

Mind the 'GAPP': a pre-graduation assessment of preparedness for practice amid a pandemic

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Key points

Illustrates the perceived effect of the COVID-19 pandemic on final year students' preparedness for practice and the impact it may have on dental foundation training through quantitative and qualitative methods.

Highlights and explores the differences in the perceptions of preparedness for practice of final year students across sex, age and course length.

Explores various aspects of clinical supervision and assessment and reinforces the importance of appropriate student-staff ratios to ensure clinical learning is effective.

Abstract

Introduction 'Preparedness for practice' refers to a multifaceted concept, encompassing not only clinical skills, but also broader, non-clinical skills, such as communication and professionalism. Previous graduates have reported feeling less prepared for complex procedures, such as molar endodontics and surgical extractions. Dental students typically utilise their final year to refine their clinical skills, however, the COVID-19 pandemic has meant that newly qualified dentists will have had around six months where they have not performed clinical dentistry before beginning dental foundation training (DFT).

Aims This study aimed to explore final year students' self-reported preparedness for practice, identify areas of relative weakness that may influence future training needs and to highlight any perceived impact of the pandemic on final year experience and potential impact on DFT.

Materials and methods The current Graduate Assessment of Preparedness for Practice (GAPP) questionnaire was adapted for our specific research aims and piloted and the PreGAPP questionnaire distributed via the social media channels of dental school student societies. Analysis was carried out using IBM Statistical Package for the Social Sciences software using descriptive statistics and the Mann-Whitney U test for two unrelated variables.

Results Responses were received from final year students across all 16 UK dental schools. Students reported increased preparedness across domains in which they had the most experience; for example, providing preventative advice and administering local anaesthesia. Male students reported feeling significantly more prepared than female students, mature students significantly more than younger students, and students on four-year courses significantly more than traditional five-year courses. The COVID-19 pandemic was expected to have a major-to-severe impact on undergraduate experience and future DFT prospects.

Conclusion Dental graduates in the COVID-19 era may have significantly different training needs to those before them. Complex clinical procedures remain the areas where students feel they are least prepared for practice. The importance of a clinical passport to highlight current experience level to trainers, alongside the creation of a personal development plan at the beginning of DFT, will ensure that targeted and personalised training can be implemented where required.

Introduction

Within dentistry, 'preparedness for practice' refers to a multifaceted concept encompassing

not only an individual's clinical competence and ability but also the behavioural and emotional aspects of 'softer' attitudinal skills, such as communication and professionalism.¹ Preparedness for practice itself may focus on more than one transition phase and in the UK, this may relate to the transition from final year student to 'safe beginner' or from 'safe beginner' to 'independent practitioner'.²

Dental schools facilitate the initial transition from student to 'safe beginner' by developing well-rounded professionals who, following completion of their dental degree, are able to demonstrate they have met the learning outcomes required for registration

with the General Dental Council (GDC).³ Undergraduate dental education is unique in that each dental school has autonomy over how they plan and deliver their curriculum, with close scrutiny and regular quality assurance by the GDC.⁴ This autonomy, however, means that dental graduates are likely to have had significantly different dental school experiences, with wide variation in the 'standard' of graduating dentists reported in the literature.⁵

Dentistry, unlike professions such as medicine and law, does not require mandatory vocational training for its graduates before full registration with its governing body.³ Instead, each year, >99% of newly qualified

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UK dentists enter dental foundation training (DFT) (or vocational training in Scotland), a year-long programme of supervised practice and study days which aims to bridge the gap between undergraduate and postgraduate life and enable the second transition from 'safe beginner' into 'independent practitioner'.^{1,2} DFT facilitates what is already a daunting step from full-time education into full-time employment, however, in countries such as India and Brazil, preparedness for practice is an even more important construct, since graduates face potentially 'hostile' work environments as graduate employment is not guaranteed.^{6,7,8}

Unlike undergraduate education, all dental foundation trainees are assessed against the same curriculum and competencies set by the UK Committee of Postgraduate Dental Deans and Directors.⁹ Satisfactory completion of DFT enables dentists to apply to join the NHS Performers List and provide independent treatment on the NHS.⁶ The GDC has acknowledged the importance of DFT in developing new graduates, on top of the onus on dental schools to produce dentists suitable for immediate registration, however, at present, they have no actual input into the content or remit of DFT.⁵ They define 'safe beginner' and 'independent practitioner' in their 2015 *Preparing for practice* document;³ however, the definitions are not distinct and do not clearly delineate what is expected of a newly qualified dentist at their initial point of GDC registration.¹

In 1999, Cabot and Radford¹⁰ reported the first rumblings of an undertone running through the profession that dental graduates are 'not as good as they used to be'.¹¹ Despite a 2013 GDC report into the *Transition to independent practice*¹² finding no evidence of newly qualified dentists providing any increased risk to patient safety, the GDC report that they continue to receive anecdotal feedback from dental professionals regarding significant gaps in the 'knowledge and skills of new graduates'.¹ This stance is analogous with the wider literature from outside the UK, which reports a lack of preparedness shared across healthcare systems comparable with our own, such as those in New Zealand, Hong Kong, Australia and Canada.^{13,14,15,16} Lack of perceived preparedness for practice has not only been reported by students and new graduates but by the very educational supervisors (ES) who train them throughout DFT. Patel *et al.*¹⁷ found that ES' felt their

trainees were continually lacking certain clinical competencies, in addition to a more recent study by Oxley *et al.*⁵ which highlighted that trainers felt standards in 'basic' clinical areas such as fillings, extractions and denture provision were diminishing.

The immediate and dramatic impact of the COVID-19 pandemic on dental education from mid-March 2020 presented a stark contrast to the seamless transition final year students normally experience from undergraduate education into DFT and a career of lifelong learning.^{9,18} Students and foundation dentists (FDs) were quick to voice their concerns about the transition from dental school and what would be viable for FDs to carry out in DFT and beyond.^{19,20}

The focus of this study is on the transition from student to 'safe beginner' through use of a modified version of the Graduate Assessment of Preparedness for Practice (GAPP) questionnaire – a validated and reliable method of assessing preparedness for 'independent' practice.⁹ This research aims to: explore the self-reported perception of preparedness for practice of final year dental students before graduation; to identify areas of relative weakness in undergraduate education that may influence future training needs of foundation dentists; and to highlight the perceived impact of the COVID-19 pandemic on final year experience and future training needs.

Materials and methods

Questionnaire design, ethics, study setting and piloting

The questionnaire was developed following literature synthesis surrounding the construct of dental 'preparedness for practice'. Aspects of the Dental Undergraduates Preparedness Assessment Scale⁴ and the GAPP questionnaire⁹ were adapted for our specific research aims. Several iterations of the questionnaire were considered before a consensus was established and the final PreGAPP questionnaire created, comprising four distinct sections (three mandatory, one optional). Ethical approval was granted for the study by the Newcastle University Ethics Committee (REF: 2515/2020). All students who completed the questionnaire consented to participate, in addition to allowing the anonymous data being used for any future presentation(s) and/or publication.

