



What is the gold standard of the dental anxiety scale?

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It is important to understand patients' anxiety and fear about dental treatment. A patient's anxiety can be quantified through a self-report questionnaire, and many related scales have been developed. In this review, I tried to find out which scale is most suitable for the patient's dental anxiety and fear evaluation by examining the contents of previously developed scales and comparing the strengths and weaknesses of each scale.

Keywords: Anxiety Scale; Dental Anxiety; Dental Fear; Self Report; Surveys and Questionnaires



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INTRODUCTION

Dental anxiety and fear (DAF) can significantly lower a patient's quality of life in a number of ways. Nevertheless, the influence of this issue is often underestimated. When was DAF first recognized? The fact that nitrous oxide, known as laughing gas, was first discovered as an anesthetic by the dentist Horace Wells suggests that the history of DAF is also longstanding [1]. Dental fear has been ranked fifth among the most common fears [2].

DAF is a global issue that affects people worldwide. While there may be variations in the prevalence of DAF among different races, countries, and cultures, research papers on the same topic have been published worldwide [3]. Moreover, there are over dozens of DAF scales that have been developed to date, and they exist in various countries around the world. This signifies that a significant number of individuals are suffering from DAF,

and many dentists in each country are also concerned about addressing this issue. The degree held by dentists is referred to as Doctor of Dental Surgery (DDS). As dental treatments primarily involve surgical interventions, they can potentially trigger "needle phobia" and "blood phobia." In addition, there is a term called "dental phobia" that specifically addresses the fear of dentistry. This term emphasizes that dental anxiety is a distinct issue that dentists should never overlook or underestimate. Anxiety is a subjective experience that is difficult to quantify. However, there are three methods through which anxiety can be measured: self-report (e.g., questionnaire), physiological measures (e.g., heart rate, amount of saliva, sweat on palms), and overt behavior measures (e.g., avoiding eye contact, fidgeting) [4]. Among these methods, using a questionnaire for self-reporting anxiety measurement is strongly associated with assessing subjective experiences of anxiety and pain in patients [5].

Anxiety and fear are subjective experiences that vary in terms of intensity, severity, and the way they are

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Dental Anxiety Scale

1. If you had to go to the dentist tomorrow, how would you feel about it?
 - a) I would look forward to it as a reasonably enjoyable experience.
 - b) I wouldn't care one way or the other.
 - c) I would be a little uneasy about it.
 - d) I would be afraid that it would be unpleasant and painful.
 - e) I would be very frightened of what the dentist might do.
2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?
 - a) Relaxed.
 - b) A little uneasy.
 - c) Tense.
 - d) Anxious.
 - e) So anxious that I sometimes break out in a sweat or almost feel physically sick.
3. When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel? (Same alternatives as number 2.)
4. You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel?[8] (Same alternatives as number 2.)

Points were assigned for the subject's choices, with one point for an (a) choice to 5 points for an (e) choice.

Fig. 1. Corah Dental Anxiety Scale (DAS) [9]

expressed by individuals. Therefore, objective quantification of these experiences is not an easy task. Furthermore, anxiety itself has various characteristics, making it challenging to fully understand and comprehend [6]. As a result, numerous dental anxiety scales have been developed over time, and the process of developing such scales is still ongoing. As a dentist, understanding dental anxiety scales can be helpful in comprehending and managing patient anxiety and fear. Therefore, the goal of this review is to analyze and contrast the numerous dental anxiety scales that have been produced thus far in order to determine their strengths and weaknesses.

MATERIALS AND METHODS

1. Terms related to ((evaluation OR development OR prevalence) of) AND/OR (dental anxiety OR dental fear OR dental cognition OR dental phobia) AND/OR (scale OR survey OR questionnaire) were searched through Google Scholar. Then, related papers cited in each paper were searched sequentially.
2. Inclusion Criteria
 - The only requirement for inclusion was the

availability of an abstract written in English.

- Full text available
 - Scale for adult
 - Only for dental use
3. Exclusion Criteria
 - Scale for adolescent/children
 - Not written in the English language
 - Full text is not available
 - Not for dental use only

If possible, I attempted to find the original papers related to the development of the scales. If that was not possible or the original paper did not include the full contents of the scale, I cited other papers that included the full details of the scale.

