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O-HEALTH-EDU: A scoping review on the reporting of oral health professional education in Europe

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Abstract

Introduction: The variability in oral health professional education is likely to impact on the management of oral health needs across Europe. This scoping review forms the initial part of a larger EU-funded collaborative Erasmus + project, 'O-Health-Edu'. The aim of this scoping review is to investigate how oral health professional education in Europe is reported.

Methods: The PRISMA and Arksey & O'Malley methodological frameworks for scoping reviews were used to guide reviewers in answering the research question "How is oral health professional education reported in Europe?". The search strategy encompassed published literature searches, internet searches and further searching of relevant documents from educational organisations, regulators and professional bodies. Once the search strategy was developed, it was sent to key stakeholders for consultation. Sources were reviewed by two authors (JD, JF) and included in the review if they reported on oral health professional education in Europe.

Results: A total of 508 sources were retrieved from all of the searches. A total of 405 sources were excluded as they did not report on the topic of interest, leaving 103 sources that reported on oral health professional education in Europe. Handsearching the references of published sources lead to a further 41 sources being screened, of which, 15 were included. In total, 33 duplications were removed and the final number of included sources was 85. The average year of publication for the included sources was 2007, with sources most commonly published in journals dedicated to dental education. Surveys represented the most common form of reporting. From the data obtained, four broad themes of reporting were evident: dental education at a programme level, dental education at a discipline level, other oral health professional education, and postgraduate education and continuous professional development.

Conclusion: The reporting of dental and oral health professional education in Europe is limited. Whilst there are many useful documents that provide guidelines on dental

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education, there is limited knowledge on how education is implemented and delivered. There is a greater need for comprehensive educationally driven programme-level data on oral health professional education across Europe.

KEYWORDS

dental education, dental hygienists, dentists, oral health professionals, professional education, review

1 | INTRODUCTION

Historically, 'dental education' has focused on the education of dentists. More recently, however, the term is used to encompass a wider range of professionals, also known as 'dental care professionals' or 'oral health professionals'. It is difficult to obtain a unanimously agreed definition of these terms due to the different regulation of oral health professionals across the continent. However, the terms tend to encompass the complete range of dental professionals including dentists, hygienists, therapists, nurses and clinical dental technicians.

Basic dental training (a primary degree in dentistry or dental surgery) in the EU is regulated by the European directive 2005/36/EC on the recognition of professional qualifications. This states that "initial dental training must be for at least 5 years' study, with the equivalent ECTS credits, and must consist of at least 5,000 hours of full-time theoretical and practical training provided in a university or in a higher institute providing training recognised as being of an equivalent level or under the supervision of a university".¹ There is no similar recognised directive for other oral health professionals such as dental hygienists or dental therapists²; instead, this is often managed nationally by individual regulators.

The variability of oral health professional (OHP) education, training and clinical experience may be explained by the superficial guidance present in the directive—and therefore is open to broad interpretation by dental educators across Europe. The European directive informs educators regarding the length and type of training that should be provided, but provides little guidance by way of curriculum content and programme delivery.

1.1 | Harmonising dental education within the European Higher Education Area

Whilst the World Health Organization (WHO) defines the European Region as comprising "53 countries, covering a vast geographical region from the Atlantic to the Pacific ocean",³ the European Union (EU) is defined as "a unique economic and political union between 27 EU countries that together cover much of the continent".⁴ The European Economic Area (EEA) is a political link between the EU and three European Free Trade Association (EFTA) countries (Iceland, Lichtenstein, Norway). In contrast, the European Higher Education Area (EHEA) is an international collaboration between 48 European countries. It

was formed to follow up the signing of the Bologna Process in 1999, which placed the mutual recognition of higher education qualifications into European law and therefore facilitated the movement of students and professionals across higher education institutions in Europe.⁵

In 1998, the European Union's Directorate for Education and Culture funded the DentEd Thematic Network Project (TNP) which aimed to harmonise dental education through promoting higher standards in dental education in an ever-widening EU.⁶ The Association for Dental Education in Europe (ADEE) embodies dental schools across Europe and has formed a large network of dental educators. ADEE has supported or acted as a medium for much of the recent work aiming to harmonise dental education through their annual meetings, taskforces and special interest groups. The DentEd project led ADEE to commission three task forces to focus on the delivery of European dental education. This culminated in the development and publication of the Graduating European Dentist in 2017, which provides recommendations for best academic practice in dental education.⁷

This variability in oral health professional education is of concern, because current EU legislation permits European graduates to practice dentistry across Europe through mutual recognition of their qualifications. These important migration flows of students and dentists across Europe may bring together professionals with differing experiences and skill sets. This, in turn, may lead to inequities in the density and competence of oral health professionals—with some places underserved and others overcrowded. This is likely to impact on the management of oral health needs across Europe.

Considering the extensive nature of oral health professional education and the lack of previous reviews in the area, a scoping review has been selected as the appropriate methodological approach. A scoping review is of particular benefit when the initial research question is broad, allowing exploration of the literature that underpins the research question. In turn, this facilitates further more focused reviews (including systematic reviews).^{8,9}

This scoping review forms the initial part of a larger EU-funded collaborative Erasmus + project, 'O-Health-Edu'. The project aims to better understand the existing state of oral health professional education in Europe and to develop a common vision of this education and support changes by 2030. These changes would allow the profession to be in a greater position to meet the oral health needs of the European population. The aim of this scoping review is to investigate how oral health professional education in Europe is reported.

2 | METHODS

The PRISMA Extension for Scoping Reviews and the Arksey & O'Malley methodological framework for scoping reviews were used to guide the reviewers throughout the scoping review process.^{8,9}

These frameworks allow for the identification of both in-depth and broad literature. In a systematic review, the data collected is guided by a highly focussed research question and very specific study designs. In contrast, the approach used here aimed to identify all relevant literature, regardless of its construct or quality.

2.1 | Search strategy

The search strategy (Figure 1) was developed from the research question "How is oral health professional education reported in Europe?". The search strategy encompassed published literature searches, internet searches and further searching of relevant documents from educational organisations, regulators and professional bodies. The specific search terms for each search undertaken can be seen in Table 1. In order to identify relevant published studies, both educational (Education Resources Information Center—ERIC) and scientific databases (PubMed) were used. As well as searching for published sources, a Google Scholar and two separate Google web searches were carried out. For the latter, the first 100 sources were considered. Finally, websites of known Educational Organisations, Regulators, Data Reporting Agencies, Professional Bodies and Health Agencies were hand-searched for further relevant sources. After screening the results of the published literature search,

handsearching of the references of included sources was undertaken to identify further sources.

