after COVID-19.

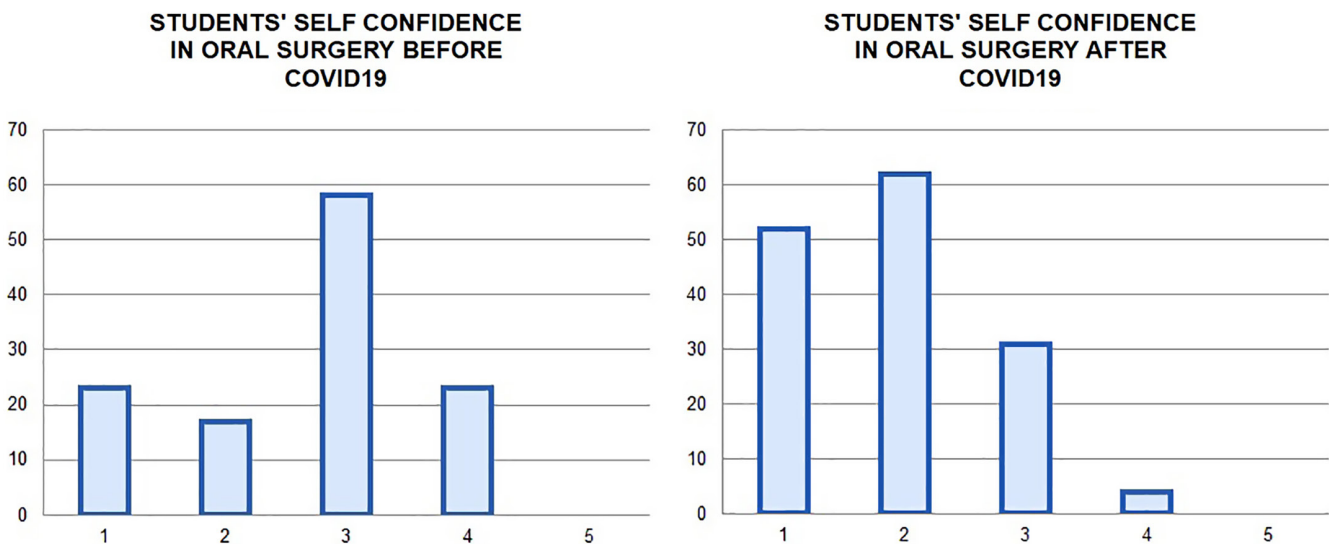


FIGURE 4 Students' self-confidence in oral surgery before and after COVID-19.

suspension, 105 students (55.3%) identified as a viable material to supply and increase clinical knowledge "Webinar online," 24 (12.6%) answered "Social network," 29 (15.3%) "Books and e-books" and 22 (11.6%) "Online courses and congresses." Among the suggested alternatives proposed for acquiring theoretical-practical knowledge in the various disciplines, the use of a video tutorials (23.5%) and the use of manikins/dental simulators (29.9%) were the most quoted.

The Kruskal-Wallis test highlighted statistical differences that are reported in Figure 5.

Statistical analysis was performed using SPSS for Windows release 26.0 (SPSS Inc., Chicago, IL, USA). The significance level was set at $p \leq .05$.

4 | DISCUSSION

This work aimed to estimate the impact of the suspension of the clinical practical training on the self-confidence of Italian dental undergraduates.

Only the students attending the third, fourth, fifth and sixth year of the undergraduate program were enrolled because the practical training is carried out since the third year in Italy. The adherence to the questionnaire was satisfying and several interviewed answered all questions. Some universities showed a greater engagement in answering and the students gave also important suggestions for alternative methods of teaching. Surely, a 67-question survey should be a potential barrier to answering all items: in fact, fewer

Conservative dentistry: statistical difference between:	
University "G. D'Annunzio" of Chieti and University of Brescia (p=0,018)	
Dental Emergencies: statistical differences between:	
University of Turin (p=0,046)	} University of Palermo
University of Padua (p=0,034)	
University of Brescia (p=0,046)	
University "La Sapienza" of Rome (p=0,017)	
Endodontic: statistical differences between:	
University "G. D'Annunzio" of Chieti (p=0,035)	} University of Brescia
University of Verona (p=0,048)	
University of Palermo (p=0,022)	
Oral Surgery: statistical differences between:	
University of Palermo (p=0,027)	} University of Trieste
University of Brescia (p=0,045)	

FIGURE 5 Statistical differences between the answers of the different universities, highlighted by the Kruskal-Wallis Test.

responses were collected from some universities, probably due to the length of the questionnaire. This should be taken into account when assessing the overall results. In presenting the results, the authors have eliminated incomplete responses or insufficient data to ensure the robustness of the results.

Interesting findings emerged from the data analysed, also regarding basic procedures in different disciplines. For example, even executing local anaesthesia was a procedure undermined in terms of self-confidence. As evidence of the seriousness of the interruption of practical internships on the training of future dentists, according to a specific question in the survey, 93.3% of the interviewed believe that the suspension of training dictated by the outbreak determined a serious discontinuity in their training path. In our opinion, this discontinuity was responsible for the decrease in confidence in performing clinical procedures such as local anaesthesia, removal of dental caries and isolation of the operative field. This is easily justified when we consider that when learning practical procedures, training is essential to make them more intuitive and reproducible. Moreover, we must not forget that dental procedures, like medical interventions, are directed at patients, at people with needs and complaints. With this in mind, the authors believe that the decreasing confidence reported by the respondents could be due to both a decrease in the ability to perform technical practical procedures and a perceived weakness in caring for patients who ask for help.