ADULT DENTAL ANXIETY SCALE

1. Corah Dental Anxiety Scale (DAS) [7]

According to this review, the DAS developed by Corah in 1969 is the first-ever dental anxiety scale. DAS consists of 4 questions, making it easy to use [8]. The DAS is a 5-point scale that allows respondents to answer accordingly (Fig. 1). The first question asks, "How would you feel if you had to visit a dentist tomorrow?" The

possible answers are: (1) I would look forward to the visit. (2) I would not care one way or the other. (3) I would be slightly uncomfortable. (4) I would be quite uncomfortable and fearful of the pain. (5) I would be extremely fearful of what the dentist might do. (5) The higher the score, the higher the dental anxiety level can be considered. The second, third, and fourth questions inquire about the respondents' feelings during different situations related to dental visits. These situations include waiting in the dental office on the day of the appointment, just before the dentist starts using the dental drill, and when the dentist is preparing to do scaling. The possible answers to these questions are: "I feel comfortable." (1), "I feel slightly uncomfortable." (2), "I feel tense." (3), "I feel anxious." (4), and "I feel extremely anxious to the point of sweating or feeling actual physical discomfort." (5). As with the first question, higher scores indicate higher levels of dental anxiety. The total dental anxiety score is calculated by summing up the scores from the four questions. The scores range from 4 to 20, and the patient's level of anxiety is quantified as follows: a total score of 4 indicates "no fear", a score between 5 and 8 corresponds to "low fear", a score between 9 and 14 indicates "moderate fear", and a score between 15 and 20 corresponds to "high fear" [9]. These scores help evaluate the level of dental anxiety experienced by the patient. As a father of dental anxiety scale, DAS is considered the benchmark for dental anxiety scales and serves as the most appropriate reference for newly developed scales. While it has faced criticism in some studies, it continues to be widely cited as the standard for dental anxiety assessment [10]. In fact, numerous research papers compare correlation coefficients with this scale when introducing newly created scales. There are indeed several criticisms regarding the disadvantages of the DAS. First, it lacks content related to an important aspect of dental treatment, which is local anesthesia injection. Secondly, the content used in questions 2, 3, and 4 includes some items that pertain to emotional states (such as "relaxed" or "anxious") and others related to physical reactions (such as "tight," "break out in a sweat

Modified Dental Anxiety Scale	
1. If you went to your dentist for TREATMENT TOMORROW, how would you feel?	
Not anxious	<input type="checkbox"/> = [1]
Slightly anxious	<input type="checkbox"/> = [2]
Fairly anxious	<input type="checkbox"/> = [3]
Very anxious	<input type="checkbox"/> = [4]
Extremely anxious	<input type="checkbox"/> = [5]
2. If you were sitting in the WAITING ROOM (waiting for the treatment), how would you feel?	
Not anxious	<input type="checkbox"/> = [1]
Slightly anxious	<input type="checkbox"/> = [2]
Fairly anxious	<input type="checkbox"/> = [3]
Very anxious	<input type="checkbox"/> = [4]
Extremely anxious	<input type="checkbox"/> = [5]
3. If you were about to have your TEETH DRILLED, how would you feel?	
Not anxious	<input type="checkbox"/> = [1]
Slightly anxious	<input type="checkbox"/> = [2]
Fairly anxious	<input type="checkbox"/> = [3]
Very anxious	<input type="checkbox"/> = [4]
Extremely anxious	<input type="checkbox"/> = [5]
4. If you were about to have your TEETH SCALED AND POLISHED, how would you feel?	
Not anxious	<input type="checkbox"/> = [1]
Slightly anxious	<input type="checkbox"/> = [2]
Fairly anxious	<input type="checkbox"/> = [3]
Very anxious	<input type="checkbox"/> = [4]
Extremely anxious	<input type="checkbox"/> = [5]
5. If you were about to have a LOCAL ANAESTHETIC INJECTION in your gum, above an upper back tooth, how would you feel?	
Not anxious	<input type="checkbox"/> = [1]
Slightly anxious	<input type="checkbox"/> = [2]
Fairly anxious	<input type="checkbox"/> = [3]
Very anxious	<input type="checkbox"/> = [4]
Extremely anxious	<input type="checkbox"/> = [5]

Fig. 2. Modified Dental Anxiety Scale (MDAS) [8]

or feel physically sick"). As a result, the scale's content is not monodimensional, meaning it doesn't measure dental anxiety along a single consistent dimension [6]. Third, DAS was not able to detect the effect of the dentist-patient relations on dental anxiety [11].

2. Modified Dental Anxiety Scale (MDAS) [12]

In 1995, 26 years after the development of DAS, the MDAS was created by Humphris et al. from the United Kingdom (Fig. 2). MDAS differs from DAS in two main aspects [8]. Firstly, it includes an additional question that asks about the patient's feelings just before receiving a "local anesthetic injection," making five questions.