The authors felt a systematic and wide-ranging search strategy across the data sources would give a more comprehensive picture of the reporting of oral health professional education in Europe. Therefore, no limitations were placed on year of publication although only articles in English were accepted. Once the search strategy was developed, it was sent to key stakeholders for consultation; the list of these can be seen in Table 2. After considering feedback from all stakeholders, the search strategy was finalised. The searches were undertaken in a period from the beginning of December 2019 to the end of February 2020.

2.2 | Selection of sources of evidence (Screening)

The title and abstracts of all sources identified from the searches were retrieved and screened by two authors (JD, JF). Sources were included in the scoping review if they reported on oral health professional education in Europe, regardless of the level of reporting, study type or subject matter. The EHEA definition of Europe was used to determine the inclusion of relevant articles. If the source did not have an abstract or if the data reported were unclear from the abstract, the full-text document was retrieved and screened by both authors concurrently. Equally, if a unanimous agreement could not be established from the abstract, the full-text document was retrieved to determine its inclusion in the scoping review. If there was disagreement when screening, the issue was discussed further with the other authors in order to reach a consensus.

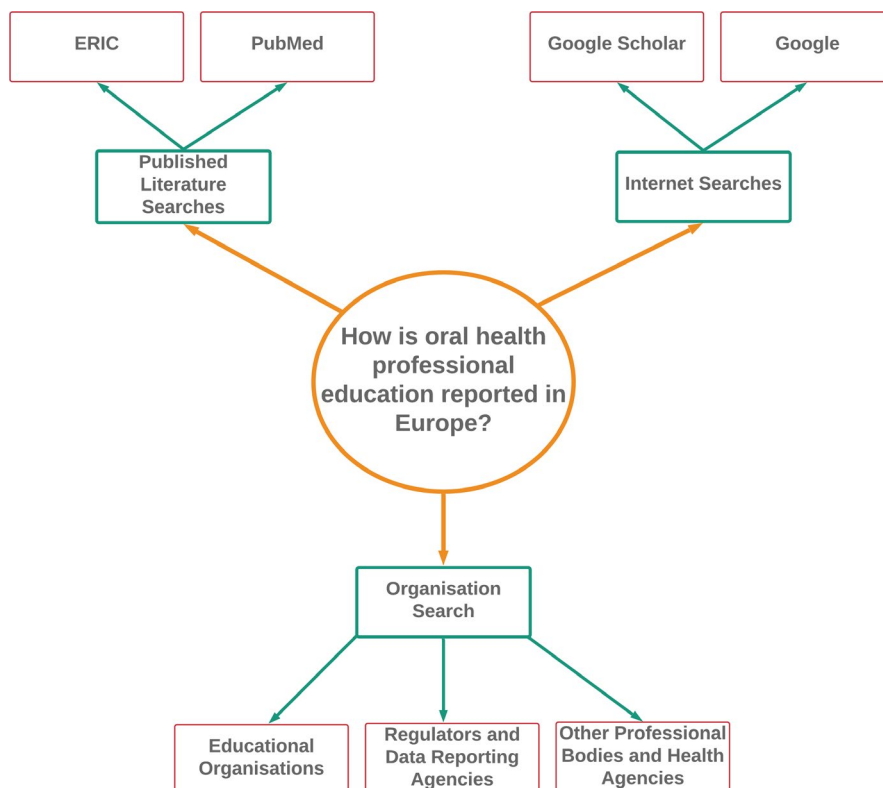


FIGURE 1 Search Strategy [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 1 Individual search terms for each search undertaken

Search	Search terms
ERIC and PubMed	[All] Dental OR Oral Health OR Dental Student OR Dental graduate OR Hygienist OR Hygiene OR dental therapy OR dental therapist AND Education [Title/Abs] Europe AND Report No date restrictions, English only
Secondary PubMed	[All] Dental OR Oral Health Professional OR Dental Student OR Dental graduate OR Hygienist OR Hygiene OR dental therapy OR dental therapist AND Education [Title/Abs] Europe AND Survey No date restrictions, English only
Google Scholar	Dental OR Oral Health AND Education AND Delivery OR Europe
Google Search 1	"Europe Dental Education Delivery Report"
Google Search 2	"Europe Oral Health Education Delivery Report"
Educational Organisations	Handsearching websites of ADEE, ADEA, CECCDO, EDSA, EDHF, IADR, IFDEA, FEHDD, Dental School Councils, identifiable through web searches
Regulators and Data Reporting Agencies	Handsearching websites of FEDCAR, EUROSTAT, Eurydice, ENQA, country-specific regulators, identifiable through web searches
Other Professional Bodies and Health Agencies	Handsearching websites of CED, FDI, country-specific bodies, identifiable through web searches

TABLE 2 Key stakeholders approached to help shape the search strategy

British Dental Association
Council of European Chief Dental Officers
Council of European Dentists
European Dental Hygienists Federation
European Dental Students' Association
FDI—Fédération Dentaire Internationale
FEDCAR—Federation of European Dental Competent Authorities and Regulators
Irish Dental Council

2.3 | Data charting process

All final sources included in the scoping review were read in full text and subsequently recorded in the charting form—an example of which can be seen in Figure 2. The data recorded included the following: author(s), year of publication, title, journal or publisher name, study type, location, and the subject matter reported. This form allowed for the appropriate organisation of included sources and for a standardised extraction of data relevant to the scoping review. The decision on which variables were used to extract data from each source was based on the research question. It was not within the scope of the review to report the full research findings of each study; instead, any data relating to *how oral health professional*

education was provided or delivered in Europe was recorded in the charting form.

Similar to the screening process, the two lead authors (JD, JF) reviewed all of the included studies and charted them as per the information previously. Due to the novel nature of the subject of the scoping review, it was not possible to plan calibration of reviewers prior to charting; however, as this process continued, both reviewers were in communication to standardise the procedure.

2.4 | Data analysis

In line with the recommendations by Arksey and O'Malley,⁹ the search terms were slightly refined as the lead authors became more familiar with the reviewed literature. This allowed a second and more sensitive search of the literature. As such, a second PubMed search was undertaken to exclude the term "report" and to include the term "survey." This change in search terms was undertaken due to the common use of survey methodologies in included studies.

