
Dr Millicent Rowena Taylor
BChD(Stell); GradCertHPE(UWA); FCGDent(UK); FRACDS(GDP); MSOralSc(SUNY)

This thesis is presented for the degree of Master of Health Professions Education of The University of Western Australia
School of Allied Health
Health Professions Education

2023
THESIS DECLARATION

I, Millicent Rowena Taylor, certify that:

This thesis has been substantially accomplished during enrolment in this degree.

This thesis is my own work and does not contain any material previously published or written by another person, except where due reference has been made in the text or Authorship Declaration.

This thesis does not contain material which has been submitted for the award of any other degree or diploma in my name, in any university or other tertiary institution.

In the future, no part of this thesis will be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of The University of Western Australia and where applicable, any partner institution responsible for the joint-award of this degree.

This thesis does not violate or infringe any copyright, trademark, patent, or other rights whatsoever of any person.

The research involving human data reported in this thesis was assessed and approved by The University of Western Australia Human Research Ethics Committee. Approval #: ROAP 2022/ET000346. Written participant consent has been received and archived for the research involving patient data reported in this thesis.

Signature: [Signature]

Date: 24 October 2023
ACKNOWLEDGEMENTS

I would like to express my gratitude to Professors Sandra Carr and Omar Kujan for their guidance and mentorship, throughout my study and thesis writing process. Your expertise and support greatly impacted the direction of my research. I am genuinely thankful for your feedback and insightful perspectives, which have contributed immensely to my growth as a researcher.

To my husband and sons, words cannot adequately convey how grateful I am for your support during this academic journey. Your belief in me and encouragement have been pivotal in keeping me motivated through every challenge.

A heartfelt thanks goes out to all the participants who generously dedicated their time and shared their experiences for the study. Your valuable contributions not only advanced our field of study, but also underscored the importance of collaboration in academic research.

Lastly, I want to acknowledge the scholars whose previous work has laid a foundation for my research. The wealth of knowledge they have provided forms a basis upon which my thesis stands.

This research was supported by an Australian Government Research Training Program (RTP) Scholarship.

Thank you,

Sincerely,

Milli
AUTHORSHIP DECLARATION

1. Bibliographic details of publication/Manuscript 1
Taylor M., Carr S., Baynes L., Kujan O. Student and Clinical Supervisor Perceptions of Community-based Dental Educational Experiences: A Scoping Review. Journal of Dental Education. 2024:02

Location in thesis: Chapter 2

Student contribution to work: Primary author, primary researcher, literature search and review, data collection and analysis, writing the original manuscript

Co-author signatures and dates:
Associate Professor Omar Kujan
27/10/2023

Professor Sandra Carr
27th October 2023

Lida Baynes
27 October 2023

2. Bibliographic details of publication/Manuscript 2

Location in thesis: Chapter 3

Student contribution to work: Primary author, primary researcher, literature search and review, data collection and analysis, writing the original manuscript

Co-author signatures and dates:
Associate Professor Omar Kujan
27/10/2023

Professor Sandra Carr
27th October 2023
3. Bibliographic details of publication/manuscript 3

Taylor M., Carr S., Kujan O. Challenges in implementing Community-based Dental Education Programs in Australia: The lived experiences of program coordinators. Manuscript submitted for publication.

Location in thesis: Chapter 4

Student contribution to work: Primary researcher, literature search and review, data collection and analysis, writing the original manuscript

Co-author signatures and dates:

Associate Professor Omar Kujan

27/10/2023

Professor Sandra Carr

27th October 2023

Student signature:
Date: 24 October 2023

I, Professor Sandra Carr certify that the student’s statements regarding their contribution to each of the works listed above are correct.

Coordinating supervisor signature:
Date: 27 October 2023
# Table of Contents

**ABSTRACT** ................................................................................................................................................. 1

**CHAPTER 1: Introduction** .......................................................................................................................... 4
1.1. Overview .................................................................................................................................................. 4
1.2. Background ........................................................................................................................................... 4
1.3. Pedagogy ................................................................................................................................................ 9
1.4. Thesis Structure .................................................................................................................................. 11
1.5. Research Methods and Study Design ................................................................................................. 11
1.6. References ......................................................................................................................................... 14

**CHAPTER 2: Manuscript 1** ....................................................................................................................... 16

Student and Clinical Supervisor Perceptions of Community-based Dental Educational Experiences (CBDE): A Scoping Review

2.1. Preface ................................................................................................................................................. 17
2.2. Abstract ............................................................................................................................................... 18
2.3. Introduction ....................................................................................................................................... 19
2.4. Methods ............................................................................................................................................ 21
2.5. Results ............................................................................................................................................... 26
2.6. Discussion ......................................................................................................................................... 31
2.7. Limitations ....................................................................................................................................... 35
2.8. Conclusion ....................................................................................................................................... 36
2.9. References ....................................................................................................................................... 38
Tables 2 ...................................................................................................................................................... 42
Tables 3 ...................................................................................................................................................... 47
Tables 4 ...................................................................................................................................................... 50

**CHAPTER 3: Manuscript 2** ....................................................................................................................... 51

Insights Into Community-based Dental Education in Australian Dental Schools: A Mixed-Methods Approach

3.1. Preface ............................................................................................................................................... 52
3.2. Abstract ............................................................................................................................................. 53
3.3. Introduction ....................................................................................................................................... 55
3.4. Methods ............................................................................................................................................ 58
3.5. Results ............................................................................................................................................... 61
3.6. Discussion ....................................................................................................................................... 65
3.7. Limitations ....................................................................................................................................... 74
3.8. Conclusion ......................................................................................................................... 75
3.9. References .......................................................................................................................... 77
Table 1 ...................................................................................................................................... 80
Table 2 ...................................................................................................................................... 82
Table 3 ...................................................................................................................................... 85

CHAPTER 4: Manuscript 3 ........................................................................................................... 87
Challenges in implementing Community-based Dental Education Programs in Australia: The lived
experiences of program coordinators
4.1. Preface ................................................................................................................................. 88
4.2. Abstract ............................................................................................................................... 91
4.3. Introduction ......................................................................................................................... 92
4.4. Methods ............................................................................................................................... 94
4.5. Results ................................................................................................................................. 97
4.6. Discussion ............................................................................................................................ 108
4.7. Limitations .......................................................................................................................... 114
4.8. Conclusion .......................................................................................................................... 115
4.9. References .......................................................................................................................... 116

CHAPTER 5: DISCUSSION .......................................................................................................... 119
5.1. Summary of Studies ............................................................................................................ 119
5.2. Ensuring Quality of Qualitative Research .......................................................................... 127
5.3. Comparative Analysis of All Three Studies ........................................................................ 129
5.4. Proposed Framework for CBDE Implementation ............................................................... 134
5.5. Limitations of Thesis .......................................................................................................... 142
5.6. Implications for further research ....................................................................................... 143
5.7. Conclusion .......................................................................................................................... 144
5.8. References .......................................................................................................................... 145

APPENDICES
  Appendix A: Ethics Approval
  Appendix B: Participant Information and Consent Forms
  Appendix C: Chapter 2 Supplemental Information
  Appendix D: Chapter 3 Supplemental Information
  Appendix E: Chapter 4 Supplemental Information
ABSTRACT

Background
A substantial body of evidence has placed increasing emphasis on providing clinical experiences for dental students in community-based clinics to supplement training offered in traditional dental school-based clinics. Community-based dental education (CBDE) is a dental training approach that blends clinical learning with service-oriented experiences. It is a complex system that involves various stakeholders like dental schools, students, faculty members, community clinical supervisors, healthcare organisations, and government agencies. They all collaborate to prepare students for independent practice whilst enhancing oral healthcare in underserved areas. Although the incorporation of CBDE has been endorsed by the Australian Dental Council (ADC), the details of program implementation are left to individual dental schools.

Aims
This thesis had four main objectives in ascertaining how to successfully implement CBDE in Australia:
1. To review student and clinical supervisor perceptions of CBDE globally,
2. To gain insights into current CBDE implementation at Australian Dental Schools and compare to available evidence
3. To assess the challenges faced by dental schools in Australia in implementing CBDE and aspirations for future development
4. To formulate a theoretical framework to guide the implementation of future CBDE programs
**Methods**

A scoping review was conducted to ascertain student and clinical supervisor perspectives, following the structured framework proposed by Arksey and O’Malley and adhering to PRISMA-SCR guidelines for scoping reviews. Applying specified eligibility criteria, a systematic search of four electronic databases (PubMed, Scopus, Embase and Web of Science) was followed by data extraction and data synthesis of full-text articles. Research was conducted between June 2022 and September 2022.

A mixed-methods study utilising a 24-item, self-completion survey, adapted from existing questionnaires, was sent to the CBDE coordinators in the nine eligible dental programs in Australia between mid-January 2023 and mid-April 2023. Quantitative and qualitative data are reported which provide insights into CBDE program implementation in Australia.

An Interpretive Phenomenological study utilising in-depth interviews with a purposeful sample of program coordinators at six of the nine Australian dental schools, was conducted to assess challenges faced by dental schools in implementing CBDE.

**Results**

1. A scoping review of student and clinical supervisor perceptions of CBDE identified five domains: (i) preparation for autonomous practice, (ii) understanding of primary care dentistry, (iii) understanding of health disparities and patient needs, (iv) clinical confidence, clinical diversity, and skill development, and (v) perspectives on quality of teaching and assessment.
2. A mixed-methods study provided insights into the implementation of CBDE in Australian dental schools. Implementation of CBDE appears to be influenced by: level of student involvement, the types of clinics utilised, allocation and length of rotation, demands of student supervision and assessment, pre-rotation preparation and post rotation evaluation.

3. A Qualitative analysis of challenges faced by CBDE coordinators at Australian dental schools revealed four major themes. These themes reflect on various aspects of the educational process in implementing CBDE, including administering programs, funding, the student experience and partner site relationships.

Conclusion

The ideal framework for community-based dental education programs should prioritise establishing effective partnerships with community organisations. It should provide students with hands-on clinical experience in diverse community settings, including underserved areas, to foster cultural competence and a holistic approach to oral healthcare. The curriculum should be designed to address the specific oral health needs of the community and emphasise primary dental care. Continuous evaluation and feedback from both students and community members should be incorporated to ensure the program remains responsive and adaptable to evolving needs.
CHAPTER 1
Introduction

1.1 Overview

Community-based dental education (CBDE) represents an essential component of dental curricula, aimed at equipping dental students for independent practice. It establishes the groundwork for primary care practice and instils a sense of social responsibility toward providing care to underserved communities.

1.2 Background

Community-based dental education (CDBE) programs, using various methodologies, have been developed and implemented in dental schools across the globe as an adjunct to traditional Dental School clinical teaching, since the 1970’s.[1]

The aim of CDBE is to assist in preparing dental students for independent practice through service-learning, a form of experiential learning, whereby students reflect on the experiences gained from clinical opportunities in community dental clinics.[2,3,4,5] Insights from their individual reflections prompt learners to draw meaning from a particular experience and stimulate development of problem-identification and solving abilities, thereby initiating opportunities for personal and professional growth.[2,3,4,5]
The three main goals of CDBE have been identified as: expanding on traditional dental school education, to promote community engagement and to address societal oral health needs.[15] The advantages of CBDE are well documented. The lower student-tutor ratio in community clinics is viewed as a significant advantage with students demonstrating an increase in clinical skills, speed, treatment planning and improved patient management during their placement.[1,6,7] Students have also reported a greater awareness of working as part of a team and acquiring a more holistic view of patient management compared to traditional dental school teaching which is often discipline focused.[8] When comparing senior dental student clinical productivity at CBDE sites to their productivity at dental school clinics, Perez et al., 2010, found that students completed more procedures at community clinics than at dental school clinics.[9] These results were consistent with similar studies by Bean et al., 2007 and Smith et al., 2010.[11,12] However, these studies also demonstrated that procedures performed at placement sites were less complex compared to those performed at dental school clinics.[9,11,12] These differences in profiles of experience may be attributed to the different roles of these settings within dental health service provision.[12] For example, dental schools’ greater emphasis on cast or composite restorations compared to extractions and amalgam restorations performed in outreach clinics, may be related to the specialist role of dental schools compared to the role of community based dental clinics in meeting the primary care needs of patients.[12] Nonetheless, studies have identified the benefits of external placements to students’ appreciation of the wider health service and their increase in competence in everyday dentistry and primary care exodontia routines.[13,14]
The CBDE experience serves as a culmination of learning experiences before students move on to independent practice, as such, overall competence is more emphasised than in traditional discipline-focused teaching.[28,29] When evaluating student competency within an outreach setting, the objective is for the student to be able to integrate knowledge and apply learning to specific patient situations, rather than focus on a specific procedure or discipline approach.[28] This attribute of competency encompasses comprehensive care rather than emphasis on a specific discipline and refutes the need for itemised clinical requirements.[28]

Effects of community-based programs on partner sites have also been studied, although to a lesser extent. Student supervisors are usually general dentists who provide supervision, guidance and support to students at outreach clinics.[17,18,19] Studying partner-site perspectives, preceptors (student supervisors) have reported the following advantages of providing community learning experiences to dental students: opportunities for community dental clinics to mentor and recruit students for future employment; increases in the number of patients treated, raising awareness of the oral health needs in the community, staying current with developments in clinical dentistry and cultivating a diverse workplace environment.[17] However, student supervisors expressed challenges in balancing their own clinical responsibilities with education/training of students, challenges in communicating with the university regarding students’ level of competence and maintaining student interest and motivation in the outreach program.[17,18,19] Furthermore, student supervisors have reported concerns over students’ poor time management, inexperience treating medically compromised patients, managing dental emergencies and students’ lack of experience in
providing dental treatment to patients from varying cultural and socio-economic backgrounds.[17,18]

To improve successful outcomes, several authors have emphasised the importance of an effective infrastructure for CBDE programs, regardless of the CBDE model utilised, as well as student and supervisor preparation for placements.[20,22]

Community-based clinical teaching is generally implemented through two traditional models:

- The ‘dispersed practice’ model; clinical teaching being distributed across several community dental clinics[21]
- The ‘purpose built’ model; these are dental clinics specifically designed and built to facilitate the program.[21]

Regarding preparation for CBDE rotations, dental schools are expected to provide students with at least basic competence in procedures they will perform at these community sites.[1]

Likewise, studies have also recognised the need for community site preparation, particularly a structured induction program, in addition to the provision of an externship operations manual, developed for both students and supervisors as essential prerequisites for a successful rotation.[20] The operations manual should serve as a continual reference and should include information for students and supervisors on the objectives of the program, the placement process, timeline, attendance policy, grading, sharps injury protocols, contact details of site, clinical and professional expectations and operational information about the site.[20,22]
Furthermore, the primary responsibility of community sites is patient care and teaching is often not a role student supervisors have actively sought.[20,22] As such, the educational mind-set in community-based settings is often different from that of dental school-based faculty.[23] However, evidence has shown that it is essential that community-based educators attain the appropriate teaching skills to successfully provide clinical mentoring and supervision.[23,24] McAndrew[23] further emphasises that technical and clinical skills alone are insufficient to be an effective clinical teacher and that it is essential for supervisors to attend educational and calibration sessions. Several studies have concurred with this, recommending faculty site visits to foster cooperation and collegiality, transfer teaching skills and to continuously evaluate community-based clinical education programs.[21,23,25]

In order to successfully implement community-based service learning, positive partnerships between outreach clinics and the university need to be developed and maintained.[20,22] This include the need for a Memorandum of Understanding (MOU) between the dental school and community sites to clarify roles and responsibilities.[20,22] This agreement recognises the roles of the school and the site respectively and provides an opportunity for detailed advanced planning that meets the educational program objectives, as well as contributes to much needed community service.[20]

Formicola et al[1] stress that community-based dental education is not merely an off-site rotation for dental students. Across the globe, community-based dental education is a core part of the dental curriculum with service-learning beneficial to both service providers and students.[15] However, for any service-learning program to be sustainable, it is important for both faculty and community partner sites to continuously pursue the best model for
community-based dental education and to maintain flexibility notwithstanding continuous change.[26,27]

The general consensus is that the absence of formal reflective learning in any CBDE program, limits any attempt to affect student learning and progress.[1,2,3,4,5] This educational endeavour requires sound pedagogical foundations. The positive impact of community-based dental education that includes reflective learning, is well documented with studies showing that students report an increase in self-confidence, empathy and communication skills with an evolving awareness of the social determinants of oral health.[5,10,16].

1.3 Pedagogy

Underpinning CBDE is experiential learning.[31] In its most basic form, experiential learning involves the process of building understanding and significance from real-life encounters. When considering medical and dental education, this concept is typically associated with incorporating experiences into the curriculum to immerse learners in specific roles and contexts.[30,31] This approach is favoured because genuine workplace experiences, where education and actual service delivery occur concurrently, serve as the primary means by which individuals develop the skills to become healthcare professionals.[30,31] Consequently, experiential learning is closely tied to a context that is directly pertinent to learners' future careers, such as placements for dental students in community dental settings.[30,31] CBDE utilises the principles of experiential learning to enhance students' understanding of human diversity and community dynamics.[31] The incorporation of such service-learning
components into dental education programs offers students valuable chances to grasp how culture, lifestyles, and behaviours can significantly impact the occurrence of health issues, diseases, and oral health within a population.[31]

The process of experiential learning involves the student engaging in self-reflection to derive significance and insight from their personal experiences. This approach is marked by a continuous cycle: first, the student undergoes a tangible experience (such as interacting with a patient); next, they reflect on this experience as it unfolds, draw conclusions and generalisations from it, and finally, put these insights and concepts to the test in different contexts.[2,3,4,5,31] It serves to help students develop skills in critical thinking, problem-solving, clinical decision-making and lifelong learning in their profession.[2,3,4,5,30,31]. CBDE, as a form of experiential learning, offers students these valuable clinical experiences within community settings.[31]

As a clinical supervisor for dental students in a community-based dental clinic, the author has had the privilege of observing both the rewarding moments and the challenges in student growth and development. Motivated by a strong desire to improve my organisation's CBDE program, I enrolled in the Master of Health Professions Education. The rationale was to gain a deeper understanding of the essential elements required for successful implementation of CBDE programs and potentially contribute to the existing body of literature aimed at program enhancement.
1.4 Thesis Structure

The thesis comprises a series of papers, each functioning as an independent chapter, progressively contributing to an enhanced comprehension of the elements required for the effective implementation of CBDE programs.

i) The first paper is a scoping review of dental student and clinical supervisor perceptions of their experiences in CBDE

ii) The second paper is a mixed-methods cross-sectional study providing insights into methods of administering CBDE in Australian dental schools

iii) The third paper is a qualitative analysis of interview data, utilising interpretive phenomenology, of challenges faced by dental school CBDE coordinators in administering CBDE programs at the nine dental schools in Australia, as well as gaining insight into their aspirations for CBDE programs over the coming years

The three components of the research, though interconnected, had distinct aims and research approaches. In the final chapter, the narratives of all three papers are brought together to serve the thesis objectives.

1.5 Research Methods and Study Design

Three studies were conducted:

1. Student and Clinical Supervisor Perceptions of Community-based Dental Educational Experiences (CBDE): A Scoping Review
This scoping review was conducted following the structured framework proposed by Arksey and O’Malley and adhering to PRISMA-SCR guidelines for scoping reviews. Applying specified eligibility criteria, a systematic search of four electronic databases (PubMed, Scopus, Embase and Web of Science) was followed by data extraction and data synthesis of full-text articles. Research was conducted between June 2022 and September 2022. Utilising a narrative thematic review, the following five domains are presented: preparation for autonomous practice, understanding of primary care dentistry, understanding of health disparities and patient needs, clinical confidence, clinical diversity, and skill development, and perspectives on quality of teaching and assessment.

The manuscript for this study was submitted for publication in the *Journal of Dental Education*.

2. **Insights Into Community-based Dental Education in Australian Dental Schools: A Mixed-Methods Approach**

This was a mixed-methods study utilising a 24-item, self-completion survey, adapted from existing questionnaires, which was sent to the CBDE coordinators in the nine eligible dental programs in Australia between mid-January 2023 and mid-April 2023. Quantitative and qualitative data are reported. The following data was presented: level of student involvement, the types of clinics utilised, allocation and length of rotations, student supervision and assessment, pre-rotation preparation, post rotation evaluation and challenges faced by institutions.
Community-based Dental Education Programs in Australia: A Qualitative Analysis of Challenges and Aspirations

Semi-structured interviews were conducted between February 2023 and May 2023 on a purposive sampling of CBDE program coordinators at Australian Dental Schools and Interpretative Phenomenological Analysis (IPA) was applied. The four emerging themes reflect on various aspects of the educational process in implementing CBDE including, administering programs, funding, the student experience and partner site relationships.

Ethics was approved by the Human Research Committee of the University of Western Australia on 23 June 2022 (ref: 2022/ET000346). Ethics approval for the above project was granted in accordance with the requirements of the National Statement on Ethical Conduct in Human Research (National Statement) and the policies and procedures of The University of Western Australia. The period of ethics approval for this project was five (5) years from the date of notification. As per conditional approval, annual milestone reports have been submitted.
1.6 References

24. McAndrew M. Community-Based Dental Education and the Importance of Faculty Development. Journal of Dental Education. 2010;74(9):980–5.
CHAPTER 2

Manuscript 1

Student and Clinical Supervisor Perceptions of Community-based Dental Educational Experiences: A Scoping Review

Millicent R Taylor,¹ Sandra E Carr,¹ Lida Baynes,¹ Omar Kujan²

¹Division of Health Professions Education, School of Allied Health, The University of Western Australia, Perth WA, Australia
²UWA Dental School, The University of Western Australia, Nedlands, WA, Australia
2.1 Preface

CBDE places dental students in diverse community settings, enhancing their clinical skills while serving underserved populations. Clinical supervisors play a pivotal role as guiding mentors. This review aims to explore dental students' and clinical supervisors' perceptions of CBDE. In this review we explore CBDE from the perspective of those involved, uncovering experiences, challenges, and triumphs. This review aims to contribute to knowledge and guide the enhancement of CBDE for future programs and contribute to the development of a theoretical framework for best practices in this field.

Initially, the intention was to conduct a systematic review to explore the perceptions and experiences of both students and student clinical supervisors regarding CDBE. However, with more engagement with the subject matter and research methodologies, it became apparent that a scoping review would be a more suitable approach. This scoping review was designed not only to offer insights into the concept, but also to function as an instrument for assessing research methodologies utilised in this field. This change did not have any impact on the Ethics approval for this study.

The protocol was peer-reviewed and registered at the Open Science Framework osf.io/gsm78; Registration DOI: 10.17605/OSF.IO/Z5YVB. Please refer to the Appendix.

This manuscript was published in the the Journal of Dental Education on 14 February 2024


2.2 Abstract

Purpose

This scoping review was conducted to map the breadth of experiences in community-based dental education (CBDE), as reported by students and clinical supervisors.

Methods

This scoping review was conducted following the structured framework proposed by Arksey and O’Malley and adhering to PRISMA-SCR guidelines for scoping reviews. Applying specified eligibility criteria, a systematic search of four electronic databases (PubMed, Scopus, Embase and Web of Science) was followed by data extraction and data synthesis of full-text articles. Research was conducted between June 2022 and September 2022.

Results

Sixteen articles were identified for the final full-text review. Utilising a narrative thematic review, the following five domains emerged: preparation for autonomous practice, understanding of primary care dentistry, understanding of health disparities and patient needs, clinical confidence, clinical diversity, and skill development, and perspectives on quality of teaching and assessment.

Conclusion

Community / outreach dental education effectively supplements traditional dental school-based education from the perspectives of students and community-based clinical supervisors.
2.3 Introduction

The newly qualified dentist is expected to possess the personal traits, cognitive abilities, applied knowledge and skills needed to provide competent person-centred dental care. These include leadership, communication, critical thinking and clinical decision-making skills alongside health promotion, scientific and clinical knowledge.[1] To attain these competencies, dental students must develop their ability to deliver care in real-world clinical settings prior to graduation.[2,3]

Evidence suggests that community-based dental education (CBDE), also referred to as outreach or service learning, provide resources and opportunities for students to become more confident, caring, and effective practitioners.[2,3,4,5,6] CBDE has been shown to enhance students’ awareness of the social, ethical, and cultural aspects of community oral health, when compared to dental students who only receive training in traditional settings.[2,3,4,5,6] This emphasises the need for dental schools to provide students with clinical experiences in community-based or outreach clinics to complement training provided in conventional dental school-based clinics.[2,3,4,5,6]

Through service-learning (a type of experiential learning) during clinical rotations at community outreach clinics, opportunities for both personal and professional growth are sparked by learners' reflective practice which encourages the development of problem-identifying and problem-solving skills.[4,5] In this context, students gain exposure to real clinical problems while treating patients under supervision.[4,5] Consequently, overall competency is emphasised more than in more conventional, discipline-focused instruction.
Therefore, before students engage in independent practice, the CBDE/outreach experience is a capstone of their learning experiences.[2,3]

In outreach clinics, clinical supervisors are typically general dentists who supervise, direct and support students.[6,7,8] Partner-sites have identified the following advantages of giving community learning opportunities to dentistry students: opportunities for community dental clinics to mentor and seek out students for future employment, opportunities to treat more patients, promote community awareness of oral health requirements, keep up with clinical dentistry advancements, and foster a diverse workplace environment.[6,7,8] However, student supervisors acknowledge that it is difficult to manage their clinical obligations with teaching and training students and found it challenging to communicate with the university regarding student competence, as well as keeping students interested and motivated for the duration of the outreach program.[6,7,8]

Furthermore, the primary function of community clinics is patient care, and student supervisors frequently do not actively pursue a teaching position.[7,8,9,10] As a result, the educational mindset in community-based settings differs frequently from that of faculty at dental schools.[7,8,9,10]

Formicola et al.[11] stress that CBDE is more than just an off-site rotation for dental students. CBDE is a key component of dentistry curricula worldwide, and service-learning is advantageous to both service providers and students.[12,13] The optimal model for CBDE must therefore be consistently sought after, and flexibility must be maintained despite ongoing change, for any service-learning program to be sustainable.[11,14]
To date, no study has synthesised the literature to ascertain how dental students and their clinical supervisors perceive CBDE with regards to student development. Without a synthesis of this understanding, developing best practice guidelines, evaluating programs, and guiding student engagement in community-based / outreach education is challenging.