Gale's Ranking Questionnaire (RQ)
Situation
Dentist is pulling your tooth
Dentist is drilling your tooth
Dentist tells you that you have bad teeth
Dentist holds the syringe and needle in front of you
Dentist is giving you a shot
Have a probe placed in a cavity
Dentist laughs as he looks in your mouth
Dentist squirts air into a cavity
Sitting in the dentist's waiting room
Dentist is laying out his instruments
Nurse tells you it is your turn
Getting in the dentist's chair
Dentist is putting in the filling
Thinking about going to the dentist
Dentist cleans your teeth with steel probe
Getting in your car to go to the dentist
Dentist looks at your chart
Dentist places cotton in your mouth
Calling a dentist to make an appointment
Dental assistant places a bib on you
Dentist squirts water in your mouth
Making another appointment with the nurse
Dentist is cleaning your teeth
Dentist asks you to rinse your mouth
Dentist tells you he is through

Fig. 3. Gale's Ranking Questionnaire (RQ) [13]

Secondly, the content of the response options was changed to assess the degree of anxiety (not anxious(1), slightly anxious(2), fairly anxious(3), very anxious(4), extremely anxious(5)), applying the same response options for all questions, which is often seen as an improvement over the DAS, where different types of responses were used for each question, which is considered a weakness of DAS. The scores are calculated in the same manner as DAS, by summing up the responses, resulting in a distribution of 5 to 25 points. Higher scores indicate higher levels of anxiety.

3. Gale's Ranking Questionnaire (RQ) [13]

The RQ, developed by Gale in the United States in 1972, consists of 29 items divided into three parts (Fig. 3). The first part includes three questions related to demographic variables (sex, age, and number of dental visits). The second part involves a single question where the patient rates the level of fear experienced when visiting the dentist, ranging from 1 (no fear) to 7 (terror).

Avoidance of dentistry
(1. Never . . . 5. Often)
1. Have avoided calling for appointment
2. Have canceled or not appeared
Felt physiological responses
(1. None . . . 5. Great)
3. Muscles become tense
4. Breathing increases
5. Perspiration increases
6. Nausea
7. Heart rate increases
8. Mouth salivates
Fearfulness of stimuli
(1. None . . . 5. Great)
9. Making an appointment
10. Approaching office
11. Waiting room
12. Dental chair
13. Smell of office
14. Seeing dentist
15. Seeing needle
16. Feeling needle
17. Seeing drill
18. Hearing drill
19. Feeling drill
20. Feeling as if you will gag
21. Having teeth cleaned
22. Feeling pain even after anesthetic injection
23. Generally how fearful are you of dentistry
How fearful were your:
24. Mother
25. Father
26. Brothers and sisters
27. Childhood friends

Fig. 4. Dental Fear Survey (DFS) [14]

The last part instructs the patient to rank 25 dental situations in order of their perceived fearfulness. Through this study, Gale divided the patients into a low-fear group and a high-fear group based on the responses in the second part. In the third part, the study aimed to compare the priorities of anxiety-inducing situations between the two groups. However, the results indicated that regardless of the patient's baseline anxiety levels, the prioritization of anxiety-inducing dental situations was similar for both groups.

4. Dental Fear Survey (DFS) [14]

The DFS, developed in 1973, comprises 27 items (Fig. 4). The DFS, which consists of a total of 4 parts, is designed to assess dental phobia and related behaviors in patients. The first part includes two questions that focus

1. Has fear of dental work ever caused you to put off making an appointment?					
	1	2	3	4	5
	Never	Once or twice	A few times	Often	Nealy every time
2. Has fear of dental work ever caused you to cancel or not appear for an appointment?					
	1	2	3	4	5
	Never	Once or twice	A few times	Often	Nealy every time
When having dental work done:					
3. My muscles become tense...					
	1	2	3	4	5
	Never	Once or twice	A few times	Often	Nealy every time
4. My breathing rate increases...					
	1	2	3	4	5
	Never	Once or twice	A few times	Often	Nealy every time
5. I perspire...					
	1	2	3	4	5
	Never	Once or twice	A few times	Often	Nealy every time
6. I feel nauseated and sick to my stomach					
	1	2	3	4	5
	Never	Once or twice	A few times	Often	Nealy every time
7. My heart beats faster...					
	1	2	3	4	5
	Never	Once or twice	A few times	Often	Nealy every time
	1	2	3	4	5
	None at all	A little	Some-what	Much	Very much
8. Making an appointment for dentistry...					
9. Approaching the dentist's office...					
10. Sitting in the waiting room...					
11. Being seated in the dental chair					
12. The smell of the dentist's office					
13. Seeing the dentist walk in...					
14. Seeing the anesthetic needle...					
15. Feeling the needle injected...					
16. Seeing the drill...					
17. Hearing the drill...					
18. Feeling the vibrations of the drill...					
19. Having your teeth cleaned...					
20. All things considered, how fearful are you of having dental work done?					

