

# Evaluation of the ability of dental clinicians to rate dental anxiety

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The aim of this study was to evaluate the ability of dental clinicians to rate dental anxiety. A total of 104 clinicians from 24 public dental clinics in the Region of Östergötland, Sweden, examined 1,128 adult patients undergoing their regular dental examination. The patients rated their dental anxiety using the Modified Dental Anxiety Scale and a Visual Analogue Scale. After the examination, the clinicians rated the patients' levels of dental anxiety on a Visual Analogue Scale. The correlation ( $r_s$ ) between the clinicians' and patients' ratings of dental anxiety was 0.45. Among highly dentally anxious patients, there was no correlation between clinicians' and patients' ratings. Dental clinicians rated dental anxiety lower than their patients did, especially if the patients were highly anxious. The ability of clinicians to rate dental anxiety was better when the clinician was older and the patient was older. There was an inverse association between clinicians' confidence and their ability to rate a patient's dental anxiety. In conclusion, clinicians are unsuccessful in identifying a dentally anxious patient without the concurrent use of patient self-assessment tools. A Visual Analogue Scale is a suitable screening tool in general practice for detection of dental anxiety.

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Dental anxiety is a common challenge for many dental clinicians, and it causes suffering for many patients. As many as 75% of American dentists feel that the greatest barrier preventing patients from receiving adequate dental care is patient anxiety (1). Patients with dental anxiety are more likely to cancel dental appointments; for example, 8.4% of the patients in a recent American study reported missing a dental appointment because of dental anxiety (2). This leads to delayed treatment for the patient and loss of income for the dentist (3). The dentally anxious patient is more likely to avoid dental treatment altogether (4–6). Avoidance of dental treatment leads to poor oral health-related quality of life (7) as a result of pain, tooth decay (6, 8), and social stigmatization, and (in extreme cases) may even cause social isolation (9). Patients with dental anxiety feel more pain during dental treatment (10), and even dentists suffer during the treatment of this patient group (3).

Many people experience dental anxiety. In a recent Swedish study, one in five persons reported some level of dental anxiety (11), which is in line with findings from other industrialized countries (12–15). If the dentist is able to identify a patient's level of dental anxiety,

several techniques can be used to manage and treat it (16–18). One of the most common ways to determine a patient's level of dental anxiety is through a self-assessment questionnaire (19). There are various such questionnaires used for rating dental anxiety; the questionnaires vary in numbers of items and have differences in their theoretical framework (19). The single-item Visual Analogue Scale (VAS) has been suggested as suitable for application in the dental clinic (20). The VAS is widely used in psychology and medicine to assess subjective phenomena, such as pain and quality of life (21). Several studies have evaluated the ability of the VAS to rate dental anxiety and found it reliable and easy to use (20, 22, 23).

In practice, however, only a small percentage of dental professionals use any form of assessment technique to rate dental anxiety (24, 25). If no assessment technique is used, we must assume that dental professionals rely on their experience and intuition, usually called 'the clinical eye', to rate a patient's level of dental anxiety.

There is a knowledge gap concerning the ability of dental clinicians (dentists, dental hygienists, and dental assistants) to identify patients with dental anxiety

without the use of any assessment technique. To our knowledge, only one study has evaluated the ability of dentist to estimate clinically the level of dental anxiety in adult patients. HEATON *et al.* (26) found a weak-to-moderate correlation between the level of dental anxiety observed by the clinician during treatment and the level indicated by several dental anxiety questionnaires in 108 adult patients in a periodontology clinic. They found that more invasive treatment type, younger age, higher decayed, missing, and filled scores, and having previously avoided treatment because of a bad experience were correlated to the observed dental score level. That study focussed solely on the patient's side of the interaction and did not evaluate the observer. In two studies from Newcastle, UK (27, 28), paediatric patients were observed in a clinical setting; the paediatric dentists were mostly successful in identifying anxious and non-anxious paediatric dental patients.