This study, therefore, seeks to summarise the existing literature on the experiences of students and clinical supervisors with regards to community-based / outreach dental education. This scoping review also functioned as a tool for examining how research has been carried out in this field.

2.4 Methods

This scoping review was conducted using the structured framework proposed by Arksey and O'Malley,[15,16,17,21] updated by Pham[16], Peters[17] and Levac[21], and adhering to PRISMA-SCR guidelines.[22]

2.4.1 Protocol and registration

The protocol was peer-reviewed and registered at the Open Science Framework osf.io/gsm78; Registration DOI: 10.17605/OSF.IO/Z5YVB.

2.4.2 Stage 1: Identifying the Research Question[15,16,17,18]

Population, Concept, Context (PCC) statement
The PCC was used to formulate the research questions.[17] For this scoping review dental students and dental clinical supervisors in community-based/outreach settings are the populations of interest. The concept is ‘perceptions of community-based dental education’ and context is ‘dental educational settings outside traditional dental school clinics.’

The following research questions are addressed to generate a ‘breadth of coverage’:

1. How do dental students perceive community-based / outreach education with regards to their development?
2. How do dental student clinical supervisors/preceptors perceive their role in community-based / outreach education with regards to student development?

2.4.3 Stage 2: Identifying relevant studies[15,16,17,18]

Search terms were developed by analysing seed articles for keywords and subject headings and were determined by the primary author with input from the co-authors. A research librarian was consulted on the most appropriate Medical Subject Headings (MeSH) for the search, and a search strategy applicable to all databases. The research was conducted between June 2022 and September 2022.

The following electronic databases were included in the search; PubMed (Medline), Embase, Web of Science and Scopus. Databases were searched using Medical Subject Headings (MeSH) or equivalent, keywords, truncation, adjacency functions, and Boolean operators. Additional research was also carried out in grey literature, including Google Scholar, and a manual search on reference lists of included studies.
2.4.3 Stage 3: Study selection[15,16,17,18]

Although a scoping review is designed to cover a broad spectrum of literature,[17] inclusion and exclusion criteria guided the search and helped filter literature.

The following eligibility criteria for inclusion were applied (See Table 1):

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>English articles, published since 2000, were included in the search</td>
<td>Non-English, non-peer-reviewed, published before 2000</td>
</tr>
<tr>
<td>However, due to the recency of developments in this aspect of dental education, articles were limited to a 10-year recency of publication at full-text analysis,</td>
<td>Articles older than 10 years</td>
</tr>
<tr>
<td>Peer-reviewed sources that covered the research questions</td>
<td>Excluded data were conference abstracts, editorials and commentaries, non-peer reviewed grey literature and education policy and discussion articles</td>
</tr>
<tr>
<td>Full text articles which were available electronically</td>
<td></td>
</tr>
<tr>
<td>Articles relating to the perspectives of dental students and/or clinical supervisors in an outreach setting, and articles describing the method of education CBDE, service-learning for dental students, outreach dental education or rural dental education</td>
<td>Faculty perspectives</td>
</tr>
<tr>
<td>Method of education within traditional Dental School environment</td>
<td></td>
</tr>
</tbody>
</table>

Two thousand four hundred and sixty-eight records (n = 2468) were identified from the initial search of databases (Figure 1). All retrieved citations were transferred to EndNote20, where duplicated references (n = 1612) and records irrelevant to the topic (n = 686) were excluded. One hundred and seventy (n = 170) articles remained. Study selection was carried out in two phases.
In phase one, two authors (MT and LB) independently screened the citation titles and abstracts against the inclusion criteria for the review, using EndNote20 to identify the papers eligible for full text analysis. References of included studies were also scanned.

A third independent reviewer, (OK), verified the results and resolved disagreements about study eligibility. One hundred and fifteen (n = 115) records were excluded during the title and abstract screening. In phase two, full-text articles were independently screened by two authors (SC and OK), while a third author (MT) removed discrepancies.

Based on the inclusion and exclusion criteria, sixteen (n = 16) studies were included for review after full-text screening. (See Figure 1)
Figure 1: PRISMA Flow Diagram for the Scoping Review Process Performed[22]
### 2.4.4 Stage 4: Charting the data [15,16,17,18]

A data collection form using a Microsoft Excel sheet was developed by the primary author and reviewed by the co-authors to confirm study relevance and extract relevant study characteristics. The final concept map included seven categories that were used to capture information from the selected articles and address the aims of the scoping review. The following data were charted: author, year and location, study aim, study design, strengths and limitations of study, findings and conclusions (See Table 2).

### 2.4.5 Stage 5: Collating, summarising and reporting the results [15,16,17,18]

This scoping review considered mixed, qualitative and quantitative studies for data extraction and analysis. While necessary when undertaking a systematic review, quality assessment is not considered a required element of scoping reviews.[19] However, the authors of this scoping review considered citation appraisal a necessary component to assess bias and evaluate the methodological merits of eligible studies. The mixed-methods assessment tool (MMAT)[23,24], updated by Hong et al.[25], allows for concurrent evaluation of qualitative, quantitative and mixed methods studies to determine comparative reliability and validity and was utilised in this scoping review (Supplementary Table 1 and Table 3). Findings were categorised and presented using a narrative thematic review.[26,27] It is a rudimentary evaluation of information extracted from the selected citations. It entails identifying recurrent or noteworthy themes (guided by the research questions) and summarising the results of many studies into thematic headings to explain essential points.[26,27] The purpose of a narrative thematic review or summary is to give an account of the evidence with commentary.
and interpretation.[26,27] It can incorporate both qualitative and quantitative evidence, discussing diverse evidence side by side.[26,27] When analysing data and making inferences, a narrative review takes a textual approach as opposed to a statistical one.[26,27] Analysis and narrative thematic review of the data in this scoping review offered insights into the body of research undertaken around the perceptions of dental students and clinical supervisors regarding student development in outreach settings.

2.5 Results

Sixteen peer reviewed original research publications met the inclusion criteria (Table 2); four applied qualitative research methods,[28,33,35,37] four quantitative,[29,36,40,41] and eight utilised a mixed-methods design.[30,31,32,34,8,38,39,42] Four publications were North American,[28,29,36,8] six from the United Kingdom,[33,35,37,38,39,42] one South American (Brazil),[30] two from India,[40,41] and one each from Australia,[32] Finland[31] and Sweden,[34] respectively. All of the studies used self-reported methods, most frequently surveys. Eleven of the studies had students as participants,[28,29,30,31,33,36,38,39,40,41,42] two had clinical supervisors[35,8] and three studies had both clinical supervisors and students as participants.[32,34,37]

One author (MT) extracted data which was reviewed by SC and OK. Papers were grouped into the respective research questions and themes identified within each group. General areas about students’ and clinical supervisors’ perceptions of outreach dental education experiences were identified.
2.5.1 How do dental students perceive community-based / outreach education in relation to their development?

Table 4 summaries the main findings by themes.

Key finding 1: Preparation for autonomous practice.

A predominant theme of student empowerment and preparation for autonomous practice emerged in all studies, as a result of their external rotations.[30,33,34,35,38,39,42] Students were able to identify experiences at community and outreach placements which enabled their preparation for general dental practice.[30,33,38,42] A general key finding consensus was that outreach placements provided opportunities for students to advance their skills which subsequently improved their self-perceived ability to work unsupervised. Radford et al.[38] emphasised the sense of empowerment students gained from their outreach experience and the increased autonomy they enjoyed as a result. Results from the Radford study[38] identified several concepts supporting students becoming independent practitioners. These include; giving students opportunities to develop their decision-making skills, to be self-reliant and to be given respect and trust.[38]

Key finding 2: Understanding of primary care dentistry.

Student participants reported that their overall growth as dental professionals was promoted through their increased understanding of the role of a dentist in primary care.[31,39] This growth was further supported through engaging in treatment planning assisted by clinical supervisors who are general dentists, as opposed to specialists from within the dental
school.[33,39] In particular, Radford et al.[39] emphasised the importance of this interaction, as patients in the primary care environment are not triaged by a faculty staff member, as in traditional dental schools, so the nature of the student engagement with patients is dependent primarily on the patient’s needs. Students therefore gain experience in working in settings they are more likely to encounter after graduation.[33]

**Key finding 3: Understanding of health disparities and patient needs.**

Two studies[28,40] reported an increase in student awareness of social health care issues, health disparities and a desire to care for underserved communities as a result of outreach rotations. Findings from both these studies suggest that the service-learning experience helped students grow in their ethical understanding of the socio-cultural determinants of oral health and increased their sense of civic responsibility. Furthermore, as a result of their increased understanding of health disparities, outreach education was found to enhance student focus on patient-centred care and motivated students to prioritise optimal care for patients with an increased realisation that oral health care has to be individualised and holistic.[28,33,37,38,40]

**Key finding 4: Clinical confidence, clinical diversity, and skill development.**

Several studies focused on student self-reported development in clinical confidence, clinical skills and competence.[29,30,31,32,34,36,38,40,41] All studies confirmed that students find community-based education to be valuable in terms of clinical exposure and skill development.
The quantitative study by McFarland et al.[36] reported on student perceptions of attaining competencies required of new dentists. Researchers found that the students’ self-reported competence in each of the six ADEA (American Dental Education Association) domains, i.e., Critical Thinking, Professionalism, Communication and Interpersonal Skills, Health Promotion, Practice Management and Informatics, and Patient care improved significantly following their outreach rotation.[36] Students’ self-rating was highest in the domain of Critical Thinking and lowest in Communication and Interpersonal skills. Four studies[29,31,33,42] reported an increased diversity of experiences at outreach clinics. Students valued the opportunity to gain a wide range of clinical experience and practice a variety of clinical procedures within a broader scope of oral diseases.[31,33]

Key finding 5: Perspectives on quality of teaching and assessment.

Six studies reported on student perspectives of the teaching and assessment they received on external rotations.[30,31,34,39,40,42] Responses were varied; one study reported a decrease in motivation over time, as a result of repetitive tasks during their outreach placement.[30] Another study[42] recognised student frustration with inconsistencies in teaching and assessment between the outreach setting and dental school. Specifically, students commented on the differences of opinions between outreach and dental school placements regarding treatment options and clinical decision making.[42] Both studies[30,42] recognised that an integrated course plan, developed in collaboration between faculty members and community clinical supervisors is crucial in minimising these problems and maintaining motivation.
A study by Goswami et al.[31] reported that students experienced their external rotation as a positive learning experience with clear learning objectives and tutorial support. This study also reported that teaching and assessment practices were congruent with the university practices and that external clinical supervisors were briefed about the students prior to their placement.[31] Two studies[34,39] reported that students positively experienced the guided learning they received from outreach clinical supervisors and the availability of tutors to provide feedback. Furthermore, in a study by Radford et al.[39] students reported that they learned to effectively integrate theoretical knowledge with practical experience during their outreach placement. This finding was similar to results from Suresan et al.[40] who reported that academic field visits enhanced students’ ability to integrate didactic teaching with the clinical experience gained in the outreach setting.

2.5.2 How do dental clinical supervisors/preceptors perceive their role in community-based / outreach education in relation to student development?

Five of the sixteen retrieved citations evaluated clinical supervisors’ perceptions of community / outreach education.[32,34,35,8,37]

Disagreement with Key finding 1: Preparation for autonomous practice.

Contrary to student perspectives, clinical supervisors in outreach teaching expressed less confidence in students’ ability to work independently and readiness for general practice.[34] Two studies,[34,35] acknowledged that there is a lack of consensus between general dentists in outreach settings and faculty academics due to the variance of what is deemed acceptable
competency in primary care. Clinical supervisors in primary care settings expressed frustration at the high level of supervision students required and that students needed to attain core skills required in outreach settings prior to their rotation.[8,34,35]

Consistency with Key finding 4: Increased clinical confidence, clinical diversity, and skill development.

Five of the sixteen retrieved citations evaluated clinical supervisors’ perceptions of community / outreach education.[32,34,35,8,37] All five studies[32,34,35,8,37] demonstrate consistency with student perceptions of increased clinical skill and increased clinical confidence.

One study[8] reported on supervisor perceptions of students attaining competencies required of new dentists as specified by the ADEA. Researchers found that the supervisors perceived students to have significantly improved in five ADEA domains, i.e., Critical Thinking, Professionalism, Communication and Interpersonal Skills, Health Promotion and Patient care following their outreach rotation.[8] These results are consistent with a similar study assessing student perceptions of attaining these competencies.[36] Clinical supervisors also reported an improvement in student treatment planning, time management and communication skills, following their extramural placement.[32,34,37]

2.6 Discussion

A 2021 scoping review[43] on methods of preparing dental students for independent practice, identified the development of outreach teaching centres, as “the greatest innovation to have
taken place in dental clinical skills teaching”. In these settings students gain valuable experience in primary care dentistry and day-to-day practice as a general dentist.

There were 5 key findings that emerged from our study, i.e., student preparation for autonomous practice, student understanding of primary care dentistry, student understanding of health disparities and patient needs, increased clinical confidence, clinical diversity, and skill development and student perspectives on quality of teaching and assessment.

Globally, dental regulatory authorities mandate that newly graduated dentists possess the necessary skills and qualities to engage in independent practice without requiring supervision.[1,43,46] A scoping review by McGleenon and Morison[43] further confirms that outreach programs are integral to final-year dental student training and transitioning to general practice.

The findings of our scoping review affirm that a primary objective of CBDE or outreach instruction is to assist in equipping students to function as self-reliant practitioners and that students perceive this objective to be achieved. However, in contrast to student perceptions, clinical supervisors in outreach teaching indicated less trust in students' ability to work autonomously.[34] One of the reasons given is that students are not adequately equipped for the external rotation with the core skills essential for primary care dentistry.[8,34,35]

It should therefore be emphasised, that opportunities for student autonomy and self-reliance can only be accommodated in outreach settings if students have reached competence in the core skills, prior to their external rotation.[38] Studies emphasise that it is the responsibility of the dental school to prepare students and ensure that they are adequately equipped for
their extramural rotations.\cite{12,43} Therefore, preparing dental students for autonomous practice involves a multifaceted approach that combines clinical skills, communication abilities, ethical understanding of practice, and a strong foundation in dental knowledge, formed at the dental school and reinforced on external rotations.\cite{43,45}

Given that general dental practice is predominantly based in primary dental care, whereas patients presenting for care at a dental school are invariably more complex, referred patients, it is not surprising that students express an increased understanding and appreciation for primary dental care when allowed to work in outreach clinics.\cite{33,39,47} Moreover, it is acknowledged that dental schools often prioritise education over patient care, in contrast to primary care dental clinics that place a stronger emphasis on addressing patient needs.\cite{8}

This notion is reinforced by additional research, validating that specifically, the process of formulating treatment plans with general dentists in primary care settings was more closely aligned with the students’ anticipated career in general practice.\cite{52} These results are consistent with several studies,\cite{33,39,43,45,47} which underline that rotations in community based external clinics are integral in providing students insights into the role and responsibilities of a general dental practitioner in primary care.

Accreditation requirements set by the Australian Dental Council (ADC) state that the newly graduate dentist should be able to “provide culturally safe care to diverse groups and populations, recognising barriers to accessing care and responding to the distinct needs of those at increased risk of poor oral health.”\cite{1} The ADC further defines person-centred care as care that is “respectful and responsive to the individual needs and values of the patient”.\cite{1}
These standards necessitate that students develop an awareness of these populations’ needs, enabling them to offer holistic care and be able to address obstacles to accessing care. A scoping review by Furlini et al. on student preparedness to treat underserved populations, confirm that public health community-based clinics provide students with opportunities to serve vulnerable populations and gain insight into public health challenges and the role of dentistry in addressing them.

Results from this scoping review further align with these studies and confirm that outreach placements, from the student perspective, are beneficial in developing a deeper understanding of the challenges faced by underserved communities and may motivate students to address these disparities through their future practice.

Findings from this study suggest that CBDE provide opportunities for students to develop clinical confidence and competencies and is a valuable aid in preparing students for general dental practice. These findings are supported in the literature by several studies, which offer insights into the key advantages of CBDE. These include fostering adaptability and problem-solving, gaining practical experience to refine technical skills, developing communication skills through explaining procedures and treatment options in ways that are easily understood by patients from different backgrounds and with varying levels of health literacy, and increasing student confidence in clinical abilities by successfully diagnosing and treating a diverse range of patients.

Furthermore, congruency between student and clinical supervisor perspectives strengthen perceptions that extramural placements assist in improving student communication skills, critical thinking, health promotion, clinical knowledge and skill.
In this scoping review, student perceptions of the quality of teaching and assessment in community-based dental education are varied and can be attributed to a range of factors. These include variations in educational approaches between the dental school and outreach settings,[42] differing priorities among stakeholders, varying levels of clinical supervisor training and expertise,[31] and the complex nature of assessing practical skills in a real-world context.[47]

It is noteworthy that all articles that positively reported on the quality of teaching in outreach settings, included extensive community partner and dental school collaboration.[31,40] For example, in the Helsinki model of outreach teaching,[31] training, calibration, support and development of clinical supervisors are provided by the dental school to ensure that teaching and assessment of students in outreach settings were in line with the university. This approach is supported by other studies that provide commentary on frameworks for outreach programs.[11,45,47,53] Therefore, for any outreach program to be effective and sustainable, collaboration and communication between faculty members and community / outreach partners is a fundamental requirement in maintaining a high quality of teaching and assessment in outreach settings.

### 2.7 Limitations

Our findings must be viewed in the context of the following limitations. Although an exhaustive search methodology was utilised, it is possible that not all eligible studies were
retrieved. Nonetheless, this review followed an appropriate approach for a scoping review, using a five-stage framework that was verified.[15,16,17,18]

Secondly, several of the included studies acknowledged that their results are not generalisable, i.e. involved a small number of participants, sampling bias, low response rate or used a non-validated data collection tool.[28,29,30,31,32,33,34,36,8,37,38,39,40,41,42]

Thirdly, self-reported data was used in the majority of studies in this review. This methodology has the potential for recall bias, judgement error, memory loss or providing socially desirable answers.[44]

Furthermore, current research is disproportionately weighted toward student perceptions, with only five studies retrieved for this review evaluating clinical supervisor perspectives on community-based dental education.[8,32,34,35,37]

### 2.8 Conclusion

In this scoping review, we highlighted the scarcity of recent research on student and clinical supervisor perspectives on community-based dental education, an ever-evolving field in dental education.

However, dental students and community clinical supervisors share a consistent favourable perception of community-/outreach education but, the competing customs of the dental school and community-based clinics appears to be an area that education providers need to address. Integrating community-based education with the core curriculum of a dental program can be challenging. It requires careful planning to ensure that students receive a cohesive and well-rounded education and is dependent on close collaboration between all stakeholders involved.
This review recommends that community partner agencies be actively involved in identifying problems to be addressed in community-based programs, and that the selection of outreach activities be based on both the needs of the population served as well as the educational needs of the students.

Acknowledgements

The authors of this paper would like to express our gratitude and appreciation to the UWA research librarians for their invaluable assistance. This research was supported by an Australian Government Research Training Program (RTP) Scholarship.

Conflict of interests

The authors declare no conflict of interest.

Data availability statement

Data from this study is provided as an additional supplement (Appendix C)
2.9 References

2. Licari F, Chambers D. Some Paradoxes in Competency-Based Dental Education. Journal of Dental Education. 2008;72(1): 8 – 18


### TABLE 2: Characteristics of the included studies

<table>
<thead>
<tr>
<th>Author, year, location</th>
<th>Aim</th>
<th>Design</th>
<th>Strengths</th>
<th>Findings</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behar-Horenstein et al. 2015[28] USA</td>
<td>To explore how a service-learning experience affected dental students' beliefs about cultural competence, professionalism, career development, desire to practice in a community service setting, and perceptions about access and disparities issues.</td>
<td>Qualitative study using grounded theory methodology</td>
<td>Experienced researchers, applying Creswell’ strategies; i.e triangulation, using rich descriptions to convey findings, clarifying bias, utilising peer reviewers and confirming prolonged engagement and persistent observation.</td>
<td>Enhanced awareness of social health care issues and patient differences; demonstrated and orientation towards social justice and desire to address disparities</td>
<td>Findings support the potential for service-learning to raise awareness in dental students of the role of community issues in dental health care delivery</td>
</tr>
<tr>
<td>Coe JM, et al. 2018[29] USA</td>
<td>To determine the impact of community-based clinical training with paediatric patients on dental students’ self-perceived confidence in treating paediatric patients</td>
<td>Quantitative cross-sectional study administered via electronic survey</td>
<td>Ethics Approval obtained for study; High response rate; Combines both procedures with differing types of patients, such as children at high risk.</td>
<td>Increase in self-perceived clinical confidence; Enhanced education through increased diversity of clinical experiences; Increased confidence in treating more and young children</td>
<td>These findings suggest that community-based clinical experiences can supplement school-based paediatric clinical experience</td>
</tr>
<tr>
<td>Daher et al. 2012[30] Brazil</td>
<td>To assess a group of Brazilian dental students’ views of their experiences in a service-learning program focusing on paediatric dental care and to explore changes in their perceptions over the course of the program</td>
<td>Retrospective mixed-methods study using structured reports</td>
<td>Ethics approval obtained for study; Study evaluated program implementation</td>
<td>Students’ positive impression was mainly associated with performing dental treatment themselves and increased self-reliance and perceiving the commitment of the outreach health team. Decrease in student motivation over time.</td>
<td>An integrated course plan, developed by faculty members and tutors, is crucial for minimising problems and maintaining students’ motivation in outreach settings</td>
</tr>
<tr>
<td>Study (Year, Country)</td>
<td>Methodology</td>
<td>Ethics Approval</td>
<td>Findings</td>
<td>Conclusion</td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
<td>----------------</td>
<td>----------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Goswami S, et al. 2018[31] Finland</td>
<td>To summarise the experiences and explore student perspectives of a health centre-based outreach teaching clinic. Mixed methods study utilising a questionnaire with both numerical values and free-text comments. Ethics approval obtained for study</td>
<td>Majority of students reported that outreach teaching broadened their clinical experience; Students reported that it was a useful educational approach to broaden their understanding of oral diseases. Positive experience with teaching.</td>
<td>Outreach is essential for dental students to gain satisfactory clinical experience and self-perceived confidence in real-life working situations. It is a complementary clinical experience rather than a substitution for university clinical training. Opportunity to get acquainted with primary health care system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnson et al. 2012[32] Australia</td>
<td>To evaluate the effectiveness of a rural clinical placement on students’ self-perceived clinical skills and work location choice post-graduation Mixed-methods study administered through two surveys - pre- and post-rotation and interviews Ethics approval obtained for study; Multiple sources of information provided consistent data, which increases validity and reliability of findings.</td>
<td>Supervisors reported an increase in confidence and ability in clinical skills post placement. The majority (96%) of students reported a self-perceived increased in confidence and clinical skills. Increased communication skills, increase in clinical ability, increase in treatment planning skills.</td>
<td>The rural placement improved the self-perceived clinical skills of the students and enhanced positive attitudes towards working in a rural location.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kuroski et al. 2019[33] UK</td>
<td>To explore how working at dental education centres (DECs), away from the university campus, has influenced the attitudes of dental students towards providing dental care in a primary setting Exploratory, qualitative interview study Ethics Approval obtained for study, Impartiality of interviewer</td>
<td>The main theme identified was ‘real life dentistry’. Students felt they were getting prepared for general practice in this setting.</td>
<td>The findings support those from other studies and may be applicable to other outreach models.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leisnert et al. 2017[34] Sweden</td>
<td>To investigate changes in students’ and clinical mentors’ perceptions of a model for outreach education over a 5-year period, 2006–2010 Mixed methods study utilising a questionnaire with both numerical values and free-text comments. High response rate to questionnaire</td>
<td>Dental students and their clinical mentors reported a favourable perception of this outreach education model over 5 years. The students reported increased professional confidence and self-reliance. Clinical mentors</td>
<td>This model resulted in that students perceived that they became self-reliant, which may facilitate their transition from being a student to becoming a professional. The current model supports exchange and professional development for students, faculty and outreach clinics.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Authors</td>
<td>Year</td>
<td>Country</td>
<td>Study Design</td>
<td>Methodology</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
<td>------</td>
<td>---------</td>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>8.</td>
<td>Lynch et al. 2012[35] UK</td>
<td>To report the experiences, feedback and opinions of trainers following their first-hand experience of the community-based clinical teaching programme at Cardiff.</td>
<td>Qualitative study using a questionnaire</td>
<td>High response rate 83% Data entered anonymously</td>
<td>Respondents felt that: the teaching provided within the community-based clinical teaching programme was appropriate, they were satisfied with the scope and content of the community-based clinical teaching programme, and that they felt students were adequately prepared</td>
</tr>
<tr>
<td>9.</td>
<td>McFarland et al. 2016[36] USA</td>
<td>The aim of this study was to assess the impact of participation in the CBDE program on the self-rated competencies of students.</td>
<td>A retrospective quantitative survey</td>
<td>Retrospective post-test survey – limited Hawthorne effect ADEA competencies were found to have good reliability (Cronbach’s alpha coefficients for internal consistency).</td>
<td>In this study, the students’ self-rated competence in each of the six ADEA domains was found to be significantly improved following participation in the CBDE program</td>
</tr>
<tr>
<td>10.</td>
<td>Nayar et al. 201[48] USA</td>
<td>To examine the perspectives of supervising dentists at rural CBDE sites regarding the University of Nebraska Medical Center program’s effectiveness in improving the competencies of dental students</td>
<td>Mixed methods study utilising a questionnaire with both numerical values and free-text comments.</td>
<td>Anonymous – limits bias</td>
<td>Overall, these preceptors rated the CBDE program as effective (excellent or very good) in improving the students’ competence in five of the six ADEA domains</td>
</tr>
<tr>
<td>11.</td>
<td>Radford et al. 2015[37] UK</td>
<td>To establish what the dental students’ attitudes to the outreach placement are and how these correlates to the</td>
<td>A simple, closed, two-question questionnaire, using Delphi</td>
<td>Used the Delphi consensus method, which follows a wider range of knowledge</td>
<td>Students demonstrated increase focus on patient care, however students main focus was their future</td>
</tr>
</tbody>
</table>
perceptions of the staff who work with them

