





## Dental clinicians recognizing signs of dental anxiety: a grounded theory study

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### ABSTRACT

**Introduction and Objective:** There is a knowledge gap in how dental clinicians recognise dental anxiety. The aim of this study was to identify, describe and generate concepts regarding this process.

**Materials and Methods:** Eleven semi-structured interviews were conducted with dental clinicians from the public dental service of Östergötland, Sweden. Purposive and theoretical sampling was used. Theoretical saturation was reached after eight interviews. The interviews were audio-recorded and transcribed verbatim. Classical grounded theory was used to inductively analyse data by constant comparative analysis.

**Results:** The core category was identified as; ‘the clinical eye’, clinicians noticing behaviours possibly due to dental anxiety based on their knowledge, experiences, or intuition. The core category comprises the five categories: *Sympathetic activation*, *Patient-reported anxiety*, *Controlling behaviours*, *Avoidance* and *Accomplishment*. Initially there is usually uncertainty about whether a behaviour is due to dental anxiety or part of a patient’s normal behaviour. To gain additional certainty, clinicians need to recognise a stressor as something in the dental setting by observing a change in behaviour, for better or for worse, in the anticipation, presence or removal of the stressor.

**Conclusions:** Clinicians identify patients as dentally anxious if their behaviour changes with exposure to a stressor.

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### Introduction

Dental anxiety is associated with psychological, social and economic suffering for the patient [1–3]. It is also associated with avoidance of dental care, or irregular dental attendance, usually motivated by acute pain [4]. The tendency among dentally anxious patients to avoid regular and necessary dental treatment and check-ups leads to poor oral health because they have more untreated decay and fewer restored/filled teeth [4,5]. When dentally anxious patients seek dental treatment, they experience more pain than other patients due to their dental anxiety [6]. Among anxieties, fears, and phobias, those related to dental care are some of the most commonly reported [7]. One in five people in Sweden suffer from some degree of dental anxiety [8], and as many as one in 30 going for an annual check-up is highly dentally anxious [9]. The level of dental anxiety ranges on a continuous scale from none to extreme, and the most severe form of dental anxiety can be diagnosed as a specific phobia [10]. The terms ‘dental anxiety’ and ‘dental fear’ are often used interchangeably. According to the Glossary of *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* [10], anxiety is ‘the apprehensive anticipation of future danger’ and fear is ‘an emotional response to perceived

imminent threat’. The MeSH term ‘dental anxiety’ is used more frequently in modern literature and will be used in this paper to describe both anxiety and fear related to dental care.

If a dentist correctly identifies a patient’s level of dental anxiety, several techniques can be used to manage symptoms and facilitate treatment. For example, ‘tell, show, do’ can be used with those suffering from mild dental anxiety and cognitive behavioural therapy on those suffering from dental phobia [11,12]. To correctly identify the patient’s dental anxiety is thus of great importance. The majority of dental clinicians rely on their experience and intuition to recognise dental anxiety [13,14]. Understanding and describing the process of how dental clinicians recognise dental anxiety can create awareness among clinicians, enabling them to turn the recognition process into an active process, one that can more actively be utilised. This can hopefully lead to the patient receiving the correct, evidence-based care for their dental anxiety. Currently there is a knowledge gap in the understanding of what dental clinicians recognise as dental anxiety as no previous article has been published exploring this process. Therefore, the aim of this study was to identify, describe and generate concepts regarding how dental clinicians recognise dentally anxious patients.

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## Material and method

Classic grounded theory (GT) [15] was used to explore how dental clinicians recognise dental anxiety. Classical GT was chosen as it is a well proven method when studying interactions and social processes of human behaviours, based on symbolic interactionism [16]. GT offers a systematic method to develop a theoretical construct without a preconceived hypothesis. The perspective of those experiencing the phenomenon is instead used to inductively reach a theoretical construct to answer the research question. The theoretical construct is grounded in the data through conceptual categories and identification of a core category. The research team was multidisciplinary, ensuring there were different perspectives to identify and acknowledge the nuances in the clinicians' expressions [17]. The analysis was supervised and guided in all steps by CB, a qualitative researcher familiar with GT.

Ethical approval for the study was obtained from the Swedish Ethical Review Authority before the study started (Ref. no.: 2019-01025). Our main ethical concern was to guarantee the confidentiality of the participants.

