

# A survey of undergraduate orthodontic teaching and factors affecting pursuit of postgraduate training

P. Jauhar,<sup>1</sup> P. A. Mossey,<sup>2</sup> H. Popat,<sup>3</sup> J. Seehra<sup>4</sup> and P. S. Fleming\*<sup>1</sup>

## In brief

Provides an overview of the satisfaction of a broad cross-section of undergraduate dental students with orthodontic teaching.

Provides an interesting insight into the treatments that students consider to be 'specialist' in nature.

Identifies students' interests in respect of further training and potential barriers to undertaking formal specialist training pathways.

Reflects undergraduate student opinions with regards to styles of teaching they prefer.

**Background** Undergraduate orthodontic teaching has been focused on developing an understanding of occlusal development in an effort to equip practitioners to make appropriate referrals for specialist-delivered care. However, there is a growing interest among general dentists in delivering more specialised treatments, including short-term orthodontic alignment. This study aimed to assess the levels of knowledge of occlusal problems among final year undergraduate dental students, as well as their interest in various orthodontics techniques and training. **Methods** A 36-item electronic questionnaire was sent to all final year undergraduate students in four dental institutes in the UK (Barts and the London, Kings College London, Cardiff and Dundee). The questionnaire explored satisfaction with undergraduate orthodontic teaching; students' perception of knowledge, based on General Dental Council learning outcomes; perceptions of the need for specialist involvement in the management of dental problems; interest in further training in orthodontics; and potential barriers to undertaking specialist training. **Results** The overall response rate was 66% (239/362). The majority of students (84.1%) were aware of GDC guidance in terms of undergraduate teaching. Students reported a preference for case-based and practical teaching sessions in orthodontics, with less interest in lectures or problem-based learning approaches. A high percentage were interested in further teaching in interceptive orthodontics (60.3%) and fixed appliance therapy (55.7%). Further training including specialist orthodontic training (36.4%), Invisalign (59%) and Six Month Smiles (41%) courses appealed to undergraduates. Levels of student debt, course fees and geographical issues were seen as potential barriers to formal, specialist training pathways. **Conclusions** Satisfaction with undergraduate orthodontic teaching is high and interest in further training, including specialist training pathways, continues to be high. While short-term orthodontics is not taught at undergraduate level, there appears to be an appetite to undertake alternatives to conventional orthodontics among dental students.

## Introduction

Undergraduate dental training is directed at developing 'safe starters', with the General Dental Council (GDC) issuing guidance in relation to the level of competence and knowledge expected of graduates;<sup>1</sup> these

were updated<sup>2</sup> in 2012, and contain specific direction on the level of practical ability, core knowledge and professionalism expected of trainees. Accordingly, undergraduate orthodontic teaching is geared at developing awareness and knowledge of orthodontic aspects and the development of the dentition without equipping students with the practical skills to undertake treatment as inexperienced qualified practitioners.<sup>2</sup>

In recent years specialist care, particularly orthodontics, is increasingly offered by non-specialist dental providers, with short-term orthodontics (STO) gaining increasing traction among general dentists following very limited periods of training.<sup>3,4</sup> The merits of this development has been debated<sup>1</sup> and an increase in the level of litigation in relation to specialist dental procedures performed by

non-specialists has been noted.<sup>5</sup> Nevertheless, training in specific methods may be attractive, are heavily-marketed to dental professionals, and offer the possibility of broadening general dentists' armamentarium without recourse to involved specialist training with associated costs and time commitments. A previous survey of final year dental students undertaken in London highlighted that 16% of students were interested in specialist training in both orthodontics and restorative dentistry.<sup>6</sup> There is, however, little appreciation of the interest in specialist treatments among undergraduates more broadly and indeed on the potential effect of the recent prominence of short-term on the level of interest in pursuing speciality training in orthodontics.