| consensus procedures | and experience to be involved and that, as an anonymous technique, it prevents group members to conforming with the opinion of others | compared to main focus of trainers on patient care. | placement being a realistic preparation for their future practising career. This is combined with a strong sense of belonging. |

| 12. Radford et al. 2017[38] UK | To undertake a quantitative and qualitative examination into what aspects of the students’ experience in outreach at University of Portsmouth Dental Academy (UPDA) are encouraging their empowerment as autonomous practitioners, ready to graduate as ‘safe beginners’. | A comprehensive questionnaire divided into domains that provided both quantitative and qualitative data | Anonymous survey High response rate Ethics Approval obtained Two themes with seven subthemes were identified from the free text responses. The two themes were ‘self-actualisation: developing self-awareness and self-confidence’ and ‘delivery of care as a dentist’. Students learned pragmatic and holistic approach to patient management. |

| 13. Radford et al. 2016[39] UK | To evaluate the dental students’ response to the residential outreach educational experience at the UPDA | A 49-item questionnaire that provided both qualitative data and quantitative data | High response rate 95% (303 respondents). Data collected from different student groups - four successive cohorts of students in 2010–2014 Students valued highly the quality of the clinical teaching. Through their experience, they felt they understood fully the role of the dentist in care planning in primary care. Guided learning received from outreach clinical supervisors Students were positive about all the aspects of this residential outreach education but particularly valued the immersion in clinical dentistry and the bridging from dental school to their dental foundation training. |

<p>| 14. Suresan et al. 2019[40] India | To evaluate the effectiveness of outreach programs on academic development, personal development, and civic responsibilities of dental students and also to assess the | The quantitative study methodology followed a before and after control informal | Ethics approval obtained Pre-tested questionnaires were used Increase in: academic development; personal development and sense of civic responsibility. The outreach programs developed and enhanced the subject’s academic skills, leadership qualities, self-confidence, communication skills, managerial skills, and responsibilities toward the rural community. |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Authors</th>
<th>Year</th>
<th>Country</th>
<th>Objective</th>
<th>Study Design</th>
<th>Data Collection Method</th>
<th>Findings</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>Verma et al. 2016[41]</td>
<td>India</td>
<td>To assess effectiveness of outreach placements on clinical confidence and communication skills of Indian dental students.</td>
<td>A non-randomised trail, using a self-administered pre-tested, structured questionnaire</td>
<td>Some features of this trial increase its validity: independent outreach locations and incorporation of the then-test and transition judgement to compare the actual shifts in students’ internal scales of confidence level and communication skills of the students.</td>
<td>Global assessment revealed outreach group confidence level was higher in comparison to dental school-based group</td>
<td>The present trial supports the concept of outreach program placements to be incorporated in the existing dental curricula in order to supplement the traditional school based dental education.</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Walley et al. 2014[42]</td>
<td>UK</td>
<td>To evaluate the self-reported confidence in, and clinical exposure to, paediatric dentistry at three UK dental schools compared to outreach experiences</td>
<td>Mixed methods study utilising a questionnaire with both numerical values and free-text comments.</td>
<td>Three dental school comparison High response rate</td>
<td>Higher number of patient experiences in outreach settings Limited teaching in outreach settings and inconsistency with dental school. Increased preparedness for real-life practise in outreach</td>
<td>The need to improve the consistency of teaching between hospital and outreach centres was highlighted.</td>
<td></td>
</tr>
<tr>
<td>Author, year, location</td>
<td>Screening questions</td>
<td>Qualitative</td>
<td>Quantitative non-randomized</td>
<td>Quantitative descriptive</td>
<td>Mixed methods</td>
<td>Comments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------</td>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
<td>--------------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Behar-Horenstein et al. 2015[28] USA</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>Method of data collection clear. Reflective writings based on prompts though.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Coe JM, et al. 2018[29] USA</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>High response rate 72%, Variables are clearly defined, Measurements are justified and appropriate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Daher et al. 2012[30] Brazil</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>Missing data and poor responses, Integration between qualitative and quantitative data not clearly explained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Goswami S, et al. 2018[31] Finland</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>Rationale for integrating qualitative and quantitative data explained, Both research methods are utilised to form a complete picture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Johnson et al. 2012[32] Australia</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>Multiple sources of information provided consistent data, Limitations associated with integration of qualitative and quantitative data is acknowledged</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Kuroski et al. 2019[33] UK</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>The interpretation of results is supported by the interview data, The data collection methods address the research question</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Leisnert et al. 2017[34] Sweden</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>S1 YES S2 YES</td>
<td>Unable to determine if qualitative component of study adheres to criteria of method, Comments agreed with scores given – no inconsistencies between results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Lynch et al. 2012[35] UK</td>
<td>S1 YES</td>
<td>S2 YES</td>
<td>1.1. Yes</td>
<td>1.2. Yes</td>
<td>1.3. Yes</td>
<td>1.4. Yes</td>
<td>1.5. Yes</td>
</tr>
<tr>
<td>10.</td>
<td>Nayar et al. 2014[8] USA</td>
<td>S1 YES</td>
<td>S2 YES</td>
<td>5.1. Yes</td>
<td>5.2. Yes</td>
<td>5.3. Yes</td>
<td>5.4. Yes</td>
<td>5.5. Can’t tell</td>
</tr>
<tr>
<td>11.</td>
<td>Radford et al. 2015[37] UK</td>
<td>S1 YES</td>
<td>S2 YES</td>
<td>1.1. Yes</td>
<td>1.2. Yes</td>
<td>1.3. Yes</td>
<td>1.4. Yes</td>
<td>1.5. Yes</td>
</tr>
<tr>
<td>12.</td>
<td>Radford et al. 2017[38] UK</td>
<td>S1 YES</td>
<td>S2 YES</td>
<td>5.1. Yes</td>
<td>5.2. Yes</td>
<td>5.3. Yes</td>
<td>5.4. Yes</td>
<td>5.5. Yes</td>
</tr>
<tr>
<td>13.</td>
<td>Radford et al. 2016[39] UK</td>
<td>S1 YES</td>
<td>S2 YES</td>
<td>5.1. Yes</td>
<td>5.2. Yes</td>
<td>5.3. Yes</td>
<td>5.4. Yes</td>
<td>5.5. Yes</td>
</tr>
<tr>
<td>14.</td>
<td>Suresan et al. 2019[40] India</td>
<td>S1 YES</td>
<td>S2 YES</td>
<td>3.1. Yes</td>
<td>3.2. Yes</td>
<td>3.3. Yes</td>
<td>3.4. Can’t tell</td>
<td>3.5. Yes</td>
</tr>
<tr>
<td>ID</td>
<td>Authors</td>
<td>Country</td>
<td>S1</td>
<td>S2</td>
<td>3.1</td>
<td>3.2</td>
<td>3.3</td>
<td>3.4</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------</td>
<td>---------</td>
<td>----</td>
<td>----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>15</td>
<td>Verma et al. 2016[41]</td>
<td>India</td>
<td>YES</td>
<td>YES</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Walley et al. 2014[42]</td>
<td>UK</td>
<td>YES</td>
<td>YES</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Emerging theme</td>
<td>Relevant papers</td>
<td>Key findings from papers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------</td>
<td>--------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Preparation for autonomous practice</td>
<td>30,33,34,35,38,39,42</td>
<td>Students’ positive impression was mainly associated with performing dental treatment themselves and increased self-reliance. Students felt that they were getting prepared for independent general dental practice in this setting. Students reported increased self-reliance. Community-based clinical teaching offers an opportunity for the transition of dental students from dental school to independent practice. Students enjoyed the increase of autonomy and felt they were able to develop as autonomous practitioners. Students valued the immersion in clinical dentistry and the bridging from dental school to independent practice. Students expressed an increased preparedness to practice in the ‘real world’.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Understanding of primary care dentistry</td>
<td>31,33,39</td>
<td>Main finding was the opportunity for students get acquainted with the primary health care system. Students felt they were getting an increased understanding and preparation for general dental practice. Students felt that through their experience they understood the role of the dentist in primary care.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Understanding of health disparities and patient needs</td>
<td>28,33,37,38,40</td>
<td>Students reported an enhanced awareness of social health care issues and patient differences; demonstrated a desire to address disparities. Students valued holistic approach to patient management in outreach setting. Students demonstrated an increased focus on individual patient care. Students learned a pragmatic and holistic approach to patient management. Students reported increase in personal development, responsibility towards the rural community and civic responsibility.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Clinical confidence, clinical diversity, and skill development</td>
<td>29,30,31,32,33,34,36,38,40,41,42</td>
<td>Students reported an increase in self-perceived clinical confidence, increased diversity of clinical experiences. Students reported a positive experience in being able to treat patients themselves. Students reported that outreach teaching broadened their clinical experience and understanding of oral diseases. Students reported an increase in confidence and skills and clinical ability. Students reported obtained a wide range of clinical experiences. Students reported an increase in professional confidence. Students reported an improvement in all ADEA competencies. Students reported an increase in self-confidence, communication skills and academic development. Increase in student clinical confidence. Students reported a higher number of patients experiences in outreach settings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Perspectives on quality of teaching and assessment</td>
<td>30,31,34,39,40,42</td>
<td>Students reported a decrease in motivation over time, as a result of repetitive tasks during their outreach placement. Students reported their external rotation as a positive learning experience with clear learning objectives and tutorial support. Students positively experienced the guided learning they received from outreach clinical supervisors. Students reported an enhanced ability to integrate didactive teaching with the clinical experience. Students reported frustration with inconsistencies in teaching and assessment between outreach setting and dental school.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 3

Manuscript 2

Insights Into Community-based Dental Education in Australian Dental Schools: A Mixed-Methods Approach

Millicent R Taylor,¹ Sandra E Carr,¹ Omar Kujan²

¹Division of Health Professions Education, School of Allied Health, The University of Western Australia, Perth WA, Australia
²UWA Dental School, The University of Western Australia, Nedlands, WA, Australia
3.1 Preface

The next stage of the research was to gain insights into the current implementation of CBDE programs in Australia and compare to current evidence. Although the parent dental institution manages program coordination, the instruction and training take place within community environments.[1] This approach primarily aims to offer students firsthand exposure to primary care facilities, which differ from the more complex cases seen in dental schools where patients require secondary care.[1] However, the engagement of external collaborators introduces distinctive complexities within this educational approach.

This study therefore had three main objectives:

- Identify the models used by Australian dental schools for CBDE
- Initial exploration of the challenges faced by dental schools in administering CBDE
- Compare the study's findings with international practices

The study employed a mixed-methods, cross-sectional descriptive design, utilising both quantitative and qualitative data collection methods. A 24-item survey was adapted from existing questionnaires to gather information about the structure of CBDE programs, with closed and open-ended questions. Participants were purposefully selected, targeting coordinators of CBDE and outreach programs at the nine Australian dental schools. The survey was administered between mid-January 2023 and mid-April 2023. Quantitative data were analysed using descriptive statistics, while free-text responses were analysed through content analysis, involving multiple cycles to form categories, code data, and identify themes.

This manuscript was submitted for publication to the *Journal of Dental Education* on 14 February 2024.
3.2 Abstract

Introduction:

This study aimed to identify ways in which Australian dental schools are currently implementing Community-based Dental Education (CBDE) and compare to international evidence. In particular, we sought to identify the various types of external arrangements that are employed by universities and to explore challenges faced by program coordinators in administering CBDE.

Methods:

This mixed-methods study utilised a 24-item, self-completion survey, adapted from existing questionnaires, which was sent to the CBDE coordinators in the nine eligible dental programs in Australia between mid-January 2023 and mid-April 2023. Quantitative and qualitative data are reported.

Results:

Six of the nine invited coordinators responded, resulting in a 66.7% response rate. All participants confirmed that their schools had a community-based teaching program. External sites were private practice (n=1), public dental community clinics (n=6), nursing homes (n=2), hospital clinics (n=2), dental school owned clinics (n=2), public regional clinics (n=6) and volunteer run dental clinics (n=1). The majority (n=5) rotating students to community clinics for 10 weeks or more.

All six respondents reported that participation in external clinics is required for graduation. Six (n=6) institutions reported requiring a post rotation reflection from students and all respondents reported seeking feedback from clinical supervisors at external sites.
Conclusion:

This study provided insights into the implementation of CBDE in Australian dental schools. Implementation of CBDE appears to be influenced by: level of student involvement, the types of clinics utilised, allocation and length of rotation, student supervision and assessment, pre-rotation preparation, post rotation evaluation and challenges faced by institutions.

Keywords:

Community-based dental education, dental students, dental clinical supervision, clinical education, Australia
3.3 Introduction

Community-based dental education (CBDE) is an approach to teaching and learning in dentistry that takes place at a site or location outside the traditional dental education institution.[1] While the parent dental education provider still coordinates the program, the actual teaching and training occur in community settings, such as local public health clinics, rural clinics, or outreach programs.[1] The main reason for this model of teaching is to provide students with real-time experience in primary care centres, as opposed to the more complex needs required by patients presenting for secondary care at dental schools.[1]

CBDE has gained recognition as an essential pedagogical methodology in dental training and plays a crucial role in preparing students for a career in dentistry.[1,2,3,4,5] It entails offering dental students practical, real-world experience in oral healthcare settings beyond the traditional academic environment. This educational approach aims to bridge the gap between theoretical knowledge and practical skills, nurturing well-rounded dental professionals who possess clinical competence, empathy, and a community-focused mindset.[1-7]

CBDE programs are typically collaborations between dental schools, public health services, community clinics, private dental practices, or public hospitals, creating a diverse and comprehensive learning environment.[1,8,9,10] The objective of CBDE is to expose students to a wide range of patient populations, including underserved communities, rural patients, and vulnerable groups. By immersing students in these settings, they actively participate in patient care, diagnosis, treatment planning, and clinical procedures while supervised by
experienced dental practitioners. This hands-on learning approach promotes critical thinking, problem-solving abilities, and clinical self-assurance.[11,12,14,15]

CBDE models vary based on the level of student involvement, length of rotations, the types of services provided, and the community partnership structures.[2,8,9,10] The impact of different community dental education models on student learning can be significant and varied. The specific effects depend on the nature and structure of the models implemented, for example, models that involve students providing dental care in community settings under supervision offer valuable hands-on clinical experience compared to observation-only rotations.[1-15] This exposure enhances students' technical clinical skills, critical thinking abilities, and problem-solving aptitude, ultimately improving their clinical competence.[1-15]

In addition, student assessment in CBDE presents unique challenges due to the dynamic nature of community settings.[9,14] Furthermore, some CBDE models incorporate opportunities for students to reflect on their experiences in community settings. This reflection allows students to analyse their clinical encounters, assess their strengths and weaknesses, and identify areas for improvement, leading to a deeper level of self-directed learning.[16,17]

It is understood that different dental schools in Australia have adopted a range of community-based teaching strategies. Due to the evolving nature of CBDE programs, it is important to provide a national picture and comparison of how Australian dental schools employ CBDE in their curricula.
Therefore, this study aimed to:

1) identify models in which Australian dental schools are currently implementing CBDE for their students. This study sought to determine the types of external placements utilised, the level of student involvement, whether students produced a reflection assignment or completed a survey after the rotation and the nature of the relationship between faculty and the affiliated organisations.

2) to explore the challenges faced by dental schools in administering CBDE and, finally,

3) compare results from this study to current international practices.

3.4 Methods

3.4.1 Study design

The study is designed as a mixed-methods, cross-sectional descriptive study. Utilising both quantitative and qualitative methods to investigate predetermined and emerging approaches that may be uncovered through employing both methods.[45,46]

3.4.2 Data instrument

This study utilised a 24-item, self-completion survey, adapted from questionnaires developed by Mays et al, 2016[9] and Smith and Mays, 2019[40]. The research team reviewed and modified survey questions to suit local conditions (Appendix D). The benefits of using an existing survey instrument are well documented; these include time saving, using an
instrument with proven validity and reliability and the opportunity to draw comparisons between the research results and other studies that utilised the same instrument.[47]

The questionnaire sought information on the program's current structure. The survey questions were designed with a combination of closed and open styles. Closed style questions sought information on types of external clinics utilised, length of rotations, student supervision and assessment, pre rotation preparation, and post rotation feedback and reflection. Respondents were given space to provide textual responses to open questions. Respondents were asked to comment on the challenges faced by their institutions in implementing CBDE and encouraged to leave further comments.

3.4.3 Participants

For this study, purposeful sampling was employed, targeting program directors or coordinators of CBDE and outreach programs at the nine Dental Schools in Australia. Purposeful sampling is specifically utilised to identify and select participants with the most information possible and entails locating and choosing individuals or groups of individuals who have particular expertise in or experience with an interest phenomenon.[48] The study centres around the premise that these CBDE program directors / coordinators hold key responsibility for the outreach program’s implementation, making them valuable sources of focused information regarding the current practices at their respective institutions.
3.4.4 Recruitment

Introductory letters were sent to the heads of all nine Australian dental schools, giving a detailed overview of the research and requesting participation. Participating schools were asked to identify a senior member of faculty responsible for the CBDE program.

3.4.5 Data collection

Secure online platform Research Electronic Data Capture (REDCap) was utilised to conduct the survey between mid-January 2023 and mid-April 2023 through the University of Western Australia.

3.4.6 Ethics approval

This research was approved by the University of Western Australia Human Research Ethics Committee (HREC). Informed consent was sought from all participants with a cover letter sent to all explaining the purpose of the study, the voluntary nature of the survey and an assurance of confidentiality.

3.4.7 Analysis Procedure

The responses on REDCap were exported directly to an Excel spreadsheet accessible to the principal investigator under a protective password. Response options were dichotomous,
multiple choice or a textual response (Table 1). Quantitative data was managed with descriptive statistics using frequencies and percentages to describe survey items (Table 2).

Free text responses were analysed, coded and themes identified. The general workflow for the qualitative content analysis of the open-ended survey questions is illustrated in Figure 1, adapted from Kuckartz, 2019.[49]

Utilising the five phases of qualitative content analysis, the study aims hold a central role.[49] It serves as the guiding perspective for the analysis, which involves thorough reading and analysis of the texts.[49] In qualitative methodologies, it's customary for the different phases of analysis to be conducted in a cyclical manner, with the process of forming categories, coding the data and formulating themes occurring over multiple cycles, as utilised in this study.[49]

**Figure 1:** The five phases of qualitative content analysis (adapted from Kuckartz 2019)[49]
3.5 Results

Of the nine eligible participants invited to participate in this study, six consented resulting in a 66.7% response rate. All (n=6) confirmed that their schools had a community-based teaching program which provides opportunities for students to participate in external clinical rotations.

3.5.1 Types of external clinics

When asked to categorise the type of external clinics affiliated with their school, the respondents stated that the sites were private practice (n=1), public dental community clinics (n=6), nursing homes (n=2), hospital clinics (n=2), dental school owned clinics (n=2), public regional clinics (n=6) and volunteer run dental clinics (n=1) (See Figure 2).

Figure 2: Types of External Clinics
All participants indicated that they employ a combination of two models for community-based externships:

- The “dispersed practice” model, where students are allocated to selected community-based clinics, either in metropolitan or rural areas,[3,10,18,19,20,21] and
- The “purpose built” model, which are bespoke university owned community-based primary care clinics staffed by the faculty.[3,10,18,19,22]

Three dental schools stated that they incorporate external community rotations into their educational programs, spanning various years of study and not only limited to the final year of their curriculum.

According to all respondents, students are assigned to public community clinics in their final year to gain practical experience in performing clinical treatments. Additionally, two dental schools assign final year students to university-owned external clinics for practical experience, while four schools offered these opportunities to selected students at regional clinics. Regarding observation-only rotations, respondents reported that students attend hospital clinics, (50%) private practices,(17%) and nursing homes (33%) , but do not render treatment at these sites (Figure 2).

### 3.5.2 Allocation and length of rotation

Each school reported that their students complete the community-based teaching program in “blocks” in the final year of study which involve a specific number of weeks dedicated to this program. Additionally, two schools reported a combination of block and “linear” teaching i.e. continuous distribution throughout the year in the earlier years of study.
There was little variation in the time devoted to block community rotations, with the majority (n=5) rotating students to community clinics for 10 weeks or more. The number of weeks allocated to block rotations per institution are as follows: 13 weeks, 15 weeks, 17 weeks, 12-14 weeks and 34 weeks. One respondent reported rotating students for the full academic year to external sites.

### 3.5.3 Student supervision and assessment

All reported that participation in external clinics is a critical requirement for graduation. Five schools indicated that students receive clinical recognition for procedures conducted at external locations that counts towards their clinical training requirements. Three reported that their students are supervised and assessed solely by clinicians employed by the external site organisation who are neither trained as assessors nor calibrated for inter-rater reliability. From three institutions, it was noted that faculty members and external site clinicians collaborate in supervising students and evaluating their competence. Additionally, the clinicians at these external sites undergo training and calibration to ensure consistency in student assessments.

### 3.5.4 Pre-rotation preparation

All reported that students are provided with a structured orientation and site manual at external sites where they undertake dental treatment. Five respondents indicated that their institution had an Affiliate agreement/Memorandum of Understanding with the external site
organisation and one respondent was not sure. None of the respondents elaborated on the content of the agreement.

3.5.5 Post rotation evaluation

Five institutions reported performing a post rotation survey to seek students’ perspectives, and all respondents reported seeking feedback from clinical supervisors at external sites.

All institutions reported that students are required to complete a self-reflection of their experiences at external sites.

Four respondents reported conducting site visits to external clinics, 1 -2/year, while three institutions indicated that site visits are not conducted.

3.5.6 Challenges faced in implementing CBDE

Two free text questions were presented to participants. Participants were requested to share their insights regarding:

- challenges faced by their institutions in administering CBDE / outreach teaching programs and to
- add additional comments.

Five of the six participants responded to the open-ended questions. Of the five participants who responded to the open-ended survey questions, only one addressed the request to add additional remarks.
Results of applying the standard inductive thematic analysis to free text survey questions, found that comments provided by participants were related to four emerging themes (Table 3). These are: challenges regarding coordinating external rosters, challenges regarding funding, challenges regarding student supervision at external sites and challenges regarding types of student exposure on external rotations.

3.6 Discussion

Results from this study indicate that most Australian Dental Schools include community-based dental education in their curriculum. The models used for implementation appear guided by the following: level of student involvement, the types of clinics available for participation, allocation and length of rotation, student supervision and assessment, pre-rotation preparation, post rotation evaluation and challenges faced by institutions.