The questionnaire was piloted to assess the content and face validity by final year dental students at Newcastle University. Minor amendments were made to the layout, response structure and mandatory nature of some question responses as a result of this validation process. A full version of the PreGAPP questionnaire is provided in the online Supplementary Information (reproduced with permission from Jisc).

The first section collected anonymous demographic data, such as age, sex, affiliated dental school, length of dental degree (four or five years) and the year in which finals exams are undertaken, as well as COVID-related questions, such as date of dental school closure, adaptation of exam procedures and whether or not participants had completed a personal development plan (PDP) before. This section of the survey utilised 'skip logic', a feature which determines if and when certain questions appear in the survey, dependent on the previous response.

The second section contained the PreGAPP questionnaire.⁹ This comprised 36 competency-based questions across the four domains of the GDC's *Preparing for practice* curriculum: clinical, communication, professionalism and management and leadership. Each of the 36 questions was preceded by the stem: 'how well prepared do you currently feel for general dental practice in order to...?' Although a seven-point Likert-type scale was used in the original GAPP questionnaire, as a result of piloting feedback, in which students reported the seven-point scale being cumbersome with too many similar options, a five-point Likert scale was employed in the PreGAPP questionnaire: completely unprepared; poorly prepared; neither well nor poorly prepared; well prepared; completely prepared. Less categories in a response scale have been postulated to maintain low respondent stress,^{9,21} with five responses maintaining an equivalent psychometric distance between options from 'neutral'^{9,22} while ensuring less chance of respondent irritation or even non-response, with maintenance of a 'neutral' central category.^{9,23}

The third section comprised seven five-point Likert scale questions surrounding the perceived impact of the global COVID-19 pandemic on their current and future education and clinical experience from 'insignificant' through 'minor', 'moderate', 'major' and 'severe'.

Although section two provides a 'quantitative benchmark' of a student's perceived preparedness for practice, qualitative information such as a student's experiences and feelings are inexpressible through a quantitative method alone. Hence, the fourth section, although optional, comprised three, unlimited free-text response boxes, which allowed respondents to provide their personal perspective surrounding their current and previous undergraduate education and future expectations for DFT, as well as the impact of COVID-19 on their current and future circumstances.

Questionnaire distribution

The PreGAPP questionnaire was uploaded onto Online Surveys (formerly BOS)²⁴ and hyperlinks to the survey were promoted on social media (Facebook and Twitter). These were distributed by the student society social media accounts (Facebook and/or Instagram) of each of the 16 dental schools in the UK for six weeks between 15 May 2020 and 1 July 2020. In order to limit the potential for response bias, only two subsequent reminders were sent at three and five weeks, with an automated message informing the respondent they had already completed the survey, should the system detect a further attempt from the IP address of a previous response.

Data analysis

Data were analysed using Statistical Package for the Social Sciences (SPSS) (IBM Corp. Released 2019. IBM SPSS Statistics for Mac, Version 26.0. Armonk, NY) and the in-built tools on the Online Surveys website. Categorical data from section one were coded numerically, for example, sex was converted to 0 (male) and 1 (female) to allow descriptive statistical analysis. The quantitative categorical data from section two were also coded to allow statistical analysis: code '1' represented completely unprepared through to code '5' representing 'completely prepared'.

Due to the non-parametric nature of categorical (ordinal) data from Likert scales in section two and three, median scores with interquartile range (IQR) were calculated and analysed and the Mann-Whitney U test used to analyse two unrelated variables, due to the non-normal nature of the data. Mean rank scores were considered to be statistically significant if $P < 0.05$.

The free-text responses in section four were analysed using an inductive, iterative process, that is, derived and driven by the response data and not categorised based on the questions asked. Coding and subsequent development of the thematic analysis were performed by the first and second authors which resulted in creation of themes and subthemes within the qualitative data, with review of the final thematic matrices completed by the third author.

Results

Response rate

Responses were received from final year students across all 16 UK dental schools, with 105 students completing the survey. With approximately 905 graduates who entered DFT in September 2020 across England, Wales and Northern Ireland, this equates to 12% of those currently undertaking DFT.²⁵

Section one results

Respondent descriptive data

The majority of respondents were aged between 22–27 years old (88.6%; $n = 93$), with ten (9.5%) aged between 28–33 years old, one (1%) aged between 34–39 years old and one (1%) aged 40 years or older. Sex distribution was 22.9% ($n = 24$) male, 76.2% ($n = 80$) female and one (0.9%) undisclosed. In total, 12 respondents (11.4%) were on a four-year dental degree, with 93 (88.6%) on a five-year dental degree.

The earliest reported dental school cessation of face-to-face teaching and clinical activity was 2 March 2020, with the latest reported as 30 March 2020. Overall, seven respondents (6.7%) advised their finals exams took place in the penultimate year of their degree, 84 (80%) in the final year of their degree, with 14 (13.3%) advising a split over the last two years of their degree.

Ninety-eight respondents (93.3%) advised the format of their finals examinations had changed as a result of the pandemic. The new formats consisted of: video conferencing, for example, Zoom interviews ($n = 40$; 40.8%); written examinations, vivas and case presentations converted to online submissions ($n = 91$; 92.9%); while 40.8% ($n = 40$) reported having some form of examination cancelled. Moreover, 87 respondents (82.9%) had never prepared a personal PDP before, with only 18 (17.1%) having some experience of a PDP.

Section two results

Section two descriptive data

The mode, median (IQR), mean rank and significance values from all PreGAPP questionnaire responses are displayed in Table 1. Overall, final year students rated themselves 'completely prepared' for only 2 of the 24 clinical domains – providing preventive advice and administration of local anaesthesia. Students felt 'well prepared' for 19 clinical areas, with 'orthodontic appliance repair' and 'temporomandibular joint (TMJ) management' ranked 'neither well nor poorly prepared' and 'surgical extractions' rated as 'poorly prepared'.

Across the three non-clinical domains, respondents regarded themselves as 'well prepared' or 'completely prepared', with all communication areas 'well prepared' and all professionalism domains 'completely prepared'. Students felt 'completely prepared' to act as patient advocate where appropriate, with all other management and leadership domains rated 'well prepared'.

Sex (Mann-Whitney U test)

H_0 : There will be no difference between the sexes of final year students in their self-reported rating of preparedness.

For all questions considered as a whole, male students reported a higher rating of preparedness than female students. Female students felt more prepared in 3 out of 36 domains: to refer patients for advice, assessment or treatment; to undertake orthodontic appliance repair; and to communicate with patients and the public. Significant differences were noted in the clinical domain only: patient examination ($P = 0.015$), drug prescription ($P = 0.042$), direct restorations ($P = 0.042$), endodontics ($P = 0.029$), extractions ($P = 0.011$), surgical extractions ($P < 0.001$), dentures ($P = 0.004$) and medical emergency management ($P = 0.025$).