Once data from all included sources were charted, the data were analysed by the lead authors (JD, JF). Year of publication, journal/publisher, study type and location reported were analysed quantitatively with means, modes and percentages calculated to demonstrate the average and most common findings. Due to the predominantly qualitative nature of the data, the "subject matter reported" data were analysed using the six-phase

Author	Year	Title	Journal/Publisher	Study/ Source type	Location Reported	Subject Matter Reported
Luciak-Donsberger & Eaton	2009	Dental hygienists in Europe: trends towards harmonization of education and practice since 2003	International Journal of Dental Hygiene	Survey and Interview	Europe	23 EU countries surveyed on offering DH education, duration of study, diploma type, dual education DH & DT, harmonisation in Europe? Prerequisites, institutional settings, patterns of change in programmes, ECTS, total hours, PG education for DH&T, regulation trends in EU, practice supervision/direct access per country.
Gürsoy <i>et al.</i>	2018	Periodontal education and assessment in the undergraduate dental curriculum-A questionnaire-based survey in European countries	European Journal of Dental Education	Survey	Europe (EFP member institutions)	Survey of European Federation of Periodontology (EFP) members. Reports on periodontal education and assessment in Europe: minimum competences, pedagogical delivery methods, time allocated, assessment methods, student access to complex periodontal management techniques.
Council of European Chief Dental Officers (CECDO)	2017	CECDO EU & EEA Database	Council of European Chief Dental Officers (CECDO)	Database	Europe	Database on population, workforce and education. Reports on number of schools, public/private, entries, % of females, graduates, total intake as a country, course duration, school closures, VT, Hygienist courses, duration and diploma type, possibility of further therapist training.

FIGURE 2 Example of an entry into the data charting form

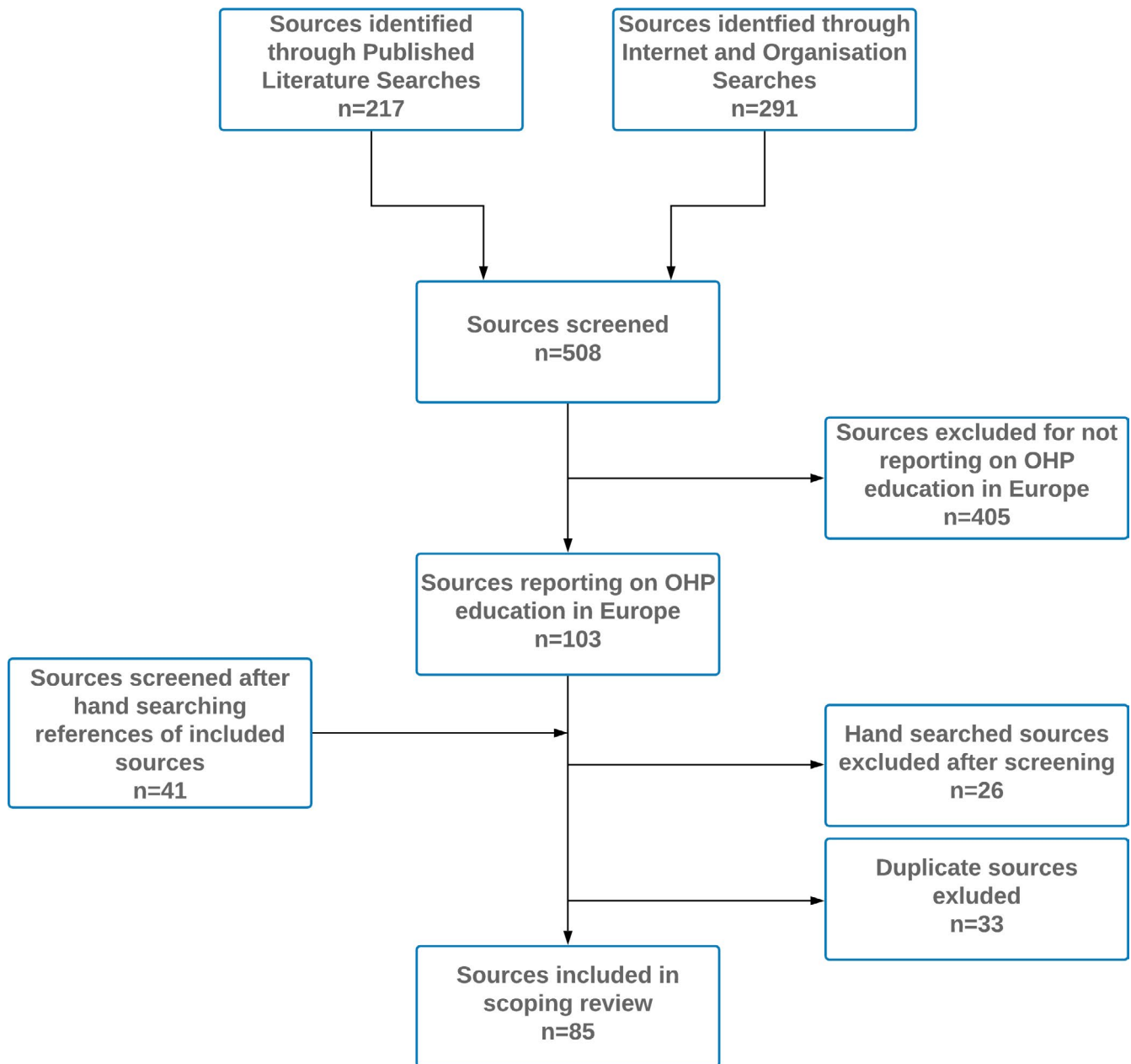


FIGURE 3 Results flow chart [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

guide to thematic analysis outlined by Braun and Clarke.¹⁰ This process involved familiarisation with the data, coding and subsequent naming and data separation into themes. Themes were

highlighted according to relevance or “keyness” to the research question rather than a purely focussing on their prevalence in the results.¹⁰

TABLE 3 Sources included in the scoping review and a summary of the data extracted