A further factor with the potential to influence the uptake of specialist training

<sup>1</sup>Barts and The London School of Medicine and Dentistry, Institute of Dentistry, Queen Mary University of London, Queen Mary University of London, London, E1 2AD; <sup>2</sup>University of Dundee; <sup>3</sup>Faculty of Medicine, Dentistry and Health Sciences, Melbourne University, Australia; <sup>4</sup>King's College London, Department of Orthodontics, Dental Institute, Strand, London, WC2T 2LS  
\*Correspondence to: Dr Padhraig S. Fleming  
Email: padhraig.fleming@gmail.com  
Tel: +44 207 7397 7377

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opportunities may be the burden of debt on dental students and postgraduate trainees in the UK. Specifically, fees for postgraduate training within dentistry have increased in recent years and recruitment to specialist training programmes have been aligned with medical models in embracing national recruitment, whereby prospective students may be assigned either to their chosen unit or region, or to a less preferred area pending on ranking within the recruitment process. A previous study involving Canadian dental students highlighted that 33% of students across a cross-section of ten dental schools admitted that the level of debt would influence career pathway.<sup>7,8</sup> There has, however, been little assessment of the influence of central recruitment on pursuit of specialist training.

The aims of the study were therefore to:

- Assess the satisfaction of final year dental students in relation to their undergraduate training
- Assess the levels of orthodontic knowledge of final year dental students with respect to GDC guidance
- Ascertain final year dental students' level of interest in specialist training and orthodontic courses
- Explore potential barriers to undertaking specialist training in orthodontics.

### Materials and methods

Ethical approval for a cross-sectional survey of final year undergraduate dental students was granted by QMUL research ethics committee (QMREC1293). Following initial piloting on undergraduate dental students, a 36-item online questionnaire was developed. This was distributed to all final year dental students at the following four UK-based dental institutes via orthodontic consultants: Queen Mary University of London, Kings College London, Cardiff University School of Dentistry and University of Dundee. The questionnaire was designed for online, electronic completion (www.surveymoz.com) and was compatible with mobile devices. A cover letter was sent with the request and students were advised that completion would take no more than 10 minutes. Follow-up, reminder emails were sent on up to two occasions following the initial email with a period of 6 weeks permitted for responses.

The questionnaire explored demographic details; details of undergraduate orthodontic

teaching, including nature of teaching, preferences for teaching modalities and overall satisfaction; students' perception of knowledge based on General Dental Council learning outcomes; perceptions of need for specialist involvement in the management of various dental problems; interest in further training in orthodontics; and potential barriers to undertaking specialist training. Where a list of possible responses was given, respondents were invited to choose the most appropriate answer. Opportunity for further explanation and clarification was given in free text boxes.

Students were questioned in relation to undergraduate orthodontic teaching modalities and experience of orthodontic treatments. Nine questions explored students' confidence in managing various orthodontic problems commonly faced in general dental practice. The remaining questions concentrated on students' interest in and perception of specialist training and other courses, as well as considering potential economic and geographic barriers to specialist training.

Data was entered into an Excel spreadsheet for analysis. Descriptive statistics were obtained including means (SD) for continuous variables and frequencies (%) pending on the nature of the responses.

### Results

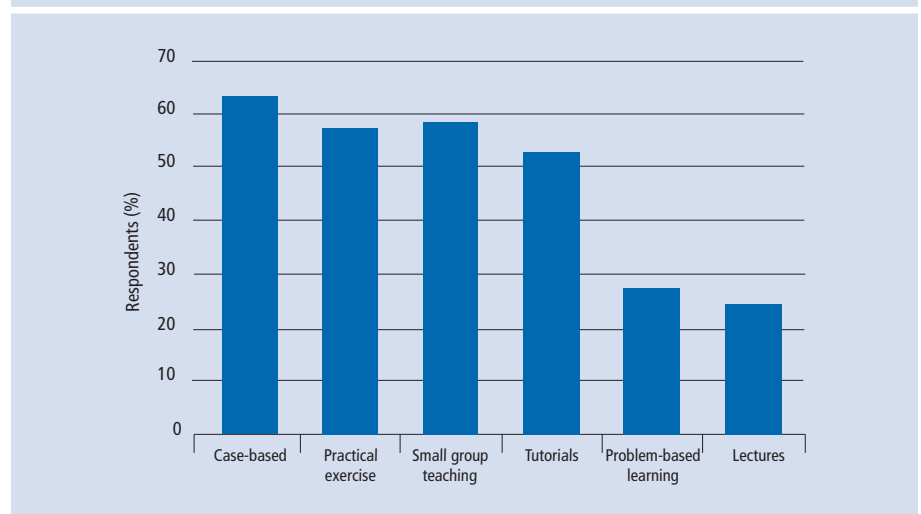
The overall response rate was 66% (239/362), with baseline demographics being shown in Table 1. The majority of students (84.1%) were aware of GDC guidance in terms of undergraduate teaching. Overall students were confident using the IOTN (50.2%) while only a minority were 'very confident'

