

Undergraduate dental students' perceptions of dental pain in children – A grounded theory study

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Abstract

Introduction: There is an underuse of pain management strategies in dental care for children, possibly owing to perceived stress and discomfort when treating children, which has also been reported by dental students. The aim of this study was to explore how undergraduate dental students experience and understand pain related to dental treatment in children.

Materials and Methods: Interviews were held with 21 Swedish dental students, from 3 dental schools, all in their final 2 years of education. The interviews were transcribed verbatim and analysed according to Grounded Theory.

Results: A core category, *seeking guidance to avoid pain*, was identified and related to 6 conceptual categories. The students used different strategies to manage pain prevention in child dentistry and to become skilled dentists. They described high levels of stress, as well as having high expectations on themselves when treating children. The stress led to a surface learning approach, something the students were not fully aware of.

Conclusion: All children should have the right to be ensured optimal pain prevention in dental care. The basis for this is laid during undergraduate education. Thus, pain management in child dentistry is an area in need of special attention in this respect. The academic staff has an important role in supporting their students in their process to gain an identity as professional dentists. To ensure that students incorporate an understanding of the importance of pain prevention when treating children there is a need to create more integration between theory and clinical training in undergraduate education.

KEYWORDS

child, dental education, dental student, paediatric dentistry, pain, procedural pain

1 | INTRODUCTION

Despite the fact that all children should have the right to optimal pain prevention in dental care, literature show that children commonly encounter dental pain (pain from teeth and their supporting

tissues, pain experienced in connection with dental treatment, and pain that occurs after dental treatment).¹⁻⁴ Pain experienced during dental treatment is known to have potentially long-term negative consequences, including dental anxiety and even avoidance of dental care.^{5,6} Over a longer perspective this can impact negatively on

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both oral health and quality of life in childhood as well as adulthood.⁷⁻⁹ Based on this knowledge, it is not only reasonable but also expected that the dental healthcare team tries in every way to reduce the risk of pain. Although local anaesthetics are a cornerstone in the prevention of pain during dental treatment, several studies have reported underuse of this.¹⁰⁻¹³ A perceived stress when treating children, being unsure of how child patients will react to injection, underestimating children's perceptions of pain and lack of guidelines for pain prevention have been suggested as factors contributing to insufficient pain prevention.¹¹⁻¹³

As knowledge and much of the professional attitudes are formed during undergraduate education, the students' viewpoints and understanding of pain, including procedural pain in children, as well as prevention, are important. A recent study reported that some students had insufficient knowledge and varying attitudes with regard to prevention of dental pain in children.¹⁴ Dental students have also been reported to feel more anxious and less confident when administering local anaesthetics to children for the first time in comparison to administering the same treatment to adults.¹⁵ Therefore there seems to be a need to improve undergraduate education in paediatric dentistry, especially concerning pain prevention. To achieve this, we need more comprehensive knowledge about dental students' perceptions of children's pain experiences, as well as their views on curricula concerning pain in dental education.

The aim of this qualitative study was to explore how undergraduate dental students experience and understand pain related to dental treatment in children.

This report was written in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist.¹⁶

2 | MATERIALS AND METHODS

2.1 | Research team and reflexivity

The initial interviews were conducted by RR, with verifying interviews by HB. RR is a PhD student and post graduate dentist in paediatric dentistry, HB and GK are specialists in paediatric dentistry, and UH is a sociologist. HB, GK and UH have extensive experience of using Grounded Theory (GT). All authors participated in analyses and in preparing and finalizing the manuscript. The present study is part of RR's doctoral thesis. RR, GK and HB teach paediatric dentistry at Malmö University and are thereby known to informants from that university.

2.2 | Study design

2.2.1 | Theoretical framework

GT was first described by Glaser and Strauss (1967).¹⁷ The method was later modified by Corbin and Strauss (1998),¹⁸ and includes

open, axial, and theoretical coding. The modified version was used in this study. GT is well suited for studies where there is a need for more knowledge and formulation of hypotheses that can be tested in future quantitative studies.^{19,20} The method and coding process have previously been described in detail.²¹⁻²³

2.2.2 | Participants

Undergraduate dental students in their final 2 years of education from the four Swedish dental schools were invited to participate in the present study by posting information on digital learning platforms at the universities. Students wishing to participate contacted the main author (RR) to receive formal oral and written information and subsequently signed a consent form.

