What I wish I’d learned as an orthodontic trainee: an online survey of British Orthodontic Society members concerning postgraduate training experiences

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Abstract

Objective: To survey the opinion of recently qualified and established orthodontists on the perceived value of their training and to identify specific areas which were considered to be deficient, adequately covered or focussed on excessively.

Design: Descriptive cross-sectional survey

Setting: Online electronic questionnaire.

Participants: Members of the British Orthodontic Society (BOS).

Methods: An electronic questionnaire was circulated to members of the BOS focusing on dental education history, and opinions concerning orthodontic teaching generally and specific clinical and non-clinical subjects. Information was also obtained in terms of possible need for improvement, modification or removal of teaching on focused academic and clinical aspects.

Results: A total of 217 responses were received from 1080 emailed invitations resulting in a response rate of 20.1%. Respondents were generally satisfied with their training both in relation to theoretical, academic and practical aspects. However, training was regarded as deficient by some respondents in respect of temporary anchorage devices (38%), bonded retainers (6%), experience with lingual appliances (47%), removable aligners (44%), inter-proximal reduction (24%) and adult orthodontics (16%), working with therapists (32%), and NHS contracts (47%) and commissioning (47%).

Conclusion: The overall satisfaction of BOS members with postgraduate orthodontic training is generally high, although both recently qualified and established practitioners emphasised the need for better exposure to training in specific practical aspects and practice management within the NHS.

Keywords
education, postgraduate, orthodontics

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Introduction

Training in orthodontics dates from the infancy of the specialty led by Edward H Angle who founded the Angle School of Orthodontia in St Louis, Missouri. In the UK, George Northcroft and colleagues formed the British Society for the Study of Orthodontia (BSSO) in 1907 which eventually became one of the five societies to unify to form
the British Orthodontic Society (BOS) in 1994. The BSSO recommended that orthodontics be set up as a one-year postgraduate programme delivered in dental schools or specialist centres. Qualifications in orthodontics were introduced in the UK in 1948 when the Dental Committee of the Royal College of Physicians and Surgeons of Glasgow sanctioned the development of a diploma which was subsequently approved by the Dental Board of the United Kingdom. The first sitting of this exam was in 1949 and was followed soon after by a Diploma from the Royal College of Surgeons of England in 1954. In the late 1980s, Memberships in Orthodontics of the Royal Colleges began to supersede the original diploma. Two-year university Masters level degrees were first offered by the Welsh National School of Medicine in 1974 (Robertson, 1973) before being introduced by other dental schools across the UK.

Currently, orthodontic training involves a three-year university-based training programme requiring completion of a level 7 or 8 degree (Master’s degree or Professional Doctorate, respectively). Within the UK, each year approximately 30 students enter salaried NHS training posts with linked National Training Numbers (NTNs). The Specialty Advisory Committee (SAC) in orthodontics is responsible for overseeing the orthodontic postgraduate curriculum against which the Royal College Examinations are mapped, subsequently being approved by the General Dental Council (GDC). The latest curriculum was published in 2010 being geared at providing trainees with “the appropriate knowledge, attitudes and skills of a Specialist Orthodontist” (The Joint Committee for Postgraduate Training in Dentistry and The Specialty Advisory Committee in Orthodontics, 2010). Orthodontic training programmes are designed to reflect patterns of care with most training programmes focusing on treatment with fixed appliances (O’Brien and Spencer, 2015). Orthodontic systems continue to develop with a range of variants including removable aligner and lingual systems now taking an increasing market share; however, these treatments are not typically offered within the NHS.

A previous survey of trainees completing UK-based programmes highlighted that 20% felt training did not meet expectation (Keith et al., 1997). More recently, a survey of UK-based and international postgraduates reported a 76% satisfaction rate (Oh and Chadwick, 2016). Respondents were generally satisfied with their caseload (78.4%); however, concerns were raised among UK trainees about the value for money as well inability to influence the delivery of teaching. Outside of the UK, a survey of trainees in Turkey reported a lower satisfaction rate (58%) with programmes deemed deficient in providing care to underserviced populations and disabled patients as well as in terms of exposure to multidisciplinary treatments (Usumez et al., 2013). Higher levels of satisfaction of 86% and 76% have been reported in similar surveys in Canada and the USA, respectively (Noble et al., 2009a, 2009b).

Notwithstanding this, there is currently no information regarding the perceived value of orthodontic training among qualified orthodontists in the UK, nor is there any information in relation to specific areas of the curriculum. As such, it is of interest to stakeholders in postgraduate orthodontic education to better understand the opinions of all stakeholders. Our aims were therefore to survey the opinion of recently qualified and established orthodontists on the perceived value of their training and to identify specific areas which they believed to be deficient, adequately covered or over-emphasised.