3.6.1 Level of student involvement

In this study, it is evident that students are rotated to external sites throughout their studies. However, it is predominantly in the final year of study that students attend externships where they undertake dental treatment on patients. All sites where students perform dental treatments are within primary care settings.

Current evidence suggests that CBDE models that involve students providing dental care in community settings, under supervision, offer valuable hands-on clinical experience. This exposure has been proven to enhance students’ technical skills, critical thinking abilities, and
problem-solving aptitude, ultimately improving their clinical competence and readiness for independent practice.[10,11,12,14] In addition to clinical skill development, through engaging with underserved populations and witnessing the disparities in oral health access and outcomes, students develop a heightened sense of social responsibility and an understanding of the role of primary care dentistry in public health.[3,5,6] These are all essential attributes required of the newly graduate dentist, as determined by the Australian Dental Council (ADC).[35]

3.6.2 Types of external clinics

While there are currently no studies comparing educational outcomes between dispersed and purpose-built models, Lynch et al.[10,18] speculate that perceived control over issues such as staffing, funding, educational content and program coordination is accountable for opting to use purpose built primary units.[10,18,19] A further motivation for the bespoke units is to provide access to suitable patients in a primary setting directly by the dental school, as opposed to the complex needs of patients referred for specialist care at a teaching hospital.[1,3]

Utilising the dispersed model, conversely, has its own benefits. Firstly, using the community dental clinics already in place is cost effective for the university by reducing the need for new facilities and equipment.[24] This allows the university's resource allocation to be more efficient.[24] Secondly, in comparison to academic clinics, community dentistry clinics often serve a higher volume of patients.[1,3,23] Students therefore have more opportunity to practice their skills, improve their speed and efficiency, and develop clinical
Thirdly, networking opportunities are fostered by participation with existing public community clinics. These networking opportunities may result in research collaborations and employment offers for students. Fourthly, the university's partnership with public dental clinics enhances the university's reputation and fosters goodwill among the faculty and the community at large.

Furthermore, four of the universities indicated that they offer rotations for students in rural locations where they perform treatment. This is encouraging considering the critical skills shortages encountered in rural areas in Australia. Whilst placing students in rural areas for clinical rotations offers several benefits and opportunities, it also presents with unique challenges. Benefits include: exposing students to patient cases that may be less common in urban areas; thus enabling students to develop a broader skill set; increased clinical confidence due to fewer supervising staff in rural clinics and opportunities for students to take on more clinical responsibilities; increased community engagement by becoming integral members of the rural community; developing cultural competence through exposure to diverse populations; opportunities for interdisciplinary professional collaboration as healthcare workers in rural areas often work closely together due to limited resources; and an increase in rural employment after graduation.

However, unique challenges may be associated with rural placements which are not encountered in urban placements. Findings from this study indicate that funding, staffing, and administrative burdens are the main challenges associated with rural placements. These findings are supported by current evidence, which include: limited resources with lack of dental equipment and facilities; fewer appropriately experienced dentists to provide...
supervision and mentorship,[31,33] limited funding for placements,[36] and isolation from usual support networks.[28,29,33]

3.6.3 Allocation and length of rotation

Depending on the curriculum of the dental school, CBDE rotation lengths and allocations are varied in this study. For example, the general trend noted in this study is that urban dental schools with a traditional curriculum offer shorter community-based rotations compared to longer rotations offered by dental schools with a rural based program.

Block allocations and linear allocations are two different approaches in assigning students to external rotations.[3,34] In block allocations, students are assigned to outreach rotations by timeframes, such as weeks or months and all students within a particular block undergo the same clinical experiences simultaneously before rotating to a different experience in the next block.[3,34] In a linear allocation, students are assigned to an external rotation on an ongoing basis, usually offered in the earlier years of study.[3,34] The merits or limitations of either allocation are primarily determined by the length of the rotation and the logistical challenges of coordinating placements.[3,34] A benefit of a linear exposure to community settings is that students are offered an opportunity to develop ongoing relationships with patients and communities.[3,34]

Block rotations can range typically from a few weeks to several months. The length of time is frequently influenced by elements such as curriculum requirements, the rotation’s aims, the
accessibility of community sites, and the general objectives of the CBDE program at the dental school.[1,2,3]

Duration of the rotation can have several impacts on the CBDE program and outcomes. Shorter rotations, typically lasting three to four uninterrupted weeks, provide dental students with the opportunity to become acquainted with community settings and obtain an insight into oral health needs in underserved areas.[2,20] However, such short-term rotations present with several disadvantages on rotations where students perform dental treatment on patients.[9,20,37,38] Several studies indicate that these short CBDE programs, are not long enough to allow significant learning experiences for students and are insufficient in fostering opportunities for reflection.[2,9,37,38] Mascarhenas[8] reported that it takes students two weeks to adjust to a new clinical environment. In addition, short rotations can negatively impact the continuity of patient care and strain relationships with community partners.[9,37,38] Due to the time required for more comprehensive treatment, short rotations limit the type of patient encounters community partners can accommodate and consequently limit student skill development.[2,9,37,38]

These shorter experiences are therefore advised to be integrated into the early stages of dental school education on rotations where students do not undertake dental treatment.[20,37] On short-stay rural rotations, where longer placements may not be logistically possible, dental schools and clinical partners are required to work together to ensure appropriate handovers and seamless transitions of care.[20]

Conversely, longer rotations are more prevalent during the later years of dental school, usually in the final year of study, lasting typically eight weeks or longer.[9,37,38]
Mays et al.[9] recommend a minimum of eight uninterrupted weeks per rotation, whereas Mascarenhas et al.[38] recommend ten-week uninterrupted rotations to allow students the opportunity to perform more involved treatments. This may also be beneficial for the community partner sites as longer student rotations have been proven to increase student clinical productivity.[37,38,39] These extended periods enable students to immerse themselves in clinical practice, establish stronger connections with the community, and provide comprehensive care to patients over an extended timeframe.[2,9,37,38,39] However, the optimal length of rotations may vary based on factors such as educational goals, available resources, community partner resources and needs and the overall structure of the dental program.[2,3,9,34,37,38] Although extended rotations can result in more profound learning opportunities, enhanced competencies, and stronger community connections, they necessitate meticulous preparation to address logistical barriers and maintain a comprehensive dental curriculum.[2,3,9,34,37,38]

**3.6.4 Student supervision and assessment**

This study's qualitative and quantitative findings suggest variations exist between community partner sites and dental schools in the diverse educational methods employed. Student supervisors at community partner sites are usually general dentists who supervise, guide, and support students at outreach clinics.[27] In a study by Smith et al.[27] community student supervisors expressed challenges in balancing expected clinical obligations prescribed by their employer with the training requirements of students. In addition, they may not necessarily have sought a teaching career and experienced difficulty in communicating with
the university regarding student competence and professionalism, as well as keeping students interested and motivated.[26,27,41]

Moreover, community clinics primarily focus on delivering patient care. As a result, the educational approach in community-based environments often differs significantly from that of the faculty.[7,8,9,10]

In addition, community student supervisors are often expected to perform competency assessments on students which is based on observing their overall performance.[26]

Several studies[9,20,25,37,43] emphasise, that if competencies are to be assessed during CBDE rotations, it is imperative that assessors located at the community sites receive proper training and calibration to evaluate those competencies effectively. In addition, it is recommended that community clinical supervisors be provided with training at the dental school to ensure cohesion between the community site's service goals and the university's educational goals.[9,20,25,37,43]

3.6.5 Pre rotation preparation

A Memorandum of Understanding (MOU) or Affiliate agreement between the university and community partners is of significant importance in the context of CBDE and its implementation is emphasised in current literature.[8,24] This agreement should be in place prior to commencing any CBDE program, and cover the responsibilities and obligations of both organisations.[8,24]
It is recommended that the MOU outline institutional governance, roles and responsibilities of program directors, roles and responsibilities of staff and students, legal liabilities, reservation of rights pertaining to placements, insurance, remuneration, terms of agreement, criteria for teaching appointments, third party liability and interests, relevant governing law, signatures of authorised representatives and any unique issues affecting affiliating sites.[8,24]

A second component of pre-rotation preparation is to ensure that students are appropriately equipped for the external placement.[2,8,25,42] Mascharenas[8] underscores the importance for dental schools to ensure that students possess the appropriate skill set for their rotations and receive thorough orientation. In addition, Yoder,[2] emphasises that students be familiarised with the mission and values of the external site and the characteristics of the patient population, prior to their rotation. Students are also expected to follow the policies and protocols of the host service, which may present its own challenges.[3] According to Smith et al.[3] and Mascharenas,[8] these include a lack of familiarity with the host protocols and adjusting to new rules, resource limitations where community settings may have limited materials, equipment and support staff; challenges of integrating theoretical knowledge with the practical real-world experience in community settings, time constraints and adapting to diverse patients.[3,8]

Students should therefore be expected to attend a mandatory orientation which covers the site’s expectations and objectives and an overview of issues common to the populations encountered in community settings.[2,25] Students should be provided with a policy and procedure manual, developed by partner sites.[8] Masharenas[8] and Yoder[2] recommend that the manual should include, at a minimum, program objectives, a site profile with
information on the facility, hours that the site is operational, a description of staff, contact information, types of procedures students will routinely perform, protocols and procedures and various other operational guidelines, student requirements and expectations while on rotation, grading criteria, attendance policy and bloodborne pathogen exposure protocol.[2,8]

Furthermore, at dental schools where final year students must complete a CBDE rotation as a graduation requirement, students should be skilled at the core competencies before their rotation.[8] This includes student maturity and ability to work professionally and independently.[8]

A third component of the pre-rotation preparation is providing appropriate and timely information to partner sites.[8] Mascharenas[8] recommends that external sites be provided with student information a minimum of four weeks before the rotation’s commencement. This time frame gives site coordinators the opportunity to plan for students, including scheduling patients and organise staffing.[8]

Occasionally, student profiles are also provided to the sites. These profiles outline skills, levels of expertise, capacity to work autonomously, and the students' anticipations for the rotation.[8]

3.6.6 Post rotation evaluation

Community partner organisations need to play an active role in pinpointing the issues that the program aims to address. Selecting service-learning activities should be a balanced decision, considering the educational requirements of students as well as the needs of the community.
being served.[2] Gaining feedback from both students and partner sites is therefore a crucial means of obtaining valuable information. This data can contribute to enhancing the CBDE program and offer dental school educators a deeper understanding of the challenges and needs at outreach settings.[2,9] Furthermore, post rotation site visits from faculty members present a chance to clarify aims and targets, strengthen roles, and review teaching and assessment principles.[25]

In addition, reflection is a fundamental aspect of service learning. Within dental education, incorporating reflective learning demonstrates an understanding that CBDE should not solely focus on improving students' clinical skills and knowledge, but also on fostering their personal and professional growth.[2,4,9] Reflections cause students to establish links between community service and academic goals and encourages them to delve into complex social issues and personal values.[2,4]

Strauss et al.[4] reports that students’ reflections after their CBDE rotation should cover aspects such as critical incident reports, a reflective essay, and a portfolio of treatment and experiences.

International evidence confirms, that through the promotion of experiential learning and collaboration with varied communities, this educational approach addresses discrepancies in oral health and cultivates a sense of civic obligation in future dental professionals.

3.7 Limitations

A limitation of this study was locating the most suitable participant at each dental school.
The purpose was to find the respondent who is the most knowledgeable about the CBDE program at each institution. If the survey did not reach the person who is most informed about the program, it could have influenced the respondents' interpretation and the accuracy of their responses. Furthermore, although six out of a potential nine participants responded, the missing number of participants may have created a sampling bias. These limitations are congruent with investigations in similar studies.[9,10,40]

While this research gathered data on various aspects of CBDE programs in Australia, the authors recognise the possibility of certain content not being captured in this survey.

3.8 Conclusion

This mixed-method study provided insights into the implementation of CBDE in Australian dental schools. This seems to be influenced by level of student involvement, the types of clinics available for participation, allocation and length of rotation, student supervision and assessment, pre-rotation preparation, post rotation evaluation and challenges faced by institutions.

Community dental clinics are the most frequently utilised for final year dental student skills refinement, followed by rural based clinics. Most dental schools allow competency assessments at these locations which contribute to graduation, however not all of them offer training and standardisation for the assessors. There are two encouraging trends: first, all participants seek feedback from students and external sites to enhance the program, and second, the duration of rotations is planned to be mutually beneficial for students and the external clinics.
Although it is acknowledged that there is no singular approach to CBDE, the findings identified in this study for effective CBDE implementation aim to serve as a guide for dental schools looking to strengthen their programs and improve student learning outcomes.

A more comprehensive perspective, intended to delve deeper into challenges faced by dental school CBDE coordinators and their aspirations for future development of programs, is presented in a further qualitative study by the same authors.

**Acknowledgement**

The authors wish to acknowledge the study participants who agreed to provide their time and knowledge to participate in this study.

This research was supported by an Australian Government Research Training Program (RTP) Scholarship.
3.9 References

<table>
<thead>
<tr>
<th>Question scope</th>
<th>Question</th>
<th>Response type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of CBDE at institution</td>
<td>1. Does your institution offer opportunities for students to participate in external clinical rotations?</td>
<td>Dichotomous</td>
</tr>
<tr>
<td></td>
<td>2. Please identify the types of clinics where students attend external rotations (tick all that apply).</td>
<td>Multiple choice</td>
</tr>
<tr>
<td></td>
<td>3. Please specify if option “Other” was selected</td>
<td>Textual response</td>
</tr>
<tr>
<td></td>
<td>4. Please identify the sites where students perform clinical procedures themselves, under supervision, during their external rotation (tick all that apply).</td>
<td>Multiple choice</td>
</tr>
<tr>
<td></td>
<td>5. Please specify if option “Other” was selected</td>
<td>Textual response</td>
</tr>
<tr>
<td>Types of external clinics</td>
<td>6. In what year of the students’ dental training do they rotate out to external sites where they perform clinical procedures</td>
<td>Written response</td>
</tr>
<tr>
<td></td>
<td>7. Are students allocated to external clinics in &quot;blocks&quot; or as a linear distribution throughout the year?</td>
<td>Dichotomous</td>
</tr>
<tr>
<td></td>
<td>8. For 'block' rotations, please specify number of weeks per academic year</td>
<td>Textual response</td>
</tr>
<tr>
<td></td>
<td>9. For linear distribution, please specify the approximate number of days per academic year</td>
<td>Textual response</td>
</tr>
<tr>
<td>Allocation and length of rotation</td>
<td>10. Do students receive clinical credit towards graduation for procedures performed at external sites?</td>
<td>Dichotomous</td>
</tr>
<tr>
<td></td>
<td>11. Please specify who is responsible for student supervision at external sites where students perform clinical procedures?</td>
<td>Multiple choice</td>
</tr>
<tr>
<td></td>
<td>12. Additional information to previous question</td>
<td>Textual response</td>
</tr>
<tr>
<td></td>
<td>13. Please specify who is responsible for on-site competency assessments of students at external sites.</td>
<td>Multiple choice</td>
</tr>
<tr>
<td></td>
<td>14. Additional information to previous question</td>
<td>Textual response</td>
</tr>
<tr>
<td></td>
<td>15. Are student supervisors at external sites calibrated?</td>
<td>Dichotomous</td>
</tr>
<tr>
<td>Student supervision and assessment</td>
<td>16. Are students provided with a structured orientation and site manual at these sites?</td>
<td>Dichotomous</td>
</tr>
<tr>
<td></td>
<td>17. Does your institution have a Memorandum Understanding (MoU) or Affiliate agreement with external site organisations?</td>
<td>Dichotomous</td>
</tr>
<tr>
<td>Pre-rotation preparation</td>
<td>18. Does your institution perform a post rotation survey of students' perspectives of their experience at external sites?</td>
<td>Dichotomous</td>
</tr>
<tr>
<td>Post rotation evaluation</td>
<td>19. Do students complete a self-reflection of their experience at external sites?</td>
<td>Dichotomous</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| **20.** Does the Faculty seek input / feedback from student supervisors at external sites?  
**21.** Does the Faculty conduct site visits to external sites where students perform clinical procedures?  
**22.** If 'yes' to previous question, how many times a year? |   | Dichotomous  
Textual response |
| **Challenges faced in implementing CBDE** | **23.** What are the challenges faced by your institution in administering outreach / community-based dental education at external clinics?  
**24.** Are there any other comments you would like to add? |   | Free text responses |
<table>
<thead>
<tr>
<th>Questions</th>
<th>Answer</th>
<th>n</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does your institution offer opportunities for students to participate in external clinical rotations?</td>
<td>Yes, No</td>
<td>n = 6, n = 0</td>
<td>100%</td>
</tr>
<tr>
<td>2. Please identify the types of clinics where students attend external rotations (tick all that apply).</td>
<td>Private Practice, Public dental community clinics, Nursing homes, Hospital clinics, Dental School owned external clinics, Public regional clinics, Other</td>
<td>n = 1, n = 2, n = 3, n = 5, n = 0</td>
<td>17%, 33%, 50%, 33%, 83%</td>
</tr>
<tr>
<td>3. Please specify if option “Other” was selected</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>4. Please identify the sites where students perform clinical procedures themselves, under supervision, during their external rotation (tick all that apply).</td>
<td>Private Practice, Public dental community clinics, Nursing homes, Hospital clinics, Dental School owned external clinics, Public regional clinics, Other</td>
<td>n = 1, n = 6, n = 3, n = 4, n = 0</td>
<td>17%, 100%, 17%, 33%, 66.7%</td>
</tr>
<tr>
<td>5. Please specify if option “Other” was selected</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>6. In what year of the students' dental training do they rotate out to external sites where they perform clinical procedures</td>
<td>4 (final year), 3, 5 (final year), 3 (final year)</td>
<td>n = 4, n = 0, n = 2</td>
<td>66.7%, 33%</td>
</tr>
<tr>
<td>7. Are students allocated to external clinics in &quot;blocks&quot; or as a linear distribution throughout the year?</td>
<td>Blocks, Linear, Both</td>
<td>n = 4, n = 0, n = 2</td>
<td>66.7%, 33%</td>
</tr>
<tr>
<td>8. For 'block' rotations, please specify number of weeks per academic year</td>
<td>15 weeks, 17 weeks, 34 weeks, 13 weeks, 12–14 weeks (final year), Full academic year, 4 days/week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. For linear distribution, please specify the approximate number of days per academic year</td>
<td>Final year (70 days)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
<td>n 1</td>
<td>n 2</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>10. Do students receive clinical credit towards graduation for procedures performed at external sites?</td>
<td>Yes</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Please specify who is responsible for student supervision at external sites where students perform clinical procedures?</td>
<td>Students are supervised by Faculty staff</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Students are supervised by clinicians employed by external site organisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12. Additional information to previous question</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Please specify who is responsible for on-site competency assessments of students at external sites.</td>
<td>Students assessed by Faculty member</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Students assessed by clinicians employed by external site organisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14. Additional information to previous question</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Are student supervisors at external sites calibrated?</td>
<td>Yes</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Are students provided with a structured orientation and site manual at these sites?</td>
<td>Yes</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Does your institution have a Memorandum Understanding (MoU) or Affiliate agreement with external site organisations?</td>
<td>Yes</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not sure</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18. Does your institution perform a post rotation survey of students' perspectives of their experience at external sites?</td>
<td>Yes</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Do students complete a self-reflection of their experience at external sites?</td>
<td>Yes</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Does the Faculty seek input/feedback from student supervisors at external sites?</td>
<td>Yes</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Does the Faculty conduct site visits to external sites where students perform clinical procedures?</td>
<td>Yes</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. If 'yes' to previous question, how many times a year?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 – 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. What are the challenges faced by your institution in administering outreach / community-based dental education at external clinics?</td>
<td>See Table 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Are there any other comments you would like to add?</td>
<td>See Table 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emerging theme</td>
<td>Response</td>
<td>Commentary</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>
| **Theme 1** Challenges regarding coordinating external rosters | “Allocating students to attend rural remote placements, where students have family / medical other reasons to remain local.”  
“As coordinator, the challenge is to ensure placements and students feel supported at all times.”  
“The relatively short period of placement. Would be more beneficial if students get a full year of placements” | This emerging theme suggests that coordinating schedules and ensuring appropriate placements, specifically on short and rural rotations, pose an administrative burden for coordinators. |
| **Theme 2** Challenges regarding funding           | “Primarily the costs associated with outreach placements: costs of travel, accommodation”  
“Funding is the biggest challenge, particularly at university operated rural clinics”  
“There has to be discussion for clinical placements to be adequately funded.”  
“The limited number of seats available for students’ placements” | This emerging theme suggests that coordinators encounter difficulties in securing funding, especially for rural placements |
| **Theme 3** Challenges regarding student supervision at external sites | “Student experience can be impacted by the quality of clinical supervisors in metro clinics operated by external partners”  
“Supervision at these sites is therefore non-standardised, students have differing experiences.” | This emerging theme suggests that differing educational approaches between faculty and partner sites pose a challenge for program coordinators |
“The gap between educational styles in university clinics and outplacement clinics and the absence of support to bridge the gap.”

“Staffing where the School is responsible for providing staff.”

“Finding appropriate clinics with external supervision”

“Getting educators on board university policies such as using Pebblepad for student marking as they are not direct employees of the university”

<table>
<thead>
<tr>
<th>Theme 4</th>
<th>Challenges regarding types of student exposure on external rotations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“Students exposed to mainly relief of pain type of dental treatments”</td>
</tr>
<tr>
<td></td>
<td>“Some variation in the range of clinical services provided – mainly public health system.”</td>
</tr>
<tr>
<td></td>
<td>“It would be good is students can collaborate with GPs and other health professionals during their rural posting”</td>
</tr>
<tr>
<td></td>
<td>This emerging theme suggests that coordinators consider the types of clinical exposure students encounter in a primary care public health setting a challenge.</td>
</tr>
</tbody>
</table>
Chapter 4

Manuscript 3

Challenges in implementing Community-based Dental Education Programs in Australia: The lived experiences of program coordinators

Millicent Taylor\(^1\), Sandra E Carr\(^1\), Omar Kujan\(^2\)
\(^1\)Division of Health Professions Education, School of Allied Health, The University of Western Australia, WA, Australia
\(^2\)UWA Dental School, The University of Western Australia, Nedlands, WA, Australia
4.1. Preface

The objective of the third study within this thesis was to investigate the difficulties encountered by coordinators responsible for CDBE at dental schools in Australia and gain a deeper understanding of their experiences in the implementation and administration of these programs.

Semi-structured interviews were employed to facilitate a well-rounded approach, encompassing both open-ended inquiries and predefined topics. These predefined topics were derived from an analysis of open-text responses in the previous study. These topics were used to formulate the semi-structured interview guide for the current study and functioned as prompts to facilitate a deeper exploration of the participants' viewpoints and experiences.

Interpretive phenomenology, the research approach used in this study, focuses on understanding individuals' lived experiences by uncovering the meaning and significance they attach to these experiences. It examines subjective perspectives and how they are influenced by personal contexts. Researchers in this framework aim to acknowledge their own unconscious ideas and perspectives rather than ignoring them, which is particularly relevant in this study because I am actively involved in CBDE. Methods to manage potential bias is discussed in more detail in the manuscript.

Interpretative Phenomenological Analysis (IPA), this study seeks to gain insight into how individuals derive meaning from their personal and social experiences.[101] Developed within the field of psychology and rooted in phenomenology, IPA places a significant emphasis on
understanding participants' lived experiences and prioritising their personal perceptions over objective accounts.[101] The theoretical foundations of IPA can be traced back to phenomenology, hermeneutics, and idiography. IPA strives to minimise external influences such as pre-existing theories or the researcher's own biases.[101,102]

The defining traits of IPA are its broad and exploratory approach, where researchers pose open-ended questions without preconceived notions.[103, 104] In order to gather data, IPA utilises a small, purposeful, homogenous sample who share similar characteristics, with the in-depth semi-structured interview being the primary method of data collection.[103,104] This method prioritises obtaining rich and detailed first-person accounts, aiming to understand the participants' perceptions.[103,104] The semi-structured interview fosters a dynamic dialogue, emphasising the building of rapport with participants and enabling flexible questioning and exploration of emerging themes that align with their interests and concerns.[103,104]

When designing questions for semi-structured interviews, strategies may involve promoting open and candid participant conversation without excessive guidance.[103,104] This may involve preparing prompts for difficult questions, creating a balance between explicitness while maintaining participant engagement.[103,104] Effective interviewing techniques encompass initiating with broad questions and gradually progressing towards more specific ones - commonly referred to as "funnelling" to facilitate a thorough exploration of participant viewpoints.[103,104] Striking a balance between general and precise inquiries is crucial, as over-reliance on detailed follow-up questions should be avoided.[103,104]
When conducting IPA interviews, ethical considerations play a crucial role, especially in addressing the potential for interviewer bias.[105] As such, it is imperative to record interviews and transcribe them verbatim.[105] The transcriptions are then closely examined through a qualitative analysis that focuses on individual case experiences, followed by a search for patterns across cases.[105] This approach allows for a thorough understanding of the data, taking into account the perspectives of both the participants and the researchers.[105] Ultimately, the goal of IPA analysis is to present evidence of participants' interpretations while acknowledging the researchers' own.[105]

During this writing phase, the themes are transformed into a narrative account.[103, 104, 105] This allows for a detailed exploration of the themes through explanations, examples, and nuanced details.[103, 104, 105] The summary of themes serves as the building blocks for presenting the participants' responses.[103, 104, 105] The narrative should be a well-crafted argument, supported by direct quotes from the transcripts. Importantly, a clear distinction is made between the participants' words and the researcher’s interpretations. As the narrative unfolds, revisiting the transcribed excerpts often leads to insightful commentary, showcasing the dynamic nature of qualitative analysis.[103, 104, 105] In summary, Smith [102] stresses the vital importance for IPA researchers to understand that this qualitative method aims to comprehensively understand, interpret, and enhance the "lived experiences" of participants and therefore urges for the meaningful and respectful reporting of their experiences.