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
Addy et al ¹¹	The teaching of implant dentistry in undergraduate dental schools in the United Kingdom and Ireland	2008	Published Literature	Survey	Implantology curricula and teaching	UK and Ireland	Discipline level
Afsharzand et al ¹²	Predotoral implant dentistry curriculum survey: European dental schools	2005	Published Literature	Survey	Implantology curricula	Europe	Discipline level
Alsafi et al ¹³	Achieved competencies in TMD	2015	Published Literature	Survey	TMD (temporomandibular disorder) competencies	Europe	Discipline level
Atashrazm et al ¹⁴	Worldwide Predotoral Dental Implant Curriculum Survey	2011	Published Literature	Survey	Implantology curricula	Global	Discipline level
Atkin ¹⁵	Human disease/clinical medical sciences for dentistry in early-years dental graduates: Transition from undergraduate study to clinical practice	2019	Published Literature	Survey	Graduate experience of undergraduate teaching of human diseases	Wales	Discipline level
Bánóczy ¹⁶	The evolution of dental education—a European perspective	1993	Published Literature	Opinion	Evolution of dental education	Europe	Programme level
Bánóczy and Ray ¹⁷	Process and outcome of a visitation to a Central European dental school	1998	Published Literature	Visitation report	Programme review	Semmelweis University, Hungary.	Programme level
Bánóczy ¹⁸	Harmonisation of dental education and curricula in Europe	1999	Published Literature	Narrative report	History of dental education	Europe	Programme level
Beeley ¹⁹	Nutrition in dental education: a European perspective	1997	Published Literature	Survey	Nutrition curricula	Europe	Discipline level
Brand et al ²⁰	A survey of local anaesthesia education in European dental schools	2008	Published Literature	Survey	Local anaesthetic curricula	Europe	Discipline level
Buerkle et al ²¹	Restoration materials for primary molars—results from a European survey	2005	Published Literature	Survey	Restorative materials used for primary teeth	Europe	Discipline level
Bullock et al ²²	Continuing professional development systems and requirements for graduate dentists in the EU: survey results from the DentCPD project	2013	Published Literature	Survey	CPD systems and requirements	Europe	Postgraduate education and CPD
De Boever ²³	Undergraduate and graduate education in prosthodontics in continental Europe	1989	Published Literature	Survey	Prosthodontic teaching and training time in undergraduate and postgraduate programmes.	Select European countries	Discipline level, Postgraduate education and CPD
De Bruyn et al ²⁴	A survey on undergraduate implant dentistry education in Europe	2009	Published Literature	Survey	Implantology curricula	Europe	Discipline level

(Continues)

TABLE 3 (Continued)

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
Durocher ²⁵	Potential models in Europe for dentistry in the United States—a report	1969	Published Literature	Narrative report	Degree titles, length of training, curriculum content, clinical targets, course hours, naming of specialties.	Europe	Programme level
Field et al ²⁶	Curriculum content and assessment of pre-clinical dental skills: A survey of undergraduate dental education in Europe	2018	Published Literature	Survey	Preclinical skills curricula	Europe (ADEE member institutions)	Discipline level
Gaengler et al ²⁷	Special report: ADEE INITIATIVE. The positive tendency in approaches to the dental curriculum in Belarus: a report arising from a WHO-sponsored visitation to schools in the former USSR and Eastern Europe and a follow-up invited visit of ADEE/AADS representatives to Minsk, Belarus	2002	Published Literature	Visitation report	Programme review	Minsk, Belarus	Programme level
Gatermann-Strobel and Perno Goldie ²⁸	Independent dental hygiene practice worldwide: a report of two meetings	2005	Published Literature	Narrative report	Duration & cost of dental hygiene education	Europe, The United States and Canada	Other Oral Health Professional Education
Gürsoy et al ²⁹	Periodontal education and assessment in the undergraduate dental curriculum—A questionnaire-based survey in European countries	2018	Published Literature	Survey	Periodontology curricula and competences	Europe (EFP member institutions)	Discipline level
Harzer et al ³⁰	Undergraduate orthodontic & paediatric dentistry education in Europe—the DentEd project	2001	Published Literature	Guidelines	Orthodontic and paediatric curricula	Europe	Discipline level
Harzer et al ³¹	Harmonisation of Dental Education in Europe—a survey about 15 years after visitation of dental schools participating in the DentEd project	2017	Published Literature	Survey	Curricula, Facilities, ECTS allocations	Europe	Programme level
Hey et al ³²	Content and goals of preclinical prosthodontic programs at German-language dental schools	2014	Published Literature	Survey	Preclinical prosthodontic curricula and learning outcomes	German-speaking schools	Discipline level
Huggare et al ³³	The Erasmus programme for postgraduate education in orthodontics in Europe: an update of the guidelines	2014	Published Literature	Guidelines	Postgraduate orthodontic training in Europe	Europe	Postgraduate education and CPD
Jaber et al ³⁴	Spanish dental students knowledge of oral malignancy and premalignancy	1997	Published Literature	Survey	Undergraduate experience with oral malignancies	Spain	Discipline level

(Continues)

TABLE 3 (Continued)

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
Johnson ³⁵	International profiles of dental hygiene 1987 to 1998: a 19-nation comparative study	2001	Published Literature	Survey and narrative report	Number of programmes per country, length, number of graduates, professional regulation, scope of practice	International Federation of Dental Hygienist members	Other Oral Health Professional Education
Koole et al ³⁶	Implant dentistry education in Europe: 5 years after the Association for Dental Education in Europe consensus report	2014	Published Literature	Survey	Undergraduate & postgraduate implant training, preclinical vs clinical implant education	Europe	Discipline level, Postgraduate education and CPD
Koole and Bruyn ³⁷	Contemporary undergraduate implant dentistry education: a systematic review	2014	Published Literature	Narrative report	Implant curricula and clinical training	Global	Discipline level
Kroepin and Strub ³⁸	Implant dentistry curriculum in undergraduate education: part 1—a literature review	2011	Published Literature	Literature review	Implant curricula and student experience	The United States and Europe	Discipline level
Luciak-Donsberger ³⁹	The effects of gender disparities on dental hygiene education and practice in Europe	2003	Published Literature	Narrative report	Gender disparity of dental hygienists	Europe	Other Oral Health Professional Education
Manogue et al ⁴⁰	Curriculum structure, content, learning and assessment in European undergraduate dental education—update 2010	2011	Published Literature	Guidelines	Dental hygiene courses per country, programme details	Europe	Programme level
McDonald et al ⁴¹	A survey of postgraduate (specialist) orthodontic education in 23 European countries.	2000	Published Literature	Survey	Length of programmes in EU, vocational training, curriculum structure	Europe	Postgraduate education and CPD
Monteiro et al ⁴²	The teaching of management of the pulp in primary molars across Europe.	2017	Published Literature	Survey	Orthodontics specialty training settings, funding, assessment.	Europe	Discipline level
Nasseripour et al ⁴³	Oral surgery in the European Union: challenges of diversity in training and practice	2017	Published Literature	Survey	Pulp management in primary molars: techniques and materials.	Europe	Postgraduate education and CPD

(Continues)

TABLE 3 (Continued)