Age (Mann-Whitney U test)

H_0 : The age of final year students will not affect their self-reported rating of preparedness.

Respondents were grouped together into two age brackets: 22–27 years old and ≥ 28 years old. Across the clinical domains, respondents aged 28+ felt more prepared as a whole (20/24 domains). Significant differences were noted in patient examination ($P = 0.009$) and surgical extractions ($P = 0.006$). Older students felt more prepared across all communication domains, whereas across the

Table 1 PreGAPP questionnaire data

Domain	Mode	Median (IQR)	Mean rank		Sig	Mean rank		Sig	Mean rank		Sig
			Sex			Age			Course length		
			Male	Female		22-27	28+		4 years	5 years	
Clinical											
History taking	4	4 (4, 5)	53.69	52.14	P = 0.804	52.20	50.10	P = 0.811	68.50	51.00	P = 0.034*
Patient examination	4	4 (4, 4)	63.98	49.06	P = 0.015*	49.82	72.30	P = 0.009*	65.67	51.37	P = 0.081
Orthodontic assessment	4	4 (3, 4)	60.50	50.10	P = 0.114	50.92	62.00	P = 0.235	73.88	50.31	P = 0.007*
Acute patient management	4	4 (3, 4)	62.31	49.56	P = 0.051	51.59	55.80	P = 0.648	67.54	51.12	P = 0.059
Special tests	4	4 (4, 5)	60.50	50.10	P = 0.090	51.17	59.75	P = 0.324	73.13	50.40	P = 0.005*
Diagnosis	4	4 (4, 5)	56.46	51.31	P = 0.393	51.29	58.60	P = 0.389	68.38	51.02	P = 0.031*
Treatment planning	4	4 (4, 5)	61.29	49.86	P = 0.071	50.72	63.95	P = 0.138	73.04	50.41	P = 0.007*
Prevention advice	5	5 (4, 5)	58.10	50.82	P = 0.248	52.91	43.55	P = 0.293	56.46	52.55	P = 0.641
Referrals	4	4 (3, 4)	48.44	53.72	P = 0.414	51.40	57.60	P = 0.497	64.00	51.58	P = 0.150
Safeguarding	4	4 (3, 4)	56.33	51.35	P = 0.452	52.31	49.10	P = 0.732	49.92	53.40	P = 0.693
Drug prescription	4	4 (3, 4)	62.92	49.38	P = 0.042*	50.94	61.90	P = 0.245	70.42	50.75	P = 0.027*
Periodontal	4	4 (4, 5)	56.96	51.16	P = 0.349	52.17	50.45	P = 0.845	63.38	51.66	P = 0.156
Local anaesthesia	5	5 (4, 5)	59.88	50.29	P = 0.108	51.52	56.50	P = 0.554	56.00	52.61	P = 0.669
Direct restorations	4	4 (4, 5)	63.00	49.35	P = 0.028*	50.40	66.90	P = 0.061	63.25	51.68	P = 0.163
Endodontics	4	4 (4, 4)	63.10	49.32	P = 0.029*	50.66	64.50	P = 0.121	63.88	51.60	P = 0.146
Extractions	4	4 (4, 5)	65.00	48.75	P = 0.011*	51.20	59.45	P = 0.365	65.21	51.42	P = 0.107
Surgical extractions	2	2 (2, 4)	71.25	46.88	P < 0.001*	49.41	76.10	P = 0.006*	73.33	50.38	P = 0.011*
Dentures	4	4 (3, 4)	66.67	48.25	P = 0.004*	50.43	66.60	P = 0.075	72.25	50.52	P = 0.011*
Indirect restorations	4	4 (3, 4)	59.90	50.28	P = 0.144	50.89	62.30	P = 0.220	68.75	50.97	P = 0.043*
Orthodontic appliance repair	3	3 (2, 4)	52.48	52.51	P = 0.997	51.41	57.45	P = 0.533	60.46	52.04	P = 0.355
TMJ management	3	3 (2, 4)	57.46	51.01	P = 0.343	50.97	61.55	P = 0.272	63.29	51.67	P = 0.199
Patient and public safety	4	4 (4, 5)	58.08	50.83	P = 0.259	51.48	56.80	P = 0.558	66.25	51.29	P = 0.081
Medical emergencies	4	4 (4, 4)	63.00	49.35	P = 0.025*	51.18	59.60	P = 0.332	63.38	51.66	P = 0.151
Population-based care	4	4 (3, 5)	58.75	50.63	P = 0.214	51.63	55.45	P = 0.679	60.29	52.06	P = 0.345
Communication											
Patients and public	4	4 (4, 5)	52.38	52.54	P = 0.979	51.90	52.90	P = 0.910	62.88	51.73	P = 0.177
Other healthcare professionals	4	4 (4, 5)	53.83	52.10	P = 0.790	51.07	60.65	P = 0.299	63.04	50.98	P = 0.192
Generic communication skills	4	4 (4, 5)	56.21	51.39	P = 0.436	51.52	56.45	P = 0.575	61.50	51.92	P = 0.032*
Professionalism											
Patients and the public	5	5 (4, 5)	59.06	50.53	P = 0.159	52.12	50.90	P = 0.887	59.33	52.18	P = 0.232
Dignity, equality and diversity	5	5 (4, 5)	58.92	50.58	P = 0.167	51.92	52.70	P = 0.928	61.38	51.92	P = 0.238
Ethical and legal	5	5 (4, 5)	58.00	50.85	P = 0.244	52.24	49.75	P = 0.774	59.33	52.18	P = 0.381
Teamwork	5	5 (4, 5)	55.85	51.49	P = 0.482	51.47	56.90	P = 0.536	61.33	51.92	P = 0.253
Development of self and others	5	5 (4, 5)	61.50	49.80	P = 0.059	51.42	57.40	P = 0.496	57.67	52.40	P = 0.523
Management and leadership											
Relating to self	4	4 (4, 5)	57.58	50.98	P = 0.302	52.02	51.80	P = 0.980	64.33	51.54	P = 0.133
Relating to others – advocacy	5	5 (4, 5)	54.52	51.89	P = 0.668	52.30	49.25	P = 0.725	58.67	52.27	P = 0.432
Relating to others – colleagues	4	4 (3, 5)	58.94	50.57	P = 0.208	51.86	53.30	P = 0.878	63.96	51.59	P = 0.162
Relating to the working environment	4	4 (4, 5)	60.42	50.13	P = 0.105	51.26	58.90	P = 0.396	63.83	51.60	P = 0.148

