

Impact of the COVID-19 pandemic on dental students: a cross-sectional study across UK universities

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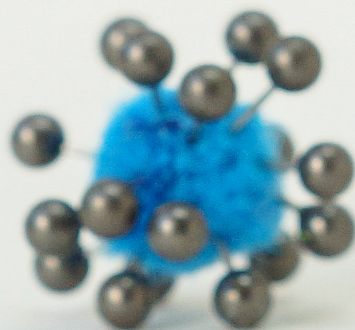
How has the pandemic
affected dental students?

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First reported in China in December 2019, COVID-19 was declared a global pandemic by the World Health Organization on 11 March 2020.¹ In the wake of this global health crisis, the UK Prime Minister announced restrictions on 23 March 2020. These measures were imposed to slow the virus spread and included the first nationwide lockdown.² Consequently, UK universities were forced to rapidly adapt their curriculum delivery from face-to-face teaching to remote learning. Undergraduate dental courses were among those particularly affected. Although they were able to adopt remote delivery of academic teaching and assessment, clinical teaching could not be delivered remotely. This first lockdown resulted in the loss of up to five months of clinical experience for UK dental students.

Widespread outbreaks of infectious disease, such as COVID-19, are associated with psychological distress and symptoms of mental illness.³ Being a student during these outbreaks has been associated with further increased stress, anxiety and depression.⁴

Dental students often report high levels of stress.⁵ This is of particular concern to the dental profession given that this stress does not appear to cease on graduation. A cross-sectional survey of over 2,000 dentists working in the UK showed that dentists exhibit high levels of stress, leading to burnout,⁶ and a retrospective analysis found that stress related illnesses are one of the main factors contributing to premature retirement.⁷ With this in mind, the aim of this study was to explore the impact of the initial phase of the COVID-19 pandemic (and subsequent university closure) on the teaching and learning experiences of undergraduate dental students in the UK, including the impact on their clinical confidence and mental health.

Methods

Ethical approval was gained from the University of Manchester research ethics committee (2020-10156-16279). This study was a cross-sectional online survey of current undergraduate dental students at UK universities developed using SelectSurvey.NET™ (ClassApps, Kansas City, MO, US). Question types varied between five-point Likert scales ranging from 1 (poor) to 5 (excellent), multiple choice questions and free text boxes. Questions comprised the following areas:

- demographic questions (university, year, location)
- questions relating to students' rating of their university before and after the pandemic (quality of teaching, communication, support available, course satisfaction)
- questions relating to the pandemic's impact (on overall learning, clinical skills, confidence treating patients, stress levels about studies)
- questions relating to the impact on students' mental health
- free text questions (mental health, positive effects, suggestions for university)

The deans of all 16 dental schools in the UK were emailed directly and asked to distribute the survey to

the dental students enrolled in their university during the 2019–2020 academic year. We received mixed responses. Five deans indicated that they would send it out, three had automatic annual leave replies, two said they were not currently circulating questionnaires and the rest did not reply. It cannot be confirmed how many deans subsequently distributed the survey. An open invitation was also posted on social media, including Facebook and Instagram. All respondents read and completed a consent form prior to accessing the survey. In order to encourage participation, respondents were given the opportunity to be entered into a prize draw for a £30 Amazon gift card.

Data collection began on 10 August 2020 and ceased on 17 September 2020. Statistical analysis was performed using SPSS® Statistics version 25 (IBM, New York, US). Statistical significance was set at a *p*-value of <0.05.

Results

A total of 312 questionnaires were collected. Responses were obtained from each of the 16 dental schools in the UK (Figure 1) and contained UK students (93%), EU students (2%) and non-EU students (6%). Responses per dental school varied, ranging from 98 responses to 1 response. Responses by year group were more evenly distributed (Figure 2).

Most students (85%) thought their overall learning was negatively affected by the lockdown and university closures, although 6% reported that the closures had a positive impact. Comparisons were made between students' perceptions of teaching quality, communication, satisfaction with the support received, and overall course satisfaction before and after the

Nearly all dental students believe their clinical skills will be affected by the change in teaching due to university closure