### Setting

The study participants were dental clinicians working in public dental clinics in the Region of Östergötland, Sweden. The public dental clinics of Östergötland are a mix of large urban clinics and smaller rural clinics offering full service to all patients in the region. Approximately 3.6% of the adult patients attending the clinics could be classified as highly dentally anxious [9]. The clinicians of the public dental clinics of Östergötland were chosen using a purposive sample, with the aim of getting data that was as rich as possible, focusing on both a wide distribution of sociodemographic factors (profession, age, sex and years of experience) as well as the first author's knowledge of his colleagues' different level of experience and attitudes towards dental anxiety. The first author's knowledge about the dental clinicians of the regions was based on his experience of working with referrals for dental anxiety for just under a decade. Inclusion criteria were being a dental clinician (a dentist or a dental hygienist) and having encountered patients with dental anxiety. Potential participants were contacted by e-mail and, if preliminarily interested, given verbal and written information about the general aim and method of the study. Clinicians were informed that participation was voluntary, and that they could withdraw from the study at any time without any negative consequences. They were given the opportunity to ask questions about the study prior to accepting. If they chose to accept, written consent was obtained. After the first interview and data analysis, a theoretical sampling was used in a further selection of clinicians to interview, with the aim of getting the richest data possible and ensuring stable categories [15]. A total of 11 dental clinicians, all from different dental clinics, participated in the study. The clinicians' ages, genders, professions, and years in current profession, as well as the length of each interview, are presented in Table 1.

**Table 1.** Participants' background demographics and interview length.

Age	Sex	Profession	Yr in profession	Length of Interview (min)
41	Female	Dentist	17	55
66	Female	Dental hygienist	37	55
60	Female	Dental hygienist	11	33
48	Male	Dentist	23	40
62	Female	Dentist	38	33
40	Male	Dentist	12	28
26	Female	Dental hygienist	2	36
31	Female	Dentist	3	39
40	Male	Dentist	13	48
39	Female	Dentist	16	52
39	Female	Dental hygienist	16	32

### Data collection

A semi-structured interview guide was constructed by the research team, and the first author conducted all the interviews. All interviews started with the same opening question: 'Please tell me about a recent encounter with a dentally anxious patient'. The interviewees were then asked the central question: 'How do you recognise a patient with dental anxiety?' The researcher listened carefully and used probes like 'Can you explain more about that?' and similar techniques to encourage elaboration from the interviewee. The focus of the interview was on otherwise healthy dentally anxious adults, and excluded dentally anxious children. Field notes were taken directly after each interview. The opening question was, when needed, accompanied by the following questions 'Does the patient's sex affect how they express their dental anxiety?' and 'Does the patient's age affect how they express their dental anxiety?' The complementary questions about age and sex were used to enable the clinicians to describe more facets of dental anxiety and thus give richer data. The interview guide evolved and grew with each interview as new data were collected and analysed. For example, when it was discovered that some patients claimed they were dentally anxious but were met with disbelief by the clinicians the question 'Have you had any patients that claimed they were dentally anxious but did not show any signs of dental anxiety?' was added. Other questions added to the interview guide focussed on adding more data to unstable categories, for example 'What symptoms of dental anxiety can the patient experience prior to treatment?' or 'What differences do you see in your professional relations with dentally anxious patients compared to other patients?' or 'What differences do you see between the dentally anxious patients that speak freely about their dental anxiety and the ones that won't mention it?' If the interviewer found a subject interesting, even when this was not in the interview guide, he was free to explore this according to the research question.

To minimise inconvenience and time loss for the clinicians, the interviews were held at the clinician's primary place of work, which had the added possible benefit of empowering the clinicians and keeping them in their professional role. The interviews were held in the clinician's office or any other suitably secluded area. Emphasis was placed on the importance of an undisturbed interview.

## Data analysis

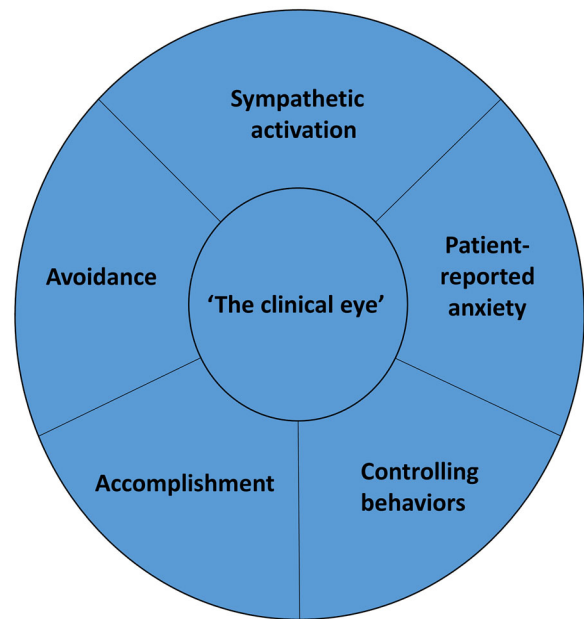
The interviews were audio-recorded and transcribed verbatim by the first author. Analysis was primarily performed by the first and last authors, followed by discussion with the other authors. The transcript was analysed line by line and coded according to the steps suggested in constant comparative analysis, which is the foundation of GT analysis [15]. Researcher triangulation of the coding was performed. Three of the authors independently coded one interview and then compared and discussed the results until agreement was reached. Analysis was performed concurrently with data collection and continued until theoretical saturation was reached, after eight interviews. Three more interviews were then conducted to ensure that there was theoretical saturation.