Methods

This was a descriptive, cross-sectional study in which an online questionnaire was distributed to members of the BOS. The 12-item questionnaire was developed based on a previous survey into opinions concerning undergraduate dental education (Oliver et al., 2016). Ethical approval was provided by Queen Mary University of London, Ethics of Research Committee (QMREC2046) with prior approval from the BOS, Clinical Governance Committee. Members of the Consultant Orthodontic Group (COG), Community Group (CG), Orthodontic Specialists Group (OSG), University Teachers Group (UTG), Practitioner Group (PG) and Post-Certificate of Completion of Specialist Training (Post-C CST) trainees of the Trainee Grades Group (TGG) of the BOS were invited to participate in the survey via an initial email in March 2019. Two reminder emails were sent thereafter at three-weekly intervals. The survey was open for 10 weeks from March until May 2019. The survey was administered, and results collected using Online Surveys (JISC, Bristol, 2019).

Questions were asked to gain an understanding of the respondents’ dental education history and current place of work. Opinions were sought on specific areas of clinical and non-clinical training, areas of orthodontics or training where exposure or experience could be increased or reduced, as well as ascertaining how well postgraduate training prepared former students for working as a specialist orthodontist (Appendix 1).

Results were assessed for the group as a whole, with further comparison between recent graduates (< 10 years since graduation) and ‘established practitioners’ (qualified ≥ 10 years). Statistical analysis included demographic data allied to Chi-squared tests to assess possible differences between recent and established practitioners. In cases of insufficient data, Fisher’s exact test was used with a P value < 0.05 representing statistical significance. Free-text responses were also coded and described.

Results

A total of 217 responses were received from 1080 emails on the BOS mailing list, representing a 20.1% response rate.
The majority of respondents (n = 140; 64.5%) were ‘established orthodontists’ having completed orthodontic training before 2009, while ‘recent orthodontic graduates’ comprised a smaller proportion (n = 71; 32.3%). Six respondents failed to provide this information.

Of the respondents, 55% were female (n = 119) and 43.5% were male (n = 95). One respondent was aged < 30 and 20 were aged > 60 years (Table 1). Respondents had primarily completed both their undergraduate (93.5%) and orthodontic (95%) training within a UK or Irish university (Table 2). Of respondents, 66% (n = 143) work within a specialist dental practice setting, while 37% (n = 80) were NHS hospital consultants. Fifteen (10%) respondents were undertaking a PhD or Post-CCST training with some respondents working in multiple settings.

Knowledge, theory and diagnosis

There was general satisfaction with the depth of training in the areas of research and critical appraisal (68%, n = 148), clinical governance (60%, n = 130), oral and dental health education (83%, n = 180), and epidemiology (67%, n = 146). Psychology, however, had the lowest satisfaction rate (n = 143) work within a specialist dental practice setting, while 37% (n = 80) were NHS hospital consultants. Fifteen (10%) respondents were undertaking a PhD or Post-CCST training with some respondents working in multiple settings.

Table 1. Demographic characteristics of respondents (n = 217).

|                | Recent graduates (n = 70) | Experienced orthodontists established practitioners (n = 141) | Total (n = 217) |
|----------------|--------------------------|---------------------------------------------------------------|-----------------|
| **Gender**     |                          |                                                                |                 |
| Male           | 26 (36.5)                | 66 (47)                                                       | 95 (43.5)       |
| Female         | 45 (63.5)                | 72 (51.5)                                                     | 119 (55)        |
| Undisclosed    | 0 (0)                    | 2 (1.5)                                                       | 3 (1.5)         |
| **Age (years)**|                          |                                                                |                 |
| < 30           | 1 (1.5)                  | 0 (0)                                                         | 1 (0.5)         |
| 30–40          | 54 (76)                  | 4 (3)                                                         | 59 (27)         |
| 41–50          | 14 (19.5)                | 65 (46)                                                       | 80 (37)         |
| 51–60          | 2 (3)                    | 50 (36)                                                       | 56 (26)         |
| > 60           | 0 (0)                    | 20 (14)                                                       | 20 (9)          |
| Undisclosed    | 0 (0)                    | 1 (1)                                                         | 1 (0.5)         |

Values are given as n (%).

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Treatments and appliances

Satisfaction was highest with training in relation to removable (83%, n = 181), functional (88%, n = 192) and pre-adjusted edgewise appliances (89%, n = 194), and removable retainers (90%, n = 196). Only a small percentage wished they learned more in relation to removable appliances (8%, n = 18), functional appliances (6%, n = 13), pre-adjusted edgewise appliances (5%, n = 11) and removable retainers (4%, n = 8). Training in relation to fixed retainers received 74% (n = 161) satisfaction with 16% (n = 35) wishing they learned more (Table 3).

There were also mixed responses to training in inter-dental enamel reduction with 37% (n = 80) learning the right amount, 35% (n = 76) wished they learned more and 24% (n = 53) thought their training was deficient. Satisfaction with training in temporary anchorage devices was also relatively low with slightly greater satisfaction among recent graduates at 30% (n = 42) compared to established practitioners at 14% (n = 42); however, similar percentages of experienced and recent graduates wished they learned more at 34% (n = 48) and 35% (n = 25), respectively; 39% (n = 55) and 35% (n = 25) thought their training to be deficient. Over 40% of practitioners felt that their training was deficient in relation to lingual appliances (n = 96) and aligner therapy (n = 101); 36% (n = 79) and 35% (n = 75) wished they learned more and only 14% (n = 26) and 11% (n = 22) learned the right amount. Similarly, only 41% (n = 89) were satisfied with their training in adult orthodontics. Fifty-eight percent (n = 81) and 59% (n = 42) of established and recent practitioners, respectively, felt their training was deficient or wished they
had learned more in this respect. The management of obstructive sleep apnoea received the lowest levels of respondent satisfaction with only 27% (n = 58). Seventy-two percent (n = 156) and 74% (n = 160) learned the right amount in relation to the management of hypodontia and facial deformity/orthognathic, respectively, while 23% (n = 50) and 20% (n = 43) wished they learned more.