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
Nilner et al ⁴⁴	Guidelines for curriculum of undergraduate and postgraduate education in orofacial pain and temporomandibular disorders in Europe.	2003	Published Literature	Guidelines	Curriculum guidelines for orofacial pain and TMD	Europe	Discipline level, Postgraduate education and CPD
Paravina et al ⁴⁵	Teaching of color in predoctoral and postdoctoral dental education in 2009	2010	Published Literature	Survey	Teaching of colour in dentistry	Global	Discipline level
Perry et al ⁴⁶	Simulation and curriculum design: a global survey in dental education	2017	Published Literature	Survey	Curricula trends in dental education	Global	Programme level
Petersson et al ⁴⁷	Undergraduate education in endodontology at two European dental schools	2002	Published Literature	Survey	Undergraduate endodontic training: educational methods, clinical procedures and assessment	Malmö, Sweden Paris, France	Discipline level
Rüttermann et al ⁴⁸	Teaching and assessment of communication skills in undergraduate dental education - a survey in German-speaking countries	2017	Published Literature	Survey	Communication skills training, timing, assessment.	German-speaking European countries	Discipline level
Scott ⁴⁹	Convergence in dental education: The DENTED project	1999	Published Literature	Narrative report	Disparities in clinical training	Europe	Programme level
Scott ⁵⁰	Dental education in Europe: the challenges of variety	2003	Published Literature	Narrative report	Differences in degree titles & training, number of schools, graduates, dentists, curricular differences.	Europe	Programme level
Serrano et al ⁵¹	Challenges in the transition to clinical training in dentistry: An ADEE special interest group initial report	2018	Published Literature	Survey and working group consultation	Programme duration, entry requirements, curriculum design, preclinical course design & clinical training.	ADEE member institutions	Programme level Discipline level
Shanley et al ⁵²	Undergraduate training in the European Union: Convergence or divergence?	1997	Published Literature	Survey	Curriculum design, Quality Assurance processes, student selection	Europe	Programme level
Sieminska-Piekarczyk et al ⁵³	A survey of perceived problems in orthodontic education in 23 European countries	2000	Published Literature	Survey	Perceived problems with orthodontic postgraduate training.	Europe	Postgraduate education and CPD
Ucer et al ⁵⁴	Current trends and status of continuing professional development in implant dentistry in Europe	2014	Published Literature	Survey	Trends and status of CPD in implant dentistry in Europe.	Europe	Postgraduate education and CPD

(Continues)

TABLE 3 (Continued)

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
van der Linden et al ⁵⁵	European orthodontic specialists in 2002	2004	Published Literature	Survey	Orthodontic specialists in Europe, training and availability.	Europe	Postgraduate education and CPD
Vasak et al ⁵⁶	Current state of training for implant dentistry in Europe: a questionnaire-based survey	2007	Published Literature	Survey	Continuing education courses in implant dentistry, course length, delivery, types of attendees.	Europe	Postgraduate education and CPD
Wilson & Alcaïno ⁵⁷	Survey on sedation in paediatric dentistry: a global perspective	2011	Published Literature	Survey	Behaviour management techniques used in postgraduate paediatric dental training.	Global	Postgraduate education and CPD
Wilson & Mjör ⁵⁸	The teaching of Class I and Class II direct composite restorations in European dental schools	2000	Published Literature	Survey	Teaching of posterior composite restorations	Europe	Discipline level
Wilson & Setcos ⁵⁹	The teaching of posterior composites: a worldwide survey	1989	Published Literature	Survey	Teaching of posterior composites	Global	Discipline level
Wilson et al ⁶⁰	Preclinical Operative Dentistry Courses in Northern Europe and Scandinavia	1993	Published Literature	Survey	Preclinical operative skills course curricula variation	Northern Europe and Scandinavia	Discipline level
Zelles et al ⁶¹	Basic science teaching in dentistry in Central/Eastern Europe. Towards harmonisation?	2011	Published Literature	Survey	Time devoted to basic sciences.	Central and Eastern Europe	Discipline level
Luciak-Donsberger & Eaton ⁶²	Dental hygienists in Europe: trends towards harmonization of education and practice since 2003	2009	Internet	Survey and interview	Dental hygiene curricula, entry requirements and regulation	Europe	Other Oral Health Professional Education
Schulte et al ⁶³	A survey on education in cariology for undergraduate dental students in Europe	2011	Internet	Survey	Undergraduate cariology curricula	Europe	Discipline level
Luciak-Donsberger ⁶⁴	Origins and benefits of dental hygiene practice in Europe	2003	Internet	Survey and narrative report	History of dental hygiene, programme details, regulation and scope of practice	Europe	Other Oral Health Professional Education
Barnes et al ⁶⁵	A review of continuing professional development for dentists in Europe	2013	Internet	Literature review	CPD in Europe: dentist engagement in CPD, common modes of delivery and their effectiveness	Europe	Postgraduate education and CPD

(Continues)

TABLE 3 (Continued)

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
Mattheos et al ⁶⁶	Developing implant dentistry education in Europe: the continuum from undergraduate to postgraduate education and continuing professional development	2014	Internet	Consensus workshop report	Implant curricula, recommendations	Europe	Discipline level, Postgraduate education and CPD
Preshaw & Mohammad ⁶⁷	Geriatric dentistry education in European dental schools	2005	Internet	Survey	Geriatric dentistry curricula	Europe	Discipline level
Sanz et al ⁶⁸	Is there a need for a common framework of dental specialties in Europe?	2008	Internet	Narrative report	Specialties and training across Europe	Europe	Postgraduate education and CPD
Martínez-Álvarez et al ⁶⁹	Basic sciences education in the dental curriculum in Southern Europe	2001	Internet	Survey	Science curricula and staffing	Southern Europe	Discipline level
Seckinger et al ⁷⁰	The status of undergraduate implant education in dental schools outside the United States.	1995	Internet	Survey	Undergraduate implant training	External to United States	Discipline level
Keevil ⁷¹	Faculty openings and recruitment in dental hygiene education	1992	Internet	Survey	Recruitment and staffing of hygiene programmes	Global	Other Oral Health Professional Education
Dumme ⁷²	Comparison of undergraduate endodontic teaching programmes in the United Kingdom and in some dental schools in Europe and the United States	1991	Internet	Survey and visitation report	Endodontic undergraduate curriculum	Europe and United States	Discipline level
Health Education England ⁷³	Advancing Dental Care: Education and Training Review. Final report	2018	Internet	Report	Oral health professional (OHP) workforce number in UK, scope of practice of OHP, applications to dental and DH&T courses, dental foundation training, postgraduate training, speciality training, dental school income	UK	Programme level, Other Oral Health Professional Education, Postgraduate education and CPD
Chuenjitwongs ⁷⁴	Developing Educators of European Undergraduate Dental Students: Towards an Agreed Curriculum	2015	Internet	Literature review	Bologna process harmonisation towards odontology programmes, directive 78/687/EEC describing list of subjects required for a dental programme	Europe	Programme level