Open coding was used in the initial phase to extract all possibly relevant data answering the question 'How do dental clinicians recognise dental anxiety?' Extracted data were clustered together into substantive codes. Those codes were compared with other codes, and data that fit together were formed into categories. Codes and categories were constantly compared, rewritten, and rearranged after each interview. There were discussions and consensus was reached about the meaning of the data as the categories and core category developed [17]. The interview guide was adjusted continuously to answer new questions and address topics that emerged from the data, i.e. theoretical sampling. During each step of the data collection and analysis, the researchers continuously developed the theoretical construct; this included memo-writing to elaborate categories, identification of the core category, and integration of categories and their relationships with one another. Categories were considered saturated when data did not add new information.

When the preliminary core category had emerged, selective coding was used to elaborate the categories and their relationships with one another and the core category [15]. A continuous effort was made to identify key variables answering the question of how dental clinicians recognise dental anxiety. After the final data collection, a theoretical construct or 'core category' which answered how dental clinicians recognise dental anxiety was identified.

## Results

The analysis led to a description of concepts and identified the core category answering the research question. The core category was identified as '*the clinical eye*'. The core category comprised the five categories: *Sympathetic activation*, *Patient-reported anxiety*, *Controlling behaviours*, *Avoidance* and *Accomplishment*. All categories were related to and affected each other, and together they formed the core category, which answered the research question. The categories are illustrated in Figure 1. The results section first presents the core category and then describes the categories. All categories are at an abstract level, while the quotations presented are at a descriptive level.



**Figure 1.** A grounded theory model of how dental clinicians recognise dental anxiety. The core category surrounded by the categories.

### *The clinical eye*

The analysis identified that clinicians recognise dental anxiety through a process we name '*the clinical eye*'. The process starts when clinicians notice an action or reaction which they recognise as dental anxiety based on their knowledge, past experiences, or intuition. In the initial stage of the process there is usually a high level of uncertainty about whether a patient is dentally anxious or not.

To determine with a greater certainty if the patient is dentally anxious two things happen in parallel. There is a search for other actions and reactions that could be linked to dental anxiety; this includes both actively searching for them in the present as well as reflecting on a patient's past actions and reactions. There is also a continued effort to determine with greater certainty if an observed action or reaction is due to dental anxiety. These observations need to be placed in context, recognising the stressors as something in the dental setting.

The process of linking a behaviour to dental anxiety is quite complex and is associated with uncertainty. The problem the clinicians are facing is to determine if a behaviour is due to anxiety or is a patient's normal state of being. If a clinician has detailed knowledge of a patient's behaviour when relaxed and stress-free, and thereby has a good reference point, it would facilitate noticing changes from this behaviour and identifying the stressors. However, a clinician generally does not have a good reference point, and can never assume that a patient is stress-free during any part of their interaction. So, a clinician can never know with certainty how a patient behaves when free of stress. Without a reference point a clinician needs to observe a marked change in the behaviour, for better or for worse, associated with anticipation, presence or removal of the stressor (treatment) to link it to dental anxiety. That is why the clinical eye is so important.