Most clinicians rate patients' dental anxiety without the use of any assessment technique (24, 25), and yet independent clinician evaluation, or the 'clinical eye', is one of the least explored methods. There is a need to study further the clinician's ability to rate dental anxiety in a large sample of clinicians and patients. If there are factors that are negatively associated with a clinician's rating of dental anxiety, the dental community must be made aware of these and steps taken to correct them. Accordingly, we evaluated the ability of dental clinicians to rate dental anxiety in adults and to identify factors affecting the rating.

## Material and methods

This study used a cross-sectional design. The managers of all 29 public dental clinics in the Region of Östergötland, Sweden, were contacted by telephone and asked to participate in the study. The managers were given written instructions to recruit, to this study, all general dentists, dental hygienists, and dental assistants (all professional categories referred to collectively as dental clinicians or clinicians in this article) performing routine dental examinations. Upon accepting and signing a written consent, the clinicians were asked to recruit, over a period of 2 wk, all of their regular patients, older than 18 yr of age, who were visiting the clinic for an annual check-up. Patient exclusion criteria were declining to participate, inability to read and/or write Swedish, or severe medical conditions making the patient unable to answer the questionnaire.

Instructions and questionnaires were presented in written form. All VAS-based instruments used in this study shared the same design, with a straight horizontal line – 100 mm in length – and the extreme lower and upper limits marked as minimum and maximum, respectively.

The Modified Dental Anxiety Scale (MDAS), which rates dental anxiety (29), consists of five questions, each with a five-category rating scale, ranging from 'not anxious' to 'extremely anxious'. The MDAS is an improved version of Corah's Dental Anxiety Scale (30), with an additional question about injection anxiety and adjustment of the response options to achieve comparable ratings.

The patient was asked by the receptionist or the examining clinician in the waiting room, prior to the examination,

to participate in the study. If the patient accepted and signed the written consent, he or she was given the questionnaire. The patient rated his/her level of dental anxiety on the MDAS and a VAS. The patient also rated his/her confidence in being able to manage dental anxiety on a VAS (pDA-VAS) and stated their sex, age, and level of education. Instructions were given to the patient to fold the completed questionnaire before entering the examination room; this was to prevent the clinician from seeing the patient's answers. All patients underwent the same clinical procedure, namely an oral examination. The examination consisted of taking a medical history, performing a clinical examination, periodontal probing of the incisors and first molars with a periodontal probe, obtaining two to four bitewings, and possibly removal of minor amounts of calculus. After finishing the examination and after the patient had left the room, the clinician rated the patient's level of dental anxiety on the opposite side of the questionnaire. To ensure validity, the dental anxiety rated by the clinicians was measured in two different ways: directly, by answering the question 'how dentally anxious was the patient?' on a VAS (cDA-VAS); and, indirectly, by answering the question 'how tense was the patient?' on a VAS. At the end of the 2-wk data-collection period, the clinicians gathered the questionnaires, added their written consent, and answered a separate questionnaire regarding their sex, age, profession, years of experience, country of education, interest in dental anxiety, special training concerning dental anxiety, and confidence in their ability to handle dental anxiety. This was sent in a sealed envelope to the corresponding author. Upon arrival, the signed consent was separated from the questionnaires and the answers were digitized and saved on a spreadsheet. Partially answered questionnaires were included as long as the MDAS, pDA-VAS, and cDA-VAS were recorded. Unanswered questions were left blank and not included in any statistical calculations.

The study was independently reviewed and approved by the Regional Ethical Review Board of Linköping, Sweden. Written informed consent was collected from all participating clinicians and patients.

All clinicians participated anonymously and without compensation.

## Statistical analyses

All statistical analyses used SPSS Statistics 25 (IBM, Armonk, NY, USA). Power calculation based on our pilot study on eight dental clinicians showed that 120 dental clinicians were needed to notice a hypothetical difference of 0.2 in correlation between different patient and clinician correlations, assuming a power of 80% and a significance level of 0.05. All ratings of dental anxiety were skewed and did not follow a normal distribution; thus, Spearman's rank correlation was used to calculate correlations.

The difference (DA-DIFF) between the clinician-rated cDA-VAS and the patient's reported dental anxiety was calculated for each patient by subtracting the MDAS score from the cDA-VAS score, after compensating for differences between these two scales,  $(MDAS - 5) \times 5 = VAS$ . The DA-DIFF followed a normal distribution and thus linear regression was used to identify factors that were associated with the difference (DA-DIFF) at group level.