At first, theoretical sampling was employed to ensure differences in age, sex, years of studying dentistry, experience of children (e.g., being a parent or not), and the student's own experiences of dental treatment and dental anxiety. As interviews and analysis proceeded, informants were included using strategic sampling to reach saturation. Individual interviews were held with 18 undergraduate students (12 females) from three of four Swedish dental schools. Thirteen of the informants were in their final year of training; 5 of them were in their penultimate year. Repeat interviews were not carried out. In March 2023, an additional interview for validation of the results was held with a group of 3 new informants who were in their last semester. In all, 21 students (14 females) were interviewed. All informants who accepted participation were also interviewed.

2.2.3 | Setting and data collection

Interviews lasted 30–60 min and were held in-person at Malmö University, by telephone or as digital meetings, during the period November 2020 through May 2022. The variation was due to the COVID-19 pandemic and geographic distance. An interview guide was used, covering the following themes: *informants' experiences of own pain and that of children's pain, experiences of how children interpret and handle pain, and how informants prevent and handle pain in conjunction with dental treatments*. Opportunities were provided for follow-up questions and for informants to ask questions. All interviews were recorded and transcribed verbatim.

Interviews and analyses were conducted in parallel until theoretical saturation was reached.²⁴ All authors coded and analysed data independently and they also discussed the preliminary findings continuously. As part of the analytical process memos were written, investigating associations between codes and emerging categories, and covering ideas and theoretical reflections. The Swedish Ethical Review Authority approved the study (Uppsala #2020-03589), and the study was registered in Clinical Trials (NCT04643951).

2.3 | Context

There are four universities in Sweden that have dentistry programmes: Karolinska Institutet, University of Gothenburg, Umeå University and Malmö University (where this study was conducted). The dental curriculum in Sweden stretches over five years, and clinical training in paediatric dentistry starts during the eighth or ninth semester depending on the university.

3 | RESULTS

A core category was identified and labelled as *seeking guidance to avoid pain*. This described the process whereby students sought, through a variety of practices, to establish a roadmap to understanding children and how children act in the dental setting in general, and react to experiences of pain in particular. The core category was captured by the following quotes:

It's just that cognitive ability to understand what ... I mean what situation you're in. That ... Well I'm thinking of [local] anaesthesia. It can hurt as in pain, but at the same time ... many adult patients might say, 'The pain will be over quickly,' but children think it's a bigger deal. But it can also be related to fear, so it's difficult to say it just depends on one thing ... pain is very complicated. Of course, there are many factors that come into play. As I understand, it's common they partly react to pain, but also react to things, things that might not be pain alone.

(ID13)

You have some textbooks that you use a lot. Like the textbook in paediatric dentistry and so on. Then we have...I tend to look a lot now at [web site on odontology], I think it's very good. If you just look at who the author is and who reviewed it, it's usually ok. Erm... or I also look for papers on PubMed and so ... I still think it's a bit difficult to see whether a paper is good or not. ... But I probably use [web site on odontology] more and more often, actually. And then I also like to ask the supervisors if there's anything I wonder about and so on. This is a big benefit of being here, that there is always someone you can ask.

(ID6)

Up until starting training in paediatric dentistry the students had only met adult patients and had modelled their way of interacting with patients on this experience. As students encountered child patients, they compared the children's behaviours and reactions in the dental setting to what they had learned when treating adults and came to realize that children were not like adults, including themselves. Students understood they needed to modify the way they interacted with a child patient. However, they struggled to understand

how to change their practices and where to find relevant knowledge. The very nature of pain was difficult for students to understand. When treating adults any pain was quickly dealt with, but children's pain experiences were seen as more complex and affected by a multitude of factors, i.e., fear and anxiety.

The core category was in turn related to six conceptual categories: *learning to know the unknown child*, *trying to overcome challenges when internalizing new knowledge*, *striving to do the right thing*, *feeling an expectation to act*, *involving own experiences*, and *relying on a model to follow* (Table 1).

