

The perceptions and attitudes of qualified dental therapists towards a diagnostic role in the provision of paediatric dental care

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Key points

Dental therapists believe that if they were to operate in a diagnostic role, there would be an increase in access to dental services.

Dental therapists believe that there would be benefits to patients, dentists and the profession if they were to operate in a diagnostic role.

Dental therapists identify that there are barriers to a diagnostic role, including: the business of dentistry; the perceptions of dentists and patients, which include a lack of awareness from patients; and the dental therapists' remit.

Abstract

Objectives This study explored the perceptions and attitudes of qualified UK dental therapists (DTs) to act in a diagnostic role in the dental care of paediatric patients.

Methods A mixed methods study. An electronic questionnaire was sent out to the members of associations and closed social networking groups for qualified DTs across the UK. The questionnaire explored the training, clinical experience and working practices of the participants and measured their agreements with applicable statements using Likert scale scores. Semi-structured interviews were also undertaken to explore how UK DTs perceived a diagnostic role for them and what barriers and facilitators they experienced.

Results A total of 155 questionnaire responses were returned and 11 interviews conducted. Participants were mostly women (94.8%) with a broad range of working experience, with a mean experience of 9.5 years (\pm 8.8 standard deviation [SD]) (range: 1–42 years). From the questionnaires, when asked to score agreement on a Likert scale from 0–5, DTs agreed that in a diagnostic role, they could increase access to dentistry for patients and a high proportion were in agreement that they had the knowledge to carry out examination (mean = 4.43 \pm 0.87 SD), diagnosis (mean = 4.37 \pm 0.90 SD) and care planning for paediatric patients (mean = 2.74 \pm 1.32 SD). The interviews yielded three qualitative supra themes: 'working in the UK as a DT today'; 'the perceptions of dental therapists on acting in a diagnostic role in paediatric dental care'; and 'barriers and facilitators to acting in a diagnostic role' and within these, eight major themes were identified.

Conclusion Within the limitations of a small sample who were representative of the workforce demographic and educational structures, we found that DTs felt that if they were to act in a diagnostic role, it would improve access to dental services benefitting patients, dentists and the DT profession. DTs identified and explored barriers and facilitators to a diagnostic role. Change is required to overcome these barriers in order to support DTs to act in a front-line diagnostic role.

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Introduction

Delayed diagnosis of caries in children can delay treatment and untreated dental caries can cause pain, infection and an increased risk of sepsis.^{1,2} In the UK in 2019, 41.6% of children aged between 0–17 years had not seen a dentist for a check-up within 12 months,³ which is a cause for concern.⁴ This may result in many children eventually presenting for dental treatment with extensive unrestorable carious lesions, which would require conscious sedation or general anaesthesia for management.²

In the UK, hospital admissions for dental caries accounted for 7.8% of admissions for children aged 5–9 years.⁵ These hospital admissions are stressful for both the child and parents/guardians, as well as being costly for service commissioners.

Identifying how access to dental services can be improved has been a long-term national priority.⁶ It is also the second out of ten priorities identified by the James Lind Alliance Oral and Dental Health Priority Setting Partnership, which included members of the public, patients, carers of patients and a range of dental clinicians,

as well as representatives from professional dental and educational bodies.⁷ Involving dental care professionals, including dental therapists (DTs), in a wider range of duties to improve access to dentistry has been proposed.⁸ Recent research has identified that there are cost-savings^{8,9,10} and dentist clinical time-saving^{10,11,12} benefits, through the delegation of a diagnostic role to dental therapists in the UK without an increase in oral disease in the population.