When a clinician greets a patient in the waiting room prior to treatment with a handshake, the clinician notices that the patient's hands are damper than most other patients' hands. 'The hand is warm and sticky when I greet them' (interview E). The clinician's past experiences recognise this as *Sympathetic activation* linked to dental anxiety, but it can also be caused by several other factors. At this stage of the process the clinician is unsure and observes whether there are additional signs of dental anxiety and how these signs change in relation to the stressor. During the drilling of a cavity the clinician notices how the patient's tension increases and that the patient now is tenser than in the waiting room. Reflecting on the patient's previous actions the clinician realises that the patient had mentioned disturbed sleep prior to the treatment and wanted reassurance that the clinician would be gentle (*Patient-reported anxiety*). This might also explain why the patient had asked the clinician not to use certain instruments, 'Not allowed to use certain instruments ... according to their demands' (interview F) (*Controlling behaviours*). The patient also slightly hesitated on entering the treatment room '[I observe] a slight hesitation to enter the treatment room' (interview H) and previously there was an unusually high number of cancelled appointments (*Avoidance*). When the filling is done, and the treatment is over the patient relaxes significantly 'They [dentally anxious patients] start to breathe again [after removal of the stressor]' (interview I) compared to how they appeared in the waiting room (*Sympathetic activation*). The patient is very proud of having completed the treatment 'When they [dentally anxious patients] do something they have wanted to do for 30 years... they feel proud' (interview C) (*Accomplishment*) and praises the dentist for the work. The clinician is now quite certain that the patient is dentally anxious and asks the patient, who confirms the clinician's assumptions (*Patient-reported anxiety*) 'They usually do not say that they're dentally anxious until after a while, you kind of have to wiggle it out of them' (interview E).

If a patient maintains the same level of anxiety throughout a treatment, the clinician might suspect that a behaviour is due to dental anxiety based on experience. However, if a clinician fails to observe a change in behaviour related to the stressor, linking the behaviour to dental anxiety, the clinician will remain unsure if the behaviour was a sign of dental anxiety, or if it was due to some other reason or possibly the patient's normal state of being. Clinicians reported that in most cases they could, prior to or during treatment, recognise a dentally anxious patient, as their actions and reactions change with proximity to the stressor. However, sometimes they only realised after the treatment was finished, when the patients returned to their normal behaviour, that the patient's previous behaviour was probably due to dental anxiety. 'Only after the treatment do I notice that they [dentally anxious patients] look incredibly relieved, as if all the burden suddenly has fallen from their shoulders' (interview F), 'Hesitant, but as soon as everything goes well, then they change completely' (interview B). 'The clinical eye' of the clinician was processing the signs, actions, and reactions both consciously and unconsciously.

### **Sympathetic activation**

This category contains a patient's involuntary physiologic signs of stress as recognised by clinicians. The signs of sympathetic activation were recognised by all clinicians and there were similarities between the clinicians' observations. Tension was recognised by every clinician in a wide variety of ways: general tension; tension of the face (grimace), shoulders, back, arms or legs; firm gripping of the armrests; or similar expressions of tension. '[The dentally anxious patient was] very tense, feet straight out ... squirming' (interview J). Other observed examples of sympathetic activation included forced and somewhat stochastic movement of the limbs and decreased fine motor function. 'Trying to help but in a very stressed way ... it is no help, rather the opposite' (interview B). Rapid speech, sometimes in a raised voice, and rapid shallow breathing or irregular breathing patterns were other signs mentioned. In more extreme cases, there were difficulties breathing through the nose while simultaneously holding water in the mouth, leading to gurgling, a feeling of asphyxiation and panic. Increased perspiration was recognised by clinicians in four different ways: visually, through contact (by shaking hands), by perspiration left in the chair or by odour. Some recognised physiological signs of anxiety such as: increased sensitivity to pain and sometimes pain without physical stimuli 'Usually more [pain] sensitive, you're not even touching the tooth when they [dentally anxious patients] react' (interview G); a flushed or pale face 'Either they [dentally anxious patients] are red or pale in the face' (interview H) combined with wide-open eyes; as well as nausea, dryness of mouth and crying. All these actions and reactions were easy to recognise by clinicians as signs of dental anxiety as they changed with proximity to the stressor.

### **Patient-reported anxiety**

Verbal clues from patients can be recognised by the clinician in two ways, directly and indirectly. Direct recognition occurred when patients clearly stated that they were dentally anxious 'I'm afraid, I do not like to come here' (participant H, citing a dentally anxious patient), or they had anxiety regarding specific parts of a treatment, for example, injection, extraction, or root canal treatment. 'Said exactly what parts makes them [dentally anxious patients] anxious' (interview K). This was usually only deemed believable by the clinician if supported by signs of sympathetic activation or cooperation difficulties.