3.1 | Conceptual categories

Learning to know the unknown child emerged as a conceptual category when informants described perceiving child patients as 'aliens' in the sense that children in general were unknown to them. The informants were in a period of life where they didn't interact or meet with children unless they had children of their own. The perceived otherness had consequences for students, as they found it difficult to interact on an appropriate level, especially with younger children. Interactions became easier when the child patients were older.

I guess, I usually think ... they are not adults. You have to think really hard that maybe they aren't on the same level. You try to adapt yourself to their level...

(ID7)

Informants expressed that they were mostly satisfied with the theoretical part of their education in paediatric dentistry and felt as prepared as possible to start their clinical training. Some students perceived limitations to what could be learned and taught theoretically and acknowledged there are aspects that needed to be learned through practice in a clinical setting. This notion was captured in the conceptual category *trying to overcome challenges when internalizing new knowledge*.

And we were prepared theoretically before we had patients. So, theoretically I feel I was pretty ready for it. But then, there's the practical aspect ... I think you're never really ready for it until you do it yourself.

(ID7)

Usually ... most often it's the practical experience that I feel I ... lack and need. If I believe I'm lacking theoretical knowledge that we may have already covered in class and so. Then I can check the literature. But first, I think I would check with the supervisors...with the colleagues If there's something I feel is missing, it's...it's usually not that we haven't gone through it. Instead, it's often just that I've forgotten about it. I have lots of notes and literature that I feel I can turn to if I ... if it's just theory that I feel I'm lacking.

(ID7)

TABLE 1 Core category, conceptual categories, properties, and examples of meaning units regarding 'seeking guidance to avoid pain'.

Core category	Conceptual categories	Properties	Examples of meaning units (in vitro codes)
Seeking guidance to avoid pain	Learning to know the unknown child	It is important to learn more about child development	1 Difficult to read the child (ID14) 2 Children don't always share thoughts and feelings (ID15) 3 It is difficult to know what the child is like (ID1) 4 Theoretically prepared, practically unprepared (ID9) 5 Using body language to detect pain (ID6)
	Trying to overcome challenges when internalizing new knowledge	It is stressful when you go live and treat children	1 Learning while watching teachers (ID10) 2 Learning from fellow students (ID12) 3 Planning to work with experienced colleagues (ID11)
	Striving to do the right thing	Students have high demands on themselves	1 Doing everything to avoid pain (ID2) 2 Ensuring that the child is OK (ID14) 3 Choice of treatment affected by the child's response to pain (ID7) 4 Afraid to inflict dental fear (ID6)
	Feeling an expectation to act	Treating becomes the maxim	1 Perceived expectations leading to forcing treatment (ID17) 2 Not being sure when to stop (ID1) 3 Parents pushing treatment (ID9)
	Involving own experiences	Experiences from interacting with children or being children themselves	1 Own negative experiences from childhood (ID7) 2 Knowing what hurts (ID14) 3 Experiences of meeting children (ID11)
	Relying on a model to follow	Students look for guidelines	1 Looking for more precise guidelines on pain management (ID19) 2 Using Tell-Show-Do (ID13) 3 Adapt Tell-Show-Do to child's age (ID10)

When the students described where or from whom they acquired new knowledge, the clinical supervisors were mentioned as an important source for clinical knowledge. This kind of practical knowledge and its transfer was much appreciated. The students also described how they expected to learn in the same way from more experienced colleagues after graduation.

...the supervisor is present and perhaps even shows how they usually do it and what tricks they use. Cause it's not really from the lectures ... the lecturers don't share their tricks ... instead you learn it when you're in the clinic and see patients, then right there when doing the treatment, the good tricks and tips and stuff come and ... I ... I've had very good supervisors so far ... who have helped me with very good tricks and stuff ... and I think it helps very much.

(ID19)

Dental students described a desire to meet and treat the child patient in a good and correct way, which was captured in **striving to do the right thing**. Central to this notion was the fear to inflict pain, which in turn could lead to a child developing dental fear and anxiety, resulting in the child avoiding dental care in the future.