(Continues)

TABLE 3 (Continued)

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
Tsuruta ⁷⁵	Comparison of the quality assurance system of dental professionals in Japan, the EU and the ASEAN	2019	Internet	Narrative report	QA systems	Europe, Japan and South-East Asia	Programme level
Jayachandran et al ⁷⁶	Maintaining dental implants—do general dental practitioners have the necessary knowledge?	2015	Internet	Survey	Implant knowledge and training of primary care dentists	West Midlands, UK	Postgraduate education and CPD
Wikipedia ⁷⁷	"Dentistry"		Internet	Website	Reports that dental education in EU must be at least 5 years, vocational training.	n/a	Programme level
University of Glasgow ⁷⁸	Self-Evaluation Report	2010	Internet	Educational review	Programmes review	Glasgow, Scotland	Programme level
NHS Scotland ⁷⁹	Dental Workforce Report December 2014	2014	Internet	Workforce report	Applicants to dental school, intake targets, total number of students entering BDS/BSc/DH&T programmes, demographics of students starting BDS course, completion rates, bursaries, vocational training.	Scotland	Programme level, Other Oral Health Professional Education, Postgraduate education and CPD
European Commission ⁸⁰	EAHC/2013/Health/07 Study concerning the review and mapping of continuous professional development and lifelong learning for health professionals in the EU	2013	Internet	Narrative report	CPD across EU all health professionals. Country-by-country guide on dentists mandatory & voluntary CPD, organisational providers, law, monitoring, enforcement, accreditation, financing	Europe	Postgraduate education and CPD
Robb ⁸¹	Pain and anxiety control in dentistry—the foundation of successful practice, but the cinderella of dental pre-registration education	2017	Internet	Narrative report	Anxiety and pain management curricula	UK	Discipline level

(Continues)

TABLE 3 (Continued)

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
Postgraduate Medical Education and Training Board ⁸²	PMETB report on training in Oral and Maxillofacial Surgery (OMFS)	2008	Internet	Narrative report	OMFS specialty training	UK	Postgraduate education and CPD
Nash et al ⁸³	A review of the global literature on dental therapists	2014	Internet	Literature review	Dates of adoption of dental therapy by country, length of training of therapists, scope of practice.	Global	Other Oral Health Professional Education
National Health Service ⁸⁴	Dentists Act	1984	Internet	Legal document	Reports on General Dental Council, education, supervision.	n/a	Programme level
Health Education England ⁸⁵	The Future Oral and Dental Workforce for England. Liberating human resources to serve the population across the life-course	2019	Internet	Workforce report	Number of dental schools in UK, number of students vs number of applicants, DH&T education settings, hygienist education vs DH&T education, technology programmes in UK, orthodontic therapy programmes, dental nurse programmes, gender of workforce.	UK	Programme level, Other Oral Health Professional Education, Postgraduate education and CPD

(Continues)

TABLE 3 (Continued)

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
European Union ⁸⁶	Mutual evaluation of regulated professions. Overview of the regulatory framework in the health services sector—dental hygienists and related professions	2016	Internet	Narrative report	Report on the education of OHPs. Number of dental hygiene schools, students per year, number of hygienists working as educators, regulation of OHPs, activity/scope of practice for each country, autonomy of DH&T, degree titles, length of training, registration with professional bodies, CPD, regulation, link to dentists, periodontists, technicians and dental nurses.	Europe	Other Oral Health Professional Education
Lynch et al ⁸⁷	Community-based dental hygiene and therapy education	2011	Internet	Survey and narrative report	Dental hygiene and therapy student's thoughts on the community-based teaching.	UK	Other Oral Health Professional Education
UK Parliament ⁸⁸	Health Committee—Written evidence from the General Dental Council (ETWP 111)	2012	Internet	Legal document	GDC learning outcomes, CPD, scope of practice.	n/a	Programme level, Postgraduate education and CPD
ADEE ⁸⁹	Monitoring & assessment in undergraduate Endodontology; towards a European standard	2015	Organisation	Website – ADEE special interest group outputs	Undergraduate endodontology curricula	Europe	Discipline level

(Continues)

TABLE 3 (Continued)

Author	Title	Year	Search	Type	Subject matter reported	Location reported	Reporting theme
Council of European Chief Dental Officers (CECDO) ⁹⁰	CECDO EU & EEA Database	2017	Organisation	Database	Database on population, workforce and education. Reports on number of schools, public/private, entries, % of females, graduates, total intake as a country, course duration, school closures, vocational training, hygienist courses, duration and diploma type, possibility of further therapist training.	Europe	Programme level, Other Oral Health Professional Education
Council of European Dentists (CED) ⁹¹	Manual of Dental Practice (Edition 5.1)	2015	Organisation	Report	EU directives, basic dental training requirements, country-specific capacity for dental training, number of schools, vocational training requirements	Europe	Programme level
Council of European Dentists (CED) ⁹²	CED-ADEE Joint Statements on Basic Dental Training	2013	Organisation	Statement	Time and credit recommendations	n/a	Programme level
Council of European Dentists (CED) ⁹³	Revised CED Resolution—Annex V.3/5.3.1 of Directive 2005/36/EC	2016	Organisation	Guidelines	Proposed changes to annex of subjects taught due to outdated terminology and the frequency of other subjects being present in curricula.	n/a	Programme level
Council of European Dentists (CED) ⁹⁴	CED Statement—Specialist Dentists	2016	Organisation	Statement	Recognition of dental specialties	n/a	Postgraduate education and CPD
European Dental Students' Association (EDSA) ⁹⁵	Clinical Practice in EU Dental Schools: Preliminary Results	2016	Organisation	Survey	Clinical procedures performed & amount, confidence in autonomous practice.	Europe	Programme level

3 | RESULTS

3.1 | Selection of sources of evidence

A flow chart demonstrating the results of the searches undertaken, the number of sources screened and ultimately included in the scoping review can be seen in Figure 3. A total of 217 published articles were retrieved from the primary and secondary PubMed and ERIC searches. A total of 291 sources were identified through the Internet and organisation searches, leaving a total of 508 sources to be screened. A total of 405 sources were excluded as they did not report on the topic of interest, leaving 103 sources that reported on oral health professional education in Europe. Handsearching of the references of the included and published sources leads to a further 41 articles being screened, in which 15 sources reported on oral health professional education in Europe. In total, 33 duplications were removed and the final number of included sources was 85.