DTs are mid-level dental providers who have a broad skill set, which includes a range of preventative and restorative dental treatments. DTs have had a historical role internationally in improving access to dental services, particularly for children. Unlike the UK, in countries such as New Zealand and Australia, DTs have held a diagnostic role.¹³ In 2013, the General Dental Council (GDC) introduced 'Direct Access', which permitted DTs to see and treat patients without the need for a prescription from a dentist.¹⁴ When considering DTs' competence in acting in a diagnostic role, a recent review of the literature reported that comparative diagnostic test accuracy studies have shown similar abilities between dental hygienists, therapists and dentists in diagnosing periodontal conditions, caries and potential oral malignancy.¹⁵

Although previous research suggests that DTs were accepted in an operative and diagnostic role by patients but with a mixed reception by dentists,¹⁵ there is a paucity of research on the attitudes of DTs towards a diagnostic role for either adults or children and whether they are prepared to work in this way.

This study therefore aimed to explore the perceptions and attitudes of qualified DTs towards a diagnostic role in the dental care of paediatric patients. Four primary objectives were identified:

- Outline the experience, training and working practices of UK qualified DTs
- Explore how qualified DTs perceive a frontline diagnostic role in the dental care of paediatric patients
- Explore the barriers and facilitators perceived by DTs towards a frontline diagnostic clinical role
- Make recommendations to support a role change for DTs towards a frontline diagnostic role in the dental care of paediatric patients.

Methods

Ethical approval was sought and obtained from the University of Portsmouth Science and Health Faculty Ethics Committee (SFEC 2019-082A). This study utilised a mixed methods approach to meet the objectives of the study:

- An electronic questionnaire was distributed to qualified DTs working in the UK
- Semi-structured interviews with qualified DTs working in the UK were conducted.

The questionnaire consisted of three sections. Section one examined participants' demographics, training and work history. To ensure demographic questions were valid and comparable to other large-scale questionnaires, the UK Data Service's Question bank¹⁶ was used to inform question wording and response options. Section two measured participants' agreement with a series of statements, exploring their attitudes and beliefs towards their role in clinical dentistry today and their attitudes and beliefs towards acting in a frontline diagnostic role. The survey also included a third section which measured participants' self-reported confidence on the key clinical and non-clinical skills required to carry out a frontline diagnostic role. These findings will be reported separately.

Piloting of the questionnaire for usability and readability was subsequently undertaken using a cohort of six qualified DTs (based at the University of Portsmouth), similar to the target group and appropriate modifications were made. The modified questionnaire was administered electronically using Google Forms between October 2019 and February 2020.

Semi-structured interviews were undertaken, either face-to-face or over the telephone and recorded using Dictaphone or audio software by JQ between December 2019 and March 2020. Interviews took between 30–45 minutes. The interview guide was informed by the study objectives and from the current literature. The guide was organised into three sections: 1) current practice; 2) barriers and facilitators to a frontline diagnostic role; and 3) future practice (in a diagnostic role). After pilot interviews, the interview guide was refined. The interviews were transcribed verbatim and were anonymised.

Participants for both the questionnaire and interviews were qualified DTs, recruited through an invitation within a regular

electronic newsletter to the membership of the British Society of Dental Hygiene and Therapy, or through invitations shared on the closed social media of professional or educational networks. Participants' consent was given on submission of the completed questionnaire and prior to interviews.

Quantitative data from the questionnaire were analysed using descriptive statistics and mean scores of participants' agreement with statements were analysed (IBM SPSS Statistics version 25 software package). Participants' agreement with statements was measured on a Likert scale from 0–5 (where 0 = strong disagreement and 5 = strong agreement). Qualitative, thematic analysis¹⁷ was undertaken using the QSR International NVivo 12 software package. With qualitative research, the researchers' position, beliefs or shared experiences with the participants may affect the design, outcome or analysis of the research.¹⁸ JQ is a qualified DT with clinical experience in general practice and special care dentistry. To reduce bias and influence on the participants, efforts were taken prior to data collection and during data analysis. Prior to interviews, participants were informed that JQ would be interviewing them as a researcher only and they were asked to explain any clinical or niche terminology in order to avoid incorrect assumptions. Analysis was undertaken by two researchers, JQ and DR. DR is a dentist, experienced in qualitative analysis and independently read the transcripts and coded them without the use of NVivo. Remote (due to COVID-19) round table discussions were conducted on two occasions to refine the themes and subthemes.