I'm actually afraid I could traumatize children that I ... I mean a trauma like the one I suffered. I'm actually afraid ... I don't want to be the reason they won't dare to seek dental care in the future.

(ID10)

Feeling an expectation to act described how students sometimes encountered demands to follow through with examinations or treatments in the clinical setting. Students themselves, clinical supervisors, and parents provided these expectations, leading the students to be torn between different needs and wishes. At the same time, the informants knew they needed, at times, to push forward and challenge the child patient. However, the students found it difficult to know how much pressure they could put on a child. Could they risk that their needs as dental students and future dentists went beyond the needs of the child?

"So, the worst thing in that situation was that ... where to draw the line. The parent who was there, wanted us to do it [tooth extraction] that day. Partly because they didn't want to have to come back and partly because they were very keen to get the braces, and that I can understand."

(ID2)

The students also described **involving own experiences** to understand children's behaviours and experiences of pain in the clinical setting. The dental students drew from a wide array of personal experiences, including their own dental fear and painful dental treatments as a child, and in some cases as parents, when interacting with their young patients.

It hurt, they were heavy-handed. They ... uh ... I felt they never listened to me. [...] But that...but... as I said, but I have a bit of experience too about how important it is ... that you listen to your patient.

And like really eh ... give them what they need, the time they need.

(ID16)

Prior experiences of meeting children in professional or private settings were also described and perceived as helpful to understand and to be prepared for treating young patients in the clinic.

Yes, I have worked quite a lot with children. I've worked with children within disability care. I have nieces and nephews ... yeah, four nieces and nephews aged between ... yeah, the oldest is nine right now and the youngest is one. So ... I've quite a lot of experience from meeting children. And that I think that has helped me too, cause it's easier to get on a good level, and easier to talk about this and that.

(ID11)

By *relying on a model to follow* students described a wish for more concrete practical guidelines that could make it easier for both students and patients to cope with different difficulties encountered during dental treatment. It was not easy to deviate from the main principle of a model. For example, some students described how they sometimes had difficulties in adapting or tailoring general concepts like tell-show-do to a specific child patient or to modify to different age-groups.

Yeah, so for example then I think a lot about seeing child patients. We have learnt this stepwise introduction, how to introduce children to dental care. And I think it's difficult ... cause I don't think it suits all children. So, when you have learnt about this tell-show-do method it seems it's mainly for young children, but when you have a child who's 14 in the dental chair then ... you don't really know how to introduce this child.

(ID1)

4 | DISCUSSION

This qualitative study shows how dental students tried to prevent pain when they treated child patients. At the same time, they perceived it difficult and even stressful to treat children. The students were still in training and thus novices learning to become dentists. They used different strategies to manage the transition from being a student to becoming a dentist, which was captured in the core category *seeking guidance to avoid pain*. The core category was in turn related to six conceptual categories.

The focus of this study was to explore how undergraduate dental students experience and understand pain in child dentistry. When analysing data, it became evident that much of the students' experiences were related to the process of gaining new knowledge

and translating theoretical knowledge into clinical knowledge. Although this would require a deep approach to learning, the students described more of a surface approach in the clinic. A deep approach to learning is characterised by, e.g., students' aspiration to understand the meaning and reflect critically about the topic, while a surface approach concerns, e.g., memorizing facts in order to be able to reproduce them.²⁵ An example of a surface approach to learning was when students described how they turned to supervisors for clinical tips.

Internalizing new knowledge and having high demands on themselves was stressful, especially as the students knew they had to get it right the first time when treating children. Similar findings have been reported in other studies.^{26,27} A shift from a deep approach to learning to a more surface approach was also described by Lee and co-workers (2020)²⁸ when dental students moved from more theory-based courses to clinical education. At the same time the students' internal motivation for learning changed and knowledge as part of personal growth was not as important anymore. The authors ascribe these changes to the stress students perceive when they move from theory to clinic, and they suggest better integration between theoretical and clinical education.²⁸ Thus, it is obvious that the described stress and internal high expectations may turn into obstacles for the students' learning process and clinical training. It points to a need to strengthen the curricula and the support given to students when they start studying paediatric dentistry.