Orthodontics within the NHS

There were generally low levels of satisfaction with training in relation to working with orthodontic therapists (24%, n = 52), understanding of NHS contracts (11%, n = 23) and commissioning of NHS services (11%, n = 24) with no respondents feeling that they had learned more than they needed to in any of these categories (Table 3).

Knowledge and skill deficits

Based on free-text responses (Questions 9–11), knowledge deficiency was most frequently reported with aligner systems (28%, n = 61) across all respondents. Adult orthodontics, lingual appliances, commissioning and NHS orthodontics, and temporary anchorage devices were also viewed as more problematic with slight variation between recent and established practitioners (Table 3). The most common self-reported reported skill deficiency related to temporary anchorage devices (24%, n = 52). Other areas of concern included lingual orthodontics and aligner therapy, as well as wire bending (Tables 4–6).

In terms of how training prepared respondents for working as a specialist orthodontist the overall satisfaction with training was high with 68% (n=147) feeling either ‘extremely well’ or ‘very well’ prepared (Figure 1). Satisfaction rates were, however, markedly lower in relation to training in adult versus adolescent orthodontics (Figure 1).

Eighty-six respondents (40%) took the opportunity to leave free-text comments (Figure 2). Fifty described their training in a positive light. Of these, 25 went on to acknowledge limitations relating to the timing of training or environment and 12 suggested areas for improvement. Fourteen made suggestions to improve training with the most frequent suggestions for improvement being inclusion of lingual and aligner appliances (n = 8), additional training in management (n = 5) and development of a period of training to prepare for primary care orthodontics such as a mentoring scheme or vocational training type post (n = 4). Six respondents alluded to their training in a negative way and 13 made comments not relating to their training but mainly about life post-qualification. Negative comments chiefly concerned local ‘politics’ within departments (n = 4).

Discussion

Generally, respondents were very satisfied with their orthodontic training; particular areas of strength appear to reside
Table 3. Levels of satisfaction with teaching of a range of theoretical, diagnostic and treatment aspects among the sample (n = 217).

|                        | Recent graduates | Established practitioners | Total                        |
|------------------------|------------------|---------------------------|------------------------------|
|                        | I learned more  | I learned the right      | I learned more  | I learned the right      | I learned more  | I learned the right      |
|                        | than I needed to| amount                    | than I needed to| amount                    | than I needed to| amount                    | P value (Chi-squared)     |
| Research and critical  |                  |                           |                              |                           |                            |                            |
| appraisal              |                  |                           |                              |                           |                            |                            |
| Clinical governance    |                  |                           |                              |                           |                            |                            |
| Oral and dental        |                  |                           |                              |                           |                            |                            |
| education              |                  |                           |                              |                           |                            |                            |
| Psychology             |                  |                           |                              |                           |                            |                            |
| Epidemiology           |                  |                           |                              |                           |                            |                            |
| Aetiology of malocclusion |             |                           |                              |                           |                            |                            |
| Clinical diagnosis     |                  |                           |                              |                           |                            |                            |
| skills                 |                  |                           |                              |                           |                            |                            |
| Facial and dental      |                  |                           |                              |                           |                            |                            |
| aesthetics             |                  |                           |                              |                           |                            |                            |
| Radiology              |                  |                           |                              |                           |                            |                            |
| Cephalometry           |                  |                           |                              |                           |                            |                            |
| 3D imaging             |                  |                           |                              |                           |                            |                            |
| Treatment planning     |                  |                           |                              |                           |                            |                            |
| Biology                |                  |                           |                              |                           |                            |                            |
| Cell and molecular     |                  |                           |                              |                           |                            |                            |
| biology                |                  |                           |                              |                           |                            |                            |
| Embryology             |                  |                           |                              |                           |                            |                            |
| Dental growth and      |                  |                           |                              |                           |                            |                            |
| development            |                  |                           |                              |                           |                            |                            |
| Craniofacial growth    |                  |                           |                              |                           |                            |                            |
| and development        |                  |                           |                              |                           |                            |                            |