This manuscript was submitted for publication to the *Journal of Dental Education* on 15 February 2024
4.2 Abstract

Background

The benefits of community-based dental education (CBDE) reach far beyond students' educational growth, encompassing advantages for both dental schools and their community partners. Nonetheless, drawbacks associated with administering CBDE programs can have a significant impact on program outcomes. This study aims to explore the challenges faced by dental school CBDE coordinators in implementing and managing their programs.

Methods

This Interpretive Phenomenological study included in-depth interviews with a purposeful sample of program coordinators at six of the nine Australian dental schools.

Results

Four major themes emerged. These themes reflect on various aspects of the educational process in implementing CBDE, including administering programs, funding, the student experience and partner site relationships.

Conclusion

The successful implementation of community-based dental education demands meticulous planning and effective coordination. Dental institutions must establish effective partnerships with local community organisations and agencies, allocate resources for outreach initiatives, and offer appropriate guidance to students. All educators must ensure their teaching approaches align with the everchanging dynamics of dental education and community settings, facilitating student learning through both achievements and obstacles.

Keywords: Community-based dental education, Community service learning, Phenomenology, Coordinator perspectives
Community-based dental education (CBDE) is an approach to dental education that extends beyond conventional classroom instruction and clinical training. It entails placing dental students within primary care community-based / outreach environments, enabling them to improve clinical and hands-on skills while tending to the oral health needs of underserved groups.[1,2,3]

Within traditional dental education, considerable time is typically dedicated to supervised clinical settings within specialised teaching facilities.[1,2,3] Although this method should provide foundational dental knowledge and skills, it may not comprehensively equip students to manage the complexities prevalent in a variety of communities, particularly those lacking adequate healthcare access.[1,2,4] CBDE serves to address this difference by affording students the opportunity to interact with patients from various economic strata, cultural contexts, and oral health conditions enhancing student clinical and critical thinking skills.[5,6,7,8,9]

The advantages of community-based dental education are not limited to the educational gains for students alone, but also extend to the dental school and community partner sites. These initiatives frequently cultivate cooperative relationships between dental schools and community organisations, public health agencies, as well as local governmental bodies.[1,2,10,18,19,20,21] Such partnerships can result in enduring projects aimed at enhancing oral health, persisting well beyond the students' training period.
However, there are a number of potential drawbacks to CBDE reported in the dental education literature. Some of these encompass students receiving instruction in community clinics from practitioners who are not trained or calibrated in clinical supervision and assessment, who may not possess a strong interest in a teaching role, or may not be familiar with the educational goals of the dental school.[10,12,13,18,19] Furthermore, there are the logistical challenges for the university in scheduling rotations, student insurance, in some instances funding for placement in remote locations and issues regarding competency assessments of students on rotations.[10,18,19,20,21]

One of the challenges faced by CBDE coordinators is to ensure that external programs align with the school's educational goals and deliver valuable learning experiences to their students.[5,10] A key advantage of CBDE is its strong focus on experiential learning with students formulating knowledge and meaning from real-life experiences and reflecting on these experiences.[1,2,4,10,11,16,17]

There is some literature identifying the logistical challenges for the university in scheduling rotations, student insurance, supervisor training and in some instances funding for placement in remote locations.[10,18,19,20,21] However, much of this is reported from the student perspective with limited published research exploring the lived experiences of program coordinators of CBDE or reporting on the challenges they face.

This study therefore aims to ascertain the challenges faced by dental school CBDE coordinators in implementing and managing their programs.
4.4 Methods

4.4.1 Study design

Interpretive phenomenology, the qualitative research approach utilised in this study, aims to explore, and understand the lived experiences of individuals.[26,28,29] It seeks to uncover the meaning and significance people attach to their experiences by examining their subjective perspectives and how these are shaped by their contexts.[26,29] In the framework of interpretive phenomenology, researchers endeavour to acknowledge their own unconscious ideas and perspectives, rather than suppressing or disregarding them.[26,29] This methodology proved especially pertinent, given that the principal investigator in this study is actively engaged in CBDE.

4.4.2 Population

A purposeful sampling[25] method was employed, targeting program coordinators of CBDE and outreach programs at the nine Dental Schools in Australia. The research focuses on the concept that the CBDE program coordinators have a crucial role in managing their institution’s CBDE program. This positions them as valuable individuals who can provide specific and detailed insights into the challenges coordinating community based clinical education is experienced at their respective institutions.

Introductory letters were sent to the heads of all nine Australian dental schools, providing a detailed overview of the research and requesting participation. Participating schools were requested to designate a senior faculty member responsible for the CBDE program, to whom
the participant information and consent forms were sent. Proxy participants responded to the principal investigator directly.

4.4.3 Ethics Approval

This study was approved by the University of Western Australia Human Research Ethics Committee (HREC), Reference no: 2022/ET000346. Given the small purposeful sample, ethical approval encompassed a commitment to report results without revealing specific geographic locations, institutions, partner organisations, or programs that might be specific to a particular region or dental school. Participants were provided information explaining the aim of the study and emphasising maintenance of confidentiality. All participants provided written consent prior to interview and the transcripts were de-identified and a code assigned to each participant during the data analysis phase.

4.4.4 Data Collection

Semi-structured interviews were utilised to facilitate a balanced blend of open-ended questions and predetermined themes.[30] These predetermined themes emerged from analysing free text responses in a previous study by the same authors, with the same participants.[51] These themes emerged through a standard inductive process and included: challenges regarding coordinating external rosters, challenges regarding funding, challenges regarding student supervision at external sites and challenges regarding types of student exposure on external rotations. The purpose of the themes was to inform the semi-structured
interview guide for this current study and serve as prompts to delve deeper into participants' perspectives and experiences. (See Supplemental Table 1).

This approach enabled participants to share their narratives freely while ensuring consistency across interviews.[25,30] Interviews were conducted between February 2023 and May 2023 and audio-and video recorded via Microsoft Teams, as well as researcher notes where appropriate.

Interviews were initiated by covering themes in the semi-structured interview guide (See Supplemental Table 1). These themes were further explored through conversational style interviews which permitted flexibility and broader coverage.[25] Interviews were then transcribed verbatim in MS Word for rigorous analysis. Emergent themes and subthemes were considered and explored as they arose in the interviews. Qualitative analysis of these semi-structured interviews is presented in this publication.

4.4.5 Analysis

Each participant was assigned an alphanumeric code. Coded transcripts were imported into NVivo 13, produced by QSR International, which was utilised for interview data analysis.[50]

The coding approach was deductive, closely following the seven-step Interpretative Phenomenological Analysis (IPA) process (Table 1) and guided by the research question and interview guide.[26,28,29] Two authors (MT and SC) served as primary coders in the development of themes and subthemes.
Several iterations of the first six steps were completed before finalising themes, with multiple readings of each transcript, making notes and documenting impressions.

The analysis of interview data involved examining thematic codes within each individual response or interview, as well as comparing themes across to identify overlaps and consolidate themes for more efficient reporting.[26,28] The contributing authors reviewed the thematic analysis at step 7, in order to moderate potential bias and ensure that interpretations were contextual and relevant.[27] Further discussions between all investigators resolved discrepancies and data interpretation. Inevitably, some of the authors’ own experiences will be brought to the data analysis process, but the trustworthiness and reliability of the results is proven by corroborating quotes.

4.5 Results

Of the nine eligible participants invited, six agreed to participate. Although a small sample size, the effectiveness of the research arises from the ability to reach data adequacy, a longstanding criterion for determining an appropriate sample size in qualitative research.[50]
The sample of six of the nine possible participants was deemed adequate to respond to the research question. Interpretative thematic analysis of the interview transcripts yielded four prominent themes and nine subthemes that shed light on participant perspectives and experiences. (Figure 1)

Figure 1: Challenges faced by program coordinators in implementing CBDE programs

Theme and subtheme headings were directly generated from the conversations with the interviewees.
Theme 1: Administering: “…administering and delivering rather than planning and improving”

Coordinators expressed that arranging rosters, coordinating with partner sites regarding scheduling and availability, in addition to handling unforeseen scheduling changes and competing for placements with other dental schools present significant challenges. Coordinators further voiced their frustration with the growing deficit of university personnel, which has resulted in additional administrative responsibilities for them and reduced the amount of dedicated time they can allocate to quality academic activities within CBDE programs.

“As a coordinator, to chase up all the centres, find out whether it’s suitable, what they can commit to, so the rostering is painful” Participant ID9

“So mid rotation we’ve had to move students elsewhere, which is not an easy task to find them placements at short notice.” Participant ID4

“Competing universities, competing for limited places is a challenge” Participant ID5

“Because of the restructures that are happening everywhere, professional staff is becoming reduced so rostering it’s almost entirely 100% on the academic coordinators, spending significant amounts of time, checking in with staff and tutors in all these external sites. You find yourself administering and delivering rather than planning and improving” Participant ID10

Ensuring that students are assigned to appropriate sites is also acknowledged as difficult. A number of participants reported that one of their biggest challenges is rostering students to rural settings due a number of reasons including medical concerns or family separations.
“And the other big problem we have is a lot of students don’t want to go away to the regional areas and I can’t even tell you the number of reasons for that, you know people have families or mental health or religious reasons. It’s just the difficulty of me running it is trying to place the appropriate students in the appropriate areas.” Participant ID7

“Nobody’s selecting those areas. Then usually we’ll have to allocate some students without their permission. We have got to do that.” Participant ID8

“About the rural placements, 18 student groups, 20 placements. So imagine what the roster would look like, especially because some will be, you know, going every three weeks.” Participant ID9

Additional support and a corresponding supporting coordinator at partner organisations were highlighted by one participant about factors that will help with this challenge.

“It would be helpful to have a counter coordinator at the partner sites – someone who could follow up” Participant ID9

**Theme 2: Funding: “there’s just no funding...”**

This theme revolved around the challenge of available funding for CBDE. This is highlighted by most participants as a significant consideration in designing and implementing effective programs. Specifically, coordinators identified establishing and sustaining educational sites within remote communities, which incur additional expenses.

Two subthemes emerged, i) funding for students and ii) funding for staffing
Subtheme 1: Funding for students

Securing financial support for student placements in remote areas is identified as an obstacle, encompassing aspects like student transportation and accommodation. One coordinator noted that there is no dedicated funding earmarked specifically for rural based dental education, with consequent difficulties encountered in securing funds elsewhere and maintaining programs through grants and local partnerships.

“Funding is a challenge. Right now students have to pay for travel and stuff themselves. No extra funding for that. Accommodation and travel is very expensive, so we needed to source external grants for that, but again, that’s not sustainable” Participant ID9

“From the student perspective a rural placement may also be a big financial burden, accommodation, travel, living expenses.” Participant ID5

Subtheme 2: Funding for staffing

Closely linked to the previous subtheme is the difficulty in obtaining funding to support staffing for clinical supervision at remote CBDE sites. Coordinators expressed their frustration with the challenges they face regarding funding for external staff, which includes clinical supervisors and dental assistants for students. This issue arises because external sites have their own financial and staffing limitations that are separate from the university’s resources and are beyond the influence of CBDE coordinators.

“So with the supervision, the main thing that is really comes down to is funding. You know, it’s not that there’s no supervision, it’s just there’s no funding.” Participant ID9
“If students would be provided with a dental assistant at these placements, so actually they had the full
-time as operator and obviously that’s ideal because it just doubles the experience, but financially that’s
difficult because obviously that’s a lot more funding needed from the locations to be able to provide
that.” Participant ID7

Funding for staff to do rural placements is a big challenge. Funding from external partners have its own
constraints” Participant ID5

Unsurprisingly, finding adequate financing to support CBDE initiatives was mentioned in
aspirational comments from most participants:

“There has to be discussions for clinical placements to be adequately funded.” Participant ID5

“Funding for dental assistants at external sites for students” Participant ID7

“Having funding for rural placements” Participant ID9

Theme 3: Managing student experiences “….students have differing experiences”

This theme centred on the student experience at external sites and the challenges
encountered. All participants acknowledged that supervising students effectively in
community-based dental education can be complex due to the unique environment and
logistical factors involved.

From the perspective of CBDE coordinators, the subthemes that emerged in this category are;
i) the challenge to ensure quality student supervision and assessment ii) challenge to ensure
appropriate student exposure, and iii) challenge of managing student behaviour and performance
Subtheme 1: Student Supervision and Assessment “student experience can be impacted by the quality of clinical supervisors”

Due to the limited presence/absence of faculty members at external sites, coordinators report that remote sites may not have a sufficient number of experienced staff available to directly supervise students, leading to concerns about the quality of education students receive.

“Student experience can be impacted by the quality of clinical supervisors in metro clinics operated by external partners” Participant ID5

“And we appreciate them. But yeah, some educators obviously are better than others, more engaged. There is always the occasion where an external educator may say something to a student that might get a bit rogue or not in the curriculum, so that gets tricky because obviously we’re teaching our students, you know, evidence-based dentistry” Participant ID4

Ensuring consistent and standardised educational experiences and adherence to the curriculum across different community sites is reported as challenging by coordinators, especially when each site has its own dynamics and practices.

“Obviously the tutor is the person with the registration licence, and they get to do the decision making, so there’s a natural variation in tutoring styles and also in clinical practice. In terms of assessment there will always be inter observer and even intra observer or assessor variation.” Participant ID10

“Supervision at these sites is therefore non-standardised, students have differing experiences” Participant ID5

“At the end of the day, you know, you have strict markers. You have people that are not as strict, you know, more laid back educators.” Participant ID4
One of the interviewees expressed the need for increased cooperation between the dental faculty and community partner sites to ensure standardised practice.

“... there has to be opportunities for conjoint appointments of academic staff to have greater presence in external clinics and enjoy uniformity and standardisation” Participant ID5

Four interviewees stated that they held calibration sessions and maintained consistent communication with partner sites as part of their efforts to address standardisation and calibration issues.

“So we do provide calibration meetings. We regularly check with the tutors and the students and also the staff in those locations. See how things are going. Just so if there’s anything that we know of and address.” Participant ID10

“During the beginning of the year, so there will be just a small meeting. So just to explain to them what are the expectations from their side and what students are supposed to do all this, but there will be definitely one on one communication with them.” Participant ID8

“We do conduct a clinical educator’s day on campus….so that’s just a way we’re trying to engage our agencies a little bit more and trying to calibrate them” Participant ID4

“We provide discipline specific guidelines and we try and visit placements as often as we can. We have an orientation with the students and we try and explain to the students that there will be variation to some extent. We also have some tutor training evenings but more about the management and staying in touch. So we try and keep it as consistent as we can” Participant ID7

Subtheme 2: Student behaviour and performance- “occasionally we have issues...”
According to emerging subthemes from the semi-structured interviews, challenges can arise with regards to inappropriate student conduct and performance in community settings.

“We occasionally have issues when some of the final years consider themselves to be, you know, everything, and they argue with the very experienced clinician in some placement and say, well you’re doing it incorrectly. So that sometimes we get involved because you know they actually don’t know everything.” Participant ID7

“Occasionally we have issues where the external sites feel the students aren’t performing as well as they should and occasionally they want to send them back.” Participant ID7

Subtheme 3: Student Exposure – “...a lot of extractions, no complex type of work”

Ensuring an appropriate educational experience for students in CBDE settings is identified as challenging, particularly in relation to the diversity and complexity of patient clinical cases encountered in community clinics.

“The dilemma of the dental school is because the dental school is quite sophisticated in its teaching that often the primary care of dental treatment is done in the community clinics whereas the more advanced type dentistry is done within the faculty” Participant ID8

“A lot of these clinics see pretty much emergencies. And so it’s fairly fast paced. You know a lot of extractions, no complex type of work.” Participant ID7

These remarks align with the desire to have a more varied patient base for patients at off-site locations.

“.... to have diversity of patient base and treatment approaches” Participant ID10
Theme 4: Partner site relationships

This theme encompassed discussions around challenges associated with partner sites that impact the effective implementation of CBDE programs. Particularly, recruiting and training of clinical supervisors emerged as prominent themes in the semi-structured interviews conducted for this study. A further subtheme that emerged was the perception that partner-sites are resistant to change.

Subtheme 1: Partner site supervisor recruiting

Several respondents commented on the difficulties they encounter in securing staff to supervise students at external sites, especially with regards to rural rotations. One participant expressed that the lack of control over staff recruitment at all external sites is a particular challenge.

“So the main problem we’re having is just getting educators for our external placements” Participant ID4

“Staffing is a particular challenge, particularly clinical supervisors and especially for rural placements” Participant ID5

“The university has no control over recruitment of clinical supervisors in external clinics” Participant ID5

“We had to shut down a rotation due to the lack of educators” Participant ID4

“Mostly staffing. That’s the challenge” Participant ID4

“The problem is all of them have dental clinics and they’re all sitting empty and there is no supervision, so then we need to try and find supervisors” Participant ID9
Subtheme 2: Partner site supervisor training

The primary difficulty noted concerning this specific subtheme involves the task of getting clinical supervisors at external sites to actively engage in and show willingness to take part in the training provided by the university.

“We do conduct a clinical educator’s day on campus in which we invite all our external educators to come along, but at the end of the day, they’re not our staff, so we can’t make them come” Participant ID4

In alignment with these difficulties, further interview comments suggest that coordinators overseeing CBDE programs desire a more consistent group of external educators to be part of their programs.

“Just having more educators being happy to work regionally” Participant ID9

“I guess it’s just that getting the educators would make it stronger cause there’s agencies that have capacity to take more students, but they just don’t have the educators to facilitate that.” Participant ID4

“Well, one of the things is permanent staffing or stable staffing, you know.” Participant ID10

Subtheme 3: Resistance to Change

Overcoming resistance to change by external sites in CBDE is identified as a significant challenge by some interviewees. Issues identified within this subtheme are: barriers from external sites and resistance to integration of university technology.
“Sometimes external partners can have a million barriers, and there is very little incentive to change and it makes no sense.” Participant ID9

“We can only, you know, politely ask remind, but is tricky, you have to be careful in how you approach things, because we do obviously really need our agencies” Participant ID4

“We’ve had barriers that come up and even though we’ll have a solution for each one of those, there’ll be more barriers that come up and you know, you don’t have the energy or the time to just play that game.” Participant ID9

Results from this study describe the lived experiences of CBDE coordinators at six of the nine dental schools in Australia. Coordinators expressed frustrations over the lack of administrative support and the lack of funding for CBDE initiatives. Furthermore, maintaining consistent academic standards across different sites with varying resources, supervisor capabilities, and patient populations is challenging, particularly in light of perceived resistance to change from partner sites. These challenges could potentially compromise the quality of the CBDE experience for students. This, in turn, might have repercussions on the quality of dental care provided to patients and, ultimately, the effectiveness of CBDE programs in preparing dental graduates for autonomous practice. However, all respondents agreed that CBDE teaching is a vital component of their dental curriculum and were keen to address issues they encounter to ensure continuation of their programs.

4.6 Discussion

This discussion presents the key findings of this study in consideration of existing literature and offers a set of recommendations for change to CBDE placements that may be valuable for other program coordinators.
Administering CBDE programs

One of the key findings of this study is the challenge faced by coordinators in managing schedules and rosters, and the lack of support in implementing CBDE programs. This aligns with the findings of Evans et al.[31], who propose that establishing effective partnerships with community organisations or public health agencies, can provide the necessary resources and support for CBDE initiatives. This support includes providing appropriate sites for student placement that fulfill both the educational objectives of the school and the service mission of the community clinic.[10,31,40]

Recommendation

One of the participants in this study proposed the idea of designating a secondary coordinator at partner sites to aid with program-related administrative duties and alleviate demands on faculty coordinators.

Funding

Every participant acknowledged that securing funding for CBDE, particularly rural placements, posed a notable challenge in the implementation of CBDE. Several expenses associated with rural clinical placements encompass staffing, travel and accommodation for students and staff, as well as administrative support. Results from this study are congruent with other studies investigating the costs of rural dental placement programs.[34]
**Recommendation**

Lalloo et al.[34] suggest that universities initiating rural clinical placements necessitate the backing of local, state, and federal governments to ensure the financial sustainability of these placements, given the substantial costs involved.[34] Although the expense of a dental clinical placement in a distant rural area is substantial, the advantages of such placements for both students and the community hold significant value and insufficient funding can hinder the implementation of these external placements and appropriate care delivery to underserved and rural areas.[34,35]

**Managing student experiences**

CBDE involves students delivering dental care in public health settings which generally operate under different protocols and resources when compared to traditional dental school clinics.[5,10] This contrast may lead to challenges for coordinators in overseeing student experiences, as demonstrated in this study and confirmed by international evidence.[5,10,19,31] Firstly, variations in external site supervisor experience and qualifications, resources, patient populations and clinical scenarios can make it challenging to maintain standardised academic rigor in CBDE programs.[5,10,19,31] Secondly, establishing an appropriate educational experience for students in community settings is identified as challenging in this study, particularly in relation to the diversity of patient clinical cases and treatment. Thirdly, the results of this study underscore that concerns about student professionalism and performance can emerge within CBDE settings. Maintaining a consistent level of professionalism and meeting expected standards for students in community settings
can be problematic, especially when they are exposed to unfamiliar environments and a wide range of patient demographics, as also confirmed in existing literature.[5,10]

**Recommendations**

Dental institutions can address standardisation challenges through several strategies. Firstly, they should collaborate with community sites to formulate clear guidelines and protocols for proper student clinical supervision in community settings.[10,19,31] This includes regular on-site visits by faculty members and maintaining open communication with clinical supervisors at these sites.[10,19,31] Secondly, efforts should be made to standardise assessments across various community locations, especially if external rotations contribute to graduation requirements.[10,19,31] This involves creating uniform assessment tools, training clinical supervisors on assessment techniques, and defining measures for reliability.[10,19,31] Lastly, there is a need for targeted training to enhance the clinical supervision skills of supervisors, recognising that teaching is a discipline in itself and not necessarily an inherent skill.[36]

To efficiently address the challenge of exposing students to a variety of patients, it is crucial to understand that dental education in community settings and traditional dental school teaching are distinct yet complementary aspects of student training and will inevitably offer differing experiences.[1, 2, 4, 10, 13, 19, 45]

CBDE places a strong emphasis on developing primary care skills, aiming to prepare dental students for the real-world challenges they’ll face in community settings upon graduation.[45] In contrast, dental schools often prioritise specialised knowledge and advanced procedures for secondary care.[46] Collectively, primary and secondary care environments offer unique
learning experiences for dental students, each contributing significantly to comprehensive dental education and student professional growth.[45, 46]

To enhance student performance, professionalism, and ensure patient safety, dental students must possess foundational clinical, technical, and communication skills before commencing their rotation at community sites.[5, 48] Mascharenas[37] underscores the importance of dental schools providing students with the necessary skill set for their rotations while also holding students accountable for adherence to the hosting service's policies and protocols.[37] Deficiencies in student preparation have the potential to affect the level of patient care, the learning journey of students, and the overall efficacy of the CBDE program.[5,8,10,47] To address concerns about student performance and professionalism, Strauss et al.[5] suggest that clinical supervisors should report to the school when students display poor judgment, poor professionalism, or limited clinical skills. This reporting process and expected accountabilities should be incorporated into established protocols and guidelines.[5] In fact, Strauss et al. underscore that an essential feature of a successful rotational program, is its capacity to foster effective communication between the school, external sites, and students when assistance is required.[5]

**Partner site relationships**

The findings of this study reveal that recruiting, training, and retaining suitable clinical supervisors for CBDE programs pose substantial challenges at all participating dental schools. Additionally, CBDE coordinators identify a significant challenge in the perceptions that
external sites may be resistant to implementing the necessary changes in their practices to ensure the successful implementation of CBDE.