Results

Demographics and working practices

A total of 155 questionnaire responses were returned. The demographics and working patterns of the sample are outlined in Table 1. The majority of participants were women (94.8%, $n = 147$) aged between 25–44 years old (74.9%, $n = 116$). Education varied, with more participants holding diplomas (54.8%, $n = 85$) in dental therapy than bachelor's degrees (43.2%, $n = 67$) and professional certification (1.9%, $n = 3$). There was a broad range of working experience, with a mean experience of 9.5 years (± 8.8 standard deviation [SD]) (range: 1–42 years).

The most common workplace was mixed general practice (NHS and private) (64.5%,

n = 100) and more participants (56.1%, n = 87) reported working full-time rather than part-time (35.5%, n = 68). The majority of participants mostly worked with adults (52.9%, n = 82); 5.2% (n = 8) worked with children and 41.9% (n = 65) worked with an equal mix. Most participants reported working under direct access (64.5%, n = 100); however, despite this, many participants were not carrying out examinations (76.8%, n = 119) or diagnosing oral diseases (67.1%, n = 104) in children.

Agreement with statements

The agreement scale ranged from 0–5. The participants' agreement with a series of statements on working as a DT today and in a diagnostic role are given in Table 2. The greatest agreement was found with the statement that DTs reduce the workload of dentists (mean = 4.56 ± 0.85 SD). This was followed by the statement that DTs would increase access to dentistry in a diagnostic role (mean = 4.55 ± 0.78 SD) and that in a diagnostic role DTs should be paid more (mean = 4.48 ± 0.78 SD). The greatest disagreement was found with the statements that patients would be at risk when DTs carry out oral treatment planning (mean = 1.35 ± 0.79 SD), oral examination (mean = 1.37 ± 0.83 SD) and diagnosis of oral disease (mean = 1.37 ± 0.81 SD).

Considering current skill utilisation, participants overwhelmingly disagreed with the statement that DTs' skills are being fully utilised to their full potential (mean = 1.68 ± 0.98 SD). High participant agreement was found with statements that DTs have the knowledge to carry out examination (mean = 4.43 ± 0.87 SD), diagnosis (mean = 4.37 ± 0.90 SD) and care planning (mean = 4.46 ± 0.85 SD) for paediatric patients. Mixed views appeared to be held around whether DTs would need further training to carry out examinations (mean = 2.84 ± 1.27 SD), diagnosis (mean = 2.70 ± 1.33 SD) and care planning (mean = 2.74 ± 1.32 SD) for paediatric patients. Participants tended towards positive agreement with the statements that dentists would feel their jobs are threatened by DTs in a diagnostic role (mean = 3.54 ± 1.22 SD).

Qualitative findings

In total, 11 semi-structured interviews were undertaken. Seven interviews were by telephone and four were face-to-face.

Table 1 Demographic, training and working practices of questionnaire participants

Demographic	Frequency (n)	Percentage (%)
Sex		
Female	147	94.8
Male	7	4.5
Prefer not to say	1	0.6
Age (years)		
19–24	9	5.8
25–34	68	43.9
35–44	48	31.0
45–54	20	12.9
55–64	10	6.5
Qualification (type)		
Bachelors	67	43.2
Diploma	85	54.8
Prof certificate	3	1.9
Years since qualification		
0–5	66	42.6
6–10	32	20.6
11–20	40	25.8
21–30	8	5.2
31+	7	4.5
Main work setting		
Academic institution	6	3.9
Armed forces	2	1.3
Community dental services	18	11.6
Private practice	13	8.4
General practice (NHS)	7	4.5
Hospital dental service	5	3.2
Mixed hospital and community	2	1.3
Mixed NHS and private practice	100	64.5
Prison dentistry	1	0.6
Public dental service	1	0.6
Main patient group		
Adults	82	52.9
Children	8	5.2
Equal mix	65	41.9
Working level		
Part-time	68	35.5
Full-time	87	64.5

Interviews lasted between 25–45 minutes. From the analysis of the transcripts, three ‘supra’ themes with eight major themes were developed. Within the major themes, 26 minor themes were identified (Table 3).