Indirect verbal clues were recognised by the clinicians as a wide variety of verbal clues given by patients, such as mentioning previous traumatic dental experiences or stating that the patient disliked being in a dental office. Other indirect clues were patients reporting disturbed sleep prior to the dental visit or patients claiming that they had been thinking about the appointment for several days and that they were close to cancelling the appointment. 'I've been thinking about this for several days' (participant K, citing a dentally anxious patient). Clinicians also recognised indirect verbal

clues, such as a patient seeking confirmation that the clinician would be gentle, stating that they did not think they could manage the planned treatment, or selecting a simpler but less favourable treatment. Other indirect verbal clues sometimes recognised by clinicians were patients expressing unrealistic worries about accidents during treatment or unrealistic negative thoughts about the status of their teeth or the aesthetic appearance of their teeth. There could also be patients expressing embarrassment and apologising for their behaviour, or for their behaviour causing a delay in treatment. A final indirect verbal clue associated with dental anxiety recognised by some clinicians was a patient being disproportionately thankful after treatment. 'They [dentally anxious patient] thank a thousand times more than other patients' (interview K). The association between these clues of patient-reported anxiety and dental anxiety varied among dental clinicians depending on how they experienced the intensity, frequency, and duration of these behaviours.

If the clinicians suspected dental anxiety some of them actively initiated a dialog with the patient. Clinicians acted in two different ways. The first way was to ask directly if a patient was dentally anxious 'I usually ask [if the patient is dentally anxious]' (interview J). The second way was to ask indirectly by asking questions about the patient's quality of sleep prior to treatment or if there were any specific parts of a treatment they strongly disliked. 'Did you sleep last night? 'Yes I did', then you know it's not that bad, you kind of know the level [of anxiety]' (participant C, citing a dialog with a dentally anxious patient). There was a consensus among clinicians that they preferred it when a patient verbally confirmed their anxiety, as this made it possible for the clinician to form an alliance with the patient and the patient's anxiety became more manageable.

All but one of the clinicians had had patients who claimed prior to treatment that they were suffering from dental anxiety, but without any physical signs that the clinicians associated with dental anxiety and with no problems cooperating during treatment. The clinicians did not fully believe that these patients were suffering from dental anxiety.

Patient-reported anxiety was not always recognised by clinicians. It demanded sensitivity and actions from the dental clinician as the intensity, duration, or frequency of the behaviour of the patient were not always clearly linked with proximity to the stressor.

### **Controlling behaviours**

Controlling behaviours contains actions and reactions recognised by clinicians to be indicative of dental anxiety, behaviours identified as patient strategies to seek control to alleviate their dental anxiety. Control through heightened awareness was one of the most frequent reactions that clinicians noticed. This behaviour was recognised during all phases of treatment, from anxiously trying to spot the treating clinician in the waiting room, to always looking at the clinician's hands and what instruments they were using. Control through rules and restrictions was also frequently

noticed by the clinicians and involved a patient explaining prior to treatment that they wanted the treatment performed in a specific way or that specific items could not be used on them. 'Wanted it a certain way, lie down a certain way, extra suction, they [dentally anxious patients] have like more rules' (interview K). Control through information was noticed by some clinicians, such as excessive Googling about the treatment prior to an appointment and/or demanding detailed information about every step of the process and why these steps were necessary. '[A dentally anxious patient] wanted to know exactly everything I did' (interview D). The association between this controlling behaviour and dental anxiety depended on the frequency and duration of the behaviour and was more strongly associated with dental anxiety if the behaviour was deemed excessive. For example, during treatment, a patient frequently required updates on how things were developing. Some clinicians experienced that constantly being questioned about whether the dental procedure was necessary led to feelings that their authority and competence were being questioned. 'Always wanted to know why I did everything' (interview B) 'Disputed a lot, why was it necessary' (interview B). Clinicians also experienced patients using aggression 'Aggressive ... where it was later understood that he was really very scared' (interview A), rudeness, or sullen behaviour towards a clinician to gain the upper hand and increased control. Clinicians usually realised in retrospect that this behaviour was due to dental anxiety as the patient returned to their normal behaviour when the stressor was removed. 'They [dentally anxious patients] don't smile, then after the treatment they start talking, just like pulling a cork out of the bottle' (interview B). Clinicians also recognised that some dentally anxious patients prefer to go to the same clinician. This became apparent when a clinician moved a considerable distance, and the patient chose to travel to keep the same clinician. Control through high levels of oral hygiene, with the aim of minimising treatment needed, was almost impossible to spot and only became apparent when a patient started to exhibit symptoms or damage due to unmotivated and excessive tooth brushing.

The clinician's association between controlling behaviours and dental anxiety varied depending on the intensity and frequency of the behaviour of the patient. The behaviour became recognisable if it was deemed excessive and/or if it caused treatment difficulties, and also depending on how much the behaviour changed in relation to the stressor.