**Table 1 Demographic characteristics of final year participants (n = 239)**

Variable	Participants n = 239
<b>Age (years)</b>	
18–24	73.5%
25–29	19.8%
30–34	5.9%
35–39	0.8%
<b>Gender</b>	
Male	35.2%
Female	64.9%
<b>Location</b>	
England	59.4%
Wales	20.1%
Scotland	20.5%

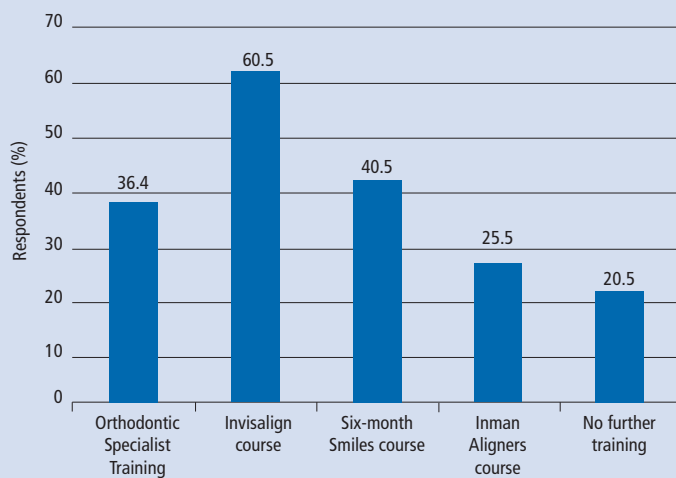
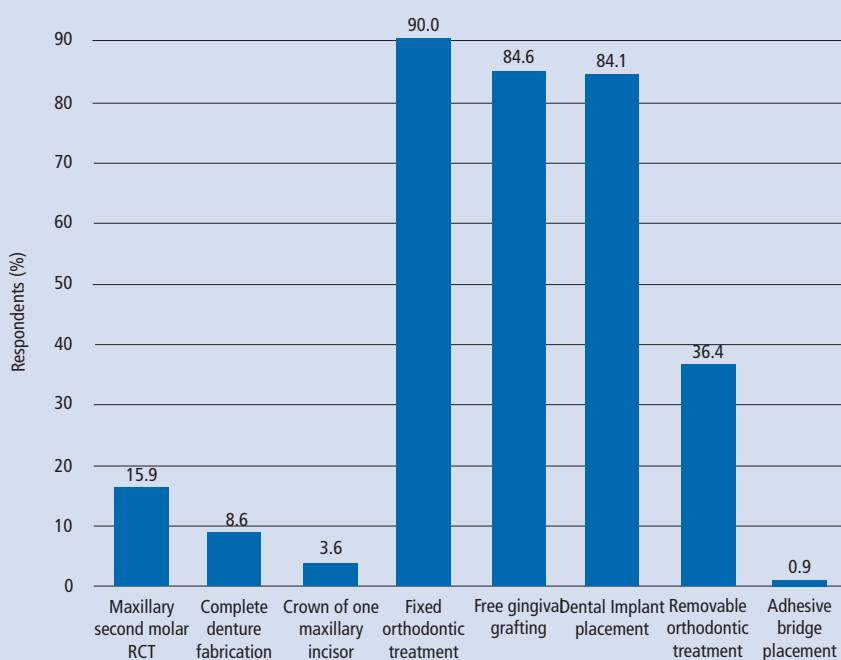
(7.1%). A significant proportion were 'slightly confident' (41.8%), and a small minority 'not confident' (0.8%), however. There was a clear preference for case-based and practical teaching sessions with less interest in lectures or problem-based learning approaches (Fig. 1). Students reported high levels of satisfaction with teaching, with 26.1% feeling that no additional teaching was needed. Of those open to additional teaching, the majority requested supplementary practical sessions (30.5%) and clinics (22.2%), while additional case-based discussions (12.5%) were also proposed (Table 2). A high percentage were interested in further teaching in interceptive orthodontics (60.3%) and fixed appliance therapy (55.7%).