Fig. 5. Modified Dental Fear Survey (MDFS) [38]

on the avoidance behavior of patients with dental phobia. The first question evaluates the extent to which the patient avoids making appointments for dental treatment or cancels them, with responses rated from 1 (never) to 5 (often). The second question assesses whether the patient has ever skipped a dental appointment, also rated from 1 to 5. The second part comprises six questions regarding somatic reactions to anxiety, evaluating muscle tension, increased respiration, sweating, nausea, increased heart rate, and increased salivation on a scale from 1 (none)

to 5 (great). The third part inquires about the level of anxiety regarding potential stimuli at the dental clinic and consists of 15 questions. These questions explore anxiety levels during various dental situations, such as making appointments, waiting in the waiting room, sitting in the dental chair, smelling the dental odor, and hearing the sound of the dental drill. The response options are similar to those in the second part. The last part of the DFS asks about the anxiety level of the patient's parents, friends, and people around them. The disadvantages of DFS are,

Dental State Anxiety Scale (DSAS)			
Below are a number of statements that people have used to describe themselves while they are at the dentist. Read each statement and then blacken in the appropriate circle on your answer sheet to indicate how you feel at the dentist's office.			
Use this scale: 1 - Not at all			
2 - Somewhat			
3 - Moderately so			
4 - Very much so			
1.	While at the dentist I feel calm	1	2 3 4
2.	While at the dentist I feel secur	1	2 3 4
3.	While at the dentist I am tense	1	2 3 4
4.	While at the dentist I am regretful	1	2 3 4
5.	While at the dentist I feel at ease	1	2 3 4
6.	While at the dentist I feel upset	1	2 3 4
7.	While at the dentist I worry over possible misfortunes	1	2 3 4
8.	While at the dentist I feel rested	1	2 3 4
9.	While at the dentist I feel anxious	1	2 3 4
10.	While at the dentist I feel comfortable	1	2 3 4
11.	While at the dentist I feel self-confident	1	2 3 4
12.	While at the dentist I feel nervous	1	2 3 4
13.	While at the dentist I am jittery	1	2 3 4
14.	While at the dentist I feel "high-strung"	1	2 3 4
15.	While at the dentist I am relaxed	1	2 3 4
16.	While at the dentist I feel content	1	2 3 4
17.	While at the dentist I am worried	1	2 3 4
18.	While at the dentist I feel over-excited and "rattled"	1	2 3 4
19.	While at the dentist I feel joyful	1	2 3 4
20.	While at the dentist I feel pleasant	1	2 3 4

Fig. 6. Dental State Anxiety Scale (DSAS) [17]

Getz's Dental Belief Survey (DBS)		
Items	Main content	
1	Dentists don't like a request	Five-point response scale 1 (highly positive beliefs) 2 3 4 5 (highly negative beliefs)
2	Feel rushed	
3	No clear explanations	
4	Dentists do not really listen	
5	Do what he wants to do no matter what I say	
6	Make me feel guilty	
7	Not sure I can believe what dentist says	
8	Say things to try and fool me	
9	Do not take my worries seriously	
10	Put me down	
11	Worry dentists are technically competent	
12	If it hurts, don't think dentist will stop	
13	Don't feel I can stop for rest	
14	Don't feel comfortable asking questions	
15	Thought of hearing news keeps me avoiding treatment	

Fig. 7. Getz's Dental Belief Survey (DBS) [20]

firstly, that it has an uneven structure. In the questionnaire, there are 2 questions on behavioral response (dental avoidance) and 5 questions on physiological response, but there are no questions on cognitive response and emotional response types [15]. Secondly, it excludes items related to the dentist's remarks and the interaction between the dentist and patient [6].