The sensitivity and specificity values for the cDA-VAS to identify correctly the pDA-VAS were calculated using a binary classification with a cut-off point of  $\geq 70$  mm (15, 22, 23) on both scales.

The Student's *t*-test was used to test the null hypothesis, comparing means of DA-DIFF, patients' confidence, and gender distribution between the highly anxious patients and the entire patient sample. The Student's *t*-test was also used to compare the mean cDA-VAS with the MDAS. Separate analyses were conducted for the subgroup with high dental anxiety (MDAS ≥ 19) (15).

**Results**

Twenty-nine public dental clinics (14 from urban areas and 15 from rural areas) were asked to participate. Two urban clinics declined participation owing to lack of time. Three rural clinics lacked their own staff and were dependent on staff from the other public clinics and were thus excluded to avoid duplicates. A total of 24 public dental clinics participated.

A total of 158 clinicians from those clinics were invited to participate, and 111 agreed. A total of seven clinicians were excluded: two did not include all required questionnaires; two did not recruit any patients; and all (three) participating dental assistants were excluded because their profession was heavily underrepresented in the study. A total of 104 (70%) of the invited clinicians therefore participated in the study. The demographic characteristics and questionnaire responses for the clinicians are summarized in Table 1. The clinicians generally had high confidence in their ability to handle dentally anxious patients. The majority of clinicians were female and had been educated in Sweden.

A total of 2,005 adult patients who underwent routine dental examination at the participating public

dental clinics were asked to participate. In total, 1128 (56%) patients agreed to participate in the study and met the inclusion criteria; none was excluded. The demographic characteristics and questionnaire responses for the patients are presented in Table 2. Some 41 (3.6%) patients had an MDAS score of ≥ 19 and were classified as highly dentally anxious (15). The patients were generally confident in their ability to handle their dental anxiety.

The correlations between MDAS, pDA-VAS, cDA-VAS, clinicians' rating of patient tenseness, and patients' rating of their confidence in handling dental anxiety are presented in Table 3. A scatterplot of MDAS vs. cDA-VAS is presented in Fig. 1. There was a moderate correlation ( $r_s = 0.40-0.47$ ) between all patients' (MDAS and pDA-VAS) and clinicians' (cDA-VAS and patient tenseness) ratings of dental anxiety. There was a strong correlation ( $r_s = 0.80-0.86$ ) between the patients' two ratings of dental anxiety (MDAS and pDA-VAS) as well as between the clinicians' two

Table 1

*Demographic characteristics of clinicians and their questionnaire answers*

Demographics/Questionnaire responses	Data value
Clinician gender	
Male	15 (14.4)
Female	89 (85.6)
Clinician profession	
General dentist	43 (41.3)
Dental hygienist	61 (58.7)
Country of education	
Sweden	86 (82.7)
Other	18 (17.3)
Special training in dental anxiety	
Yes	83 (79.8)
No	21 (20.2)
Special interest in dental anxiety	
Yes	51 (49.0)
No	53 (51.0)
Clinician age (yr)	25-66 (45.2)
Rated dental anxiety*	0-99 (15.8)
Years of experience	0-40 (15.5)
Rated patient tenseness*	0-100 (19.2)
Confidence in ability to handle dentally anxious patients*	27-98 (74.3)

Values are given as *n* (%) or range (mean).  
\*On a Visual Analogue Scale (VAS).

Table 2

*Demographic characteristics of patients and their questionnaire answers*

Demographics/Questionnaire responses	Data value
Patient gender	
Male	561 (49.7)
Female	567 (50.3)
Patient age (yr)	18-99 (40.0)
Years of education	0-30 (13.5)
Modified Dental Anxiety Scale	5-25 (9.3)
Dental anxiety*	0-100 (19.0)
Confidence in handling their dental anxiety*	0-100 (67.9)

Values are given as *n* (%) or range (mean).

\*On a Visual Analogue Scale (VAS).