**Fig. 1 Breakdown of students' preferred methods of teaching (n = 239)**



**Table 2 Respondents suggestions for nature of additional undergraduate orthodontic teaching**

Variable	Participants (n = 239)
More practical experience	30.5%
More clinics	22.2%
More case-based teaching	12.5%
More e-learning	5%
More small group tutorials	4.6%

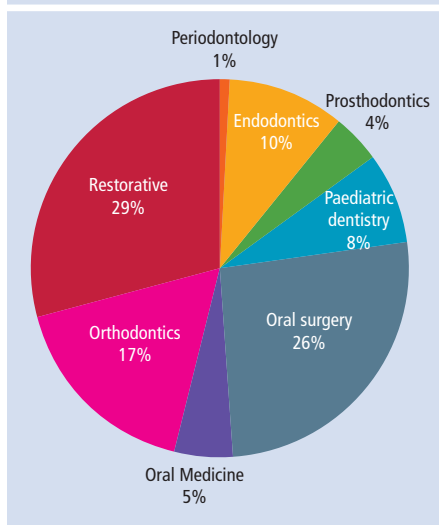
**Fig. 2 Breakdown of students' interest in undertaking specific orthodontic training and courses (n = 239)****Fig. 3 Students' responses (n = 239) concerning perceived need for specialist provision of a range of dental treatments**

Further training, including specialist orthodontic training (36.4%), Invisalign (60.5%) and Six Month Smiles (40.5%) courses, appealed to undergraduates (Fig. 2). Interestingly, the majority of students (56.9%) did not feel comfortable explaining the merits of short-term alignment treatment over specialist orthodontic treatment. An overwhelming majority, (94%) also believed that short-term orthodontics is not suitable in adolescent patients, with growth and stability being cited as potential issues. However, a significant minority (22.7%) believed that short-term approaches represent a better alternative to conventional orthodontics for adult patients. Students' views on what should be treated by specialists seemed to contradict their views on short-term orthodontics, with 90% stating that fixed orthodontic treatment should be specialist-delivered. Other treatments that respondents considered should be delivered by specialists were free gingival grafting (85.8%) and dental implant placement (84.9%) as shown in Figure 3.

In terms of long-term career plans, one-third of respondents intend to work in general practice (32.2%), the majority (41%) remained unsure of long-term plans, while the remainder (26.8%) were interested in specialist training pathways. The most popular specialties were restorative dentistry (28.6%), followed by oral surgery (25.9%), and orthodontics 17.3% (Fig. 4). Of the students who were keen to work in specialist orthodontic practice, a significant number were also interested in attending Six Month Smiles (50%), Invisalign (62.5%), and Inman Aligner (30%) courses, while those suggesting a preference for a career as a hospital consultant were less interested in attending these technique courses (25.7%, 15.5% and 16.5%, respectively).

Participants were keen to work in a variety of locations, with Greater London being the most popular (53.6%; Table 3). The free-text responses given to 'abroad' included: Australia, New Zealand, Singapore, USA and Canada. Both levels of student debt and geographical issues were seen as potential barriers to formal training pathways. Almost one third of students (32.4%) alluded to not accepting a specialist training post if it was not available in their preferred area. The level of student debt among the majority (49%) of the final year dental students is in excess of £20,000. The burden of debt appears to influence decisions to pursue specialist training, with 51.5% viewing it as a significant barrier. Their perception of what constituted a reasonable level of fees for annual

**Fig. 4 Breakdown of most popular speciality among respondents (n = 239)**



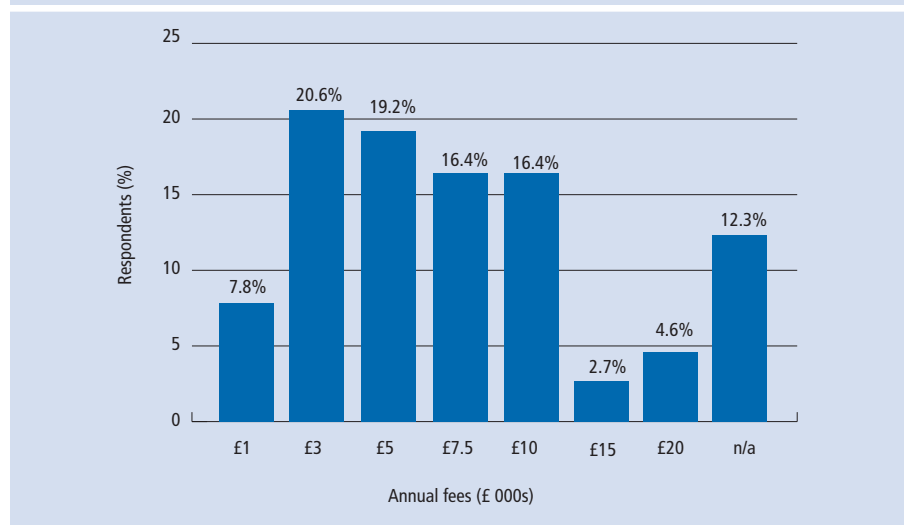
postgraduate education was varied but typically in the range of £3,000–£10,000 (Fig. 5).