### **Avoidance**

Avoidance was recognised by several dental clinicians. These avoidance behaviours varied in appearance and intensity, but all served the same function: short-term or long-term avoidance of the stressor. These behaviours, which could be linked to different levels of avoidance behaviour, were associated with the patient's level of dental anxiety. The clinicians believed that there could be a group of patients so dentally anxious that they totally avoided all forms of dental treatment, 'They [dentally anxious patients] won't come at all' (interview H). More common were patients with frequent

cancellations who ended up only seeking treatment for acute symptoms. Other avoidance behaviours recognised by clinicians as dental anxiety were hesitation about entering a treatment room 'Stops at the door [to the treatment room] and wishes they could turn around' (interview G) or sitting in a dental chair, hesitation to accepting treatment 'Some [dentally anxious patients] talk a lot to delay the treatment' (interview J), hesitation or unwillingness to open their mouth, a need for frequent breaks during treatment 'They [dentally anxious patients] have to spit all the time' (interview E), encouraging the clinician to finish the treatment as rapidly as possible, and an excessively rapid escape after treatment 'Folded up the chair and she jumped out, she was kind of quick out of the chair' (interview K). Only a few of the clinicians noticed avoidance through detachment and distraction as signs of dental anxiety. Detachment behaviour was recognised by the clinicians as a patient avoiding eye contact, appearing unwilling to discuss the status of their teeth or planned treatment, or not actively listening to given information. 'They [dentally anxious patients] do not look you in the eyes, they look straight down, they look at their mobile when they are sitting in the chair... but it is an avoidant behaviour, they do not really want to be there' (interview K). The clinicians could perceive this as the patient being unfocused or unresponsive in conversations. Avoidance through distraction could be noticed as a patient fiddling with their phone or similar item prior to or during treatment. Detachment or a distracted behaviour could be interpreted in one of two ways: the clinician could associate the behaviour with dental anxiety or, if misread, a clinician could consider the patient as rude for breaking the etiquette surrounding dental treatment. If the detached or distracted behaviour changed directly after the removal of the stressor, the behaviour was likely to be deemed to be caused by dental anxiety.

Another way of avoidance was through support. When an adult patient brings their mother or friend to support them during a dental visit it represents 'hiding' behind support, as a form of avoidance. Few clinicians were confronted with this unusual behaviour, which was associated with dental anxiety.

### Accomplishment

Accomplishment was when the patients exhibit feelings of pride and satisfaction after overcoming the challenges of a dental visit. Clinicians noticed patients expressing feelings of pride and joy usually accompanied by relief that the treatment was over 'Then [after treatment] he is very satisfied, and much calmer' (interview B), '[After treatment] relieved, relieved and some joy' (interview H). In patients with extreme dental anxiety, there was sometimes also an expressed relief that they had survived the treatment '[The dentally anxious patient] was very pleased when she left that she had made it' (interview J). Accomplishment differs from the other behaviours presented; as when removing the stressor, it is not about returning to a relaxed neutral 'normal' behaviour but rather results in a mood boost. The clinicians

experienced these accomplishing behaviours as something positive that they enjoyed recognising. The extra effort they as clinicians put into facilitating treatment for the dentally anxious patient ended in the patient gaining a positive experience. All signs and behaviours need to show intensity and duration for the clinicians to be able to recognise them as dental anxiety.

There were two ways clinicians recognised *via* a proxy that a patient was dentally anxious. Firstly, several of the clinicians mentioned that a patient's chart would state if the patient was dentally anxious. Secondly, one clinician who considered himself to have a poor ability to recognise dental anxiety had learned to notice dental anxiety based on how his dental assistant interacted with the patient. Both ways were excluded from the model as they relied on another person's assessment