(continued)
Table 3. (continued)

| Treatments and appliances                                      | Recent graduates | Established practitioners | Total |
|----------------------------------------------------------------|-----------------|---------------------------|-------|
| **I learned more than I needed to**                            | I learned the right amount | My training was deficient | No response | **I learned more than I needed to** | I learned the right amount | My training was deficient | No response | **P value** (Chi-square test) |
| Intercept treatment                                           | 0 (0) | 47 (66) | 21 (30) | 3 (4) | 0 (0) | 1 (1) | 112 (80) | 25 (18) | 1 (1) | 1 (1) | 1 (0) | 165 (76) | 46 (21) | 4 (2) | 1 (0) | 0.043† |
| Removable appliances                                          | 1 (1) | 59 (83) | 10 (14) | 1 (1) | 0 (0) | 12 (9) | 118 (84) | 8 (6) | 1 (1) | 1 (1) | 15 (7) | 181 (83) | 18 (8) | 2 (1) | 1 (0) | 0.000* |
| Functional appliances                                         | 0 (0) | 67 (94) | 4 (6) | 0 (0) | 0 (0) | 11 (8) | 120 (86) | 8 (6) | 0 (0) | 1 (1) | 11 (5) | 192 (88) | 13 (6) | 0 (0) | 1 (0) | 0.013† |
| Extra-oral appliances                                         | 6 (8) | 47 (66) | 14 (20) | 4 (6) | 0 (0) | 13 (9) | 114 (81) | 9 (6) | 3 (2) | 1 (1) | 20 (9) | 165 (76) | 24 (11) | 7 (3) | 1 (0) | 0.002 |
| Pre-adjusted edgewise appliances                              | 2 (3) | 66 (93) | 3 (4) | 0 (0) | 0 (0) | 6 (4) | 124 (89) | 6 (4) | 2 (1) | 2 (1) | 8 (4) | 194 (89) | 11 (5) | 2 (1) | 2 (1) | 0.882† |
| Tip-edge appliances                                           | 9 (13) | 28 (39) | 22 (31) | 12 (17) | 0 (0) | 24 (17) | 73 (52) | 23 (16) | 12 (9) | 8 (6) | 33 (15) | 106 (49) | 46 (21) | 24 (11) | 8 (4) | 0.001 |
| Begg appliances                                               | 6 (8) | 31 (44) | 16 (23) | 16 (23) | 2 (3) | 25 (18) | 82 (59) | 15 (11) | 12 (9) | 6 (4) | 33 (15) | 116 (53) | 32 (15) | 28 (13) | 8 (4) | 0.000* |
| Aligner appliances                                            | 0 (0) | 5 (7) | 27 (38) | 39 (55) | 0 (0) | 1 (1) | 19 (14) | 50 (36) | 55 (39) | 15 (11) | 1 (0) | 26 (12) | 79 (36) | 96 (44) | 15 (7) | 0.102‡ |
| Lingual appliances                                            | 0 (0) | 5 (7) | 25 (35) | 41 (58) | 0 (0) | 1 (1) | 15 (11) | 48 (34) | 58 (41) | 18 (13) | 1 (0) | 22 (10) | 75 (35) | 101 (47) | 18 (8) | 0.239‡ |
| Removable retention appliances                                 | 1 (1) | 66 (93) | 2 (3) | 2 (3) | 0 (0) | 5 (4) | 126 (90) | 5 (4) | 2 (1) | 2 (1) | 7 (3) | 196 (90) | 8 (4) | 4 (2) | 2 (1) | 0.231 |
| Fixed/Bonded retention appliances                              | 0 (0) | 54 (76) | 11 (15) | 5 (7) | 1 (1) | 4 (3) | 102 (73) | 24 (17) | 8 (6) | 2 (1) | 5 (2) | 161 (74) | 35 (16) | 13 (6) | 3 (1) | 0.424† |
| Temporary anchorage devices                                   | 0 (0) | 21 (30) | 25 (35) | 25 (35) | 0 (0) | 1 (1) | 20 (14) | 48 (34) | 55 (39) | 16 (11) | 1 (0) | 42 (19) | 75 (35) | 82 (38) | 17 (8) | 0.069† |
| Inter-dental enamel reduction                                  | 0 (0) | 25 (35) | 30 (42) | 16 (23) | 0 (0) | 1 (1) | 52 (37) | 45 (32) | 35 (25) | 15 (11) | 1 (0) | 80 (37) | 76 (35) | 53 (24) | 7 (3) | 0.512† |

**Multidisciplinary care**

| Orthodontics and periodontal disease                          | 0 (0) | 33 (46) | 33 (46) | 5 (7) | 0 (0) | 1 (1) | 88 (63) | 44 (33) | 7 (5) | 0 (0) | 1 (0) | 125 (58) | 79 (36) | 12 (6) | 0 (0) | 0.053† |
| Management of impacted/ectopic teeth                          | 2 (3) | 63 (89) | 4 (6) | 2 (3) | 0 (0) | 4 (3) | 122 (87) | 12 (9) | 2 (1) | 0 (0) | 6 (3) | 190 (88) | 17 (8) | 4 (2) | 0 (0) | 0.523 |
| Management of hypodontia                                      | 2 (3) | 57 (80) | 10 (14) | 2 (3) | 0 (0) | 3 (2) | 94 (67) | 39 (28) | 4 (3) | 0 (0) | 5 (2) | 156 (72) | 50 (23) | 6 (3) | 0 (0) | 0.001 |
| Management of obstructive sleep apnoea                       | 1 (1) | 23 (32) | 29 (41) | 18 (25) | 0 (0) | 4 (3) | 33 (24) | 55 (39) | 35 (25) | 15 (11) | 5 (2) | 58 (27) | 86 (40) | 54 (25) | 14 (6) | 0.266 |
| Management of facial deformity/Orthographic                   | 4 (6) | 49 (69) | 16 (23) | 2 (3) | 0 (0) | 7 (5) | 106 (76) | 26 (19) | 1 (1) | 0 (0) | 11 (5) | 160 (74) | 43 (20) | 3 (1) | 0 (0) | 0.393 |
| Adult orthodontics                                           | 0 (0) | 29 (41) | 28 (39) | 14 (20) | 0 (0) | 1 (1) | 57 (41) | 62 (44) | 19 (14) | 1 (1) | 1 (0) | 89 (41) | 92 (42) | 24 (16) | 1 (0) | 0.533† |
| Trauma in orthodontics                                       | 0 (0) | 34 (48) | 29 (41) | 8 (11) | 0 (0) | 0 (0) | 77 (55) | 50 (36) | 13 (9) | 0 (0) | 0 (0) | 115 (53) | 79 (36) | 23 (11) | 0 (0) | 0.642† |