**Recommendations**

In order to address challenges related to the training, recruitment, and retention of clinical supervisors and to implement informed improvement suggestions, it is crucial to acknowledge the challenges that external site clinical supervisors encounter, as highlighted in recent research. Many community-based clinical supervisors, often general dentists who have no education training, express facing challenges in their roles and balancing clinical work with teaching.[19,36] They also express that the demand for student supervision competes with health service delivery, affecting time and resources available for training.[19,36,37] In a study by Bartle et al.[36], clinical supervisors expressed disappointment in the lack of recognition for their vital role in preparing students for independent practice. This lack of acknowledgment, also observed in studies by Smith et al. [19], Puryer et al.[41], and Radford et al.[42], influenced their long-term commitment to the role.

To enhance the recruitment and retention of clinical supervisors in CBDE programs, dental schools can consider the following recommendations:

- Recognise the importance of primary care outreach in dental training and its integration into the curriculum[43]
- Acknowledge the role CBDE clinical supervisors play in dental education to attract qualified clinicians to these programs[5,44]
• Provide necessary training for clinical supervisors in community settings to maintain job satisfaction and educational excellence[36, 38]

• Create a supportive environment for clinical supervisors, recognising the unique challenges they face[45]

• Encourage sharing of insights and best practices through regular meetings or discussion platforms to foster inclusion, professional growth, and job satisfaction[19, 36, 38]

• Provide competitive compensation and benefits to attract and retain clinical supervisors in CBDE programs[36]

Resistance to change at partner sites in CBDE may be due to various factors, including organisational culture, lack of knowledge about CBDE, and concerns about how changes might impact daily operations and patient care.[1, 4, 10] To effectively address this resistance, it's essential to skilfully convey the objectives and benefits of CBDE to external sites, emphasising how these changes can enhance patient care, increase access to dental services, and promote the professional growth of dental students and the future workforce.[1, 4, 10] Overcoming resistance in CBDE requires strategies like effective communication, cooperation, and addressing logistical and resource challenges.[22]

4.7 Study limitations

Semi-structured interviews offer data depth but also have limitations: limited standardisation, potential subjectivity and potential bias, especially in smaller sample sizes.[30] To mitigate bias, this study employed various techniques, including reflexivity, rapport-building, probing questions, triangulation, debriefing sessions, transparent data analysis, verbatim quotes, and
involving multiple researchers in coding and theme development.[30] However, the sample size, while sufficient for Australian dental schools, may not be globally generalisable.

4.8 Conclusion

In summary, CBDE signifies an essential component in dental training for dental schools in Australia. However, coordinators of CBDE programs face several challenges, as identified in this study. It is important to recognise that CBDE is not merely an off-site rotation and that successful implementation demands meticulous planning and effective coordination. To meet accreditation standards, CBDE must be recognised as an educational activity underpinned by evidence-based pedagogical methods.

Dental institutions must establish effective, mutually collaborative partnerships with local community organisations and agencies, allocate resources for outreach initiatives, and offer appropriate guidance to students. All educators must also adjust and develop their teaching approaches to align with the everchanging dynamics of dental education and community settings, facilitating student learning through both achievements and obstacles.

Acknowledgement

The authors wish to acknowledge the study participants who agreed to provide their time and knowledge to participate in this study.

This research was supported by an Australian Government Research Training Program (RTP) Scholarship.
References


50. NVivo Qualitative Data Analysis Software. Version 13, 2020. QSR International Pty Ltd


Chapter 5

DISCUSSION

5.1 Summary of Studies

Community-based dental education is a model of dental training that integrates clinical education with service-learning. CBDE is complex due to its involvement of multiple stakeholders, demanding thorough coordination and efficient management. The stakeholders in CBDE typically include dental schools, dental students, faculty members, clinical supervisors in local communities, healthcare organisations, and government agencies, all working collaboratively to improve oral health access and outcomes in underserved areas, while preparing dental students for autonomous practice.

To comprehend the necessary components for successful CBDE implementation in Australia, this thesis pursued four primary objectives:

1. To review student and clinical supervisor perceptions of CBDE,
2. To gain insights into current CBDE implementation at Australian Dental Schools and compare to available evidence
3. To assess the challenges faced by dental schools in Australia in implementing CBDE and aspirations for future development
4. To formulate a theoretical framework to guide the implementation of future CBDE programs
Objective 1

First, a scoping review investigating student and clinical supervisor perceptions on the impact of CBDE on student development, identified five key findings (Figure 1): preparation for autonomous practice, understanding of primary care dentistry, understanding of health disparities and patient needs, clinical confidence, clinical diversity, and skill development, and perspectives on quality of teaching and assessment. It also emphasised the pivotal role of outreach programs in final-year dental training in preparing students to function as independent practitioners.

Figure 1: Key findings from Scoping Review (Student and Clinical Supervisor Perspectives)
The scoping review underscored the importance of students attaining core skills before participating in external rotations, highlighting the responsibility of dental schools in this preparation. The review noted that community-based external clinics offer valuable insights into primary dental care, aligning closely with students’ anticipated careers in general practice. The study also emphasised the need for students to develop awareness of diverse patient needs, as required by accreditation standards, and highlighted how outreach placements can deepen students’ understanding of underserved communities and motivate them to address healthcare disparities in their future careers.

Overall, CBDE was found to enhance student clinical competence, student adaptability and communication skills, and student confidence, provided there was effective collaboration between dental schools and community partners to maintain high-quality teaching and assessment standards in outreach settings.

Objective 2

Second, a mixed-methods cross-sectional study, reviewed CBDE implementation in Australian dental schools and compared trends to current evidence. This study highlighted several key aspects of CBDE as administered in Australian dental schools. CBDE appears to be a common component of dental school curricula in Australia, with variations in its implementation guided by factors such as the level of student involvement, the types of clinics used, student involvement, the allocation and length of rotations, student supervision and assessment, pre-rotation preparation, and post-rotation evaluation (Figure 2)
Australian dental schools offer external rotations in various clinic types. Students primarily gain clinical experience in public community clinics during their final year. Two models for community-based externships are used: "dispersed practice" places students in various community clinics, while the "purpose-built" model uses university-owned primary care clinics. Rural rotations have benefits but face funding and staffing challenges.

Community-based teaching programs usually occur in "blocks" during the final year, with rotations lasting 10 weeks or more in most cases with one institution having a full academic year rotation. Some schools integrate community rotations throughout various study years.
Compared to current evidence, longer rotations (8 weeks, uninterrupted, or more) in the final year provide in-depth experiences but require significant planning.

Participation in external clinics is a graduation requirement at all Australian dental schools who participated in the study, and students receive clinical recognition for procedures performed. Supervision and assessment methods vary, with some schools relying solely on external site clinicians and others involving faculty members in collaboration with external clinicians who underwent training and calibration for consistency. Current evidence recommends that student supervision by general dentists at community sites demands proper training, calibration, and collaboration between sites and dental schools.

In this study, students received structured orientation and site manuals at external sites, and some institutions had Affiliate agreements/Memorandums of Understanding (MOU) with external organisations, although the specifics of these agreements were not detailed in this study. In the context of CBDE, current evidence emphasises that establishing an MOU or Affiliate agreement between the university and community partners is highly important. This agreement should be in place before starting any CBDE program and should outline the responsibilities and obligations of both parties. In addition, current evidence confirms student preparation for placements involves being familiar with the host site's mission, policies, and patient population. They must also attend a comprehensive orientation and receive an orientation manual from the partner site. For schools requiring CBDE rotations for graduation, students should demonstrate core competencies and professionalism.
Post-rotation evaluations included surveys to gather student perspectives and feedback from clinical supervisors. Students were also required to complete self-reflections on their experiences. Site visits to external clinics were conducted by some institutions. Current evidence recommends that feedback from students and partner sites is critical for improving CBDE programs and addressing community needs. Reflections by students encourage personal and professional growth and is an essential component of experiential learning. In addition, site visits are essential components of external rotation evaluation, enabling faculty members to clarify goals, strengthen roles, and review teaching and assessment principles with community partners.

There are two encouraging trends from this study: firstly, all participants actively seek input from students and external sources to improve the program, and secondly, they are planning the duration of rotations in a way that benefits both students and the external clinics.

**Objective 3**

Third, a qualitative analysis assessing the challenges faced by program coordinators in Australia in implementing CBDE identified four key themes (Figure 3): administration, funding, student experiences, and partner site relationships and provides recommendations for improvement.
**Figure 3:** Challenges encountered by CBDE coordinators in implementing CBDE

**Administering CBDE Programs:**

Coordinators face challenges in scheduling and a lack of support in implementing CBDE. The recommendation includes appointing secondary coordinators at partner sites to assist with administrative duties.

**Funding:**

Securing funding for CBDE, especially in rural areas, is a significant challenge due to various associated expenses. The recommendation suggests seeking financial support from local, state, and federal governments to ensure financial sustainability.
Managing Student Experiences:
CBDE involves students delivering dental care in public health settings, which operate differently from traditional dental school clinics. Challenges include variations in student supervision, less diversity in patient cases, and challenges regarding student professionalism and performance. Recommendations involve collaboration with community sites to establish clear guidelines, reporting and communication structures, standardised assessments, and training for clinical supervisors.

Partner Site Relationships:
Recruiting and retaining clinical supervisors is a challenge. Recommendations include recognising the importance of primary care outreach, acknowledging the role of clinical supervisors, providing necessary training, creating a supportive environment, facilitate knowledge-sharing, and offering competitive compensation.

Overcoming Resistance to Change: Partner sites may resist change due to factors like organisational culture and a lack of knowledge about CBDE. To address this, effective communication, cooperation, and addressing logistical and resource challenges are essential.

In summary, this study highlights the challenges faced by coordinators in CBDE programs and provides recommendations to enhance the program's administration, funding, student experiences, and relationships with partner sites.
5.2 Ensuring Quality of the Qualitative Research in this thesis

Qualitative researchers often discuss the concept of trustworthiness, which essentially asks whether the research findings can be trusted.[1]

Various definitions and standards for trustworthiness exist, with credibility, transferability, dependability, and confirmability considered fundamental to qualitative research.[1] Furthermore, reflexivity plays a crucial role in ensuring transparency and the overall quality of qualitative research, with the process of writing a qualitative research article reflecting the iterative nature of the research, where data analysis often continues concurrently with the writing process.[1]

Strategies utilised in this study to ensure credibility were prolonged engagement, persistent observation and triangulation.[1]

Utilising semi-structured interviews, participants were prompted to substantiate their statements with examples, while the interviewer posed additional questions for clarification. The researchers examined the data derived from the unprocessed interview material until theories surfaced.

Investigator triangulation was implemented by involving more than one researcher in data analysis and interpretation.[1] Subsequently, they engaged in discussions to reconcile any disparities and determine the most fitting interpretation that accurately represented the data's meaning. The researchers conducted regular meetings throughout the analysis process.
Additionally, routine analytical sessions were conducted with the entire research team. Data triangulation was ensured by utilising various datasets that emerged during the analysis, including raw material, codes and themes.[1]

Dependability and confirmability incorporates the element of consistency and neutrality.[1] It is essential to verify whether the analysis process aligns with the recognised standards for a specific design.[1] Employing the ‘Seven steps in the interpretive phenomenological analysis’[2,3] in this study, multiple iterations of the initial six steps were undertaken before finalising themes, involving repeated readings of each transcript, note-taking, and documenting impressions. The analysis of interview data included the examination of thematic codes within each individual response or interview, along with the comparison of themes to identify overlaps and consolidate them for more streamlined reporting.[2,3] During step 7, contributing authors reviewed the thematic analysis to mitigate potential bias and ensure contextual and relevant interpretations.[3] Discrepancies and data interpretation were resolved through further discussions among all investigators. While some of the authors inevitably brought their own experiences to the data analysis process, the trustworthiness and reliability of the results were substantiated by corroborating quotes from participants.

To ensure transferability, the researchers presented a comprehensive description of the research, encompassing details about the context, setting, sample, sample size and sample strategy. The researchers also provided information about the interview procedure, topics, semi-structured interview questions resulting from the iterative research process and included excerpts from the interviews.
As a qualitative researcher, it is crucial to recognise the significance of being self-aware and reflexive regarding your involvement in collecting, analysing, and interpreting data, as well as acknowledging the preconceived assumptions you bring to your research.[1] Consequently, all interviews, observations, and all analytical data in this study was complemented with reflexive notes.

5.3 Comparative analysis of all three studies

The subsequent section offers a comparative analysis and juxtaposition of the three studies in this thesis, focusing on their methodology, findings, limitations and implications. These studies offer significant perspectives on the administration, impact, and challenges associated with CBDE programs in Australia.

Methodology

Study 1 (Scoping Review): This study utilised a scoping review methodology to explore existing literature on student and clinical supervisor perceptions of CBDE. Scoping reviews are well-suited for synthesising diverse evidence and identifying key themes across a broad range of sources. By casting a wide net, this study captures various insights regarding the impact of CBDE on student development from the perspectives of students and clinical supervisors.

Study 2 (Mixed-Methods Cross-Sectional Study): Employing a mixed-methods approach, this study combined quantitative analysis with qualitative methods to examine CBDE
implementation in Australian dental schools. Quantitative data provided a snapshot of current practices and trends, while qualitative data allowed for a deeper exploration of challenges and aspirations from the perspective of CBDE program coordinators. This approach enabled a more comprehensive understanding of CBDE across different institutions and contexts. Due to the small sample size, this study does have limited generalisability beyond Australian dental schools.

Study 3 (Qualitative Analysis): This study adopted a qualitative analysis approach to delve deeper into the challenges faced by program coordinators in implementing CBDE. By conducting in-depth interviews, this study aimed to capture nuanced experiences and perceptions of program coordinators involved in CBDE administration. Qualitative methods are well-suited for exploring complex phenomena, such as this study, and generating rich, contextualised data.

Findings

Study 1: Identified several key areas of student development enhanced by CBDE, including clinical competence, adaptability, communication skills, and clinical confidence. The study underscored the importance of effective collaboration between dental schools and community partners in maintaining high-quality teaching and assessment standards. Additionally, it highlighted the role of outreach programs in preparing students for independent practice and addressing healthcare disparities.
Study 2: This study revealed variations in CBDE implementation across Australian dental schools, including differences in program structure, supervision, and student assessment. Key challenges such as funding constraints, supervision issues, and the importance of structured orientation and agreements with community partners were identified. The findings emphasised the need for standardised practices and increased support for CBDE programs.

Study 3: This study explored the challenges encountered by program coordinators in administering CBDE, including administrative hurdles, funding constraints, managing student experiences, and partner site relationships. The study provided practical recommendations to address these challenges, such as appointing secondary coordinators at partner sites, securing financial support from government sources, and improving communication and collaboration with external partners.

Limitations

A critical and comparative analysis of the limitations in the three studies reveals several common themes as well as unique challenges inherent in each study.

In Study 1, limitations revolve around the scoping review methodology and the nature of the included studies. The possibility of missing eligible studies despite an exhaustive search methodology introduces a risk of incomplete evidence synthesis, potentially limiting the comprehensiveness of the findings. Additionally, the reliance on self-reported data in many of the included studies raises concerns about recall bias and social desirability bias, which
could impact the reliability of the synthesised evidence. Furthermore, the disproportionate focus on student perceptions highlights a potential gap in the literature regarding clinical supervisor perspectives on CBDE, suggesting a limited understanding of the full spectrum of stakeholder experiences in CBDE programs. However, the authors acknowledge these limitations and emphasise the need for further research to build upon their findings, positioning this study as a foundational contribution to the field.

Study 2 faces challenges related to survey methodology and participant selection. The difficulty in identifying the most knowledgeable participant at each dental school regarding the CBDE program poses a risk to the accuracy and interpretation of the survey responses. This limitation is compounded by a small number of participants, potentially introducing sampling bias and compromising the generalisability of the study's findings. Despite these limitations, the study provides valuable insights into various aspects of CBDE programs in Australia, although the authors acknowledge the possibility of certain content not being captured in the survey.

In Study 3, the limitations are primarily associated with the IPA methodology, utilising semi-structured interviews and the sample size. While semi-structured interviews offer depth of data, they also entail limitations such as potential subjectivity and bias, particularly in smaller sample sizes. To mitigate these limitations, the study employs various techniques, including reflexivity and triangulation. However, the sample size, although deemed sufficient for Australian dental schools, may not be globally generalisable, indicating a potential limitation in the external validity of the study's findings.
Overall, while each study contributes valuable insights into CBDE programs, they also exhibit limitations that warrant consideration in interpreting their findings and implications for future research.

Comparative summary

Study 1 provided a broad overview of student and supervisor perceptions of CBDE, laying the groundwork for understanding its impact on student development.

Study 2 offered a detailed examination of CBDE implementation across multiple institutions in Australia, shedding light on variations, trends, and challenges within the Australian context.

Study 3 focused on the challenges of implementing CBDE, offering practical recommendations for program improvement based on the perspectives of program coordinators.

By comparing these studies, we gain a comprehensive understanding of CBDE’s implementation, impact, and challenges. While each study approaches the topic from a different angle, they collectively provide valuable insights for improving CBDE programs and advancing dental education practices. These three studies collectively contribute to our understanding of CBDE implementation and its impact on student development in Australia and enables the formulation of a proposed framework for CBDE implementation.
5.4 **Objective 4: Proposed Framework for CBDE implementation**

After thoroughly reviewing the findings of the three studies within this thesis, in combination with international evidence, a framework for establishing and maintaining CBDE initiatives is presented. It incorporates crucial elements identified in the three studies as necessary for successful CBDE implementation. These essential elements underpinning the framework, comprise the following (Figure 4):

**Figure 4: Elements for CBDE implementation**
The proposed CBDE framework aims to provide a structured approach to organising CBDE programs, focusing on planning, implementation, and evaluation. This framework revolves around three key stakeholders: the university, partner sites, and students.

The framework is anticipated to enhance the quality of training experiences in community-based settings for everyone involved, influencing policies, procedures, guidelines and conduct.

A summary of the proposed framework is depicted in Figure 5, followed by an in-depth discussion.

**Figure 5: Summary of proposed framework for CBDE Implementation**
5.2.1 The University

Implementing community-based dental education at universities requires careful planning, organisation, and collaboration with various stakeholders.

**Program development and management**

Firstly, the benefits of CBDE are grounded in evidence-based pedagogy. This requires dedicated program leadership and administrative staff responsible for program development and oversight. A strategic plan is advised to incorporate community-based experiences into the dental curriculum which should outline program objectives, protocols, and guidelines, ensuring that they are in accordance with accreditation standards and educational goals. The program ought to define clear learning objectives and criteria for assessment, aiming to achieve a balance between the educational needs of students and the needs of the community being served. Therefore, it is advisable for universities to work together with community partners to jointly formulate program goals, objectives, and a curriculum that aligns with the university's educational mission and meets the needs of community partners.

**Community partnership**

Universities are advised to cultivate strong, mutually beneficial partnerships with local community organisations, clinics, and healthcare providers. It is essential to develop memoranda of understanding (MOUs) or formal agreements outlining roles, responsibilities, and expectations (Table 1).
Table 1: Recommended roles and responsibilities

<table>
<thead>
<tr>
<th>Roles and responsibilities of Dental School</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ensure appropriate incorporation of CBDE into curriculum, including type and length of rotations</td>
</tr>
<tr>
<td>• Ensure student preparation prior to rotation</td>
</tr>
<tr>
<td>• Arrange rostering of students</td>
</tr>
<tr>
<td>• Provide liability insurance for students off campus</td>
</tr>
<tr>
<td>• Calibration and training of partner site clinical supervisors</td>
</tr>
<tr>
<td>• Making library facilities available to partner site clinical supervisors</td>
</tr>
<tr>
<td>• Provide support to clinical supervisors at partner sites, such as knowledge sharing</td>
</tr>
<tr>
<td>• Facilitate a feedback mechanism for continued program improvement</td>
</tr>
<tr>
<td>• Be responsive to changes and evolving nature of CBDE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roles and responsibilities of Partner sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide facilities for clinical training of students</td>
</tr>
<tr>
<td>• Provide consistent student supervision by appropriately qualified and experienced supervisors</td>
</tr>
<tr>
<td>• Provide site orientation and manual to be used for entire rotation</td>
</tr>
<tr>
<td>• Provide liability insurance for clinical supervisors</td>
</tr>
<tr>
<td>• Clinical supervisors to participate in training and calibration offered by dental schools</td>
</tr>
<tr>
<td>• Provide students with access to patients</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Collaborative responsibilities (Dental School and Partner sites)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Protocols and guidelines to be developed collaboratively, congruent with ADC accreditation standards, as well as partner site service goals</td>
</tr>
<tr>
<td>• Establish lines of clear communication regarding student placements, student progress, withdrawing students for unprofessionalism, student absences</td>
</tr>
<tr>
<td>• Grading of student performance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student roles and responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ethical and professional conduct</td>
</tr>
<tr>
<td>• Follow partner site protocols and guidelines</td>
</tr>
<tr>
<td>• Participate in educational activities</td>
</tr>
<tr>
<td>• Provide patient care and work cooperatively with community clinical supervisors</td>
</tr>
<tr>
<td>• Provide feedback for program improvement</td>
</tr>
</tbody>
</table>

Fostering collaborative relationships built on trust, respect, and shared objectives involve establishing clear and open lines of communication between the university and partner sites and working closely with community partners to arrange student placements. It is therefore recommended that student placements and rotations be planned collaboratively with partner sites to ensure a diverse and comprehensive clinical experience. To facilitate optimal
outcomes, it is advisable that placements be congruent with research evidence with regards to length of rotation and level of student involvement.

Ideally, it is recommended that rotations in the final year of study involve at minimum, an eight-week uninterrupted placement with students providing treatment to patients. Observation-only rotations should be limited to the earlier years of study.

**Student preparation**

International evidence confirm that universities have the responsibility of adequately equipping students for their CBDE rotations. This includes providing training to prepare students for community-based experiences, which encompasses cultural sensitivity, ethical considerations, proficient communication, professionalism, and ensuring competency in core clinical skills.

**Student supervision and assessment**

Students require consistent supervision and mentorship during their community-based rotations. There needs to be clearly defined roles and responsibilities of clinical supervisors, including their expected level of involvement in student education, evaluation, and feedback. This requires universities working collaboratively with community partners to appoint qualified clinical supervisors at partner sites to oversee student learning experiences.

The dental school are advised to ensure they have a robust assessment system to evaluate students’ competencies. Clinical supervisors engaged in student evaluation need calibration.
and training in effective educational methodologies and assessment from the Faculty. A structured clinical supervision system, which includes explicit standards and approaches for evaluating students' clinical proficiency is recommended. It is important for universities to educate clinical supervisors in providing constructive verbal and written feedback and assist students in developing skills in eliciting feedback. Feedback literacy is a required skill for successful clinical learning.

Furthermore, part of the CBDE coordinators recognised role and workload generally include ongoing support and mentorship to clinical supervisors. This will facilitate communication for the purpose of monitoring student progress and addressing any issues that may arise.

Dental schools need to implement an evaluation/feedback mechanism for partner sites to have input into program improvements and to share their insights on the needs of community-based sites. This feedback is useful to refine the program and enhance the partnership and is recommended to be communicated back to the community-based sites. At minimum, annual program evaluations to record the impact on students, patients, and communities is advised.

Each dental school needs a strategy for addressing unforeseen circumstances or unexpected changes at partner locations, including backup plans for student placements. This incorporates maintaining flexibility and responsiveness in light of evolving community demands, available staffing, feedback from students, and emerging dental education best practices.
5.2.3 The Partner Sites

*Faculty partnership*

The partner sites need to consider their ability to offer a long-term (> 3 years) commitment with the dental school for program continuity. Part of the collaboration between partner sites and dental schools includes a commitment to align the documented curriculum with real-world patient cases and community health needs. This commitment would extend to developing protocols and guidelines collaboratively with the dental school, congruent with (Australian Dental Council) ADC accreditation standards, as well as partner site service goals.

It is the responsibility of the partner sites to ensure that they have the necessary infrastructure, equipment, resources and staffing to support student placements. Establishing a communication schedule between dental school coordinators and partner site clinical supervisors for addressing issues and sharing updates, such as holding weekly check-in meetings, is a suggested practice.

*Student preparation*

Current evidence recommends that community sites provide comprehensive orientation sessions to prepare students for the unique challenges and opportunities of community-based dental education. It is advised that training encompass cultural competency, communication skills, and sensitivity to community dynamics and provision of an orientation manual to be used for the entire rotation.
**Student supervision and assessment**

Students in their final year of study ought to be provided with hands-on clinical experiences including, where possible, diverse patient population to gain comprehensive clinical experience. It is recommended that community sites ensure rotations are structured to cover essential clinical competencies and procedures.

Partner sites are expected to maintain an adequate number of suitably qualified dental professionals and support staff for students' supervision to ensure uninterrupted rotations. Clinical supervisors are responsible for conducting routine feedback sessions and debriefings to address patient cases, ethical challenges, and student professional growth as part of their role. In response, students are be expected to reflect on these experiences, including challenges and successes. Additionally, clinical supervisors are advised to recognise that students may have varying levels of prior clinical exposure and adapt accordingly, be responsive to students' individual learning needs and allow for flexibility in rotations.