### Discussion

The clinical eye is the clinicians' tool to notice signs of dental anxiety. It requires intuition and experience as the behaviours associate with dental anxiety can vary significantly. The category of *Sympathetic activation* was held in high regard by the clinicians in this study. When changes in *Sympathetic activation* could be linked to the dental treatment the clinicians saw this as objective proof of dental anxiety. This highly positivistic [18] perspective is not unreasonable as there is a clear and proven connection between *Sympathetic activation* and dental anxiety [19], although there may be patients that for different reasons do not do not show any external signs of anxiety [20–22]. The category of *Patient-reported anxiety* is a highly complex one as it spans several concepts and processes involving communication, relations and interactions between the dental clinician and the patient [23]. It is affected by a dental clinician's time restraints (organizational factors), stress, communication skills, sensitivity and attitude towards dental anxiety [24–26]. Also a patient's willingness for self-disclosure, affected by stigma and guilt [27]. Given the complexity of all affecting factors it is encouraging that the interviewed still mentioned so many subtle verbal clues indicating high levels of sensitivity and awareness, as acknowledgement of the dentally fearful patients' emotions is crucial for the clinician-patient alliance and the facilitation of treatment [28]. The category of *Controlling behaviours*, fits well into the established and well-known concept of safety-seeking behaviours [29]. Interestingly, it was clear from the interviews that the dental clinicians were unfamiliar with the term 'safety-seeking behaviours' but regardless had learned to associate these behaviours with dental anxiety. *Avoidance* is at the core of dental anxiety [1,30], and similarly it was recognised by the clinicians of this study, in a myriad of different ways, as usually a rather clear indication of dental anxiety. *Avoidance* was also experienced as one of the primary obstacles to facilitating time-effective treatments. The category of *Accomplishment* can be associated with the concept of mastery and a heightened self-efficacy [31], yet the interviewed dental clinicians seemed mostly unaware of the importance

of supporting this process, only recognising *accomplishment* as a sign of dental anxiety, being proud of their efforts in facilitating the treatment, and happy for their patient.

Three studies were found mentioning signs that clinicians associate with dental anxiety. Bretheron et al. [32] mention several signs dental clinicians use to recognise dental anxiety: 'gut instinct' ... body language, eye contact, noticing the patients' agitation and their responses'. Gyllensvärd et al. [33] mentioned that some clinicians in their study associated visible physical signs with dental anxiety. Kulich et al. [34] listed several verbal and nonverbal cues, similar to the ones reported by clinicians in our study. It was unclear, however, if the listed cues originated from the interviewed clinicians or were observations from the researchers. None of these three studies shared this paper's aim or explored the topic fully. Still, their results were similar and had no contradictory findings.

General theories exist in social psychology and neuroscience concerning how one person identifies the mental state of another person. Traditionally, two theories have been suggested: the theory-theory and the simulation theory. The theory-theory suggests that through observation of others' actions and behaviours, logic and a trial-and-error approach can be used to identify their thoughts and emotions [35]. The simulation theory suggests that as humans, we recognise the thoughts and emotions of others by simulating how we would react when putting ourselves in the same situation [36]. These theories were once opposing but are now seen as complementary: theory-theory being used more for complex situations and simulation theory for simpler implicit situations [37]. Newen et al. propose a model specifically for identifying emotions that builds on the theory-theory, and suggest using a complex pattern recognition system based on several characteristic cues of which none are absolutely necessary to identify the emotions of other persons [38]. This is supported by the findings of Ekman, suggesting that basic emotions such as fear can usually be recognised quite easily with very limited information [39]. This gives support to the idea that dental clinicians notice one or more cues based on their intuition, education, and past experiences, but does not fully support the thesis that this is a process where a change in behaviour is needed to get a reference frame. In summary, there is some support in the existing literature for the suggested model of how dental clinicians recognise dental anxiety, although no other literature has been found asking the exact same question.

Clinicians use the clinical eye to observe changes in behaviours rather than merely noticing certain fixed behaviours. This can possibly explain why clinicians sometimes struggle to recognise dentally anxious patients [9]. Anxiety involves an apprehension of a future threat and thus it is likely that most patients are already somewhat anxious in the waiting room, prior to treatment. If a patient is anxious when the clinician first meets the patient, and the clinician has never seen the patient in their normal relaxed state, the clinician might suspect that the patient behaviour is due to dental anxiety. However, if they fail to see the link between the behaviour and the stressor, the clinician might falsely

assume that this is the patient's normal state of being and miss the signs of dental anxiety. Another possible reason why clinicians sometimes struggle to recognise dentally anxious patients is that clinicians mostly noticed dental anxiety when it caused discomfort for themselves or delayed the treatment. Indeed, all categories mostly support this speculation; even *Accomplishment* is more strongly associated with dental anxiety when deemed excessive and thus time-consuming. Perhaps the clinicians more easily miss dental anxiety that does not cause any disturbances in the treatment. This is an interesting topic for a future study. Another more theoretical reason why clinicians might fail to notice dental anxiety involves the possibility that a patient behaves in a way that the clinicians do not associate with dental anxiety. All but one of the clinicians had had patients who verbally explained that they were suffering from dental anxiety but did not show any signs the clinicians associated with dental anxiety and had no trouble cooperating during treatment. The clinicians did not fully believe that these patients were suffering from dental anxiety. This is highly interesting, suggesting that there is a group of patients that dental clinicians disbelieve. If a dentally anxious patient feels that the clinician does not believe them, this can severely affect their trust in the clinician. The feeling of being believed is central to the relationship between a dentally anxious patient and their dentist [24]. In the treatment of patients with chronic pain, a group that generally struggles with being believed, as this has been identified as the most important factor for successful pain management [40]. Interestingly, there are some similarities between the ability to recognise a patient's pain and the ability to recognise dental anxiety, with both being generally underestimated in comparison with the patients' own ratings [9,41,42]. Both are more easily recognised when a patient exhibits physical signs of distress, and both are met with disbelief when no physical signs exist [43].