(continued)
### Table 3. (continued)

|                      | Recent graduates | Established practitioners | Total               |
|----------------------|------------------|---------------------------|---------------------|
|                      | I learned more than I needed to | I learned the right amount | My training was deficient | No response | I learned more than I needed to | I learned the right amount | My training was deficient | No response | I learned more than I needed to | I learned the right amount | My training was deficient | No response | P value (Chi-squared test) |
| **Risks and benefits** |                  |                           |                      |             |                              |                           |                      |             |                              |                           |                      |             |                          |
| Psychological/Quality of life benefits |                  |                           |                      |             |                              |                           |                      |             |                              |                           |                      |             |                          |
| Dental health benefits |                  |                           |                      |             |                              |                           |                      |             |                              |                           |                      |             |                          |
| Orthodontically induced inflammatory root resorption | 1 (1) | 47 (66) | 19 (27) | 4 (6) | 0 (0) | 2 (1) | 78 (56) | 48 (34) | 7 (5) | 5 (4) | 3 (1) | 130 (60) | 68 (31) | 11 (5) | 5 (2) | 0.278 |
| Decalcification/demineralisation | 3 (4) | 60 (85) | 8 (11) | 0 (0) | 0 (0) | 4 (3) | 131 (94) | 4 (3) | 0 (0) | 1 (1) | 8 (4) | 195 (90) | 13 (6) | 0 (0) | 1 (0) | 0.063† |
| Relapse | 2 (3) | 59 (83) | 8 (11) | 2 (3) | 0 (0) | 2 (1) | 112 (80) | 22 (16) | 2 (1) | 2 (1) | 5 (2) | 175 (81) | 30 (14) | 5 (2) | 1 (0) | 0.356† |
| Temporomandibular joint dysfunction | 1 (1) | 48 (68) | 19 (27) | 3 (4) | 0 (0) | 5 (4) | 86 (61) | 39 (28) | 8 (6) | 2 (1) | 6 (3) | 137 (63) | 61 (28) | 11 (5) | 2 (1) | 0.216 |
| **Orthodontics in the NHS** |                  |                           |                      |             |                              |                           |                      |             |                              |                           |                      |             |                          |
| Working with orthodontic therapists | 0 (0) | 23 (32) | 27 (38) | 21 (30) | 0 (0) | 0 (0) | 27 (19) | 51 (36) | 45 (32) | 17 (12) | 0 (0) | 52 (24) | 78 (36) | 69 (32) | 18 (8) | 0.285† |
| Contracts | 0 (0) | 6 (8) | 31 (44) | 34 (48) | 0 (0) | 1 (1) | 16 (11) | 44 (31) | 65 (46) | 14 (10) | 1 (0) | 23 (11) | 76 (35) | 102 (47) | 15 (7) | 0.001 |
| Commissioning | 0 (0) | 6 (8) | 30 (42) | 34 (48) | 1 (1) | 1 (1) | 17 (12) | 43 (31) | 65 (46) | 14 (10) | 1 (0) | 24 (11) | 74 (34) | 102 (47) | 16 (7) | 0.346† |
| Primary care orthodontics | 1 (1) | 19 (27) | 29 (41) | 22 (31) | 0 (0) | 0 (0) | 67 (48) | 38 (27) | 30 (21) | 5 (4) | 1 (0) | 89 (41) | 69 (32) | 53 (24) | 5 (2) | 0.000* |
| Secondary care orthodontics | 1 (1) | 49 (69) | 12 (17) | 9 (13) | 0 (0) | 3 (2) | 91 (65) | 26 (19) | 13 (9) | 7 (5) | 4 (2) | 144 (66) | 39 (18) | 23 (11) | 7 (3) | 0.640 |

Values are given as n (%).

*P < 0.001.

†In cases of insufficient data, Fisher’s exact tests were used.
in teaching of theoretical concepts, allied to teaching of fixed appliances, removable appliances and removable retainers. Based on allied free-text comments, there appears to be a recognition that postgraduate training stimulates a lifelong commitment to learning and incremental developmental founded on sound clinical principles. There were some reservations concerning teaching of specific aspects including TAD placement, fixed retention, lingual orthodontics, inter-proximal reduction and aligner therapy. These areas place an onus on practical, hands-on teaching allied to espousal of proprietary techniques, which can be less accessible but also often requires adoption of new technologies (Seehra et al., 2017).