Clinical supervisors are encouraged to engage in faculty development programs to enhance their teaching and assessment abilities and are required to be calibrated prior to assessing student performance.

Community sites need to remain flexible and receptive to input from the dental school as well as staying up to date with the evolving best practices in dental education.
5.2.3 The Students

Students are expected to maintain the highest standards of professionalism. This includes respecting patient confidentiality, obtaining informed consent for treatment and demonstrating empathy and respect towards patients from diverse backgrounds.

Students are expected to follow community site protocols and guidelines for patient care. This includes adhering to infection control measures, following ethical principles, and complying with the policies and procedures of the educational institution and the clinical site. Attendance of an orientation session should be mandatory, and students ought to follow directives in the orientation manual provided.

Students are required to display competence in executing dental procedures as appropriate to the student’s level of training. Patient safety and comfort are the main priorities during all interactions. This includes ensuring thorough and accurate patient assessments, diagnoses, and treatment planning.

Students are encouraged to actively participate in the learning process. Students should be required to engage in reflective practice by regularly evaluating their own performance, identifying areas for improvement, and taking steps to enhance their clinical skills and knowledge. Students are advised to accept evaluation from supervising clinicians as crucial for their growth and improvement and encouraged to remain open to feedback and actively work on addressing any identified weaknesses.
Opportunities to provide feedback on the program, including faculty support, supervision, and clinical experiences ought to be facilitated for students. This needs to be incorporated into continuous program improvement.

Students are encouraged to set personal and professional goals for their community-based education experiences. To support student development, community sites are encouraged to provide students with resources and guidance on career paths in community-based dentistry.

Summary

This framework was formulated from the findings of the three studies in this thesis in combination with current evidence.

Universities can create and maintain successful CBDE programs that benefit students, communities, and the broader oral healthcare system by utilising this framework which emphasises collaboration, clearly developed guidelines and protocols, quality assurance and feedback mechanisms, and a commitment to addressing oral health disparities in underserved populations.

5.3 Limitations of Thesis

Limitations related to research methodology and results are discussed in the individual chapters.
A significant limitation of both paper 2 and paper 3 is that the results were derived from six Australian Dental Schools, which limits the ability to generalise these findings due to the diverse approaches in CBDE implementation globally.

Furthermore, this thesis exclusively delves into the perspectives of students, clinical supervisors, and CBDE faculty coordinators. Incorporating perspectives from CBDE organisers at partner sites and patients would provide a more comprehensive insight into the advantages, disadvantages, demands and challenges associated with CBDE.

5.4 Implications for Future Research

Ongoing research in community-based dental education can help refine the approach, address challenges, and maximise the benefits of this educational model for dental students, universities, communities, and healthcare organisations.

It is proposed that further investigation continue in evaluating the effectiveness of CBDE programs compared to traditional dental school models within the Australian context, including evaluation of students' development of clinical proficiency, professionalism and cultural competence in community settings.

One of the common challenges identified in all three studies pertains to the training and support of clinical supervisors. Further research is proposed to examine the adequacy of training and support provided to clinical supervisors engaged in CBDE settings to ensure they possess the essential skills and resources necessary for effectively mentoring dental students.
Lastly, a prominent recurring theme across all three studies underscores the importance of establishing effective community engagement and partnerships. Research efforts can be directed towards exploring the establishment and long-term viability of partnerships between dental schools and community organisations. This research should encompass an understanding of the factors that facilitate successful collaborations and the significance of incorporating community input in developing and evaluating CBDE programs.

5.5 Conclusion

This thesis provided insights into the current implementation of CBDE programs and the challenges faced by universities in Australia in administering such student placements. The proposed framework for effective CBDE programs emphasise prioritising and establishing effective partnerships with community organisations. It is recommended that students be provided with hands-on clinical experience in diverse community settings, particularly in their final year of study, in order to refine their clinical skills, foster cultural competence and develop a holistic approach to oral healthcare. Continuous program evaluation and feedback from students and community partners is advised to ensure the program remains responsive and adaptable to evolving needs.
5.8 References


APPENDICES

Appendix A: Ethics Approval
Appendix B: Participant Information and Consent Forms
Appendix C: Chapter 2 Supplemental Information
Appendix D: Chapter 3 Supplemental Information
Appendix E: Chapter 4 Supplemental Information
Appendix A:

Ethics Approval
Our Ref: 2022/ET000346

Thursday, 23 June 2022

Professor Sandra Carr
School of Allied Health

Dear Professor Carr

HUMAN RESEARCH ETHICS APPLICATION APPROVAL – THE UNIVERSITY OF WESTERN AUSTRALIA


Ethics approval for the above project has been granted in accordance with the requirements of the National Statement on Ethical Conduct in Human Research (National Statement) and the policies and procedures of The University of Western Australia. Please note that the period of ethics approval for this project is five (5) years from the date of this notification. However, ethics approval is conditional upon the submission of satisfactory milestone reports by the designated renewal date. Therefore, initial approval has been granted from 23 Jun 2022 for 12 months.

You are reminded of the following requirements:
1. The application and all supporting documentation form the basis of the ethics approval and you must not depart from the research project that has been approved.
2. The Human Ethics office must be approached for approval in advance for any requested amendments to the approved research project.
3. The Chief Investigator is required to report immediately to the Human Ethics office any adverse or unexpected event or any other event that may impact on the ethics approval for the project.
4. The Chief Investigator must submit a final report upon project completion, even if a research project is discontinued before the anticipated date of completion.

Any conditions of ethics approval that have been imposed are listed below:
1. None.

The University of Western Australia is bound by the National Statement to monitor the progress of all approved projects until completion to ensure continued compliance with ethical principles.

The Human Ethics office will forward a request for a Progress Report approximately 30 days before the due date.

If you have any queries please contact the Human Ethics office at humanethics@uwa.edu.au. Please ensure that you quote the file reference – 2022/ET000346 – and the associated project title in all future correspondence.

Yours sincerely

[Signature]

Shihab Mundekkadan
Senior Officer- Human Ethics & Clinical Trials
Appendix B:

Participant Information and Consent Forms
Participant Information

Project title:

Name of Researchers:
1. Professor Sandra Carr, Head of Division, School of Allied Health, Health Professions Education
2. Dr Omar Kujan, Head of Division, Dental School, Oral Diagnostic and Surgical Science
3. Dr Millicent Taylor, Student Researcher, Master of Health Professions Education

Invitation:
You are invited to participate in this study investigating the current status of Community-based dental education in Australia. You are asked to take part in this project because you have been identified as the coordinator/administrator of this aspect of dental education at your institution.

Aim of the Study (What is the project about?)
The aim of this study is to provide a picture of how Community-based dental education (CBDE) is being implemented across dental schools in Australia and to compare the current status of this developing aspect of dental education to evidenced-based frameworks.

What does participation involve?
You are asked to complete a questionnaire, adapted from existing survey tools. The questionnaire consists of both quantitative closed questions as well as open-ended qualitative questions. The questionnaire will take less than 15 minutes.
You are also be asked to participate in follow-up interviews. Interviews be audio recorded and will take approximately 30 minutes.

Voluntary Participation and Withdrawal from the Study
Participation in this study is voluntary and you may withdraw at any time, without giving an explanation.

Your privacy
Your participation in this study and any information you provide will be treated in a confidential manner. Returned surveys will not be anonymous - however results from the surveys will not be reported in any way that facilitates identification of the responder. Interviews will be audio-recorded and sent to an external approved transcription service. Transcripts of interviews will be coded and de-identified by the student researcher. The findings of this research will at no time be presented in any form that would facilitate identification of the individual participants. You will also have the opportunity to review and edit the interview transcript.

Information from this project will be published but your name, the name of your institution and identifying details will not be used in any publication arising out of the research. The data will be kept in a non-identifiable format, in a password protected computer or a secure server for 7 years.

Possible Benefits

This study is significant in that it aims to provide a profile of community-based dental education in Australia and aims to formulate a theoretical framework for best practice in community-based dental education, which would be of benefit to all dental schools in the region engaged in Community-based dental education.

Possible Risks and Risk Management Plan

There are no foreseeable risks associated with the research.

Contacts

If you would like to participate or discuss any aspect of this study please feel free to contact either the student researcher, Millicent Taylor on phone, 0423866127, or via email, Millicent.Taylor@research.uwa.edu.au, or the principal researcher, professor Sandra Carr at Sandra.Carr@uwa.edu.au or co-supervisor, dr Omar Kujan at Omar.Kujan@uwa.edu.au

Approval to conduct this research has been provided by the University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time. In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Ethics office at UWA on (08) 6488 4703 or by emailing to humanethics@uwa.edu.au. All research participants are entitled to retain a copy of any Participant Information Form and/or Participant Consent Form relating to this research project.

Consent Statement

I have read the information provided and any questions I have asked have been answered to my satisfaction. I agree to participate in this research project, realizing that I may withdraw at any time without reason and without prejudice. I understand that all identifiable information that I provide is treated as confidential and will not be released by the investigator in any form that may identify me unless I have consented to this. The only exception to this principle of confidentiality is if this information is required by law to be released.
Participant Consent Form


I, ____________________________, have read the information provided and any questions I have asked have been answered to my satisfaction. I agree to participate in this research project, realizing that I may withdraw at any time without reason and without prejudice.

I understand that all identifiable information that I provide is treated as confidential and will not be released by the investigator in any form that may identify me unless I have consented to this. The only exception to this principle of confidentiality is if this information is required by law to be released.

______________________________  ________________
Participant signature            Date

Approval to conduct this research has been provided by the University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time.

In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Ethics Office at the University of Western Australia on (08) 6488 3703 or by emailing to humanethics@uwa.edu.au

All research participants are entitled to retain a copy of any Participant Information Form and/or Participant Consent Form relating to this research project.
Appendix C:

Chapter 2 Supplemental Information
The protocol was peer-reviewed and registered at the Open Science Framework osf.io/gsm78; Registration DOI: 10.17605/OSF.IO/ZSYVB.

AUTHOR INFORMATION

Author: Millicent Taylor
Co-Authors: Omar Kujan, Sandra Carr, Lida Baynes
Independent reviewer: Lida Baynes
Contact person: Millicent Taylor
Email Address: Millicent.Taylor@research.uwa.edu.au
Dates: Anticipated start date of research: June 2022
Anticipated completion date: October 2022

1.0. TITLE

Dental Students and Clinical Supervisors’ perceptions and reflections on Community-based educational experiences: A scoping review

2.0. BACKGROUND

A substantial body of evidence has placed increasing emphasis on providing clinical experiences for dental students in community-based/outreach clinics to supplement training offered in traditional dental school-based clinics. Evidence suggests that when compared to dental students trained solely in traditional settings, community-based dental education (CBDE)/outreach education offers resources and opportunities for students to become more confident, caring and productive practitioners with a higher awareness of the social, ethical and cultural aspects of community oral health.

In order to be ready for independent general practice, it is essential that dental graduates are able to provide care in real-world settings. The aim of CBDE/outreach teaching is to assist in preparing dental students for independent practice through service-learning, a form of experiential learning, whereby students reflect on the experiences gained from clinical opportunities in community dental clinics. Insights from their individual reflections prompt learners to draw meaning from a particular experience and stimulate development of problem-identification and solving abilities, thereby initiating opportunities for personal and professional growth.

The CBDE/outreach experience therefore serves as a culmination of learning experiences before students move on to independent practice, as such, overall competence is more emphasised than in traditional discipline-focused teaching.

Student clinical supervisors are usually general dentists who provide supervision, guidance and support to students at outreach clinics. Studying partner-site perspectives, preceptors (student clinical supervisors) have reported the following advantages of providing community learning experiences to dental students: opportunities for community dental clinics to mentor and recruit students for future employment; increases in the number of patients treated, raising awareness of the oral health needs in the community, staying current with developments in clinical dentistry and cultivating a diverse workplace environment. However, student supervisors expressed challenges in balancing their own clinical responsibilities with education/training of students, challenges in communicating with the university regarding students’ level of competence and maintaining student interest and motivation in the outreach program.
Furthermore, the primary responsibility of community sites is patient care and teaching is often not a role student supervisors have actively pursued. As such, the educational mind-set in community-based settings is often different from that of dental school-based faculty.

Formicola et al stress that community-based dental education is not merely an off-site rotation for dental students. Across the globe, community-based dental education is a core part of the dental curriculum with service-learning beneficial to both service providers and students.

However, for any service-learning program to be sustainable, it is important for both faculty and community partner sites to continuously pursue the best model for community-based dental education and to maintain flexibility notwithstanding continuous change.

To date, no study has synthesised and critiqued the literature to ascertain how dental students and their clinical supervisors/preceptors perceive community-based dental education in relation to student development. Without a synthesis of this understanding, it is difficult to develop best practice guidelines, evaluate programs and guide student engagement in community-based/outreach education.

Acknowledging this gap in knowledge, this study seeks to explore existing literature on the perceptions of students and clinical supervisors with regards to community-based/outreach dental education.

3.0. OBJECTIVE

The objective of this scoping review is to explore, synthesise and evaluate dental students’ and clinical supervisors’ perception of community-based dental education.

This study is significant in that it aims to provide a profile of student and preceptor perceptions of community-based dental education. The proposed outcome of this study is to contribute to guiding a theoretical framework for best practice in community-based dental education.

The rationale for utilising a scoping review as the selected approach for evidence synthesis in this study, is to systematically identify and map the available evidence, in particular the breadth of research that has been done on this topic. Furthermore, a scoping review was selected to provide insights into a particular concept in this instance, perceptions of students and clinical supervisors on community-based dental education, globally. It further serves as an examination tool of how research has been conducted in this field.

4.0. PROTOCOL DESIGN

The scoping review will adhere to the scoping review framework proposed by Arksey and O’Malley, following framework stages 1 through 5 and updated by Pham, Peters and Levac.

The final protocol will be registered prospectively with the Open Science Framework.

**Population, Concept, Context (PCC) statement**

For this scoping review the populations of interest are dental students and dental clinical supervisors. The concept is 'reflections on and perceptions of community-based/outreach dental education' and context is 'dental educational settings outside traditional dental school clinics'.

4.1. Stage 1: Identifying the Research Question

The research questions were developed by the primary author in collaboration with the co-authors:
• How do dental students perceive community-based/outreach education in relation to their
development?
• How do dental student clinical supervisors/preceptors perceive their role in community-based/outreach education in relation to student development?

4.2. Stage 2: Identifying relevant studies\textsuperscript{17,19,20,21}

4.2.1. Search strategy and information sources

The following electronic databases will be included in the search, PubMed (Medline), Embase, Web of Science and Scopus.
Databases will be searched using Medical Subject Headings (MeSH) or equivalent, keywords, truncation, adjacency functions, and Boolean operators.

4.2.2. Search terms

Search terms will be determined by the primary author with input from the co-authors. The search strategy will be developed with the assistance of a research librarian.

Preliminary search items include community-based dental education, dental outreach learning, dental student service-learning, experiences and perceptions of students and experiences and perceptions of student clinical supervisors/preceptors, student reflections on community-based/outreach education, clinical supervisors’ reflections on community-based/outreach education.

4.2.3. Search parameters

Eligibility criteria

Inclusion criteria
i) English articles, published since 2000, due to the recency of developments in this aspect of dental education.
ii) Any type of empirical study which include combinations of the initial search items with the title and/or abstract
iii) Full text articles which are available electronically
iv) Participants: Dental students, Dental student preceptors, Dental student clinical supervisors, Dental student mentors
v) Article describes the Education / Training method as: Community-based dental education, Service-learning for dental students, Outreach dental education, Rural dental education

Exclusion criteria
i) Studies not written in English
ii) Dental education studies not including Community-based dental education/Service-learning for dental students/Outreach dental education/Rural dental education
iii) Articles published before 2000
4.3. Stage 3: Study selection

The Scoping Review team are four reviewers, i.e Millicent Taylor, Omar Kujan, Sandra Carr and Lida Baynes.
Two reviewers (Millicent Taylor and Lida Baynes) will screen the citation titles and abstracts to identify the papers eligible for full text analysis. References of included studies may also be scanned. A third independent reviewer, Omar Kujan, will verify results. Disagreements between reviewers will be resolved through discussion or consultation with the Principal investigator, Sandra Carr. Dates of searches will be recorded.

All retrieved citations will be added to an EndNote Library where a de-duplication algorithm will be used to remove duplications.

4.3.1. Selection of sources of evidence

![Articles selection process for scoping review, using PRISMA flow diagram](image)
To increase consistency among the reviewers, all reviewers will screen the same publications, discuss the results and amend the screening and data extraction.

**4.4. Stage 4: Data Collection**

Records selected after removal of duplicates will be uploaded into JBI SUMARI systematic review software (Available at https://sumari.jbi.global/) through the University of Western Australia institution access), for study screening, assessment of risk of bias, data extraction, and data synthesis.

A data collection form will be developed by the primary author and reviewed by the co-authors to confirm study relevance and extract study characteristics.

Study characteristics to be extracted will include, but will not be limited to:

i) Citation details
ii) Publication year
iii) Publication type
iv) Aim of study
v) Study design
vi) Rigor, reliability, validity, limitations
vii) Analysis
viii) Findings
ix) Conclusions/Recommendations
x) MMAT score (Mixed methods appraisal tool)

The MMAT (Mixed methods appraisal tool) will be used to appraise the methodological quality of studies.\(^{18}\)

To ensure accurate data collection, each reviewer’s independent abstraction of the data will be compared, and discrepancies will be further discussed to ensure consistency.

**4.5. Stage 5: Data summary and synthesis of results**

**4.5.1. Reporting guideline**

The PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) will be utilised to report results from this Scoping review\(^{22}\).

This reporting guideline will be used to emphasise the importance of methodological rigor in the conduct of reporting in this scoping review.

**5.0. DISSEMINATION AND ETHICS**

This review will not involve any human or animal participants, or data not available on a public platform. Therefore, no formal ethics approval will be required. This study will follow the scoping review framework by Arskey and O’Malley\(^{17}\) and updated and appraised by Pham\(^{19}\), Peters\(^{20}\) and Levac\(^{21}\).
REFERENCES

1. Licari F, Chambers D. Some Paradoxes in Competency-Based Dental Education. Journal of Dental Education. 2008;72(1): 8 – 18
5. Goswami S, Karaharju-Suvanto T, Kaila M, Tseveenjav B. Community Health Centre-Based Outreach Clinic for undergraduate dental education: Experience in Helsinki over 8 years. European Journal of Dental Education. 2017;22(3).
primary studies in mixed studies reviews. International Journal of Nursing Studies. 2009. 46(4), 529-546


### Supplementary Table 1: Mixed Methods Appraisal Tool (MMAT), version 2018\textsuperscript{23,24,25}

<table>
<thead>
<tr>
<th>Category of study designs</th>
<th>Methodological quality criteria</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Screening questions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(for all types)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1. Are there clear research questions?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2. Do the collected data allow to address the research questions?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Further appraisal may not be feasible or appropriate when the answer is ‘No’ or ‘Can’t tell’ to one or both screening questions.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1. Qualitative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1. Is the qualitative approach appropriate to answer the research question?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2. Are the qualitative data collection methods adequate to address the research question?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3. Are the findings adequately derived from the data?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4. Is the interpretation of results sufficiently substantiated by data?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Quantitative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>randomized controlled trials</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1. Is randomization appropriately performed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2. Are the groups comparable at baseline?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3. Are there complete outcome data?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4. Are outcome assessors blinded to the intervention provided?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5 Did the participants adhere to the assigned intervention?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Quantitative non-randomized</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1. Are the participants representative of the target population?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3. Are there complete outcome data?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.4. Are the confounders accounted for in the design and analysis?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5. During the study period, is the intervention administered (or exposure occurred) as intended?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4. Quantitative descriptive</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1. Is the sampling strategy relevant to address the research question?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.2. Is the sample representative of the target population?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3. Are the measurements appropriate?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4. Is the risk of nonresponse bias low?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5. Is the statistical analysis appropriate to answer the research question?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5. Mixed methods</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1. Is there an adequate rationale for using a mixed methods design to address the research question?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2. Are the different components of the study effectively integrated to answer the research question?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SCOPING REVIEW SEARCH STRATEGY and SEARCH RESULTS

The protocol was peer-reviewed and registered at the Open Science Framework osf.io/gsm78; Registration DOI: 10.17605/OSF.IO/Z5YVB.

TITLE

Dental Students and Clinical Supervisors’ perceptions and reflections on Community-based educational experiences: A scoping review

PROTOCOL REGISTRATION

- Protocol registered on the Open Science Framework osf.io/gsm78
  Registration DOI: 10.17605/OSF.IO/Z5YVB

POPULATION, CONCEPT, CONTEXT (PCC) STATEMENT

- Population(s): dental students, dental clinical supervisors.
- Concept: reflections and perceptions
- Context: community-based dental education

DATABASES

- PubMed
- Scopus
- Embase
- Web of Science

GREY LITERATURE: Google scholar and specific websites, i.e Australian Dental Council and International Association for Dental Research.

STRATEGY

A. Analysing Seed articles for keywords and subject headings
B. Developing search terms
C. Searching databases, through an iterative process
D. Searching grey literature
E. Manual citation searching
A. Analysing Seed Articles for keywords and subject headings


Abstract

The aim of this qualitative study was to examine the perspectives of key personnel at partner sites providing community learning experiences to dental students to gain more understanding of the effects that community-based programs have on the sites themselves. Fourteen semi-structured interviews were conducted in 2015 with individuals from nine extramural sites. Interviewees had a range of roles from clinicians to CEOs, with six also reporting they were faculty preceptors. Three of the researchers developed a coding scheme focused on the benefits and challenges that community sites experience from participating in a community-based dental education (CBDE) program. Each coder then reviewed the interview transcripts independently before final group discussions and recoding to agreement. The main themes related to benefits were recruiting future dentists, staying current with clinical developments, sites’ indirectly improving their missions by exposing students to broader roles of oral health providers, raising awareness regarding the need for dentistry in community settings, and nurturing a positive workplace environment. The main themes related to challenges were balancing education and training for students with clinical demands, communication with the university, and managing distinctive clinical and professional characteristics of students. This study’s participants reported that the main benefit of CBDE for partner sites was dentist recruitment. The study also provided insights for both partner sites and dental schools to consider when developing and maintaining these partnerships.

Indexed in Medline and Embase

<table>
<thead>
<tr>
<th>Medline</th>
<th>Embase</th>
</tr>
</thead>
<tbody>
<tr>
<td>MeSH subject heading</td>
<td>Subject heading</td>
</tr>
<tr>
<td>Attitude of Health Personnel</td>
<td>*dental education</td>
</tr>
<tr>
<td>*Community Dentistry / ed [Education]</td>
<td>dental procedure</td>
</tr>
<tr>
<td>*Community-Institutional Relations</td>
<td>dental student</td>
</tr>
<tr>
<td>Dentists</td>
<td>dentist</td>
</tr>
<tr>
<td>*Education, Dental</td>
<td>*education</td>
</tr>
<tr>
<td>Faculty, Dental</td>
<td>health</td>
</tr>
<tr>
<td>Humans</td>
<td>health personnel attitude</td>
</tr>
<tr>
<td>Oral Health</td>
<td>human</td>
</tr>
<tr>
<td>*Preceptorship</td>
<td>problem based learning</td>
</tr>
<tr>
<td>Problem-Based Learning</td>
<td>*psychology</td>
</tr>
<tr>
<td>Public Health Dentistry</td>
<td>public health service</td>
</tr>
<tr>
<td>Schools, Dental</td>
<td>*public relations</td>
</tr>
<tr>
<td>*Students, Dental / px [Psychology]</td>
<td></td>
</tr>
<tr>
<td>Author-supplied keywords</td>
<td>Keyword heading</td>
</tr>
<tr>
<td>community dentistry</td>
<td>community dentistry</td>
</tr>
<tr>
<td>community-based dental education</td>
<td>community-based dental education</td>
</tr>
<tr>
<td>community-institutional relations</td>
<td>community-institutional relations</td>
</tr>
<tr>
<td>dental education</td>
<td>dental education</td>
</tr>
<tr>
<td>preceptorship</td>
<td>preceptorship</td>
</tr>
<tr>
<td>public health dentistry</td>
<td>public health dentistry</td>
</tr>
</tbody>
</table>

Abstract

Community-based educational activities have been introduced into health education programs across the world. However, research on students' perceptions of their experiences in these settings has been limited. The objectives of this study were to assess a group of Brazilian dental students' views of their experiences in a service-learning program focusing on pediatric dental care and to explore changes in their perceptions over the course of the program. Data were collected from fifty-five fourth-year dental students, who submitted a total of 185 reports at four points in time. The students spent sixteen of the 128 hours of their pediatric dentistry course in community-based education developing activities linked to pediatric dental care. Two professors rated each report as a positive or negative experience (Kappa 0.7) and recorded whether the students' reports reflected one or more of five types of response. The response types concerned dental treatment practice, multidisciplinary activities, observation of infant/toddler consultations, commitment of the outreach health team, and change of plans due to technical problems. The data showed that the students had a positive first impression after a short stay in a community-service program, but there was a decrease in the students' positive experiences over time (p<0.001). The students' perceptions of the outreach health team as "being not committed" (OR 6.82, 95 percent CI 2.12-21.90) and experiences of a "no change of plans due to technical problems" (OR 0.09, 95 percent CI 0.04-0.20) associated with negative student experiences.