3.2 | Characteristics of sources of evidence

The individual characteristics of all the included sources, as well as a summary of the data extracted (using the charting form Figure 2) from each source, are presented in Table 3. The table also describes the search in which the source was found, as well as the reporting theme.

A summary of the most common characteristics of the whole dataset can be seen in Table 4. The mean year of publication for all included sources was 2007. The majority of sources were published in a journal dedicated to dental education (48%), with discipline-specific journals also being relatively common (29%). Surveys represented the most common source type (55%), with narrative reports, guidelines and literature reviews also being frequent (26% combined). 57% of sources reported across Europe, a combined 25% for either individual countries or select regions within Europe and 18% globally.

Thematic analysis of the subject matter reported by all included sources revealed four broad reporting themes:

- Dental education at a programme level
- Dental education at a discipline level
- Other oral health professional education
- Postgraduate education and continuous professional development (CPD)

The four themes and the most common information reported by all included sources can be seen in Table 5.

3.3 | Dental education at a programme level

The web search of dental organisations and professional bodies revealed two important documents that present data on dental education from countries in the EU and EEA.^{90,91} These documents contain a large amount of data from dental schools across Europe—something

many of the other programme-level reports fail to provide. As these documents are written by political organisations, there is a heavy focus on the dental and oral health workforce—and therefore most of the educational data presented focuses on length of study, number of dental schools, graduate numbers, clinical experience and vocational training. Whilst these are all essential factors in dental education and ultimately managing the oral health needs of the public, there is an evident lack of data on educational strategies and principles.

3.4 | Dental education at a discipline level

More than half of the relevant studies from the published literature searches report on dental education at a discipline level.^{11-15,19-21,23,24,26,29,30,32,34,36-38,42,44,45,47,48,51,58-61} Implantology^{11,12,14,24,36-38,66,70} was the most commonly reported discipline, with Paediatric Dentistry,^{21,30,42} Endodontology^{47,72,89} and Operative Dentistry⁵⁸⁻⁶⁰ also being reported frequently. Resources that reported on dental education at a discipline-level tended to be much more focused on educational practice, rather than political drivers. Discipline and sub-course curricula, teaching methods, sub-course duration, educational settings, clinical experience and assessment were commonly reported, as seen in Table 5.

3.5 | Other oral health professional education

The majority of the data reported for oral health professional education focused on dental hygienist education,^{28,35,39,62,64,71,86} with some reporting on both dental hygiene and therapy (DH&T) education.^{73,79,85,87,90} None of the reports found in the searches reported on

TABLE 4 Most common characteristics of whole dataset

Data Variable	Findings
Mean Year of Publication	2007
Year of Publication Range	1969-2019
Most Common Journal Type	Dental Education Journals 48% Dental Discipline-specific Journals 29% Dental Scientific Journals 14% Country-specific Journals 9%
Most Common (Modal) Source Type	Survey
Most Common Location Reported	Europe 57% Global 18% Individual Countries 15% Select European Countries 10%
Subject Matter Themes	1. Dental education at a Programme Level 2. Dental education at a Discipline Level 3. Other Oral Health Professional Education 4. Postgraduate Education and Continuous Professional Development (CPD)

dental nurse or dental technology education, and this may be due to the fact that these programmes are still often delivered as vocational or further education programmes, outside of the usual higher education setting. Such a trend may also be expected considering that many countries are increasingly focusing on training dental hygienists and therapists to meet the oral health needs of their population. Nonetheless, the data available regarding dental hygiene education provide a significantly more comprehensive programme review across multiple countries and institutions in Europe, than the data for dentistry.

Considering the large variety of regulations for dental hygienists,² there have been a number of reports that have attempted to provide details on these variances.^{28,35,62,64,83} These reports cover most countries in Europe and include very useful data on length of study, scope of practice, regulation, educational attainment and historical aspects of dental hygiene, such as year of implementation. One study, by Luciak-Donsberger and Eaton,⁶² which used surveys and interviews across Europe, focuses more on the educational strategies of dental hygiene programmes in Europe. The article reports on the number and duration of study of dental hygiene programmes in European countries, as well as the educational attainment but then details educational trends in Europe, with a focus on settings and supervision.

3.6 | Postgraduate education and continuous professional development (CPD)

Postgraduate education, similar to the discipline-level data, reported more frequently on educational aspects such as curricula and training settings. Of the included studies that reported on

postgraduate education, most described the current state at a discipline level.^{33,36,43} This trend of reporting of speciality training at a discipline level is to be expected, as many of the specialties work independently to develop their programmes. However, Sanz et al published a report on the accepted specialties per country in Europe, as well as training regulation and the numbers of speciality dentists in Europe.⁶⁸

The regulation of CPD, country-specific requirements and modes of delivery were commonly reported in included studies. The DentCPD project and the Graduating European Dentist highlight the importance of lifelong learning through engagement with continuing professional development (CPD).^{7,96} Barnes et al carried out a literature review of CPD in Europe and reported on dentist engagement in CPD, common modes of delivery and their effectiveness.⁶⁵ Much of the data in this literature review was from a select list of countries, mainly those that have regulated CPD activity. An EU-funded study that reviewed CPD and lifelong learning of health professionals in the EU was found in the Internet search.⁸⁰ This mapped the mandatory and voluntary CPD requirements according to each country in the EU, as well as reporting on common topics specific to dentistry and their mode of delivery.

4 | DISCUSSION

This scoping review has highlighted that the reporting of oral health professional education in Europe is limited. The literature search revealed some useful documents that report a wide breadth of data on oral health professional education; however, these tended to either

TABLE 5 Subject matter themes and common information reported for each

Subject matter theme	Common information reported
Dental Education at a Programme Level	Length of study ^{25,40,51,77,90} Historical structure and curricula ^{18,25,31,40,50,52,74} Clinical training/experience ^{25,49,51,95} Vocational training ^{40,73,77,79,90} Number of dental schools and graduates ^{73,79,85,90}
Dental Education at a Discipline Level	Sub-course curricula ^{11,12,14,19,20,24,26,29,30,32,37,38,44,51,60,63,66,67,69,72,89} Teaching methods ^{23,42,45,47,48,70} Educational setting and clinical experience ^{36-38,47,51,70} Competencies and Assessment ^{13,29,47,48,89} Sub-course duration ^{23,36,48}
Other Oral Health Professional Education	Length of study ^{28,35,39,64,83,86,90} Scope of practice ^{35,64,73,83,86} Regulation by country ^{35,62,64,86} Entry and graduate numbers ^{35,62,86} Educational attainment ^{86,90}
Postgraduate Education and Continuous Professional Development (CPD)	Postgraduate curricula ^{33,43,55,57,82} CPD regulation and requirements ^{22,65,80} Delivery of CPD ^{54,56,65,76} Specialty recognition ^{55,68,82,94} Postgraduate training settings ^{41,73}

cover a small number of institutions or report at a national level, rather than giving a broader picture in Europe. Considering that the average year of publication of relevant articles was 2007, much of this data would now be considered outdated.