Concerns in relation to practical teaching of fixed retention is noteworthy. This finding may again reflect systemic issues whereby limited use of fixed retention is ingrained within selected academic departments. This approach, however, is incompatible with emerging evidence alluding to superiority of fixed retention relative to removable retainers in the medium- to longer- term (Al-Moghrabi et al., 2018; Schütz-Fransson et al., 2019). This discrepancy relates to a decline in compliance over time stemming from lack of supervision following discharge, independent decision-making and limited understanding of the rationale for retention (Al-Moghrabi et al., 2018). It is also interesting to speculate whether

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**Table 4.** Subjects that respondents wished they had learned more about.

| Overall | Recent Graduates | Established Practitioners |
|---------|------------------|----------------------------|
| Aligner systems (28%, n=61) | Aligner appliances (37%, n=26) | Aligner systems (25%, n=35) |
| Adult orthodontics (25%, n=54) | Lingual appliances (35%, n=25) | Adult orthodontics (24%, n=34) |
| Lingual appliances (24%, n=52) | Commissioning/NHS orthodontics (27%, n=19) | Lingual appliances (19%, n=27) |
| Commissioning/NHS orthodontics (21%, n=46) | Adult orthodontics (25%, n=18) | Commissioning/NHS orthodontics (19%, n=27) |
| Temporary anchorage devices (18%, n=40) | Temporary anchorage devices (20%, n=14) | Temporary anchorage devices (18%, n=26) |

**Table 5.** Skills that respondents wish they had gained to a greater extent.

| Overall | Recent Graduates | Established Practitioners |
|---------|------------------|----------------------------|
| Temporary anchorage devices (24%, n=52) | Temporary anchorage devices (32%, n=23) | Lingual appliances (22%, n=31) |
| Lingual appliances (23%, n=50) | Aligner appliances (27%, n=19) | Temporary anchorage devices (20%, n=28) |
| Aligner appliances (21%, n=46) | Lingual appliances (25%, n=18) | Aligner systems (19%, n=27) |
| Wire bending (12%, n=27) | Wire bending (14%, n=10) | Wire bending (11%, n=15) |
| Running a business (8%, n=18) | Ideal or compromised treatment planning (11%, n=8) | Adult orthodontics (9%, n=13) |

**Table 6.** Subject areas in which respondents considered training was excessive.

| Overall | Recent Graduates | Established Practitioners |
|---------|------------------|----------------------------|
| Research project/MSc (10%, n=21) | Cellular biology (10%, n=7) | Research project/MSc (9%, n=13) |
| Cellular biology (6%, n=13) | Research project/MSc (10%, n=7) | Cephalometry (5%, n=7) |
| Embryology (4%, n=9) | Embryology (8%, n=6) | Cellular biology (4%, n=6) |
| Headgear/extra-oral traction (4%, n=9) | Headgear/extra-oral traction (6%, n=4) | Tip-edge (3.5%, n=5) |
| Tip-edge (4%, n=9) | Tip-edge (6%, n=4) | Headgear/extra-oral traction (3.5%, n=5) |
this dissatisfaction with teaching concerning retention will ultimately affect practitioner behaviour and protocols, as certification courses concerning retention are certainly less accessible than teaching related to bespoke appliances and technologies. Interestingly, a recent survey of BOS members which highlighted a reduced predilection to extract premolars as part of orthodontic treatment, indicated that this trend was not mirrored by an increased provision of fixed retention (Fleming et al., 2018).

Since many of the respondents completed training there has clearly been progression within the speciality with evolving knowledge and evidence bases, and development of novel appliances and techniques. Some of the specific topics considered in the survey were unlikely to have been in vogue when some of the established practitioners
surveyed completed their training and have been introduced
and indeed become mainstream during their practicing
career. The most notable potential examples of this include
temporary anchorage devices, aligner and lingual systems.
Incidentally, these approaches represent the areas that all
respondents had reservations in relation to. Moreover, the
use of treatment modalities (including headgear and
TipEdge™) has declined in recent years (Keim et al., 2014a,
2014b), while the emphasis on other key techniques includ-
ing wire bending may have reduced somewhat with the
advent of the StraightWire system. As such, there is a risk
that teaching of certain approaches may become obsolete
over time; it is important that considered decisions are made
in order to supplant these with progressive and evidence-
based approaches to ensure that postgraduate teaching
remains current and pertinent.

While orthodontic training is standardised within the
SAC curriculum, there is variation in relation to treatment
philosophies, appliances and techniques that postgraduate
trainees are exposed to. There is, for example, a disparity in
relation to exposure to removable aligner therapy with some
units offering no exposure or training and others providing
postgraduates with personal cases to treat throughout their
training. Limitations and delays in the introduction of such
appliances and techniques may relate to financial constraints
and systemic issues. Crucially, techniques such as lingual
orthodontics and aligner therapy are not routinely offered
with the NHS. As such, there may be systemic constraints
and ethical considerations in providing this treatment to a
select group of patients. Clearly, there can also be reticence
among academics and practitioners to adopt new technology,
often correctly reflecting a lack of underpinning evidence to
support the use of often heavily marketed products (Seehra
et al., 2017). Notwithstanding this, there is an onus on aca-
demics and clinical teachers to espouse best current prac-
tices, ideally predicated on supporting evidence, where
possible.