Indexed in Medline and Embase

<table>
<thead>
<tr>
<th>MeSH subject headings</th>
<th>Subject Headings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>adult</td>
</tr>
<tr>
<td>Brazil</td>
<td>article</td>
</tr>
<tr>
<td>*Community Dentistry / ed [Education]</td>
<td>Brazil</td>
</tr>
<tr>
<td>Community-Institutional Relations</td>
<td>curriculum</td>
</tr>
<tr>
<td>Curriculum</td>
<td>*dental education</td>
</tr>
<tr>
<td>*Education, Dental / mt [Methods]</td>
<td>*dental procedure</td>
</tr>
<tr>
<td>Female</td>
<td>*dental student</td>
</tr>
<tr>
<td>Humans</td>
<td>*dentistry</td>
</tr>
<tr>
<td>Likelihood Functions</td>
<td>education</td>
</tr>
<tr>
<td>Linear Models</td>
<td>female</td>
</tr>
<tr>
<td>Male</td>
<td>human</td>
</tr>
<tr>
<td>*Pediatric Dentistry / ed [Education]</td>
<td>male</td>
</tr>
<tr>
<td>Personal Satisfaction</td>
<td>methodology</td>
</tr>
<tr>
<td>Retrospective Studies</td>
<td>nonparametric test</td>
</tr>
<tr>
<td>Schools, Dental</td>
<td>psychological aspect</td>
</tr>
<tr>
<td>Statistics, Nonparametric</td>
<td>public relations</td>
</tr>
<tr>
<td>*Students, Dental / px [Psychology]</td>
<td>retrospective study</td>
</tr>
<tr>
<td>Young Adult</td>
<td>satisfaction</td>
</tr>
<tr>
<td></td>
<td>statistical model</td>
</tr>
</tbody>
</table>

Other Index Terms

adult; article; Brazil; curriculum; *dental education; *dental procedure; *dental student; *dentistry; education; female; human; male; methodology; nonparametric test; psychological aspect; public relations; retrospective study; satisfaction; statistical model

Abstract

INTRODUCTION: The Portsmouth Dental Academy delivers an interprofessional education to dental students on outreach placement from King’s College London Dental Institute.

AIM: To establish what the dental students’ attitudes to the placement are and how these correlates to the perceptions of the staff who work with them.

METHOD: Using Delphi consensus procedures, a simple, closed, two-question questionnaire was developed. The questionnaire was completed by the students and then, to triangulate the results, was subsequently applied to staff who teach and assist them on clinic.

RESULTS: To the question: Why do you think the experience that is commonly termed the 'Portsmouth experience' is so successful 'in the eyes of the students', the students ranked first the response: 'Students gain experience in primary dental care clinical practice under the current NHS contract - UDAs and KPIs'. To the second question: What do you think the students most enjoyed about working in Portsmouth, the students ranked first: 'A sense of independence - being made to make their own decisions'.

CONCLUSION: The students' major perception of the 'Portsmouth experience' centres around the placement being a realistic preparation for their future practising career. This is combined with a strong sense of belonging when studying and working at the Academy.

Indexed in Medline and Embase

<table>
<thead>
<tr>
<th>MeSH subject headings</th>
<th>Embase Subject Headings</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Attitude of Health Personnel</td>
<td>*dental education</td>
</tr>
<tr>
<td>Community-Institutional Relations</td>
<td>*dental student</td>
</tr>
<tr>
<td>*Education, Dental</td>
<td>*health personnel attitude</td>
</tr>
<tr>
<td>Humans</td>
<td>human</td>
</tr>
<tr>
<td>*Students, Dental</td>
<td>public relations</td>
</tr>
<tr>
<td>Surveys and Questionnaires</td>
<td>questionnaire</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>United Kingdom</td>
</tr>
</tbody>
</table>


Abstract

OBJECTIVES: Melbourne Dental School's (MDS) rural dental clinical placement program operates in two Victorian rural areas and offers final year dental students an integrated program of practical clinical experience and rural lifestyle exposure. The objective of this study was to understand the student's experiences to determine whether they increased the likelihood of them seeking rural employment after graduation. DESIGN: The University of Melbourne final year dental students attended 5-week mandatory rural clinical placements in 2018 and 2019. At the completion of their placement, students were invited to complete an anonymous questionnaire about their experiences, which had both quantitative and qualitative questions. This study examined the qualitative data using thematic analysis to identify common themes.

SETTING: Rural clinical dental placements at Goulburn Valley Health and Latrobe Community Health Service.

PARTICIPANTS: Final year Dentistry and Oral Health students.

INTERVENTIONS: Clinical placement evaluation questionnaire.

MAIN OUTCOME MEASURES: To examine dental students’ interest in rural practice post rural clinical placement.
RESULT(S): Of the 129 students who completed the survey, 116 completed the open-ended questions and four themes were identified. Rich clinical experience; social capital; rural life and infrastructure. High levels of satisfaction were reported across all themes.

CONCLUSION(S): This study demonstrated the rural clinical program to be a positive and enjoyable placement which increased dental students’ clinical practice experience and their interest in considering rural practice upon graduation. Exposure to rural lifestyle and supportive clinical and social relationships were shown to be important influences. The current survey can benefit from refinement and further research following up MDS graduate workplace locations is recommended.

Indexed in Medline and Embase

<table>
<thead>
<tr>
<th>Medline</th>
<th>Embase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MeSH subject headings</strong></td>
<td><strong>Keyword Heading:</strong></td>
</tr>
<tr>
<td>Attitude of Health Personnel</td>
<td>clinical exposure</td>
</tr>
<tr>
<td>Career Choice</td>
<td>dental workforce</td>
</tr>
<tr>
<td>Humans</td>
<td>recruitment</td>
</tr>
<tr>
<td>*Rural Health Services</td>
<td>rural lifestyle</td>
</tr>
<tr>
<td>Rural Population</td>
<td>social capital</td>
</tr>
<tr>
<td>*Students, Dental</td>
<td></td>
</tr>
<tr>
<td>Surveys and Questionnaires</td>
<td></td>
</tr>
</tbody>
</table>

| **Keyword Heading:** | **Subject Headings:** |
| clinical exposure | decision making |
| dental workforce | *dental student |
| recruitment | health personnel attitude |
| rural lifestyle | human |
| social capital | questionnaire |
| | *rural health care |
| | rural population |

| **Other Index Terms:** | |
| decision making; *dental student; health personnel attitude; human; questionnaire; *rural health care; rural population |

Abstract

A pilot outreach course in restorative dentistry based in community clinics began in 2001. As part of the evaluation, 48 fourth year students completed a questionnaire about their opinions of the new course, and about restorative dentistry clinics in the dental hospital. Time management was the most frequently mentioned gain from outreach. In relation to the dental school, students most often saw the specialised teaching staff as a gain. Outreach was equally or more important for students’ confidence in clinical diagnosis of dental caries, treatment planning, direct restorations, communicating with patients, and managing patients, time, and resources. The dental hospital was equally or more important for their confidence in the diagnosis of periodontal disease, root planing, crowns, bridges, dentures, and communicating effectively with laboratory staff. Patients in outreach were seen as different from those at the dental hospital because they were unselected and had different treatment needs. Meeting course requirements was the most frequent concern about outreach. In relation to the dental hospital, students were most often concerned about the quality of teaching and support available. Outreach and the dental hospital provided complementary experiences and the new course met its educational objectives.

Indexed in Medline and Embase

<table>
<thead>
<tr>
<th>Medline</th>
<th>Embase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MeSH subject headings</strong></td>
<td><strong>Keyword Heading:</strong></td>
</tr>
<tr>
<td>Dental Clinics</td>
<td>curriculum</td>
</tr>
<tr>
<td>Dental caries</td>
<td></td>
</tr>
<tr>
<td>*Education, Dental / mt [Methods]</td>
<td>dental education</td>
</tr>
<tr>
<td>England</td>
<td>dentistry</td>
</tr>
<tr>
<td>Humans</td>
<td>denture</td>
</tr>
<tr>
<td>*General Practice, Dental / ed [Education]</td>
<td>doctor patient relation</td>
</tr>
<tr>
<td>Humans</td>
<td>human</td>
</tr>
<tr>
<td>Pilot Projects</td>
<td>medical student</td>
</tr>
<tr>
<td>Program Evaluation</td>
<td>patient care</td>
</tr>
<tr>
<td>*Students, Dental</td>
<td>periodontal disease</td>
</tr>
<tr>
<td>Surveys and Questionnaires</td>
<td>preventive dentistry</td>
</tr>
<tr>
<td></td>
<td>*primary medical care</td>
</tr>
<tr>
<td></td>
<td>public opinion</td>
</tr>
<tr>
<td></td>
<td>questionnaire</td>
</tr>
<tr>
<td></td>
<td>review</td>
</tr>
<tr>
<td></td>
<td>time management</td>
</tr>
<tr>
<td></td>
<td>treatment planning</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other Index Terms:</strong></td>
<td></td>
</tr>
<tr>
<td>curriculum; dental caries; *dental education; dentistry; denture; doctor patient relation; human; medical student; patient care; periodontal disease; preventive dentistry; *primary medical care; public opinion; questionnaire; review; time management; treatment planning</td>
<td></td>
</tr>
</tbody>
</table>
### B. Developing search terms: concept table

<table>
<thead>
<tr>
<th>KEY TERMS</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental Students OR Dental Clinical Supervisors</td>
<td>Community-based education</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SYNONYMS / ALTERNATE TERMS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental graduate Dental student OR Preceptor Mentor Dentist Practitioner Supervisor</td>
<td>Service-learning Outreach Rural placement Primary care Community Community-based</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEDLINE MeSH Subject Headings</th>
<th></th>
</tr>
</thead>
</table>
C. SEARCHING DATABASES

SEARCH 1: PubMed

1. Students + Community-based dental education

<table>
<thead>
<tr>
<th>Dental Student</th>
<th>Community-based education</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Field tags</td>
<td>• Field tags</td>
</tr>
<tr>
<td>[tw] Terms with truncation (Text Word)</td>
<td>[tw] Terms with truncation (Text Word)</td>
</tr>
<tr>
<td>• MeSH Subject Headings</td>
<td>• MeSH Subject Headings</td>
</tr>
<tr>
<td>*Students, Dental</td>
<td>*Community Dentistry / ed [Education]</td>
</tr>
<tr>
<td></td>
<td>*Rural Health Services</td>
</tr>
</tbody>
</table>
2. Clinical supervisors + Community-based dental education

<table>
<thead>
<tr>
<th>Clinical supervisor</th>
<th>Community-based education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field tags [tw] Terms with truncation (Text Word)</td>
<td>Field tags [tw] Terms with truncation (Text Word)</td>
</tr>
<tr>
<td>AND</td>
<td></td>
</tr>
<tr>
<td>*Community Dentistry / ed [Education]</td>
<td>*Rural Health Services</td>
</tr>
</tbody>
</table>
**SEARCH RESULTS (PubMed)**

**History and Search Details**

<table>
<thead>
<tr>
<th>Search</th>
<th>Actions</th>
<th>Details</th>
<th>Query</th>
<th>Results</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>#7</td>
<td></td>
<td></td>
<td>#1 AND #2 AND #3 Filters: from 2000 - 2022</td>
<td>395</td>
<td>23:42:09</td>
</tr>
<tr>
<td>#6</td>
<td></td>
<td></td>
<td>#1 AND #2 Filters: from 2000 - 2022</td>
<td>471</td>
<td>23:41:25</td>
</tr>
<tr>
<td>#5</td>
<td></td>
<td></td>
<td>#1 AND #2 AND #3</td>
<td>457</td>
<td>23:41:00</td>
</tr>
<tr>
<td>#4</td>
<td></td>
<td></td>
<td>#1 AND #2</td>
<td>536</td>
<td>23:40:13</td>
</tr>
<tr>
<td>#1</td>
<td></td>
<td></td>
<td>&quot;Students, Dental&quot;[Mesh] OR &quot;Dental student*&quot;[tw] OR &quot;Dental graduate*&quot;[tw]</td>
<td>12,228</td>
<td>22:27:25</td>
</tr>
</tbody>
</table>

EXPORTED TO ENDNOTE: 866
<table>
<thead>
<tr>
<th>Search Category</th>
<th>Search Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental Student</td>
<td>“Dental student*” OR “Dental graduate*”</td>
</tr>
<tr>
<td>Community-based education</td>
<td>“Community-based dental educat*” OR service-learning OR community-based OR outreach OR “rural placement*” OR “primary care” OR “outreach placement*” OR “extramural”</td>
</tr>
<tr>
<td>Clinical supervisors</td>
<td>(Preceptor* OR Mentor* OR Supervisor* OR practitioner OR staff OR dentist*) AND dent*</td>
</tr>
<tr>
<td>ID</td>
<td>Name of Search</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>#12</td>
<td>#8 AND #9 AND #10</td>
</tr>
<tr>
<td>#11</td>
<td>#9 AND #10</td>
</tr>
<tr>
<td>#10</td>
<td>#2 after 2000</td>
</tr>
<tr>
<td>#9</td>
<td>#3 after 2000</td>
</tr>
<tr>
<td>#8</td>
<td>#4 after 2000</td>
</tr>
<tr>
<td>#4</td>
<td>Clinical supervisor</td>
</tr>
<tr>
<td>#3</td>
<td>Community-based dental education</td>
</tr>
<tr>
<td>#2</td>
<td>Dental student</td>
</tr>
</tbody>
</table>

EXPORTED TO ENDNOTE: 681
**SEARCH 3: Embase**

Embase logic grid

<table>
<thead>
<tr>
<th>Concept group 1</th>
<th>Concept group 2</th>
<th>Concept group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental student</td>
<td>Clinical supervisor</td>
<td>Dental education Community-based Outreach Rural placement Rural healthcare Extramural Service-learning</td>
</tr>
</tbody>
</table>

**SEARCH RESULTS (Embase)**

Students and CDBE
Embase Classic+Embase <1947 to 2022 July 15>

<table>
<thead>
<tr>
<th></th>
<th>Term</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>dental student$.mp. or *dental student/</td>
<td>11376</td>
</tr>
<tr>
<td>2</td>
<td>dental education.mp. or *dental education/</td>
<td>25365</td>
</tr>
<tr>
<td>3</td>
<td>outreach.mp.</td>
<td>23854</td>
</tr>
<tr>
<td>4</td>
<td>rural health care/ or rural placement.mp.</td>
<td>14496</td>
</tr>
<tr>
<td>5</td>
<td>community-based.mp.</td>
<td>91627</td>
</tr>
<tr>
<td>6</td>
<td>service-learning.mp.</td>
<td>1520</td>
</tr>
<tr>
<td>7</td>
<td>clinical supervisor.mp.</td>
<td>197</td>
</tr>
<tr>
<td>8</td>
<td>extramural.mp.</td>
<td>3496</td>
</tr>
<tr>
<td>9</td>
<td>3 or 4 or 5 or 6 or 7 or 8</td>
<td>131796</td>
</tr>
<tr>
<td>10</td>
<td>1 and 2 and 9</td>
<td>224</td>
</tr>
</tbody>
</table>

Filter: 2000 ONWARDS  **211**

Supervisors and CDBE
Embase Classic+Embase <1947 to 2022 July 15>

<table>
<thead>
<tr>
<th></th>
<th>Term</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>dental education.mp. or *dental education/</td>
<td>25365</td>
</tr>
<tr>
<td>2</td>
<td>outreach.mp.</td>
<td>23854</td>
</tr>
<tr>
<td>3</td>
<td>rural health care/ or rural placement.mp.</td>
<td>14496</td>
</tr>
<tr>
<td>4</td>
<td>community-based.mp.</td>
<td>91627</td>
</tr>
<tr>
<td>5</td>
<td>service-learning.mp.</td>
<td>1520</td>
</tr>
<tr>
<td>6</td>
<td>clinical supervisor.mp.</td>
<td>197</td>
</tr>
<tr>
<td>7</td>
<td>extramural.mp.</td>
<td>3496</td>
</tr>
<tr>
<td>8</td>
<td>2 or 3 or 4 or 5 or 6 or 7</td>
<td>131796</td>
</tr>
<tr>
<td>9</td>
<td>clinical supervisor$.mp. or education/</td>
<td>487192</td>
</tr>
<tr>
<td>10</td>
<td>1 and 8 and 9</td>
<td>286</td>
</tr>
</tbody>
</table>

Filter: 2000 ONWARDS  **238**

**EXPORTED TO ENDNOTE: 449**
# SEARCH 4: Web of Science

<table>
<thead>
<tr>
<th>Concept group 1</th>
<th>Concept group 2</th>
<th>Concept group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>Clinical supervisor</td>
<td>Dental education</td>
</tr>
<tr>
<td></td>
<td>Preceptor</td>
<td>Community-based education</td>
</tr>
<tr>
<td></td>
<td>Mentor</td>
<td>Service-learning</td>
</tr>
<tr>
<td></td>
<td>Supervising dentist</td>
<td>Outreach placement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rural placement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extramural rotation</td>
</tr>
<tr>
<td><strong>SEARCH RESULTS (Web of Science)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>(((((ALL=(student*)) OR TS=(student*)) OR TI=(student*)) OR AB=(student*)) OR AK=(student*)) OR KP=(student*)</td>
<td>1,336,990 18 July</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>((((((ALL=(clinical supervisor*)) OR TS=(clinical supervisor*)) OR TI=(clinical supervisor*)) OR AB=(clinical supervisor*)) OR AK=(clinical supervisor*)) OR KP=(clinical supervisor*) OR ALL=(preceptor*) OR ALL=(supervisor*) OR ALL=(mentor*) OR ALL=(supervising dentist*)</td>
<td>136,824 18 July</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>((((ALL=(dental education)) OR TS=(dental education)) OR AB=(dental education)) OR KP=(dental education) OR AK=(dental education)</td>
<td>87,082 18 July</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>((((((&quot;community-based&quot;) OR TS=&quot;(community-based&quot;) OR TI=&quot;(community-based&quot;) OR AB=&quot;(community-based&quot;) OR TS=&quot;(community-based&quot;) OR AK=&quot;(community-based&quot;) OR KP=&quot;(community-based&quot;)</td>
<td>93,840 18 July</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>((((ALL=(outreach)) OR TS=(outreach)) OR TI=(outreach)) OR AB=(outreach)) OR AK=(outreach)) OR KP=(outreach)</td>
<td>37,842 18 July</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>((((((service-learning)) OR TS=(service-learning)) OR TI=(service-learning)) OR AB=(service-learning)) OR AK=(service-learning)) OR KP=(service-learning)</td>
<td>5,671 18 July</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>(((((ALL=(rural placement*)) OR TS=(rural placement*)) OR TI=(rural placement*)) OR AB=(rural placement*)) OR AK=(rural placement*)) OR KP=(rural placement*)</td>
<td>1,960 18 July</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>(((((ALL=(extramural rotation)) OR TS=(extramural rotation)) OR TI=(extramural rotation)) OR AB=(extramural rotation)) OR AK=(extramural rotation)) OR KP=(extramural rotation)</td>
<td>13,619 18 July</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td>#4 OR #5 OR #6 OR #7 OR #8</td>
<td>150,263 18 July</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>#1 AND #3 AND #9</td>
<td>417 18 July</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td># 10 Filter after 2000</td>
<td>409 18 July</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>#2 AND #3 AND #9 Filter after 2000</td>
<td>67 18 July</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>#12 Filter after 2000</td>
<td>63 18 July</td>
</tr>
</tbody>
</table>

**EXPORTED TO ENDNOTE: 472**
### D. Searching grey literature

<table>
<thead>
<tr>
<th>SEARCH TERM: “community-based dental education”</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SEARCH TERM: “outreach”</th>
</tr>
</thead>
</table>

---

1. International Association for Dental Research: Conference proceedings

https://iadr.abstractarchives.com/home

Date last run: 19 July 2022
<table>
<thead>
<tr>
<th>SEARCH TERM: “service-learning”</th>
</tr>
</thead>
</table>

**Google Advanced Search**

Search terms:
“community-based dental education” OR “dental service-learning” OR “outreach dental education”

Excluding peer-reviewed articles

**Dissertations, Theses, and Professional Projects:**

1. [https://epublications.marquette.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1025&context=cps_professional](https://epublications.marquette.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1025&context=cps_professional)
E. Manual citation search


3. Blinkhorn, AS et al, ‘Developing Dental Education in Primary Care: The Student Perspective’ (2005) 198(4) British dental journal 233


9. Radford DR, Hellyer P. ‘Experienced General Dental Practitioners as Clinical Teachers: a Qualitative Study of Their Experience over the First Three Years as Novice Clinical Teachers in an Outreach Setting’ (2015) 218(9) British dental journal 523


Appendix D:

Chapter 3 Supplemental Information
### Survey Instrument
#### Survey of Community Based Dental Education (CDBE) Experiences

<table>
<thead>
<tr>
<th>Does your institution offer opportunities for students to participate in external clinical rotations?</th>
<th>☐ Yes</th>
<th>☐ No</th>
</tr>
</thead>
</table>

Please identify the types of clinics where students attend external rotations (tick all that apply).  
- Private Practice  
- Public dental community clinics  
- Nursing homes  
- Hospital clinics  
- Dental School owned external clinics (purpose built)  
- Public regional clinics  
- Other

For 'Other', please specify  
__________________________

| Please identify the sites where students perform clinical procedures themselves, under supervision, during their external rotation (tick all that apply). | ☐ Private practice  
- Public dental community clinics  
- Nursing homes  
- Hospital clinics  
- Dental School owned external clinics (purpose built)  
- Public regional clinics  
- Other |
|---|---|

For 'Other', please specify  
__________________________

<table>
<thead>
<tr>
<th>In what year of the students' dental training do they rotate out to external sites where they perform clinical procedures?</th>
<th>____________________________</th>
</tr>
</thead>
</table>

| Are students allocated to external clinics in "blocks" or as a linear distribution throughout the year? | ☐ Blocks  
- Linear distribution |
|---|---|

For 'Block' rotations, please specify number of weeks per academic year  
__________________________

For linear distribution, please specify the approximate number of days per academic year  
__________________________

| Do students receive clinical credit towards graduation for procedures performed at external sites? | ☐ Yes  
- No |
|---|---|

| Does your institution perform a post rotation survey of students' perspectives of their experience at external sites? | ☐ Yes  
- No |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>Yes</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>Do students complete a self-reflection of their experience at external sites?</td>
<td>☐</td>
</tr>
<tr>
<td>Are students provided with a structured orientation and site manual at these sites?</td>
<td>☐</td>
</tr>
<tr>
<td>Please specify who is responsible for student supervision at external sites where students perform clinical procedures?</td>
<td>☐</td>
</tr>
<tr>
<td>Additional information to previous question (can be left blank)</td>
<td></td>
</tr>
<tr>
<td>Please specify who is responsible for on-site competency assessments of students at external sites.</td>
<td>☐</td>
</tr>
<tr>
<td>Additional information to previous question (can be left blank)</td>
<td></td>
</tr>
<tr>
<td>Are student supervisors at external sites calibrated?</td>
<td>☐</td>
</tr>
<tr>
<td>Does the Faculty seek input / feedback from student supervisors at external sites?</td>
<td>☐</td>
</tr>
<tr>
<td>Does the Faculty conduct site visits to external sites where students perform clinical procedures?</td>
<td>☐</td>
</tr>
<tr>
<td>If 'yes' to previous question, how many times a year?</td>
<td></td>
</tr>
</tbody>
</table>
Does your institution have a Memorandum of Understanding (MoU) or Affiliate agreement with external site organisations?

What are the challenges faced by your institution in administering outreach / community-based dental education at external clinics?

Are there any other comments you would like to add?
**Supplemental TABLE 1: Semi-Structured Interview Guide for CBDE Program Coordination**

**Introduction:**
- Welcome and thank the interviewee for participating.
- Explain the purpose of the interview: to gather insights into coordinating CBDE programs and the associated challenges.
- Assure confidentiality and inform the interviewee that their responses will be used for research purposes only.
- Confirm consent to record the interview.

**Section 1: Administering and Coordinating CBDE Programs:**
- Can you describe your role in coordinating CBDE programs at your institution?
- What are the key issues regarding organising CBDE programs?

**Section 2: Challenges regarding Resources:**
- What resources are essential for the successful implementation of CBDE programs?
- Have you encountered any resource-related challenges? If so, please describe them.

**Section 3: Challenges Regarding Student Experience:**
- From your perspective, what are some common challenges faced by students during CBDE programs?
- How do you ensure that students have a positive and enriching experience in these programs?

**Conclusion:**
- Please share your insights regarding aspirations for future development of CBDE programs?

**Closing Remarks:**
- Express gratitude once again for participants’ contribution to the interview.