4.1 | Programme-level and discipline-level data

There are a number of useful documents that provide advice and guidelines at a programme level,^{7,40,97} as well as at an individual discipline level.^{33,66,98} However, these do not report on the *current* state of oral health professional education in Europe and instead, list principles of good academic practice. In turn, we are unable to conclude to what extent this practice is adopted by institutions across Europe. The lack of reporting of dental education at a programme level is a concern. Comprehensive and geographically wide-ranging data on curriculum content and design, student assessment, admissions and clinical academic staff are more difficult to find. Articles that report on educational practices tend to have relatively small cohorts and many are outdated with current recommendations. Following the Bologna Agreement and the DENTEd project, which both aimed to drive harmonisation of dental education in Europe, many of the relevant articles from the published literature search reported on differences between historical dental education and aims for the future, with numerous papers describing the stomatology model vs odontology model. The focus on educational principles and practice by sources reporting discipline-level data is positive and allows for the sharing of best academic practice across institutions, as well as supporting decision-makers in planning changes to improve the quality of education delivered by their institution. The increase in publication of discipline and specialty-specific curricula is promising, and this is advocated within the Graduating European Dentist curriculum documents.⁷

4.2 | Postgraduate education and CPD

The reporting of postgraduate dental education, including specialty training, is similar to the reporting of dental education in general. According to the EU Directive 2005/36/EC, specialty training must be a minimum of three years full time, must have academic and clinical elements, and be delivered at approved institutions within the country concerned¹—and whilst there are many useful guidelines on *how* postgraduate education and specialty training should be delivered, it is not clear from the published literature *what* is delivered. Although there are documents that report on the CPD requirements of some countries, more information is needed on the setting and method of delivery preferred by oral health professionals. Additionally, it is not known how well oral health professionals engage in CPD, which may subsequently lead to a change in their professional practice. It is evident that there is very little knowledge on the current state of postgraduate education and CPD across Europe and more wide-ranging and comprehensive reporting is required.

4.3 | Faculty-level data

Whilst programme-level and discipline-level data were most prevalent, there was an evident lack of data at a faculty level. This includes information about academic staff numbers, qualifications of academic staff, and the research and teaching experience of academic staff. One study reported on staff involved in the delivery of dental hygiene programmes, but this mostly covered the United States.⁷¹ These data are of relevance to understand *how* education is delivered as well as how clinical academic staff balance their clinical, educational and research commitments—as such, there is a need for an increased reporting of this data, and for publications that provide advice and recommendations.

4.4 | Retrievability of sources

The authors were aware of other known sources that reported on dental education in Europe but were not found as part of this comprehensive search strategy (Table 6). The authors propose two potential reasons for known articles not appearing in the search: (a) variation in the use of keywords, and (b) the accessibility of the publishing website. The use of Medical Subject Headings (MeSH) keywords for publications is a useful tool to index and facilitate searching and access to articles. Recommended MeSH keywords related to dental education can be seen in Table 7. The fact that the majority of included sources were published in journals dedicated to dental education is positive—and allows for greater retrievability of sources. Many of the relevant articles that reported on dental education were linked to ADEE taskforces, workshops and Special Interest Groups. Whilst this serves to highlight the vital role that ADEE plays in mediating pan-European activities, it is important to ensure that this activity is written up and published in a timely fashion in order to ensure that the findings are recorded, accessible, and able to be referenced appropriately. It was positive to note that a

TABLE 6 Known documents that report on dental education but were not identified in searches

Articles known to the authors but not found in search:

ADEE. 2016. Survey of Dental Education in Europe Summary Report.⁹⁹

General Dental Council. 2019. A Review of the Literature on Continuing Professional Development (CPD). Available from https://www.gdc-uk.org/docs/default-source/research/181205-full-report-review-of-the-literature-on-cpd.pdf?sfvrsn=a4c63719_2¹⁰⁰.

Martin, N., Fairclough, A., Smith, M. & Ellis, L. 2011. Clinical educators' views on the quality of undergraduate clinical restorative dentistry in the UK and ROI *Eur J Dent Educ*, 15, 216-222.¹⁰¹

Sinclair, E., Eaton, K. & Widström, E. 2019. The healthcare systems and provision of oral healthcare in European Union member states. Part 10: comparison of systems and with the United Kingdom. *Br Dent J*, 227, 305-310.¹⁰²

number of sources identified through the online search results and hand searching, linked to a range of relevant dental educational organisations and professional bodies. However, finding these particular documents took a significant amount of time—and this finding may support the idea of a dynamic, easy-to-update central online toolkit that reports on dental education in Europe.

4.5 | Limitations of this scoping review

Potential limitations of the search strategy employed by the authors may include the inclusion of articles in English only. Whilst including articles in languages other than English may have led to more relevant articles, it is the opinion of the authors that including these would not significantly change the findings of the scoping review. With any search strategy, there is the potential for missed articles; however, the addition of the secondary PubMed search, once the authors were more familiar with the data set, strengthened the search strategy further.

4.6 | Recommendations for future reporting of dental and oral health professional education

- There is a greater need for comprehensive, educationally driven programme-level data on oral health professional education across Europe.
- Continued publication of discipline-level curricula, in line with the Graduating European Dentist recommendations.
- Increased reporting of faculty-level data, including staff numbers, clinical and research experience and educational qualifications.
- Increased reporting of postgraduate/specialty training and CPD, across all disciplines.
- Consistent use of MeSH keywords for publications in dental education (see Table 10 or use the MeSH browser <https://meshb.nlm.nih.gov/search>).
- Creation of a centralised online toolkit, in order to facilitate the collection, organisation, display and analysis of pan-European data relating to dental and oral health professional education.

TABLE 7 MeSH Keywords that can be used for publications in dental education

MeSH keywords for dental education
Dental education (Education, Dental)
Dental hygienists
Dentists
Dental students
Dental technicians
Dental assistants
Curriculum
Survey

5 | CONCLUSION


The reporting of dental and oral health professional education in Europe is limited. Whilst there are many useful documents that provide guidelines on dental education, there is limited knowledge on how education is implemented and delivered. There is a greater need for comprehensive educationally driven programme-level data on oral health professional education across Europe.

CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

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