Figure 1 The number of respondents enrolled at each of the 16 UK dental schools

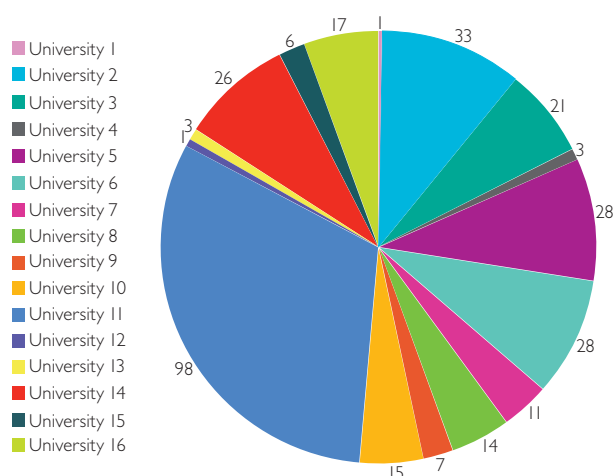
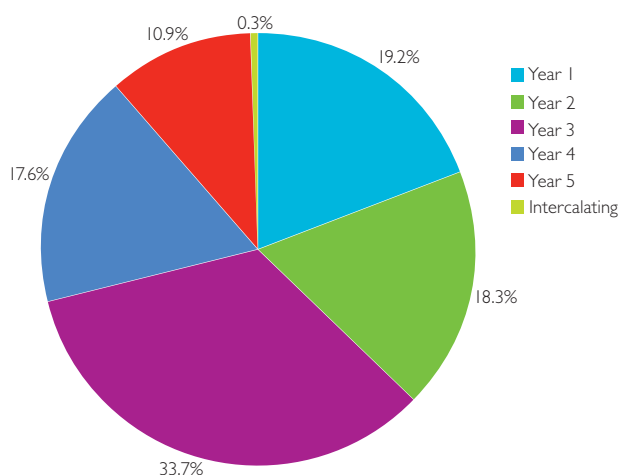


Figure 2 Respondents' year of study during the 2019-2020 academic year



lockdown period using paired samples t-tests. These showed statistically significant reductions (Table 1).

Students did not report an increase in their levels of stress about their studies compared with their existing levels of stress. A paired samples t-test demonstrated no significant difference between students' stress before university closure (mean rating: 3.54, standard deviation [SD]: 0.954) compared with after (mean rating: 3.66, SD: 1.190) ($t(309)=-1.595$, $p=0.112$).

Regarding clinical skills, 97% of respondents thought their clinical skills were affected by the change in teaching; 68% thought the impact would be short term but 29% felt the university closure would have a long-term impact. In terms of students' confidence in treating patients, comparison of scores for before and

after university closure using a paired samples t-test showed that students felt less confident about treating patients at the start of the 2020–2021 academic year (mean rating: 2.66, SD: 1.055) than they did in 2019–2020 (mean rating: 3.57, SD: 0.947) ($t(304)=15.100$, $p<0.001$). The eta-squared statistic (0.43) indicated a large effect size.

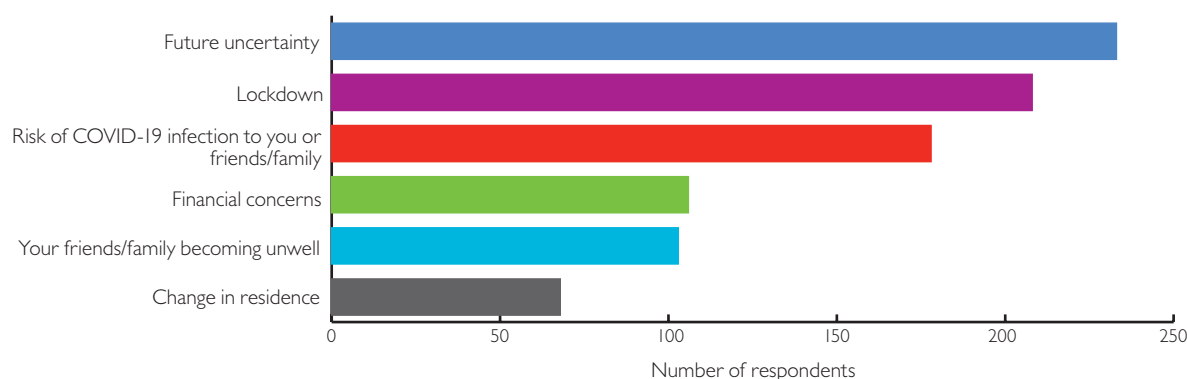
Students were asked to identify the factors (if any) that had a negative impact on their mental health. This question had a 100% response rate. Future uncertainty was the most commonly cited factor, selected by 75% of respondents (Figure 3). The lockdown itself and the risk of infection also affected the mental health of over half of those surveyed (67% and 57% respectively). Respondents expanded on this in the free text response to the question, commenting on social isolation, including missing family and friends, and 'loneliness in lockdown', as well as bereavement, with 'loss of family due to COVID'. Students also expressed their worry about catching up on missed opportunities as they felt they may not have 'the skills needed when we graduate' and this might put them at a 'disadvantage long term'.