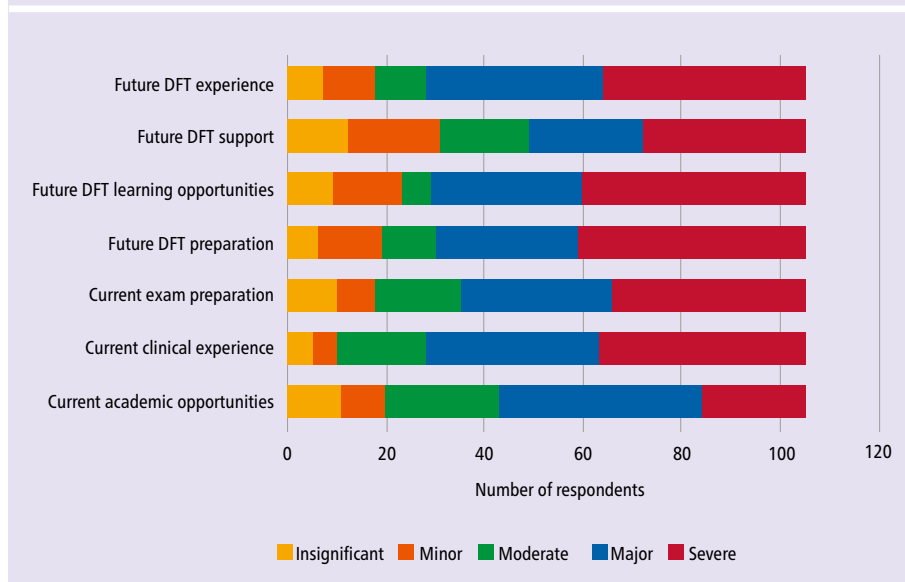
Key:
* = denotes a significant difference

Table 2 COVID-19 impact response data

Domain	Mode	Median (IQR)	Mean rank		Sig	Mean rank		Sig	Mean rank		Sig
			Sex			Age			Course length		
			Male	Female		22–27	28+		4 years	5 years	
Future DFT experience	5	4 (3, 4)	37.08	57.13	P = 0.003*	51.40	57.55	P = 0.514	46.21	53.88	P = 0.386
Future DFT support	5	4 (2, 4)	39.00	56.55	P = 0.010*	51.03	61.00	P = 0.302	41.96	54.42	P = 0.170
Future DFT learning opportunities	5	4 (3, 4)	40.65	56.06	P = 0.020*	52.13	50.75	P = 0.883	42.63	54.34	P = 0.184
Future DFT preparation	5	4 (3, 4)	33.00	58.35	P < 0.001*	51.89	53.00	P = 0.906	36.71	55.10	P = 0.037*
Current exam preparation	5	4 (2, 4)	39.60	56.37	P = 0.013*	53.16	41.25	P = 0.210	35.46	55.26	P = 0.027*
Current clinical experience	5	4 (3, 4)	40.60	56.07	P = 0.020*	52.13	50.80	P = 0.887	36.29	55.16	P = 0.033*
Current academic opportunities	4	4 (2, 4)	43.52	55.19	P = 0.083	51.77	54.10	P = 0.807	42.33	54.38	P = 0.179

Key:
* = denotes a significant difference

Fig. 1 Stacked bar chart of students’ perceived impact of COVID-19



professionalism, management and leadership domains, there was more of an equal split of reported preparedness.

Length of course (Mann-Whitney U test)

H₀: The length of the dental school course will not affect the self-reported rating of preparedness.

With all 36 domains considered as a whole, students on a four-year course felt more prepared across 35/36 domains, with safeguarding the only domain where students on a five-year course reported a higher mean-rank. Statistically significant differences were noted in nine clinical domains: history taking (P = 0.034), orthodontic assessment (P = 0.007), special tests (P = 0.005), diagnosis (P = 0.031), treatment planning (P = 0.007),

drug prescription (P = 0.027), surgical extractions (P = 0.011), dentures (P = 0.011) and indirect restorations (P = 0.043). A significant difference was also found concerning generic communication skills (P = 0.032).

Section three results

Respondent descriptive data

The mode, median (IQR), mean rank and significance values from all COVID impact questions are displayed in Table 2. Final year students felt that COVID-19 had severely affected six out of seven domains of their current and future education and clinical experience, with only ‘current academic opportunities’ felt to be ‘majorly’ affected by the pandemic. The cumulative responses from section three are shown in Figure 1.

Sex (Mann-Whitney U test)

H₀: There will be no difference between the sexes of final year students in their self-reported impact on current and future clinical and academic opportunities.

With all domains considered as a whole, female students considered the pandemic had a greater effect on their current and future learning/clinical opportunities. Statistically significant results were observed in all but one (current academic opportunities) domain.

Age (Mann-Whitney U test)

H₀: The age of final year students will not affect their self-reported impact on current and future clinical and academic opportunities.

As a whole, older students (28+ years old) were more cognisant of the impact the pandemic had on their current and future academic and clinical experience. Younger students felt the pandemic had a greater impact on current clinical experience, current exam preparation and future DFT learning opportunities. There were no statistically significant domains.

Length of course (Mann-Whitney U test)

H₀: The length of the dental school course will have no effect on current and future clinical and academic opportunities.

Across all domains, students on a five-year course felt the pandemic had a greater impact on all aspects of current and future learning and clinical experience. Statistically significant differences were noted for future DFT preparation (P = 0.037), current exam preparation (P = 0.027) and current clinical experience (P = 0.033).

Section four results

Thematic matrices

The questions in this section canvassed final year students' perceptions of the effect of the COVID-19 pandemic on their undergraduate experience and future DFT experience. The thematic matrices are presented in Figures 2 and 3. They were developed throughout the iterative process, whereby the data were continually reassessed to ensure the accuracy of the final categories.²⁶ In total, 87 comments were assessed, analysed and coded, which contributed to the development of the final major and supporting themes. Four major themes emerged: personal, educational, clinical and psychological. A process similar to that by Ray *et al.*²⁶ was performed, in which each subtheme presented in the thematic matrices is varied in size to illustrate the different volume of data derived from the analysis.

Undergraduate education

One of the strongest subthemes emerging in the 'personal' category was that of the students' doubt of their readiness for starting as a 'safe beginner'. Coupled alongside the acceptance of new challenges to alternate approaches to learning, students focused on maintaining a positive mindset, while acknowledging that the situation was outside their control:

- 'I feel that the university's management of the examinations has been nothing short of incredible considering the circumstances. They've constantly kept us in the know and asked for our feedback/ideas. We're all very grateful to be able to sit these exams, even though they're not what we expected'
- 'Taking each step at a time. Keeping a positive mindset.'