In our opinion, self-confidence is closely related to what people believe they know. For example, if a person believes he or she has mastered knowledge, he or she is more confident in putting his or her knowledge into practice.

The question proposed aimed to assess whether this concept is also valid for undergraduate students (people in education without

sound and solid knowledge or experience). After the suspension of the COVID-19, confidence decreased even among students who reported having a good knowledge of the theoretical basis. This shows that clinical education in dentistry is of great importance for the training of dentists, both in terms of knowledge and practical skills.

The authors made a conscious decision not to collect qualitative data at this stage of the study. Certainly, it could be of great interest to characterise the data in more depth; in this regard, subsequent studies should be based on interviews with a small sample of participants and open-ended questions: this would contribute to the possibility of addressing teaching pathways for specific topics and disciplines in more detail.

The shock that the pandemic caused to the entire educational system was unexpected.¹¹ Almost without notice, the teachers found themselves unprepared to teach conventionally, due to the suspension of routine activities, with only one solution of being creative in an online environment.^{2,12-15}

In several institutions, online teaching is still considered rudimentary whereas the implementation of e-learning is not evident, consequently teaching medical clinical skills became a very tough challenge.

Little evidence has been reported regarding the probable impact of this pandemic on higher education.^{12,15,16} One study reported that there could be a positive effect of the COVID-19 confinement on students' performance. The authors concluded that the pandemic period modified students' learning strategies to a more efficient productive routine with higher levels of engagement.¹¹ Contrary to these findings, most students sensed that they missed important learning experiences and felt that the interruption of clinical activities created a serious discontinuity in their study path and affected their self-confidence in routinely

clinical procedures. This could be explained by the fact that the study from Hattar et al. was related to education in basic sciences, whereas dentistry needs practice and broad clinical experiences. In this way, the same results were shown in two studies from different countries, Jordan¹¹ and Romania.¹³ The dental students of these felt less engaged in following-up distant learning and thought that the suspension period of clinical activities slowed learning of manual skills.

Furthermore, participants in these studies indicated that conservative dentistry was the most affected. The same finding was highlighted in the present study, which reported that Italian students' confidence in the operative procedures of conservative dentistry decreased significantly ($p = .018$), which mainly affected their performance in clinical activities when they returned after suspension. This is comprehensible since the bulk of students' clinical exposure during their final years revolves around restorative dentistry. Nevertheless, a difference among answers regarding the disciplines investigated was not noticed: all dentistry subspecialties analysed in our study showed a significant decrease in terms of self-confidence.

One comparative survey administered to professional dental students indicated that students experienced an increased level of stress and stated that clinical education suffered from the pandemic.^{13,17,18} We agree with this analysis, because clinical and practical training is of fundamental importance in forming a future dentist¹⁹ and, as many studies stated, the suspension of these activities seriously affected the practical skills of young people that were training that.¹¹

The e-learning method does not come without barriers and it is not suitable for all courses, especially for those with practical training.³

A review investigating the barriers and enablers of this new teaching methodology concluded that distant education might enhance learning and performance due to its flexibility and accessibility.^{20,21} Some studies have demonstrated higher satisfaction with e-learning methods and reported that many medical students find e-learning gratifying.^{11,22} Similar results from a study conducted at the University of Catanzaro demonstrated that e-learning has been appreciated by students and professors in terms of teacher–student interactions, nonetheless clinical training cannot be replaced by remote activities.²² For the purpose, understanding the contributing factors to confident graduation, one study carrying out group interviews with undergraduate students confirmed that the most important factor affecting their preparation was indeed their clinical experience.¹¹

In this sense, our study reported how the educational tools used during the lockdown period, like webinars online, social networks and online courses, were ineffective to substitute the practical training.

Our students also suggested that a possible solution to improve practical knowledge in case of a new suspension or reduction of clinical activities could be the combined use of a video tutorial and dental simulator. In this regard, an important issue to deal with is surely the quality and the sourcing of the contents available online:

not always the web is able to ensure the quality of the materials and there is a risk to find teaching contents not assured or not certified by expert teachers. Therefore, it should be advisable to address students on certified and controlled web platforms where contents uploaded are quality assured.

Several studies have been conducted on the effectiveness of the video tutorial as a substitute for the traditional lesson or as an auxiliary tool for teaching at all school levels.^{23–26} Most of these concluded that this tool can be considered “valid, valuable and economical” in helping to solve students' learning problems. According to other authors, the video tutorial cannot completely replace traditional teaching, however, remains a tool that, when combined with it, can reinforce learning and help the revision of concepts.

Surely, this kind of help in teaching and learning was found valuable also among graduated dentists and experienced professionals who followed, during the lockdown and suspension of in-presence lectures and conferences, those online.^{16,21,25,27,28}

Nevertheless, for young undergraduate people, the opportunity to face clinical situations and treatment issues is not avoidable. The finding of the present survey clearly showed this assumption, and all disciplines and their clinical procedures resulted compromised in terms of self-confidence after the lockdown period.

5 | CONCLUSION

The interruption of the clinical practice training significantly affected the educational career and the self-confidence of students. All the dental specialities evaluated showed a statistically decrease in students' self-confidence. The answers to the survey reported that an alternative teaching method involving the use of video tutorials as support in teaching clinical procedures deserves to be considered.

AUTHOR CONTRIBUTIONS

Z.F. e P.A. participated in the conception of the study, analysis and interpretation of data, wrote the study, critically reviewed the content and approved the final version. P.D. participated in the conception of the study, critically reviewed the content and approved the final version. R.L. participated in the conception of the study, in the analysis and interpretation of data, wrote the manuscript, critically reviewed the content and approved the final version. N.Z. participated in the conception of the study, critically reviewed the content and approved the final version.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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