Working as a dental therapist in the UK today

Utilisation of dental therapists

The majority of participants felt that overall, DTs’ skills and scope of practice in the UK were under-utilised, which was associated with lower job satisfaction. The interviewed DTs described how in order to practise their full scope, they must push their dental practices to allow them to do so. Some participants felt undervalued by their practice colleagues:

- ‘I do believe that dental therapists are under-utilised in dental services and they have many skills which they could be using and many of them just are working as hygienists instead of therapists’ (Participant5, Qualified2Yrs)
- ‘So, really, I feel like I’ve tried to push my scope...I’ve not been given the support’ (P2, Q8Yrs).

Dental therapists already increase access to dental services and reduce waiting times

Participants described how DTs are already increasing access to dental services in the UK by freeing up the dentist’s clinical time to focus on more complex treatments. Participants reflected on how DTs were reducing the waiting times for patients to obtain treatment and facilitate earlier interventions:

- ‘Because I am a therapist, I can do the additional treatment which then makes the dentist’s book more accessible for things I can’t do. Crowns etcetera. So it eases up their diary, it kind of helps patients get in’ (P10, Q6Yrs).

Problems for patients in dentistry today

Interviewees described how the ‘refer-down’ approach delays treatment and increases patient waiting times. The DTs described a situation where, following assessment by a dentist in the interval before the patient sees a DT, disease has progressed, or new disease has started:

- ‘It slows things down for everybody, for the patient and for the therapist, because you can’t constantly [keep] going back to the dentist, which then slows down the dentist

because they are hopefully using you, freeing up their time and when you keep going back it’s just extra work for them’ (P8, Q13Yrs).

Some participants described how UK dentistry does not support timely paediatric dental provision. Participants described poor access to NHS dental services and highlighted that the business of dentistry, including finances, makes it difficult to provide treatment for children within the NHS general dental practitioner contract. Children’s dentistry was considered time-consuming and therefore, costly. Some participants explained that general dental practices may not offer paediatric patients a full range of treatments and make unnecessary referrals to secondary services, which overwhelms these services:

- ‘I think it’s a bit of a generalisation but unfortunately I don’t think general practice as a whole give their paediatric patients procedures such as crowns or extractions. I think a lot of those patients are sometimes unnecessarily turfed over to community [and] actually that puts a lot of stress on a very difficult and oversubscribed service’ (P2, Q8Yrs).

Table 2 Participants’ agreement with statements regarding dentistry today and in a diagnostic role