## Discussion

Overall, this survey highlights high levels of satisfaction among students in relation to undergraduate teaching, an appetite for case-based and small-group teaching at undergraduate level, as well as for undertaking short-term orthodontics and clear aligner therapy upon graduation. In keeping with previous research<sup>7,8</sup> finances as well as geographical location may be important considerations affecting the decision to pursue specialist training. A broad cross-section of students was assessed from four final year cohorts, and a reasonable response rate achieved with the results likely to be indicative experienced undergraduate students within the UK more broadly.

The level of satisfaction among students in terms of undergraduate orthodontic teaching is reassuring. Notwithstanding this, students continue to express a desire for further clinical exposure with 56% and 41% keen to have more experience of fixed and removable appliances, respectively. A previous analysis of 12 UK dental schools found seven courses incorporated practical use of fixed appliances.<sup>9</sup> Previous surveys have also alluded to a desire to gain hands-on experience in orthodontics at undergraduate level<sup>10</sup> but have concluded that limited exposure to appliances during training would be insufficient to afford students the necessary skills to safely provide orthodontic treatment. As

**Fig. 5 Maximum annual fees that undergraduates regard as reasonable for postgraduate training (n = 239)**



such the emphasis has remained on developing 'safe beginners' equipped with the diagnostic skills to permit recognition of occlusal irregularities resulting in timely referrals for specialist management as stipulated by the GDC, who quality assure undergraduate training.<sup>2</sup> As such, while students may wish to obtain increased hands-on exposure in terms of both planning treatment and manipulating orthodontic appliances, this is certainly not a requirement of undergraduate orthodontic teaching under existing guidance and recommendations.

The preferred methods of orthodontic teaching were both practical and case-based. While these responses are intuitive and in keeping with findings from analogous surveys in medicine and dentistry,<sup>11</sup> this does present a challenge in view of the limited scope of the orthodontic curriculum. In particular, the emphasis on diagnosis and identification of orthodontic problems is not always compatible with the provision of practical experience or indeed holistic analysis and planning of orthodontic cases. Innovative approaches to teaching, including adoption of dedicated e-learning approaches, have proven popular among undergraduate and postgraduate dental students<sup>12,13</sup> and may be useful in addressing this. Notwithstanding this, students did not express a wish for additional e-learning resources in the present survey, although e-learning is already established within two of the universities surveyed.

The level of knowledge and confidence of undergraduates and recent graduates appeared to be acceptable in the present survey with

the majority claiming to be comfortable with knowing when to refer to a hospital orthodontic department (61%), discussing the management of ectopic canines (84.1%), and aetiology and management of hypodontia (73.1%). Their level of confidence in using the IOTN was high, although a significant proportion were only 'slightly confident' (41.8%) and a few 'not confident' (0.8%). A previous survey of GDPs in West Sussex has exposed that almost half of dentists (47%) did not refer to the index when making referrals.<sup>14</sup> In the present study, however, competence in using IOTN was not assessed. In terms of orthodontic assessment previous research has indicated that 60% of vocational dental practitioners (VDPs) lacked confidence in this respect.<sup>15</sup> These figures were corroborated by VDP trainers who opined that training is largely insufficient in respect of fixed appliances (87%), removable appliances (70%) and management of the mixed dentition (65%).<sup>15</sup>

A marked interest in attending additional training in marketed technique courses in orthodontics was noted. The popularity of these systems has grown exponentially in recent years with a recent survey of qualified practitioners in the South East of England, with an overall response rate of just 14%, alluding to approximately 19% of surveyed general practitioners offering short-term orthodontics.<sup>4</sup> The desire to undertake similar training among undergraduates appears to outstrip these levels with 41% interested in attending a course on short-term orthodontics. This finding may relate to a reticence of experienced practitioners to work beyond competence levels, with