There were, however, some strong contrasting views on students' perception of their dental school's efforts towards education and teaching during the first lockdown:

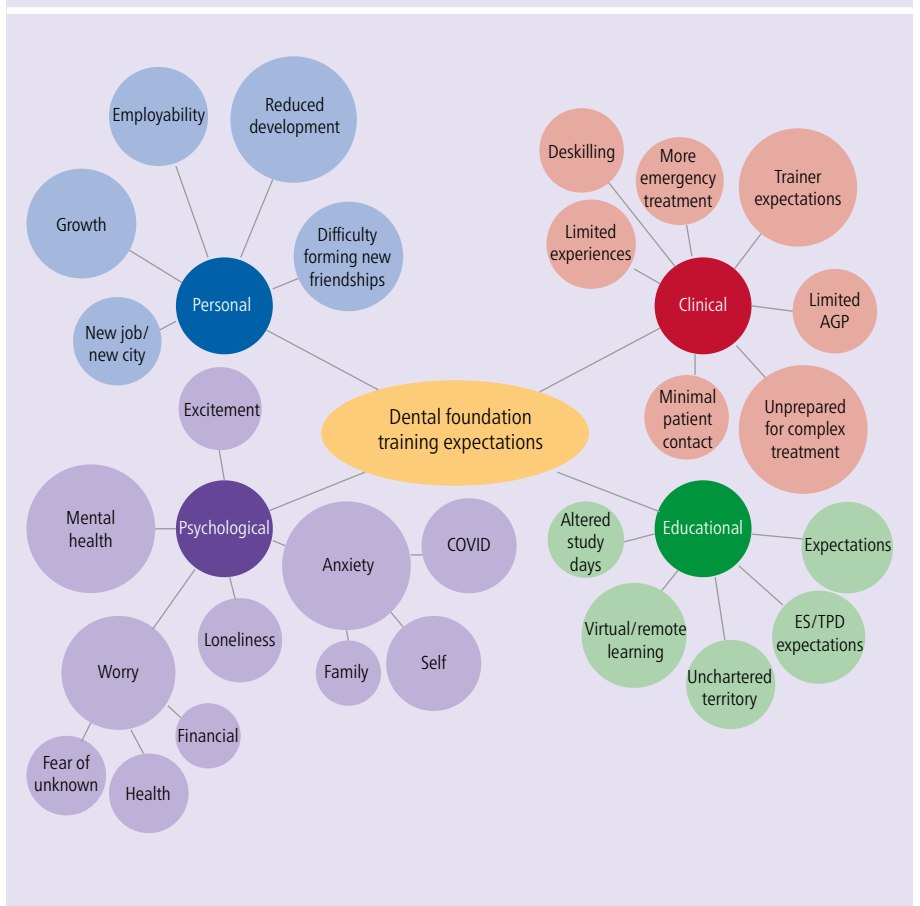
- 'Every effort was made to ensure we hit every learning target and have a well-rounded education to be safe beginners'
- 'Very disappointed with my dental school's management of our studies during the pandemic. I feel very nervous going into DFT where I hope I receive better guidance and teaching than during my time at university'
- 'Exam format and content was well planned and well executed.'

Limits on clinical time as a result of cessation of clinical activity has led to worry for some

Fig. 2 Undergraduate experience thematic matrix



Fig. 3 Dental foundation training expectation thematic matrix



students regarding carrying out certain aspects of treatment without supervision. Other students felt that their exposure to clinical activity earlier in the course had benefited them, where others were relying on the months following March 2020 to ameliorate their clinical skills:

- ‘Do not feel prepared to undertake indirect restorations/endodontic treatment/extractions alone’
- ‘Luckily our clinics had ended by the time COVID forced closure so we were not affected at all’
- ‘Primary care NHS experience and pain triage patient experience from year 2 [was] very valuable in learning about the NHS branding system and communicating with patients in real life scenarios’
- ‘Wish we had more contact time with patients in year 5 rather than in year 4’
- ‘Lack of clinical time, especially in term 4.3 where I feel dentistry really starts to click without the distraction of exams.’

Other students felt they had a better grasp of the more non-clinical areas of the curriculum, with COVID-19 forcing missed learning opportunities, as well as seeing cases to completion:

- ‘Well prepared for history and exams and professionalism, but had lots of clinical time scheduled from late March to May, so missed out on a lot of prosthodontics, oral surgery and oral and maxillofacial surgery’
- ‘The only real impact is the completion of extensive treatment plans and breadth of clinical experience. We have missed out on the chance to have a go at some procedures and see our cases to completion.’

The use of ‘outreach’ was well documented in the responses, with most feeling it had prepared them well for practising as a safe beginner, despite losing out on further clinical experience before commencing DFT:

- ‘Twenty weeks of outreach has prepared us well for the clinical aspects of dental practice as well as the clinical governance and communication aspect. I believe I have had a good experience to act as a steppingstone to my DFT year.’

The psychological impact of COVID-19 on students’ undergraduate experience was reflected in feelings of anxiety both for themselves and for those around them. Whereas some students felt well supported in attempts to

help them progress, others felt that units were more concerned with ensuring that successive year group numbers were not increasing:

- ‘Rather than focusing 100% on my finals, my mind was all over the place about moving out of uni, financial burdens, my health, my family’s health, which meant for finals I was unable to fully focus on them (even though my uni were 100% helpful and always kept us updated)’
- ‘Sometimes I felt the dental school are not interested in students’ welfare/concerns and are more concerned about numbers’
- ‘Due to the long break between the shutdown of uni and seeing DFT patients, I feel practising dentistry again may be overwhelming, but I may just be anxious.’

Dental foundation training expectations

Students were quick to acknowledge that their expectations of DFT, in comparison to previous cohorts, would be considerably different. Many were hopeful, yet frank, with their views surrounding probable limited clinical exposure, especially to more complex treatments and the likely increase in acute presentations and their associated management:

- ‘I think my expectations have changed in that I don’t expect to be doing very much restorative work next year and that it will be limited to emergencies/non-aerosol generating procedures for the majority, if not the whole year’
- ‘Hope to see a wide range of patients and complete a range of treatment. However, was aware that there may be a lot of emergency treatment/treatment planning’
- ‘Expecting much less restorative experience and a lot more focus on infection control, communication and management.’

Others were hopeful that emergency presentations would almost serve as a veiled benefit to gaining experience in exodontia and endodontics:

- ‘It may be busier with a large amount of patients with problems that need sorting and for this reason there may be a lot of extraction/endo experience to be gained’
- ‘I expect it to be a steep learning curve but a very good opportunity to build my clinical skills.’

‘Growth’ was an area focused on by many respondents, across both clinical and non-clinical domains. Students highlighted their

optimism and apprehension toward future career prospects, both in the short- and long-term:

- ‘I would like to have the training and treatment opportunities that will help me progress and be able to develop good professional relationships’
- ‘Feel well prepared in management so worried that enhancement of clinical skills will not be as I expected from DFT [sic]. Although I feel that I will get more exposure to difficult extractions which is a silver lining’
- ‘I feel that COVID will reduce our development in gaining speed in treatment as I cannot see us seeing 20 pts a day by the end of the year due to more triaging and delaying of routine treatment. Worried that this will negatively affect my employability as an associate so now more inclined to do dental core training for further training’
- ‘Worried we will not be ready and prepared at the end of DFT to become an associate.’

DFT will be the first time a student encounters the role of the ES and many students commented on their expectations from their future ES, with many focusing on additional support and supervision:

- ‘Educational supervisors understanding and providing additional support to make up for the clinical experience we missed out on, as most students planned their most complex treatments towards the end of the year when feeling most confident’
- ‘To get a varied experience of primary care with good support from ES to supervise more advanced procedures to improve as a clinician’
- ‘I hope my trainer is easily approachable as I will probably need more guidance than normal due to the loss of clinical experience before starting.’