Statement	Response N (%)					Mean ± SD	N = 155
	1 (strongly disagree)	2 (disagree)	3 (don’t know)	4 (agree)	5 (strongly agree)		
DTs carrying out oral treatment planning for paediatric patients will put these patients at risk	121 (78.1)	22 (14.2)	6 (3.9)	4 (2.6)	2 (1.3)	1.35 ± 0.79	155
DTs carrying out oral examination for paediatric patients will put these patients at risk	120 (77.4)	23 (14.8)	5 (3.2)	4 (2.6)	3 (1.9)	1.37 ± 0.83	155
DTs carrying out diagnosis of oral disease for paediatric patients will put these patients at risk	119 (76.8)	23 (14.8)	8 (5.2)	2 (1.3)	3 (1.9)	1.37 ± 0.81	155
DTs skills are being utilised to their full potential in UK dentistry	90 (58.1)	38 (24.5)	18 (11.6)	5 (3.2)	4 (2.6)	1.68 ± 0.98	155
DTs will need further training in order to diagnose oral disease in paediatric patients	36 (23.2)	38 (24.5)	36 (23.2)	26 (16.8)	19 (12.3)	2.70 ± 1.33	155
DTs will need further training in order to treatment plan for paediatric patients	35 (22.6)	38 (24.5)	31 (20.0)	34 (21.9)	17 (11.0)	2.74 ± 1.32	155
DTs will need further training in order to carry out oral examinations for paediatric patients	28 (18.1)	38 (24.5)	37 (23.9)	35 (22.6)	17 (11.0)	2.84 ± 1.27	155
Dentists will feel their jobs are threatened by DTs carrying out oral examinations and treatment planning for paediatric patients	13 (8.4)	19 (12.3)	33 (21.3)	52 (33.5)	38 (24.5)	3.54 ± 1.22	155
DTs have the knowledge to diagnose oral disease in paediatric patients	3 (1.8)	2 (1.3)	20 (12.9)	40 (25.8)	90 (58.1)	4.37 ± 0.90	155
DTs have the knowledge to carry out paediatric oral examinations	2 (1.3)	3 (1.9)	18 (11.6)	36 (23.2)	96 (61.9)	4.43 ± 0.87	155
DTs have the knowledge to carry out paediatric treatment planning	2 (1.3)	3 (1.9)	15 (9.7)	37 (23.9)	98 (63.2)	4.46 ± 0.85	155
I believe that DTs increase access to dental treatment for patients	3 (1.9)	3 (1.9)	17 (11)	26 (16.8)	106 (68.4)	4.48 ± 0.91	155
If the role of DTs included acting as a frontline diagnostic clinician, they should be paid more	1 (0.6)	2 (1.3)	16 (10.3)	38 (24.5)	98 (63.2)	4.48 ± 0.78	155
DTs in a frontline diagnostic role would further increase access to dentistry for patients	1 (0.6)	3 (1.9)	13 (8.4)	31 (20.0)	107 (69.0)	4.55 ± 0.78	155
I believe that DTs reduce the workload of dentists	3 (1.9)	3 (1.9)	10 (6.5)	27 (17.4)	112 (72.3)	4.56 ± 0.85	155

The perceptions of dental therapists on acting in a diagnostic role in paediatric dental care

Benefits and disadvantages

When exploring how DTs perceive a diagnostic role, participants described benefits and disadvantages for patients, DTs and dentists. Participants described how access to dental services for children would improve and waiting times be reduced, without putting children at risk. Participants also described how a DT in a diagnostic role would facilitate patients receiving more prevention at the first point of contact and children would get a greater continuity of care:

- ‘I think that we would probably be seeing more patients more efficiently and therefore hopefully there would be less people waiting

for dental care or not being able to access NHS dental services’ (P1, Q4Yrs)

- ‘The benefits for patients is that they’ll be able to have dental treatment [and] dental check-ups at more convenient times for them because there is more accessibility’ (P6, Q3Yrs).

When considering the DT profession, overwhelmingly, participants described how in a diagnostic role, the utilisation of DT skills and scope of practice would be increased, including greater use of their examination and care planning skills. Participants felt that DTs would be working more autonomously and with more control, therefore taking on more responsibility in the care of their patients:

- ‘So, yeah, I think that therapists would feel that, that would definitely benefit their role. Being able to take maybe a little bit more control over the care of their patients’ (P9, Q19Yrs).

Disadvantages were identified by participants, including that DTs may not be able to meet all the diagnostic/treatment needs of paediatric patients and therefore may need to refer to a dentist:

- ‘Yes I think, if maybe they’ve not had suitable training or they are not knowledgeable enough in a certain area, then it is the same as for the dentist I suppose, then there is always more room for error in those situations’ (P9, Q19Yrs).

Table 3 Supra major and minor themes identified through thematic analysis of interview transcripts

Supra theme	Major theme	Minor theme
Working as a DT in the UK today	Utilisation of DTs	DTs in the UK today are mostly under utilised
		Opportunities to practise dental therapy are uncommon and underpaid
		Level of scope of practice utilisation depends on the role
	DTs already increase access to dental services and reduce waiting times	DTs facilitated access to dentistry and dental treatment
		DTs reduce waiting times for patients
		Direct access increases access to dentistry
	There are problems for patients in dentistry today	The ‘refer-down’ approach delays treatment and increase patient waiting
		UK dentistry does not support timely paediatric dental provision
	The perceptions of DTs on acting in a diagnostic role in paediatric dental care	Benefits and disadvantages
DTs would benefit		
Dentists would benefit		
Disadvantages		
The role of dentists		Dentists will be relied upon for clinical support
		‘Refer-up’
Barriers and facilitators to acting in a diagnostic role	Barriers	The business of dentistry
		Negative attitudes
		Lack of awareness of DTs
		The dental therapist
		Prescribing
		Regulatory bodies
	Facilitators	Positive attitudes
		Confident, trained and driven workforce
		Movements in other medical professions
	Changes needed	Legislative and regulatory body changes
		Training
		More awareness and positive attitudes towards DTs