Table 3

*Spearman correlations ( $r_s$ ) between MDAS<sup>†</sup>, pDA-VAS<sup>‡</sup>, cDA-VAS<sup>§</sup>, patient tenseness<sup>¶</sup>, and patient's confidence in handling DA\*\**

	MDAS	pDA-VAS	cDA-VAS	Patient tenseness	Patient's confidence in handling DA
MDAS	1	0.80*	0.45*	0.40*	-0.33*
pDA-VAS		1	0.47*	0.41*	-0.38*
cDA-VAS			1	0.86*	-0.20*
Patient tenseness				1	-0.17*

\**P* < 0.001.

<sup>†</sup>Patient's Modified Dental Anxiety Scale (MDAS).

<sup>‡</sup>Patient's estimation of dental anxiety on a 100-mm Visual Analogue Scale (VAS).

<sup>§</sup>Clinician's rating of patient's dental anxiety (cDA-VAS) on a 100-mm VAS.

<sup>¶</sup>Clinician's rating of patient tenseness on a 100-mm VAS.

\*\*Patient's confidence in handling dental anxiety (DA) on a 100-mm VAS.

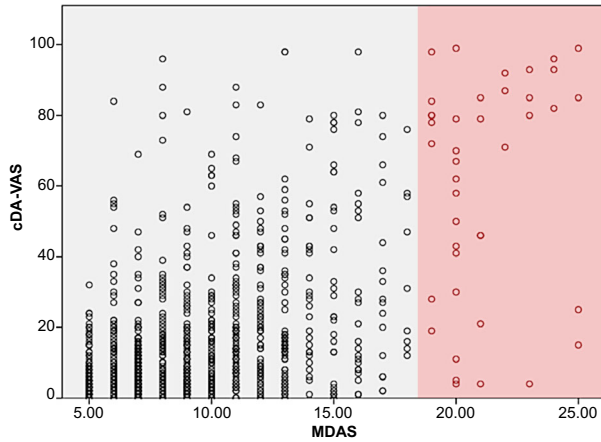


Fig. 1. Scatterplot of patients' Modified Dental Anxiety Scale (MDAS) rating versus clinicians' rating of patients' dental anxiety on a 100-mm Visual Analogue Scale (VAS) (cDA-VAS). The red zone marks highly anxious patients (MDAS ≥ 19).

ratings (cDA-VAS and patient tenseness). There was a negative correlation between all ratings of dental anxiety and the patients' rated level of confidence in handling dental anxiety.

The ages of both the patient and clinician had a synergistic impact on the correlation between cDA-VAS and MDAS (Table 4). The correlation was stronger among both older patients and older clinicians.

The correlation between cDA-VAS and MDAS was affected by the patients' confidence in handling their dental anxiety. When divided by median split into high and low patient confidence, the correlation between cDA-VAS and MDAS was 0.29 in the high-confidence group and 0.48 in the low-confidence group. When the clinicians were similarly divided into high and low confidence in handling dental anxiety, the correlation between cDA-VAS and MDAS was 0.43 in the high-confidence group and 0.48 in the low-confidence group. The clinicians' sex, years of experience, country of education, or special training in dental anxiety did not influence the correlation between cDA-VAS and MDAS, nor did the patients' level of education.

Table 4

Spearman correlations ( $r_s$ ) between MDAS<sup>†</sup> and cDA-VAS,<sup>‡</sup> according to age groups

	Young <sup>§</sup> patients 18–36 yr (n = 564)	Old <sup>§</sup> patients 36–99 yr (n = 564)
Young <sup>§</sup> dental clinicians 25–45 yr (n = 52)	0.38*	0.42*
Old <sup>§</sup> dental clinicians 46–66 yr (n = 52)	0.49*	0.51*

\* $P < 0.001$ .

<sup>†</sup>Patient's Modified Dental Anxiety Scale (MDAS).

<sup>‡</sup>Dental clinician's estimation of patient's dental anxiety (cDA-VAS) on a 100-mm Visual Analogue Scale.

<sup>§</sup>Division between young and old by median split.