Many were concerned regarding the length of time without performing clinical dentistry and hoped ES’ and training programme directors (TPD) would take this into account:

- ‘I hope the ES and TPD are aware of the impact this has had in our clinical practice. We will have had six months without a drill in our hands’
- ‘The break between treating patients seems even more amidst the abrupt finish and is causing significant concern for some of the cohort. We are hoping that the DFT

trainers are understanding of this longer break period since treating patients'

- 'Do not feel fully confident with clinical procedures due to missing out on the last few months of clinics, unsure on how dental foundation training will look but hopefully we will be supported.'

Anxiety and worry were a commonality across all domains, especially towards a 'fear of the unknown', with some even expressing 'negative' feelings towards this first phase of their professional career:

- 'Worried that I have de-skilled, will not get to see patients and advance my knowledge as easily in DFT'
- 'The fact I won't have picked up a handpiece/forceps for six months and will be expected to go into practice and be responsible for patients makes me feel very anxious'
- 'COVID-19 will likely negatively affect the progression of my clinical skills with reduced patient exposure during DFT which is concerning'
- 'I am feeling very negative about what is going to happen and whether practices will even be able to facilitate foundation dentists. I cannot see us doing very much clinical work which will put at a disadvantage further down the line as will be relatively unexperienced.'

Some were especially cognisant of the impact of COVID-19 on moving to a new city and not being able to foster new relationships, both personally and professionally:

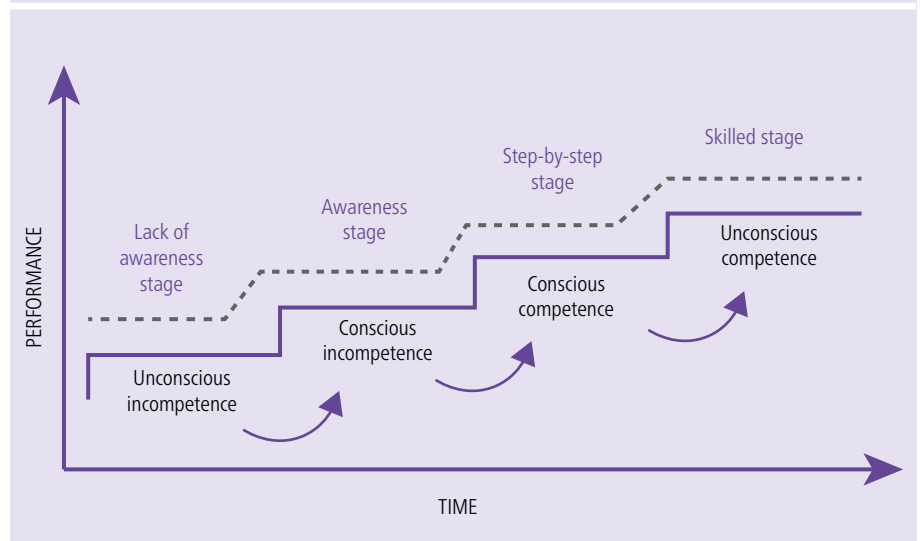
- 'It would be a shame if we couldn't get together on study days due to restrictions on the congregation of large groups. For many, DFT involves moving to a new area and study days are the best way to meet new people your age who live locally.'

Discussion

To the best of our knowledge, this is the only study concerning the self-reported preparedness for practice of final year students that contains responses from all UK dental schools, in addition to gaining insight into the perceived impact of the pandemic on their final year at dental school and the influence it may have on DFT.

Universities in the UK ceased face-to-face activity on 20 March 2020 in response to the COVID-19 pandemic, following a week of initial 'limbo' where institutions were told

Fig. 4 Conscious Competence Matrix. Reproduced with permission from Athlete Assessments²⁹



to remain open, despite schools, colleges and nurseries being urged to close by the government.²⁷ This cessation of normal activity raised a significant number of issues for education providers and caused considerable concern for students in a period where, towards the end of their final year, they are expected to refine their skills while receiving progressively less supervision, preparing them to become more autonomous in their provision of dentistry.

It must be mentioned that the results presented in this study are the students' self-reported levels of preparedness and are not indicative of their actual competence. Actual competence and the perception of competence (confidence) are very different concepts.²⁸ By final year, it may be implied that students should be at the stage of 'conscious competence' (Fig. 4),²⁹ where alongside appropriate training and support, the repetition of performing pre-determined stages of a procedure produce a predictable workflow and reproducible results.³⁰ DFT facilitates the move from safe beginner (consistent with conscious competence) to independent practitioner (unconscious competence).²⁶ Low self-belief or confidence, however, may make a student feel that despite possession of the necessary skills or competence to complete a procedure, they do not have faith in their ability to do so. This may have important connotations for DFT, whereby under-confidence or self-perceived 'conscious incompetence' may make a FD more reliant on their ES, thereby slowing their development. Conversely, overconfidence or 'unconscious incompetence' may risk patient safety if FDs act outside their scope of practice.⁶

Examinations and assessments

Prior to the COVID-19 pandemic, university examinations were dominated by traditional closed book, invigilated, pen-and-paper assessments.³¹ COVID-19 mandated a transition towards online formats, with some finals examinations restructured as 'open-book, open-web' assessments; 93.9% of respondents reported that their examinations had moved to a means of remote delivery, a stark contrast given online finals examinations were previously considered 'off-limits' as far as innovation in education was concerned.¹⁸ Anecdotally, traditional, closed-book examinations have long been considered archaic and out of date, not only because of the absence of technology that is used in everyday education and practice, but because they inhibit constructivist learning theory that facilitates deep learning.³¹ Studies show that not only do open-book approaches enable students to feel less anxious about exam revision and preparation, they actually promote a positive change in the very preparation itself, encouraging a deeper understanding of course content and its application for problem solving in real-life scenarios.^{32,33,34,35} They have, however, been more closely linked to information retrieval rather than held knowledge and provide new situational opportunities for dishonest behaviour, such as cheating and collusion.^{35,36,37}

It remains to be seen how future examinations will proceed as we move toward the 'new normal', however, respondents reported how the digital platforms utilised by their dental schools enabled them to access novel means of learning, teaching and assessment during the first lockdown, even to students scattered

across the globe, thus permitting the course progression required to fulfil GDC requirements for registration, with McGleenon and Morrison rightly noting ‘a clearer demonstration of the utility of online learning and IT systems could hardly be envisaged’.³⁸

Personal development plan and clinical ‘passport’

The GDC are aware that some students face significant challenges in gaining the required clinical experience due to restrictions imposed as a result of COVID-19 and have worked with dental schools to ensure that any adjustments made continue to satisfy requirements, so that all UK graduates are at the necessary standard and safe to treat patients upon registration.³⁹ The COVID-19 pandemic accelerated the preliminary consensus formed at the GDC preparedness for practice conference in November 2019, that all graduates should exit their undergraduate training with a PDP.¹ Any students deemed fit to practise as ‘safe beginners’ but identified as having an area of weakness or lack of experience by their relevant dental schools, will be provided with a PDP³⁹ – vital given that over four-fifths (82.9%) of respondents reported they had never prepared one before.