The role of dentists

Some participants considered the altered role of dentists if DTs were to be a diagnostic clinician for paediatric patients. Interviewees described how if they were ever unsure about the diagnosis or treatment options for a patient, they would seek the opinion and support of a clinical colleague. Often participants referred to 'seeking the advice of a dentist', potentially in a mentorship role. When discussing what they would do if they were unable to provide the care for patients within their scope of practice, participants would refer the patient to a dentist:

- 'I would seek [a] second opinion and some clarification from a colleague...I think naturally I would go to a dentist that I had a good working relationship with' (P1, Q4Yrs).

Barriers and facilitators to acting in a diagnostic role

Barriers

Many interviewees described how the role of business within dentistry and the NHS regulations were a significant barrier. Many participants highlighted specifically DTs' inability to hold a performer number within the NHS regulations. The current general dental practice remuneration system in the UK based on units of dental activity (UDA), commonly referred to as 'the UDA contract', was described as a barrier when needing to refer patients between dentist and therapist (and vice versa), as this would cause conflict about how the UDA would be split among them. Some participants also highlighted situations where employers would prefer to employ a dental hygienist working privately instead of a DT as they may be more profitable for the practice:

- 'I think that because we can't have performer numbers, obviously that is a massive barrier to us opening a course of treatment, opening a treatment plan and being able to do that frontline diagnostic role' (P1, Q4Yrs)
- 'And financially, if I'm correct, there is that belief that hygiene work is regular work, often without nursing support, brings in a higher rate of return on a room [surgery] than doing therapy work' (P2, Q8Yrs).

Many participants felt that there should be higher remuneration for a DT working in a diagnostic role as they would be taking on more responsibility but a small minority felt that no change was required:

- 'I think if you're taking on more responsibility, then you would expect to have a higher level of pay...' (P9, Q19Yrs).

The perceptions and attitudes of dentists, patients and DTs were considered to be a barrier to the expanded role of DTs. Participants felt dentists may be threatened in relation to their jobs and income or have concerns over DT capability, or a loss of control over their patients. When considering patients' attitudes, some DTs highlighted how parents of children may be concerned that their child is not being seen by a dentist:

- 'So dentists, I think dentists have a very poor attitude towards dental therapists, I feel like there is almost a threat from them, they feel threatened regards to their jobs and income' (P1, Q4Yrs).

Participants described how DTs themselves could be a barrier. Over half the participants described how some DTs are not confident working with direct access or even undertaking restorative procedures. Due to an inability to find a DT job, or not wanting to assume extra responsibility, they have become deskilled. Another significant barrier was their inability to prescribe radiographs and medicines that are often required for prevention, restorative practice or antibiotics for acute infections:

- 'Yeah confidence level of the therapists, a barrier might be that they are not very confident to do it, maybe don't want to take it on' (P10, Q6Yrs)
- 'What if a patient needed, I don't know, like say Duraphat toothpaste on a prescription and [I] can't give that. What if a patient has an infection? Needs antibiotics before you can do any further treatment, well we can't do that' (P10, Q6Yrs).

Dental regulatory bodies were identified as a barrier by participants. It was highlighted that the GDC's scope of practice for DTs is not clear enough on what DTs are able to diagnose:

- 'I think possibly, the GDC, because it's not exactly clear in their eyes, how far we can go, possibly. How far we can go in terms of diagnostics and what we can extend our diagnostic role to' (P5, 2Yrs).