Teaching in relation to adult orthodontics was frequently
reported as deficient with 42% bemoaning a lack of teaching
in this respect during postgraduate training both historically
and more recently. Current NHS training posts are focused
on the management of adolescents within the NHS funding
system reflecting recent Commissioning Guidelines (NHS
England Chief Dental Officer Team, 2015). Notwithstanding
this, adult orthodontics is part of the SAC curriculum despite
limited clinical exposure which may often be confined to
management of orthognathic or other multi-disciplinary
team-based treatments. While this situation does reflect NHS
practice, it is at odds with the ever-increasing demand for
orthodontics and aesthetic appliances among adults (Nattrass
and Sandy, 1995; BOS Admin, 2019).

Respondents reported dissatisfaction concerning the
delivery of knowledge on the business aspect of orthodon-
tics including the skillset to lead and manage a team, as
well as requisite understanding of the commissioning and
contracting of NHS orthodontic services. Currently, the lat-
ter years of five-year training pathways are directed at clin-
ical management of more complex multidisciplinary care,
but also delivery of management skills required to run a
hospital orthodontic department within the secondary NHS
care setting. There is no such equivalent for those intent on
providing orthodontic care in the primary care setting.
Notwithstanding this, complementary courses and mentor-
ing skills addressing these areas are available.

Criticism in relation to excessive training in certain areas
was noted with 10% feeling that the research component of
their training was excessive while 6% felt teaching in rela-
tion to cellular biology was also excessive. The current SAC
curriculum refers to ‘undertaking and maintaining a modern
evidence-based approach to orthodontic practise’ and hav-
ing ‘personal research training and experience’ (The Joint
Committee for Postgraduate Training in Dentistry and The
Specialty Advisory Committee in Orthodontics, 2010). It is
therefore expected that trainees either complete at least a
Masters level qualification (e.g. Msc, MClinDent, DDS) or
publish two articles in peer-reviewed journals relating to
work undertaken during the period of training. Although
most specialists will not go on to be university academics,
there is the expectation that evidence can be critically
appraised in order to ensure good evidence-based dentistry
is provided to the population. This approach is also reflected
in the GDC Principles and Standards (General Dental
Council, 2013). Clearly, academic learning and skills are
integral to providing evidence-based care ideally underpin-
ning orthodontic decision-making (Madhavji et al., 2011).

While the overall findings from this survey are certainly
positive and suggest that orthodontic trainees are generally
satisfied, there areundeniably findings which academic
directors and educators should digest. Ultimately, decisions
will be required concerning any future changes to ortho-
dontic curricula but more specifically to the delivery of
teaching on a day-to-day basis. It has been argued that ‘those
involved in the education of new dental profession-
als not to be swayed by the desires of their student consum-
ers, but to keep focused on the wider social picture’ (Lew,
2016). As such, educators must continue to grapple with
the social responsibility for training a profession within a
public health system to meet the public’s needs, not necessarily
the needs of the students.

In terms of limitations, the overall response rate of
20.1% is low. However, this approximates other online
surveys assessing the views of dental training (Oliver
et al., 2016) and indeed orthodontic treatment planning
decisions (Fleming et al., 2018). The survey was distrib-
uted through the BOS risking selection bias; however, the
society provides access to over 1000 specialist orthodon-
tists, a significant proportion of the estimated 1400 GDC-
registered orthodontic specialists (General Dental
Council, 2017). Moreover, the sample is representative of
the UK orthodontic workforce. A further limitation is the
historic nature of some of the data with more experienced practitioners included; clearly, data from the more recently qualified practitioners is of greater current importance. Notwithstanding this, it is important that satisfaction rates among recent graduates is placed in the context of historical data. Furthermore, we were able to report data specific to each group with findings relatively consistent among both subsets.

Conclusion

The overall satisfaction of BOS members concerning postgraduate orthodontic training is generally high although both recently qualified and established practitioners reflected on a need for enhanced training in specific areas including fixed retention, adult orthodontics, inter-proximal reduction, aligner therapy, lingual appliances and a greater understanding of NHS contracts and commissioning.