The mean DA-DIFF (cDA-VAS – (MDAS – 5) × 5) was –5.87, meaning that the clinicians rated the patients' level of dental anxiety as 27% lower ( $P = 0.001$ ) than the patients themselves rated their dental anxiety. A linear regression analysis of the DA-DIFF as a function of possible influential factors (Table 5) showed that high MDAS ( $B = -2.25$ ) and clinician confidence to handle dentally anxious patients ( $B = -0.09$ ) influenced the DA-DIFF and was associated with lower estimations of the patients' dental anxiety. High age of patient ( $B = 0.06$ ) and high age of clinician ( $B = 0.18$ ), as well as the clinician being a dentist ( $B = 3.36$ ), also influenced the DA-DIFF but was associated with higher estimations of the patients' dental anxiety. A scatterplot of MDAS vs. DA-DIFF is presented in Fig. 2.

Among the 41 highly anxious patients (MDAS score ≥ 19), the correlation between the clinicians' two ratings of dental anxiety – cDA-VAS and patient tenseness – was identical to that for the entire patient sample ( $r_s = 0.86$ ). There was a weak correlation between the patients' two ratings of dental anxiety – MDAS and pDA-VAS ( $r_s = 0.32$ ) – but no correlations between any of the clinicians' and patients' ratings of dental anxiety. Among the highly anxious patients, the average DA-DIFF was –21.20, in contrast to –5.87 in the entire patient sample ( $P = 0.0001$ ). The highly anxious patients also had 27% lower confidence in their ability to handle their dental anxiety in comparison with the entire patient sample ( $P = 0.02$ ). Among the highly anxious patients, only 20% were men, while 50% of the entire group were men ( $P = 0.001$ ).

The sensitivity of the cDA-VAS to correctly identify the positive pDA-VAS was 50%, and the specificity to correctly identify the negative pDA-VAS was 96%. The cut-off point was defined as ≥ 70 mm on both scales.

Table 5

Results of linear regression analysis of the DA-DIFF\* as a function of possible influential factors

Factor	B	95% CI
Patient		
MDAS	–2.25	–2.52 to –1.99
Age (yr)	0.06	0.00 to 0.12
Male gender	–0.57	–2.58 to 1.43
Confidence in handling their dental anxiety	–0.01	–0.04 to 0.03
Years of education	<0.01	–0.31 to 0.31
Clinician		
Age (yr)	0.18	0.03 to 0.33
If a dentist	3.36	0.42 to 6.30
Confidence in ability to handle dentally anxious patients	–0.09	–0.18 to –0.01
Male gender	–2.65	–6.34 to 1.05
With special training in dental anxiety	1.99	–1.05 to 5.03
Country of education	–1.97	–5.29 to 1.35
Years of experience	–0.03	–0.20 to 0.13
Interest in dental anxiety	–0.48	–2.83 to 1.87
(Constant)	–3.4	–16.30 to 9.50

\*Clinician's rating of patient's dental anxiety (cDA-VAS) on a 100-mm Visual Analogue Scale minus the patient's Modified Dental Anxiety Scale (MDAS) score.

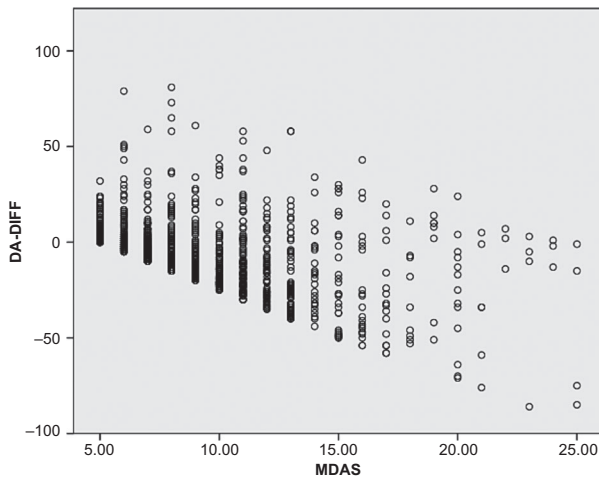


Fig. 2. Scatterplot of patients' Modified Dental Anxiety Scale (MDAS) versus the difference between clinicians' and patients' reported dental anxiety (DA-DIFF).