**Table 3 Final year students (n = 239) preference for long-term place of work**

Location	Percentage
Scotland	17.3%
Ireland	2.3%
Northern Ireland	5.5%
Wales	10.5%
North West England	6.8%
North East England	3.6%
South West England	17.7%
Midlands	7.3%
Greater London	53.6%
Abroad	15.9%

27% believing non-specialist provision of orthodontics to be inappropriate.<sup>4</sup> Moreover, the most common reason for not undertaking short-term orthodontics was, unsurprisingly, a lack of orthodontic skills.<sup>4</sup> In view of the emphasis of undergraduate orthodontic teaching on diagnostic aspects, the level of awareness of students of these short-term approaches is marked. This may reflect direct marketing to dental students, sponsorship of dental events as well as brand development using social media and Internet advertisement. Similar inducements to offer proprietary products or treatments are well-established within medicine.<sup>16</sup>

There has been a shift in focus within dentistry in recent years with a drive to broaden the duties of dental care professionals mirroring changes within medicine whereby the scope of practice of healthcare assistants has burgeoned and nurse-led models have emerged.<sup>17</sup> The remit of dental professionals has been outlined within the GDC 'scope of practice'.<sup>18</sup> The increasing interest in cosmetic treatments and more complex care offered by general dentists may well result in a further change in the shape of the dental workforce within the private sector. Notwithstanding this, the incidence of dental caries in the UK population remains high, especially among children, with a significant associated requirement for routine dental prevention and management.<sup>19</sup> The explanation for changes in the pattern of care delivery within the private sector is unclear, although the demand for cosmetic procedures and accessibility of training are contributory. This pattern is also reflected internationally with the provision of dental

implants as well as orthodontics in a general practice setting on the increase.<sup>20–21</sup> Many of the additional treatments offered include those with a potential for increased financial reward, although these do carry greater potential risk. There is evidence both within medicine and dentistry of changes to treatment approaches as a result of financial reward.<sup>23,25</sup> On the basis of the present survey, it does appear that the level of debt among undergraduates may have a bearing on their further training and education with implications for the nature of their general practice.

A cornerstone of the scope of practice is the tenet that treatment be provided within a practitioner's competency.<sup>3,25</sup> Recent guidance on cosmetic practice issued by the Royal College of Surgeons in England emphasise the 'duty of candour' when discussing the level of training that practitioners have received to underpin the provision of cosmetic treatment as well as the need to discuss both the alternatives and the possible risks.<sup>26</sup> The limited nature of training, coupled with its focus on mechanical concepts allied to approaches to marketing means that short-term orthodontic providers may well lack this background knowledge,<sup>4</sup> although more comprehensive training programmes have recently been developed in an effort to address this. While short-term approaches assume an abbreviated course of treatment, using armamentarium that has been used routinely within conventional treatments for over 30 years, the fundamental difference lies in the decision to eschew phases of treatment that are considered integral to conventional orthodontics. Consequently, a pre-meditated decision to accept an imperfect result is often made. It is therefore imperative that treatment planning involves a realistic appraisal of the nature and duration of alternative, conventional approaches with a mean treatment time of the order of 20 months for standard orthodontics being a reasonable yardstick.<sup>27</sup> Moreover, the ability of a provider to offer orthodontic alternatives and to address technical problems when they arise is an imperative, which may not be taught in a minimal period of training.

In terms of encouraging or supporting dentists to undertake specialist training, the rising cost of postgraduate fees allied to the impact of centralised recruitment may have an influence with just 7.5% considering annual fees in excess of £10,000 to be reasonable. Previous research in the US has indicated that educational debt in excess of \$100,000 was the

strongest predictor of a decision to enter private practice.<sup>28</sup> A requirement for mentoring to ensure that students opt for specialist training due to genuine personal interest rather than financial burden has therefore been suggested in US dental schools.<sup>29</sup> Increased availability of part-time training programmes or indeed combined training within hospital and specialist practice settings may help to mitigate these financial issues, although both require significant educational and infrastructural changes if high standards of training are to be protected.

## Conclusions

Satisfaction with undergraduate orthodontic teaching is high and interest in further training, including specialist training pathways remains significant, although geographical and financial constraints appear to limit its appeal. While short-term orthodontics is not taught at undergraduate level, there is a marked awareness of this and indeed an appetite to undertake alternatives to conventional orthodontics among dental students.

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