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**Appendix 1**

1. Are you male/female?  
   - Male / female / prefer not to say
2. How old are you?  
   - <30, 30–40, 41–50, 51–60, >60, prefer not to say
3. What year, university and country did you obtain your primary dental qualification in?  
4. What year, university and country did you obtain your orthodontic specialty training in?  
5. What level is your postgraduate qualification in orthodontics?  
   - Certificate, diploma, taught masters research masters, taught doctorate, research doctorate
5a. What was the duration of your training (full-time equivalent)?  
   - 1 year, 2 years, 3 years
6. Where do you currently work? (please select all that apply)  
   - General dental practice, Specialist dental practice, Community dental service, Post-CCST Trainee, PhD student, Hospital employment (e.g. non-consultant grade), NHS Consultant, University employee, Armed forces, Other, please specify (free text)
7. As best as you can recall, how could you describe your specialist orthodontic training in the following areas?

| Subject                                | I learned more than I needed to | I learned the right amount | I wish I learned more | I feel my training was deficient |
|----------------------------------------|---------------------------------|-----------------------------|-----------------------|----------------------------------|
| Knowledge, theory and diagnosis        |                                 |                             |                       |                                  |
| Research and critical appraisal        |                                 |                             |                       |                                  |
| Clinical governance                    |                                 |                             |                       |                                  |
| Oral and dental health education       |                                 |                             |                       |                                  |
| Psychology                             |                                 |                             |                       |                                  |
| Epidemiology                           |                                 |                             |                       |                                  |
| Aetiology of malocclusion              |                                 |                             |                       |                                  |
| Clinical diagnosis skills              |                                 |                             |                       |                                  |
| Facial and dental aesthetics          |                                 |                             |                       |                                  |
| Radiology                              |                                 |                             |                       |                                  |
| Cephalometry                           |                                 |                             |                       |                                  |
| 3D imaging                             |                                 |                             |                       |                                  |
| Treatment planning                     |                                 |                             |                       |                                  |
| Biology                                |                                 |                             |                       |                                  |
| Cell and molecular biology             |                                 |                             |                       |                                  |
| Embryology                             |                                 |                             |                       |                                  |
| Dental growth and development          |                                 |                             |                       |                                  |
| Craniofacial growth and development    |                                 |                             |                       |                                  |
| Treatments and appliances              |                                 |                             |                       |                                  |
| Interceptive treatment                 |                                 |                             |                       |                                  |
| Removable appliances                   |                                 |                             |                       |                                  |
| Functional appliances                  |                                 |                             |                       |                                  |
| Extra-oral appliances                  |                                 |                             |                       |                                  |
| Pre-adjusted edgewise appliances       |                                 |                             |                       |                                  |
| Tip-edge appliances                    |                                 |                             |                       |                                  |
| Begg appliances                        |                                 |                             |                       |                                  |
| Aligner appliances                     |                                 |                             |                       |                                  |
| Removable retention appliances         |                                 |                             |                       |                                  |
| Fixed/bonded retention appliances      |                                 |                             |                       |                                  |
| Temporary anchorage devices            |                                 |                             |                       |                                  |
| Inter-dental enamel reduction          |                                 |                             |                       |                                  |

(continued)
### Appendix. (continued)

| Subject                                                                 | I learned more than I needed to | I learned the right amount | I wish I learned more | I feel my training was deficient |
|-------------------------------------------------------------------------|---------------------------------|---------------------------|-----------------------|----------------------------------|
| **Multidisciplinary care**                                              |                                 |                           |                       |                                  |
| Orthodontics and periodontal disease                                    |                                 |                           |                       |                                  |
| Management of impacted/ectopic teeth                                    |                                 |                           |                       |                                  |
| Management of hypodontia                                                |                                 |                           |                       |                                  |
| Management of obstructive sleep apnoea                                  |                                 |                           |                       |                                  |
| Management of facial deformity/Orthognathic                             |                                 |                           |                       |                                  |
| Adult orthodontics                                                      |                                 |                           |                       |                                  |
| Trauma in orthodontics                                                  |                                 |                           |                       |                                  |
| **Risks and benefits**                                                  |                                 |                           |                       |                                  |
| Psychological/Quality of life benefits                                 |                                 |                           |                       |                                  |
| Dental health benefits                                                  |                                 |                           |                       |                                  |
| Orthodontically induced inflammatory root resorption                    |                                 |                           |                       |                                  |
| Relapse                                                                 |                                 |                           |                       |                                  |
| Decalcification/demineralisation                                        |                                 |                           |                       |                                  |
| Temporomandibular joint dysfunction                                     |                                 |                           |                       |                                  |
| **Orthodontics in the NHS**                                            |                                 |                           |                       |                                  |
| Working with orthodontic therapists                                     |                                 |                           |                       |                                  |
| Contracts                                                               |                                 |                           |                       |                                  |
| Commissioning                                                           |                                 |                           |                       |                                  |
| Primary care orthodontics                                               |                                 |                           |                       |                                  |
| Secondary care orthodontics                                             |                                 |                           |                       |                                  |

8. Overall, how well do you feel your training prepared you for:

|                                                                 | Extremely well | Very well | Somewhat well | Not so well | Not at all well |
|----------------------------------------------------------------|----------------|-----------|---------------|-------------|-----------------|
| Working as a specialist orthodontist                               |                |           |               |             |                 |
| Treating adolescents                                               |                |           |               |             |                 |
| Treating adults                                                    |                |           |               |             |                 |

9. With respect to your own training, can you please list the 3 areas you wish you had learned more about?
10. With respect to your own training, can you please list the 3 skills you wish you had acquired or developed to a greater extent.
11. With respect to your own training, can you please list any areas you wish you didn’t have to learn
12. Do you have any other comments you would like to share with us?