In another free text question, 191 respondents (61%) stated factors that had a positive effect on their learning. Students mentioned the benefits of remote learning, quoting 'more flexibility' to work in their own time, the ability to structure their days 'more productively' and 'fewer distractions'. Another positive effect was online lectures as students were able to 'pause and rewind to help aid [their] understanding' and they found it 'less intimidating' to ask questions online. Students also commented that the change in examination format to online was helpful owing to the 'ability to sit exams in a comfortable and familiar surrounding' and resulted in 'far less stress and pressure'. Finally, the increase in extracurricular online webinars, provided by external dental organisations, was beneficial for several students as they 'widened knowledge' and 'provided a much greater insight into specific topics'.

In a final free text question, students were invited to put forward their thoughts on how their university could improve online teaching or help them catch up in the following year; 195 students (62%) commented on this. In relation to how universities could have better dealt with the crisis, some students felt that universities 'neglected to communicate [...] effectively' and suggested that they should 'ask for input' from students. There was also a calling for universities to 'continue to offer support' throughout their closure, including a request to 'understand the disadvantages to students with poor/no internet access' during remote learning.

Students proposed several ideas for improving the remote learning experience. Many stated that they would prefer the chance to attend live lectures (rather than watching pre-recorded sessions) as it is 'more engaging' and they would feel more involved. They also suggested that universities should encourage the use of cameras and microphones for a 'more

Figure 3 Factors that negatively affected respondents' mental health



personal and interactive' experience, where students can easily 'ask questions'. In addition, some students would like the live sessions to be recorded for access at later times, ensuring they 'don't miss out' on sessions they are unable to attend, saying that this would 'suit all students, particularly international students'. Respondents also mentioned that they prefer 'small teaching groups' as they feel 'more benefit is gained'.

As well as a general request for 'additional lectures and podcasts online', students commented that they need 'lots of clinical skills catch-up sessions' in their remaining time at university. This would help them to 'regain and practise' their skills and to reignite their 'lost motivation'.

Discussion

Eighty-five per cent of dental students who took part in this study felt that their overall learning had been negatively affected by the COVID-19 lockdown and university closure. Our analysis of the survey results focused on aspects that may contribute to a long-term impact on dental education and the profession. This is with the hope that universities learn from the

pandemic's impacts on dental students to mitigate any possible adverse effects on their future careers, make curriculum changes and adapt their response in the event of future crises.

Confidence in providing clinical care for patients is considered an important education outcome for dental undergraduates.⁸ Confidence is a person's perception of his or her competence and influences whether an individual is willing to undertake a specific activity.^{9,10} Our study found that students' self-reported confidence in treating patients decreased following the period of university closure. The results also showed that nearly all dental students believe their clinical skills will be affected by the change in teaching due to university closure. This perceived decline in competence may affect students' confidence in undertaking clinical procedures.

These findings could be explained by the substitution of clinical teaching with remote theory during the months of closure. This would corroborate the results of a study on confidence levels of final year dental students that discusses the complex relationship

Table 1 Paired samples t-tests comparing students' perceptions of several factors before and after university closure

Factor	Mean rating before closure	Mean rating after closure	Percentage change	Eta-squared statistic	Effect size	Significance
Quality of university teaching	4.14 (SD: 0.668)	3.18 (SD: 1.032)	-23%	0.52	Large	t(311)=18.592 p<0.001
Communication from university	3.81 (SD: 0.939)	3.32 (SD: 1.195)	-13%	0.16	Large	t(311)=7.755 p<0.001
Satisfaction with support received	4.07 (SD: 0.934)	3.79 (SD: 1.166)	-7%	0.11	Moderate	t(310)=6.042, p<0.001
Course satisfaction	3.28 (SD: 1.120)	3.28 (SD: 1.120)	-21%	0.43	Large	t(310)=15.345 p<0.001

between clinical experience, competence and student self-perceived confidence.¹¹ Self-confidence contributes to effective clinical performance¹² and low confidence has been found to make dental graduates overly reliant on their trainers.¹¹ It is therefore a potential concern that the diminished confidence and self-assessed clinical skills of students trained during this period could have long-term consequences on their professional development. Confidence is likely to grow with increased clinical experience.¹³ Given the possible implications that these results could have on patient care, we suggest that it is crucial for dental schools to run extra clinical sessions during students' remaining undergraduate years.

Our survey revealed that the mental health of all respondents was negatively affected by the pandemic. Self-rated mental health is related to symptoms of psychological distress,¹⁴ which can have an adverse impact on students' academic performance.¹⁵ Our results suggest a need for services to be put in place to help the affected students and the long-term impact on these students' future careers could be the subject of future research. Our findings also show that students' satisfaction with the support they received from their university decreased after closure. We believe it is important for universities to improve the mental health support services available to students in the event of their closure. These services should focus on the prevailing student concerns, such as bereavement and social isolation, and should include more regular updates as future uncertainty had a negative impact on the mental health of most respondents.