In addition to a PDP, all final year students will now graduate with a clinical ‘passport-style’ record of their clinical competencies undertaken at dental school. The GDC advises this will serve as a ‘basis for future professional development’ and help to identify any gaps in experience, thus providing a platform whereby FDs and ESs can set goals and target areas for improvement.³⁹ PDPs have been a mandatory element of DFT for some time and are now more crucial than ever, as essential learning needs require prioritising in the initial months of DFT – early planning will help to overcome any challenges that cause disruption to training and not adversely affect progression.^{40,41}

It remains to be seen whether 2020 graduates, with less experience and an increased time between cessation of clinical activity and beginning DFT, will pose a greater risk to litigation or not, as they may require more direct supervision than previous cohorts. Some respondents voiced their concerns surrounding ‘de-skilling’ or becoming anxious when treating patients again, however, fitness to practise (FtP) data from the GDC actually illustrates that newly qualified dentists are nearly four times less likely to be involved in an FtP case than those who have been registered for more than three years.⁴²

Sex

The general trend was towards male students reporting their preparedness higher than female students (33/36 domains) and consequently, the null hypothesis was rejected. Significant differences were only noted in the ‘clinical’ domain, across areas such as endodontics, extractions and medical emergency management. Female final-year students felt more prepared to refer for advice, orthodontic appliance repair and to communicate with patients and the public.

This self-reported difference in preparedness by male students over female students has also been found by previous studies,⁴³ with a systematic review by Mohan and Ravindran⁸ also equating a link between increased preparedness and increased confidence of male students. Although male students have previously been reported as having greater overall confidence, there are isolated domains whereby female students were more confident, such as the routine treatment of children.⁴⁴ This trend is mirrored in undergraduate medicine, whereby female medical students have consistently reported lower confidence levels than male students.⁴⁵ Our results echo previous reports of differences in communication styles, with female students more adept at employing ‘softer’ communication skills and relating to their patients’ emotions than male students, which may also account for the increased number of female trainees in orthodontics and paediatrics.^{44,46,47,48}

While Macluskey *et al.*⁴⁹ found a perceived difference between the sexes in their study of undergraduate students, where male students reported greater confidence across both simple and surgical exodontia, conversely, ES’ have frequently referred to exodontia, as well as the other significantly different areas found in this study, as the areas in which FDs were less capable and/or overconfident.^{6,43}

Age

Evidence suggests that older students may feel more prepared for practice as they have more ‘life experiences’ than those who enter through a more traditional route (dental school straight from secondary education).² Age is an important factor to investigate as not all mature students are post-graduates and research in psychology suggests that personality traits may improve with age.⁵⁰ Studies indicate the odds of feeling well-prepared are higher for more mature graduates⁸ and this is reflected in our results, where, with all questions

considered as a whole, students aged 28+ felt more prepared for practice; the null hypothesis was therefore rejected. Significant differences were noted in the patient examination and surgical extractions domains, with older, male students reporting more preparedness across all domains. Similar trends in undergraduate medicine have been observed, whereby Barr *et al.*⁵¹ identified links between age and sex and subsequent views on preparedness for practice, as older, male graduates self-reported views of preparedness were at odds with younger male and female graduates.²

‘Mature’ students in the UK are defined as adults over 21 years of age at the start of their studies and tend to experience clinical years differently to ‘traditional’ dental students. Our research echoes the results of a previous study showing that older students have more confidence and perceived preparedness, especially in their communication skills.⁵² In addition to life experiences, which may explain increased confidence, previously reported strengths of older students have been the ability to be single-minded and to act quickly, even reflexively, which is crucial in certain clinical situations.⁵² Older healthcare students have also been reported to have a greater capacity to self-reflect and better relate to patients as they have been shown to consider the more humanistic aspect of patients.⁵³

Length of course

For all questions considered as a whole, final year students on a four-year, graduate entry (GE) programme felt significantly more prepared than those on a five-year course; the null hypothesis was therefore rejected.

Students on a 4-year course felt more prepared across 35/36 domains with significant differences noted across 10 domains. Students on a five-year course reported feelings of increased preparedness in only the safeguarding domain. A previous study highlighted the self-reported rate of safeguarding training at UK dental schools is low, at around 26%.⁵⁴ As four-year courses often place more emphasis on the practical, patient-based elements of the course,⁴³ this may be one possible explanation for ‘five-year’ dental students reporting increased preparedness in this area.

Mature GE students have the option to attend schools who run solely dedicated four-year programmes, or those who run parallel four- and five-year courses. Our results also echo the findings by Ray *et al.*,⁴³ where older students on five-year programmes felt more

prepared than the younger students they were training alongside, especially across the non-clinical domains.

This difference in preparedness has been attributed by some, in related literature, as graduate-entry students possessing greater transferable skills when they begin their studies, as opposed to those who enter straight from secondary education.⁸ Graduate-level entrants are presenting with a broad range of learning preferences and perceptions shaped by diverse backgrounds and past experiences.⁵² Although not commented upon by students in our study, previous research describes how some mature students on five-year courses foster older-relative-type relationships with younger students, bringing a 'maturity that spreads within the group', with reports of younger students having an 'immature' approach to their learning, which may relate to the GE students feeling more prepared at this stage in their training.^{26,52}

Clinical settings and experience

A recent scoping review reported that students synonymise 'confidence' with 'preparedness' and feel most confident performing procedures in which they have the most experience.³⁸ Many dental schools have transitioned away from minimum clinical targets or quotas and toward competency-based systems, where overall management is assessed alongside solo clinical procedures – this has led to some authors suggesting that once a student has passed a specific competency, there is little incentive to continue to refine said skill when other areas need 'ticking off' in order to graduate.^{38,44}

Complex treatments such as multi-rooted endodontics, surgical extractions, orthodontics and TMJ management have consistently been reported in the literature as the areas in which graduates and students felt they have least experience and feel least prepared and our results echo this sentiment.^{38,43,44} Where students have been identified by dental schools as requiring additional clinical experience, they may already be disadvantaged as they compete against increased student numbers, limited access to patients for every procedure and an ever-increasing list of 'competencies' required for progression.⁴⁴ As dental schools face real difficulties in providing sufficient clinical experience and dedicated teaching time, the role of dental foundation training will become increasingly important in the COVID-19 era.¹⁷