Learning from tips and experiences of supervisors was described as important, although the examples mostly related to tricks and not to a transfer of clinical competency based on more profound knowledge. This may again indicate a surface approach to learning, as clinical tips and tricks are not always equated with evidence-based dentistry. This is in line with previous studies showing that students don't necessarily learn at a deeper level just because they are in later years of education.²⁹ Consequently, these results also show that university teachers at all levels need to maintain a continuous dialogue about how they interact with the students to promote reflective learning rather than serving clinical tips.

The dental students wanted to deliver pain-free treatment. This is hopeful, as several studies have reported somewhat the opposite, namely an underuse of local analgesics among general dentists when treating children, which has been ascribed to the dentist's self-reported stress and discomfort when treating children.¹¹⁻¹³ This is important and points again to a need to take the students descriptions of stress seriously. There might be a need to revisit the curriculum structure to see if the move from theory to clinical practice, where the students treat child patients, should be different. Activities like participating and observing when teachers or older students have patients could be one strategy that would result in a less stressful introduction to clinical training in paediatric dentistry.

Many students expressed viewing child patients as different to adult patients. For example, younger children were expected

to have fewer filters and protest more directly if a treatment was perceived as painful or unpleasant or if there was something they did not like. This would be a natural reaction in a small child, but at the same time it caused stress in the students who had not experienced this before. This finding is consistent with what has previously been reported, e.g., by dental students and newly graduated dentists,³⁰ medical students,³¹ and by dentists.³² It is probable that our education should put more focus on the child as a patient, psychological development, and communication to enhance the understanding that you need other and more tailored strategies when treating children in comparison to adults. At the same time, the anatomy and size of structures are different in children in comparison to adults. The students have to handle a smaller mouth, primary teeth with thinner enamel and dentine, and larger pulps, as well as an anatomical position of the mandibular foramen that varies depending on growth. All this is new to the students and will probably place more stress upon them. Thus, the pre-clinical training in paediatric dentistry, with the possibility to train both injection and cavity preparation, is also important. There is a risk that it is taken for granted that knowledge gained when treating adults can be transferred to a situation where the student is treating a child. This study indicates that it is more complicated and that we may have overlooked this. At the same time clinical training is an important aspect of professional identity formation and Kwon et al. (2022)³³ described that clinical time was central for many students in their description of what becoming a dentist means to them.

The students also reported a perceived pressure to perform, which may reflect an assumption that treatments must be done quickly, where instead the child patient needs time to be well prepared before dental treatments. Developing teaching in paediatric dentistry in this way could have positive effects, including reducing the student's stress levels, increasing the interest in dental care for children, and in a longer perspective could increase quality in pain management. However, from the educators' perspective it is important to see that clinic performance is just one part of being a dentist. Aspects such as theoretical knowledge, communication skills and ability for a reflective way of reasoning are probably even more important, especially in novel stressful situations like providing local anaesthetics to pre-schoolers.

Learning is a continuous process enabling the formation and re-formation of knowledge through experience.³⁴ Reflective practices are an integral part of Kolb's experiential learning cycle, which can be used to improve students' ability to reflect on clinical experiences as they are important in the development of clinical reasoning and decision making.³⁴ By repetitive practice, early introduction and a case-based teaching and learning, clinical reasoning may be improved.³⁵ Pattern recognition or non-analytical reasoning has been described as important in clinical reasoning alongside probabilistic analytical processes.³⁶ Any dental curriculum needs to take this into account and provide ample pre-clinical training and clinical training along with adequate time to reflect on experiences. Students have also been reported to develop better skills in caring for child

patients and employing behavioural shaping techniques after reflective learning was implemented in undergraduate education in paediatric dentistry.³⁷ Mastering these techniques are important in preparing children for pain-preventing measures, i.e., injection of local anaesthetics.