Among the clinicians with a special interest in dental anxiety, 90% reported having had special training in the field of dental anxiety compared with 70% among those without special interest. No significant difference in interest or training in dental anxiety could be found either between dentists or dental hygienists or between male and female clinicians.

The clinician's sex, country of education, years of experience, or special training in dental anxiety was not associated with their ability to rate dental anxiety, and the patient's level of education did not influence this.

## Discussion

The objective of the current study was to evaluate the ability of dental clinicians to rate dental anxiety in adults and to identify factors associated with the ratings. The study showed that the correlation (31) between clinician and patient assessments of the patients' dental anxiety in the entire sample group is moderate to low. Among the subgroup with high anxiety we found no correlation between the clinicians' and the patients' ratings. We also found that the mean difference between the clinicians' and patients' ratings of dental anxiety in the highly anxious group was four times larger than in the entire patient sample. This indicates that clinicians have difficulties in correctly identifying the most anxious patients, relying solely on their experience and clinical eye.

This study has several strengths. It was a large multi-centre study in which 70% of the clinicians participated. All patients underwent the same dental procedure (a dental examination) because the invasiveness of the procedure has been shown to affect the patients' level of dental anxiety (26). The strong correlation between clinicians' cDA-VAS and clinicians' ratings of patient tenseness indicates good internal consistency in the clinicians' ratings. Similarly, the validity of the patients' dental anxiety ratings is confirmed by the strong correlation between

the overall scores obtained for patients' MDAS and pDA-VAS; however, it should be noted that these scales were only moderately correlated among highly anxious patients. All results between the clinicians' and patients' dental anxiety ratings were consistent between the different dental anxiety ratings. The patients' MDAS scores in this study are similar to those observed in a recent study conducted in a clinical setting on adults in Massachusetts, USA (2), and the scores are very similar to those in a large random sample of British adults who regularly visit their dentist (15).

This study also has several limitations. Both the MDAS and VAS are short scales, making them more susceptible to random errors (e.g., by the slip of a pen or an incorrectly read question). The theoretical framework of the MDAS and the VAS has also been questioned (19). There are several more advanced rating scales for dental anxiety, yet these are all longer. To enable as many clinicians and patients as possible to participate in the study, the questionnaire had to be short and easy to answer. Both the MDAS and VAS aim to transform a patient's subjective experience of dental anxiety into an objective measure. The data generated are ordinal (rather than numerical) meaning that they can be ranked, but the distance between the rankings is non-linear. This limits the statistical analyses that can be carried out using the material.

We did not include any private practitioners, which limited the possibility to generalize the findings of the study to that group. Moreover, only 56% of the patients attending for their annual examination volunteered to participate in the study, which raises the possibility of selection bias. However, the study sample still had good gender balance and age diversity. No drop-out analysis was performed because the ethical protocol did not allow collection of data from the people who chose not to participate.

In this study, the proportion of highly anxious (MDAS  $\geq 19$ ) patients was less frequent than reported in the general population (15, 32), probably because it is uncommon for patients with high dental anxiety to visit their dentist regularly (5, 13). Although most of the clinicians in this study were female and educated in Sweden, we do not believe that this limits the generalizability of the study's findings because neither sex nor country of education had any significant association with the ability of the clinicians to rate dental anxiety in the present study. Twenty-two of the patients did not report their years of education, indicating that the question about patient education was difficult to interpret for some respondents and could have been formulated more clearly. Finally, we did not specify what was meant by 'special training in dental anxiety' and left this interpretation to the clinician.

Several studies suggest that, in a clinical setting, rating dental anxiety on a VAS is comparable with using the Dental Anxiety Scale or the MDAS (20, 22, 23). This conclusion was supported by the strong general correlation between MDAS and the pDA-VAS in the present study. However, in the highly anxious group, only a weak correlation between the patients' MDAS and

pDA-VAS was observed, indicating that this conclusion may not be valid for the high-anxiety group. Similar findings can be found in pain research, in which the VAS has been compared with other subjective pain-rating systems similar to the MDAS and found to be comparable at the lower end of the scale but to be less valid in patients with more severe pain. It has also been noted that the VAS has a higher fail rating than other scales and that there is a tendency, among users, not to use all of the scale (33).