The same scoping review of the methods and trends in undergraduate clinical skills teaching highlighted that implementation of outreach centres has been one of the greatest innovations in recent years and this theme also featured in our thematic analysis.³⁸ All UK dental schools currently provide some form of outreach experience in their curriculum, typically in a primary care or public/community dental setting, not only increasing access to dental care for some of the most deprived areas, but complementing existing community-based services.⁵⁵ Some authors advocate outreach as the perfect solution to the increasing shortage of clinical staff at teaching and supervisory level in dental schools, while students have also expressed their appreciation for the education delivered in outreach settings which empowers them for 'independent' NHS practice and not just the 'generic practice of dentistry'.^{38,56,57,58}

Outreach centres are increasingly staffed by part-time 'clinical teachers' and Hellyer *et al.*⁵⁹ have noted that clinical teachers need to be aware that their role is distinct from the academic aspects of dental school teaching and more akin to the realities of primary care. As such, some suggest that the lack of preparedness of dental students for complex procedures is as a direct result of increasing periods of time spent at outreach which contributes to reduced experience in key areas of restorative dentistry and oral surgery.^{38,49,60}

The future of learning, teaching and supervision

The majority of clinical learning and teaching takes place on supervised dental clinics, either through multi-disciplinary approaches, where all treatment needs are met in one location or single discipline clinics, for example, periodontics, prosthodontics etc.³⁸ As a result of the reduction in senior, full-time clinical academics, it has been reported that this supervision is increasingly delivered by a workforce reliant on part-time general dental practitioners.⁶¹ With such a large number of part-time staff hailing from different backgrounds, students have consistently described a lack of continuity in teaching approaches, coupled alongside conflicting advice on treatment planning and ways to approach performing procedures.⁶²

To ensure clinical supervision is effective in promoting learning, an 'advantageous' student-staff ratio is important, as large groups

may lead to an inevitable inability to spend sufficient amounts of time teaching; previous reported ratios were normally between 5:1 and 10:1, typically 8:1.⁶² It is the authors' experience that dental school supervision, especially in restorative dentistry, tends to be 'static' in nature, where the supervisor only has the capacity to see a snapshot of student performance at a given point in time, for example, checking placement of a rubber dam or assessing a cavity preparation and not how safely the rubber dam was placed or how carefully the caries was removed from the cavity. This is in comparison with oral surgery, for example, where a national study into oral surgery teaching in the UK reported the average student-staff ratio for surgical exodontia teaching was 2:1.⁶³

A more 'fluid' approach to supervision, whereby the operator is observed performing the task, is regularly performed in DFT where trainees undertake A Dental Evaluation of Performance Tool (ADEPT), an assessment of their performance in a given clinical situation.⁶⁴ ADEPTs are a formative type of workplace-based assessment (WBA), usually trainee-led, that measure their ability and/or competence to complete a task, for example, endodontic access and working length determination, placement of sutures following extractions and fit and adjustment of partial dentures.⁶⁵ Supervisors not only score performance, they also provide feedback that is immediately transferable back into patient care, as well as a score of a trainee's insight into their performance, thus promoting self-reflection and identification of any future learning needs.³⁸

The authors propose that, while some dental schools may indeed have 'snapshot' observational aspects of clinical assessment in their curricula, such as the structured clinical objective test of competence, used by some to assess competence of forceps exodontia,⁶³ more emphasis needs to be placed on 'fluid' supervision of students, with the introduction of 'core' undergraduate ADEPTs that are consistent at all dental schools – no other assessment tool truly reflects the competency to 'do' and this forms the underlying importance of such WBAs.⁶⁵ An increased standardisation of what has been clinically achieved at dental school via core ADEPTs may circumvent any minor variations between different undergraduate curricula and allow ES' to better understand an FD's undergraduate experience – an area for future research.⁶

Strengths and limitations

The number of responses is consistent with a number of previous studies into the research area^{4,26,42,43} and 12% has been deemed an adequate sample size, given the number (population) of current FDs to ensure accuracy of the results.^{66,67} Despite responses being received from all UK dental schools, the results were not broken down by dental school as some schools were not as adequately represented as others – previous studies compared UK versus non-UK dental schools and the dental school of ESs versus the dental school of FDs, however, this was not applicable to our research.⁴²

Our method of distribution and data collection means there may be some sampling error and bias as the survey was only distributed via social media and the affiliated accounts of the student dental societies rather than university emails. This was in an effort to reduce the pressure and burden of sending reminders, in a tense period when university focus was on delivery of assessment and teaching via novel means as a result of the pandemic. The timing of questionnaire distribution has led to the most accurate way of revealing pre-graduation preparedness as it fell across the period of finals examinations, where knowledge would be expected to be at its highest (before summer graduation and the proximity of beginning as an FD). An attempt to reduce the risk of response bias in the questionnaire was made via piloting and adaptation of the questions with current final year students at that point in time.

There has been little qualitative enquiry into undergraduate preparedness for practice and this research provides greater insights into understanding the idea of preparedness for practice. The qualitative aspect of this research is and will be useful when attempting to elucidate any new and evolving causation between the COVID-19 pandemic and dental education.²⁶ The majority of previous studies into preparedness for practice have been carried out once graduates have garnered experience of DFT (or equivalent), hence consideration and caution needs to be given to the comparisons drawn between this research of pre-graduation perception and that of those who were undertaking their DFT year.

This study and the wider literature focuses on the needs of students and/or graduates, rather than whether they meet the needs of

the public – patients consume dental services in distinct ways, hence future research should investigate the patient and public perspective and what they consider contributes to elements of preparedness for practice.⁷ This needs to include consumerism and an understanding of how financial and transactional elements may influence patient choice; areas which students and graduates need to know how to deal with sensitively.¹

Conclusions

Dental graduates in the COVID-19 era may have significantly different training needs to those before them. Students continue to report a lack of preparedness in complex clinical domains of treatment, such as surgical extractions and significant differences in preparedness for practice exist across sex, age and course length.

Increased clinical exposure to and practical experience of complex areas of treatment, alongside adjustments away from static methods of supervision, may enhance student preparedness and confidence, however, further research is required. The importance of a clinical passport to highlight current experience to trainers, alongside the creation of a PDP at the beginning of DFT, will ensure that targeted training can take place where required.

The findings of this research do not imply criticism of any dental school, but seek to address the ‘supercomplexity’ of personal and professional development that occurs alongside the growth of academic and technical competence. Stakeholders need to bridge the gap between undergraduate and foundation training by fostering closer working relationships with postgraduate educators along the continuum of dental education.

Students have consistently expressed their appreciation for learning in outreach and community-type settings, however, this should not overshadow the need to refine the more complex skills in which they feel least confident. Preparedness not only encompasses clinical confidence, competence and experience but broader, ‘softer’ skills too. A year of supervised practice through DFT may act as the perfect safety net to consolidate the skills of a newly qualified dentist and complete the transition toward independent practitioner.

Ethics declaration

The authors declare no conflicts of interest.

Author contributions

Christopher Donnell contributed to the conception, design, data acquisition and interpretation and drafted and critically revised the manuscript. Luke Thomas contributed to the data acquisition and interpretation and drafted and critically revised the manuscript. Jennifer Foley contributed to the conception, design, data acquisition and interpretation and drafted the manuscript.

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