Currently, the undergraduate dental education at Malmö University is implementing case-based teaching and learning.³⁸ In line with this change, implementing peer-assisted learning may be a way forward in the introduction of students to paediatric dentistry and clinical training in the subject. Peer-assisted learning can be beneficial to both tutee and tutors,³⁹ aiding students in developing a sense of professionalism and understanding of their own knowledge, while also promoting a deeper approach to learning.⁴⁰ At the same time, peer-assisted learning has been shown to be an effective measure in promoting life-long learning,⁴¹ and skills such as teamwork, leadership, self-assessment, and feedback.⁴² Further, how we as teachers evaluate and assess our students may affect how they learn; it can, for example, stimulate a deep approach to learning.^{43,44} Cruess et al. (2016)⁴⁵ even suggested adding a fifth level to Miller's pyramid⁴⁴ for assessing how the student developed in terms of professional identity. This is an interesting way to target the process of how to become a dentist, which is captured in our core category *seeking guidance to avoid pain*. The present study focused on pain management in child dentistry and our informants described how they struggled to become professionals in that context. Therefore, strengthening students' development of professional identity in the safe environment at the dental school will be valuable for their future clinical practices. It can help them to be more resilient and confident when providing pain-free treatment for children.

Based on the knowledge that children run the risk of frequently encountering dental pain, including procedural pain, this study was conducted to learn more about how dental students perceive and understand pain related to dental treatment in children. This is important as experiences of dental pain can lead to dental fear and anxiety and in a longer perspective jeopardize children's oral health. Knowledge about children and pain, together with good clinical skills, are likely to form the basis for how dentists prevent and manage pain in conjunction with dental procedures. This is learnt during undergraduate education. The core category in this study, *seeking guidance to avoid pain*, adheres well to this and points at a need for teachers to emphasize the different aspects of pain and pain prevention when tutoring students, and what the consequences might be for children if we as a profession fail to deliver pain-free dental care to all children.

This is a qualitative study, which means that it is not possible to generalize from our results. It is important understand that informants were recruited among dental students in Sweden who were in the final years of the dentistry programme. We chose to use GT in this study, and one reason for this is that it can help to generate a tentative hypothesis that can be further tested and analysed using a quantitative research approach. Here we were able to identify a core category that describes the complexity of understanding and

handling the intricate problem prevention of pain in child dentistry. So, the choice of method is a strength in itself. Another strength is the way interviews were conducted and especially adding an interview with a group of students to verify the results. Presenting the findings to a new group of participants increases the validity of the study.⁴⁶ To counter a homogenous group of informants, strategic sampling was used to achieve diversity, benefitting transferability of results.⁴⁷ Further, to ensure quality all authors provided support during data collection, analysed the data in parallel, and discussed the emerging results throughout the study. The authors' different academic backgrounds assured a broader understanding of the data, resulting in a more comprehensive analysis.⁴⁸ There may be concerns that some of the interviews were held over telephone or digitally using Zoom, where non-verbal communication could be lost. However, the use of telephone and digital techniques have several advantages, such as making it easier to include informants that would otherwise be difficult to reach. Telephone and digital techniques may even be preferred by informants, as the format increases relative anonymity and makes it easier talk about sensitive matters.⁴⁹⁻⁵¹

5 | CONCLUSIONS

All children should have the right to optimal pain prevention in dental care. The basis for this is founded within undergraduate education. Dental students' experiences of stress when handling pain management in child dentistry affect learning processes during undergraduate education and if not handled this may impact how they manage pain prevention later on after graduation. To ensure that students incorporate an understanding of the importance of pain prevention when treating children, there is a need to create more integration between theory and clinical training in undergraduate education. The academic staff has an important role in supporting their students in their process to gain an identity as professional dentists.

AUTHOR CONTRIBUTIONS

HB and GK conceived the ideas; HB, GK, UH and RR participated in planning the study and recruiting participants; RR and HB performed all interviews; HB, GK, UH and RR analysed the data; RR led the writing; and all authors participated in finalizing the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest. The authors alone are responsible for the content and writing of the paper.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on reasonable request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

Written informed consent for study participation was obtained from all participants. The research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. The Swedish Ethical Review Authority, Sweden [Uppsala #2020-03589] approved the study.

CLINICAL TRIALS REGISTRY

The protocol for this study was registered on [ClinicalTrials.gov](https://clinicaltrials.gov) (NCT04643951), November 15, 2020, available at <https://clinicaltrials.gov/ct2/show/NCT04643951>

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