Facilitators

Fewer facilitators were described by participants. Some considered how positive attitudes, held by dentists and patients, could act as facilitators. It was suggested that patients and dentists who were aware and knowledgeable of the remit, time saving role and training of DTs would accept them in a diagnostic role, thus acting as a facilitator.

Some participants suggested that younger dentists and those who have trained with DTs would also be more accepting. For patients, the participants described a mind-set that they 'just wanted treatment done' and were not concerned as to which dental professional would be undertaking their treatment:

- 'I'm sure some, some of the more forward thinking, maybe those that qualified alongside dental therapists, might be quite happy with that. Might see it as a burden off their shoulder' (P7, Q40Yrs).

The interviewed DTs felt confident in their abilities to diagnose caries in children and mostly felt that DTs were trained and knowledgeable enough to have this diagnostic role:

- 'I do believe dental therapists are trained well and adequately in order to carry out their full scope of practice, they are trained to diagnose caries, to treatment plan and to carry out treatment effectively within their scope' (P5, Q2Yrs)

Change is needed

Participants were asked to consider what changes would be needed for DTs to successfully hold a diagnostic role. Participants discussed how there would need to be legislative, financial and regulatory changes to overcome the barriers they had described, such as: legislative ability to prescribe medicines (in some cases, antibiotics); legislative support to prescribe radiographs; changes to the NHS dental contract to allow performer numbers for DTs; and more clarification and support from the GDC and indemnifiers:

- 'Until those business dynamics change, I don't think that therapists will ever really be able to move past that' (P1, Q4Yrs)
- 'When the prescribing rights comes along and we can do the local anaesthetic and apply prescription medicines, that will help things a lot better but at the moment, we are limited' (P8, Q13Yrs).

Interviewees felt changes could be made to training at undergraduate and postgraduate levels. At undergraduate level, participants suggested more consistency in training in diagnostic skills to nurture more confidence in working in diagnostic roles across academic institutions and more training alongside dentists. At postgraduate levels, interviewees suggested refresher training for DTs who had deskilled or not qualified recently and

greater availability of foundation or mentoring schemes for newly qualified DTs:

- 'I think it would be good if there were courses available for therapists to be able to go on that are full and effective courses to train to deliver [a] more frontline [role]' (P11, Q1Yr).

Discussion

This study used a mixed methods research approach to investigate the perceptions and attitudes of qualified DTs towards a diagnostic role in the provision of paediatric dental care. The study which captured the full spectrum of experience and demography in the UK population of qualified DTs identified that DTs in the UK believe they are under-utilised and feel they could facilitate greater access to dentistry by operating safely in a diagnostic role. The results suggest that DTs are prepared to work in a diagnostic role and the participants identified facilitators, barriers and challenges to working in a diagnostic role.

The participants in both the questionnaire and interviews were mostly women and this is representative of the population of DTs in the UK.¹⁹ The average age and level of experience for participants in the questionnaire were found to be lower than previous similar nationwide studies;^{20,21} however, this is likely to be due to the effects of greater numbers of DTs entering the workforce since they were published, as described in a recent workforce study.²² It was of note that most participants reported full-time working; this is contrary to previous findings which suggested that part-time working was more common.²⁰ This difference may be caused by the younger participants in this study, where they may not yet have dependants, thereby choosing more full-time work.

DTs predicted an increase of access and reduction in waiting times to dental services/treatment if they were to work in a diagnostic role. This supports the findings of operational modelling studies in primary dental care.^{8,10,11,23} However, some DTs felt that there may be cases where they are unable to meet all the needs of the paediatric patient. DTs' broad scope of practice make them well-suited for paediatric dentistry. It is therefore a reasonable assumption that these cases may be infrequent. In more complex cases, outside of the DT scope of practice, DTs should make referrals 'up' to dentists or paediatric dental specialists.