The clinicians in this study generally rated the patients' level of dental anxiety as lower than rated by the patients themselves. In the regression model, a higher MDAS was identified as the strongest factor driving this difference, which might indicate a general tendency among clinicians to underestimate dental anxiety. To our knowledge, no previous study has evaluated the ability of clinicians to rate dental anxiety. There is, however, a similar pattern of underestimation in health care, in which there is a tendency to underestimate a patient's pain (34, 35).

The difference between the cDA-VAS and patients' MDAS was higher among younger patients in the linear regression model. In a previous study, the same factor was found to have a negative influence on the pain rating in health care, namely that the pain of younger patients was underestimated more than that of older patients (34). Higher age of both clinician and patient was associated with a better ability to rate correctly dental anxiety and a low DA-DIFF, implying that older age improves the ability both to perceive and to display dental anxiety. Interestingly, the clinicians' years of experience did not have any impact on their ability to rate dental anxiety. This implies that age in itself is the primary factor influencing the ability of clinicians to rate dental anxiety.

The dentist's DA-DIFF was smaller than the corresponding value for the dental hygienists. There was, however, no difference in correlations between the dentists' and dental hygienists' ratings of dental anxiety. This indicates that the dentists were closer than the dental hygienists to the patients' dental anxiety rating but equally scattered. BRAHM *et al.* (3) found that dentists from other countries, working in Sweden, perceived more stress and less confidence in treating patients with dental anxiety than dentists from Sweden. In our study, country of education had no association with the clinicians' ability to rate dental anxiety, which suggests that the estimation is relatively unaffected by cultural differences.

Having high confidence is usually considered to be a good thing. However, among the clinicians in this study, confidence in one's ability to handle dental anxiety had a clearly negative impact on the ability to rate dental anxiety. Perhaps high confidence makes the clinician more relaxed and less perceptive, while low confidence increases awareness of the patient's situation. It is also possible that the negative impact of high clinician confidence is a result of the so-called 'Dunning-Kruger effect', in which a cognitive bias makes people mistakenly assess their ability as greater than it is in reality (36).

The finding that patients with high confidence in their ability to handle their dental anxiety generally scored low on all dental anxiety ratings is logical, as low confidence is associated with higher anxiety (37). The difference in correlations between cDA-VAS and MDAS in the high- and low-confidence groups is hard to explain and indicates that patient confidence plays an important role that we do not yet understand, and that further research is needed to understand how patient confidence affects the clinicians' ability to rate dental anxiety.

This study evaluated the ability of dental clinicians to use their experience and clinical eye to rate the level of dental anxiety in patients. This study questions the preconception that a clinician would be able to spot highly anxious patients or that patients would inform a clinician of their high levels of dental anxiety without using patient assessment tools. The study findings indicate quite clearly that dental anxiety rating questionnaires need to be used more frequently to enable clinicians to correctly identify dentally anxious patients. Given how quick and easy the patient dental-anxiety VAS is to use and interpret, it might be suitable for use as a screening tool. When a patient reports moderate-to-high levels of dental anxiety, a more advanced questionnaire, such as Armfield's Index of Dental Anxiety and Fear (IDAF-4C<sup>+</sup>) (38), could be used to diagnose dental anxiety according to the Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> Edition (DSM-IV) and measure dental anxiety and its numerous dimensions more accurately.

In conclusion, a clinician's rating of a patient's dental anxiety was moderately correlated with the patient's own rating of dental anxiety, but the correlation was absent in the subgroup of highly dentally anxious patients. The clinician's rating of dental anxiety is better among older clinicians and older patients. The difference in dental anxiety rating between the clinician and the patient is smaller if the clinician is a dentist. Clinicians with high confidence in handling patients with dental anxiety rated a patient's level of dental anxiety as more inaccurate than did clinicians with low confidence. Based on the results from this study, we suggest the use of a patient dental anxiety VAS for screening dental anxiety among the general adult population at clinics. When a high level of dental anxiety is observed, we recommend using a more advanced questionnaire, initiating a dialogue with the patients about their fear, and investigating the need for evidence-based psychological treatments, such as cognitive behavioural treatment, for individual patients.

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