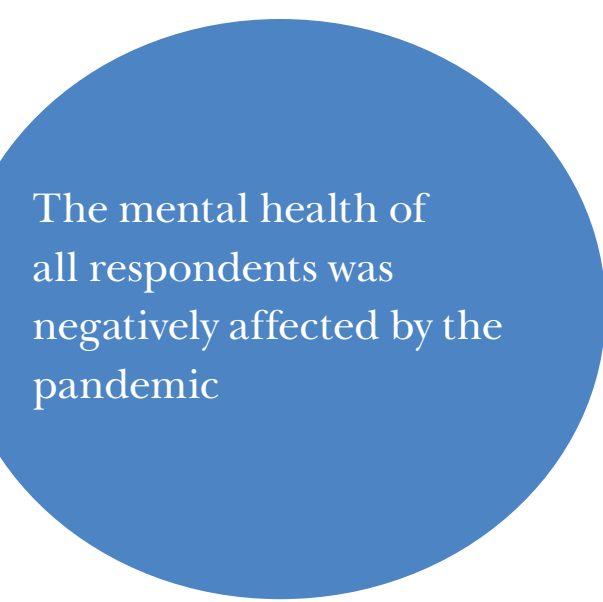
Students' ratings of the communication they received from their university decreased after university closure. It is recommended that universities amend and improve their communication strategy in the event of future closure in order to ensure useful information is conveyed to students in a manner they understand. The subject of students' concerns may change throughout the course of a crisis; if communication is made more interactive, students can express their latest concerns and universities can respond accordingly.

The circumstances surrounding this closure present unique opportunities for rethinking future teaching. This study also sought to identify positive impacts due to the enforced period of remote learning. Based on students' comments, it seems they perceived that remote learning had some positive effects on their learning. The flexibility of scheduling their own day increased productivity and reduced pressures while the advantages of online lectures include the ability to re-watch sections as well as being less intimidating for students to ask questions.

Students also indicated ways in which any future remote learning could be improved. Some suggested that live interactive sessions, which encourage student participation by allowing use of video and microphone, are more conducive to their learning than watching pre-recorded content. Students also prefer smaller groups and for content to be recorded for later access. We suggest that dental school curriculums should be adapted to incorporate remote learning, taking into account some of the recommendations made by students in this survey. A good balance can be found and universities must endeavour to mitigate potential negative outcomes of remote learning (such as social isolation) by ensuring that students are well supported by their tutors. Considering the rapid increase in free external online resources indicated by students' comments, dental schools should help students to identify good quality learning resources so that they can make informed choices when exploring online content.

Stress among dental students is well established.¹⁶ Our results did not indicate a significant change in students' stress levels about their studies after university closure. This is surprising given that other studies have indicated that the pandemic has led to elevated stress among students.⁴

Although this could be explained by stress levels being maintained at a consistently high level before and throughout the pandemic, it may also have been due to a change in the source of students' stress. Prior research has reported examinations as a frequent source of stress for dental students.⁵ The positive effects of online exams and remote learning could have offset factors that increase stress (such as future uncertainty), and this might explain why students' stress levels about their studies did not increase during the pandemic. We would advise that the use of online exams is explored



The mental health of all respondents was negatively affected by the pandemic

further to evaluate whether it is a suitable long-term approach to student assessment.

Study limitations

This study is subject to several limitations. The survey type is cross-sectional, which captured students' experiences during that specific period of time. This may have changed as the pandemic developed and they progressed further through their next academic year. The fact that not all deans sent the survey to their students likely decreased the sample size and led to unequal distribution of responses throughout universities; the results may therefore be more representative of some universities than of others. Additionally, the SelectSurvey.NET™ online platform suffered a technical fault, meaning it was unavailable for three days during the data collection period and did not allow responses from students who attempted to access the survey during this time. This may have led to a lower number of responses.

Conclusions

The findings of this study have drawn attention to both negative and positive impacts of the COVID-19 pandemic on dental students' education. We have highlighted areas for universities to focus on in order to mitigate the long-term effects on the dental profession and have also suggested opportunities for curriculum development. In the event of future closures and throughout periods when clinical opportunities remain limited compared with previous years, dental schools should ensure plans are in place to provide effective support for and communication with their students, and a greater focus should be placed on students' mental wellbeing. Further research is needed to explore the long-term impact of the pandemic on students' clinical skills and mental health.

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