It was surprising that no one in the interviews mentioned dental anxiety scales or any other form of validated instruments as a way to estimate dental anxiety. However, this is probably an accurate reflection of their reality, as awareness of the existence of dental anxiety scales is low among dental clinicians and they are very little used in clinical practice [13,14].

The person claiming trouble recognising dental anxiety delegated a great number of the treatment steps to other staff, only performing the most challenging parts of the treatment, and usually did not spend any extended period with the patient prior to or after treatment. It is possible that this limited the ability to observe the change in behaviour needed for 'the clinical eye' as the shorter the time a clinician spends with the patient, the more likely it is that the patient will maintain the same level of anxiety. However, a previous study offers another possible explanation. It suggests that the clinician's ability to assess a patient's distress is reduced during stressful or challenging parts of the treatment [44]. This could be an interesting field for further studies.

This study has some limitations. The study ended not with a substantive theory, but with a theoretical construction

and a model that clarifies the process of recognising dental anxiety. This level of result is not uncommon and fully acceptable. The suggested model does not explain how dental clinicians rate a patient's level of dental anxiety nor whether it makes any difference if the patient has anxiety for a specific part of the treatment or is generally anxious about anything related to the dental setting. These questions must be explored in future studies. No preconceived hypotheses for the process of identification of dental anxiety existed; however, the phenomenon under study was not unknown for three of the researchers and as a human being you cannot be 'totally blank' [15]. Thus, in interviewing and analysis there was awareness about possible unconscious preconceived notions. To reduce the risk for unconscious bias, the research team was multidisciplinary and the expert in GT who oversaw the analysis of the data had no experience of the phenomenon. A challenge that was foreseen was that the interviewees would explain the phenomenon to a colleague who they knew had experience with dental fear, and therefore they would not explain the basic and most obvious parts of their process. To prevent this, great importance was attached to the interviewee being allowed to talk freely, and the interviewer put great effort into probing for basic explanations. The strength of GT is that it is a very systematic method in terms of both data collection and analysis. If this systematic approach is followed, trustworthiness and validity of data will be ensured. This study's results fit the original data and the interviewed clinicians' reality. The results have a high workability as they explain the process and how the core category is linked directly to all categories. However, the level of relevance, and to some extent the modifiability, is ultimately up to the reader to decide.

In conclusion, the clinical eye is based on attentiveness, awareness and experience, all of which are needed to identify the widely varying signs implying dental anxiety. This study has several clinical implications. It can help dental clinicians understand how they recognise dental anxiety. By being aware, a previously unconscious process can become an active process, one that can more actively be utilised. This understanding is unlikely to directly improve clinicians' ability to recognise patients with dental anxiety but might increase their willingness to believe patients who state that they are dentally anxious despite showing the 'wrong' cues (e.g. uninterested, angry or showing no physical signs of distress). This study can help educators to get a better understanding of how to explain the clinical eye of recognising dental anxiety to students. They can thus make the students aware of the potential pitfalls of the method and encourage them to train their clinical eye by comparing it to validated instruments and an in-depth dialog with their patients. However, whether or not this method of self-training and calibration is effective needs to be studied in further research'.

This study is the first of explore this process. It is important that the questions raised by this study is explored in future qualitative and quantitative studies. How do clinicians rate different levels of dental anxiety and what importance do they give to the different signs of dental anxiety?

Given the uncertainty involved in the process of recognising dental anxiety the need to screen for dental anxiety using reliable and validated instruments becomes clear. If a patient is found to be highly dentally anxious and one suspects the patient is suffering from dental phobia, or any other phobia severely complicating the dental treatment, it is prudent to refer the patient to for example a specialised service or a cognitive behavioural psychotherapist or psychologist for proper diagnosis and treatment.

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