From the questionnaire findings, as expected, the vast majority of UK DTs are not currently

carrying out examinations or diagnostics for paediatric patients. This suggested that there are barriers to this type of work for DTs and was further explored in the qualitative research. The business of dentistry was a significant barrier highlighted by the DTs as they cannot hold a performer number. This is a significant stumbling block for NHS services which would greatly benefit from the efficiency savings.^{8,10,11,23} New financial systems for a 'refer up' working model, where DTs refer patients to dentists for treatment or investigation outside their scope of practice, need to be identified and tested for their efficacy and patients' experience of this practice model should be studied in further research.

Conflicting perceptions of dentists and patients towards DTs in a potential diagnostic role have been reported in the previous literature.^{24,25,26,27} This study raises similar questions from the participants who felt that the attitudes of dentists and patients could be a barrier. This was strongly associated with a lack of awareness of DTs' remit and training, which has been well-explored in the literature and a review of the Scope of Practice by the GDC.^{24,25,26,28} It was interesting to find that the DTs felt that newly qualified dentists, who may have trained alongside DTs, may hold more positive attitudes towards and facilitate DTs' diagnostic roles. This contrasted with findings of a recent case study research by Bullock *et al.* where it was reported that newly qualified dentists may in fact be less accepting of DTs.²⁹ As awareness of DTs by patients and dentists appears to heavily affect their attitudes towards their utilisation in a diagnostic capacity, some DTs suggested that joint training between DTs and dentists should be increased. Dentists concerns over patient safety are reported in the literature.^{27,30} DTs disagreed and felt that children would not be at risk if they were to work in a diagnostic role. The participants of this study felt their profession was sufficiently knowledgeable and trained to operate in a diagnostic role.

The limitations of this study include the recent introduction of the General Data Protection Regulations and Data Protection Act in 2018, which, when approached during the study design phase in February 2019, was cited by the GDC as to why they were unable to share the contact details of UK DTs. Previous studies up to this point were able to obtain lists of registrants' names, qualifications and email addresses to support recruitment.³¹ Therefore, this study relied upon UK DTs being members

of the main association for dental therapists in the UK or members of networking or educational groups on social media. This proved to be a limitation of this study as the questionnaire had a lower response rate than is ideal for inferential statistical analysis. It was not possible to establish the true response rate, as social media platforms, such as Facebook, do not supply metrics on how many saw or interacted with the invitation to participate. Another limitation from this method of recruitment is the potential introduction of selection and sampling bias; however, the participants of this study were representative of the population of qualified UK DTs with a range of experience and working practices.

A strength of this study is that it was mixed method. These studies allow for triangulation of data to enhance the findings of the study.³² This study used qualitative research methods in this way; however, qualitative findings are only applicable to the sample interviewed and are not generalisable across populations.³³ Another limitation to qualitative methodologies is the potential for interview and observer bias.¹⁸ Although this was recognised at planning and analysis stages of this research, caution must be taken when considering these findings.

Conclusion

In a small but representative sample, we found that DTs in the UK believe they are under-utilised. The participants felt that if they were to act in a diagnostic role, it would improve access to paediatric dental services, without putting the dental health of children at risk, thus benefitting patients, dentists and the DT profession. DTs overall reported high confidence in some of the key skills required to act in a frontline diagnostic role, with the exception of carrying out orthodontic assessments, requesting laboratory tests and prescribing antimicrobials. Positive attitudes and a confident, trained and driven workforce would facilitate DTs working in a diagnostic role. However, there are barriers for DTs, including the business of dentistry, attitudes of dentists and patients, lack of awareness, DTs themselves, prescribing rights and regulatory body-related issues.

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Ethics declaration

There was no financial support or funding for this research study. This study was conducted in accordance with the Helsinki declaration as revised in 2013.

Author contributions

Joshua Quach was involved in all stages of the research process, including research design, recruitment, interviewing, analysis and writing of the research manuscript. Kristina Wanyonyi Kay acted as research and academic supervisor to Joshua Quach who supported in quantitative analysis and manuscript writing. David Radford acted as research and academic supervisor to Joshua Quach who supported in qualitative analysis and manuscript writing. Chris Louca acted as research and academic supervisor to Joshua Quach who supported in manuscript writing.

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