5. Modified Dental Fear Survey (MDFS) [16]

In 1984, the DFS was modified to include 20 items (Fig. 5). The part that asked about the anxiety level of the patient's acquaintances was removed. In the second part, one question related to salivation was deleted from the section that inquired about somatic reactions. In the

Revised Dental Belief Survey (DBS-R)		
Items	Main content	
1	I am concerned that dentists recommend work that is not really needed	Five-point response scale 1 (highly positive beliefs) 2 3 4 5 (highly negative beliefs)
2	I believe dentists say/do things to withhold information from me	
3	I worry if the dentist is technically competent and is doing quality work	
4	I have had dentists say one thing and do another	
5	I am concerned that dentists provide all the information I need to make good decisions	
6	Dentists don't seem to care that patients sometimes need a rest	
7	I've had dentists seem reluctant to correct work unsatisfactory to me	
8	When a dentist seems in a hurry I worry that I'm not getting good care	
9	I am concerned that the dentist is not really looking out for my best interests	
10	Dentists focus too much on getting the job done and not enough on the patient's comfort	
11	I'm concerned that dentists might not be skilled enough to deal with my fear or dental problems	
12	I feel dentists do not provide clear explanations	
13	I am concerned that dentists do not like to take the time to really talk to patients	
14	I feel uncomfortable asking questions	
15	Dental professionals say things to make me feel guilty about the way I care for my teeth	
16	I am concerned that dentists will not take my worries (fears) about dentistry seriously	
17	I am concerned that dentists will put me down (make light of my fears)	
18	I am concerned that dentists do not like it when a patient makes request	
19	I am concerned that dental personnel will embarrass me over the condition of my teeth	
20	I believe that dentists don't have enough empathy for what it is really like to be a patient	
21	When I am in the chair I don't feel like I can stop the appointment for a rest if I feel the need	
22	Dentists don't seem to notice that patients sometimes need a rest	
23	Once I am in the chair I feel helpless (that things are out of my control)	
24	If I were to indicate that it hurts, I think that the dentist would be reluctant to stop and try to correct the problem	
25	I have had dentists not believe me when I said I felt pain	
26	Dentists often seem in a hurry, so I feel rushed	
27	I am concerned that the dentist will do what he wants and not really listen to me while I'm in the chair	
28	Being overwhelmed by the amount of work needed (all the bad news) could be enough to keep me from beginning or completing treatment	

Fig. 8. Revised version of Dental Belief Survey (DBS-R) [45]

third part, two questions regarding the feeling of possible vomiting and experiencing pain even after anesthesia were removed.

6. Dental State Anxiety Scale (DSAS) [17]

Developed in 1982, the DSAS is a modification of the State-Trait Anxiety Inventory (STAI), a widely used psychological tool to assess general anxiety levels in patients (Fig. 6) [18]. DSAS is tailored to evaluate anxiety specifically in dental situations. It comprises a total of 20 questions, and respondents provide answers on a scale of 1 (not at all), 2 (somewhat), 3 (moderately so), or 4 (very much so). The questions focus on how the patient feels while being at the dental clinic, including emotions such as feeling calm, secure, tense, regretful, and so on.

7. Getz's Dental Belief Survey (DBS) [19]

The original version of the DBS, developed in 1985,

consists of 15 questions (Fig. 7). The main focus is to assess how patients perceive the way dental treatment is provided by the dentist [20]. The DBS is divided into four main parts, each addressing different aspects of the patient's perceptions [21]. The first part focuses on communication-related content (Item nos. 1, 3, 4, 14, and 15), evaluating how patients perceive their communication with the dentist. The second part assesses the level of trust patients have in their dentist (Item nos. 7 and 8). The third part explores the content of belittlement or fear of negative information (Item nos. 6, 9, and 11). Lastly, the fourth part examines the feeling of a lack of control (Item nos. 5, 12, and 13) that patients may experience. The responses are rated on a scale from 1 (indicating highly positive beliefs) to 5 (reflecting highly negative beliefs).

Dental Anxiety Inventory (DAI)				
1-----	-----2-----	-----3-----	-----4-----	-----5
Totally untrue	Hardly true	Partly true	Quite true	Completely true
1. I become nervous when the dentist invites me to sit down in the chair.				
2. I need to go to the toilet more often when I sit in the waiting room thinking that the dentist will say my teeth look bad.				
3. When I'm on my way to the dentist and thinking about the anaesthetic, I would rather go back.				
4. I sleep badly when I think about having to make an appointment with the dentist.				
5. When I lie back in the dentist's chair, I think about never coming back again.				
6. When I know the dentist is going to extract a tooth, I am already afraid in the waiting room.				
7. When I think of the sound of the drilling machine on my way to the dentist, I would rather go back.				
8. I already feel uncomfortable at home when I think that the dentist will make a remark about my teeth.				
9. When the dentist is about to give me an anaesthetic, I cling to the arms of the chair.				
10. I become afraid in the waiting room when I hear sounds coming from the dentist's surgery.				
11. On my way to the dentist, I sweat or freeze at the thought that the dentist will say I brush my teeth badly.				
12. When I think of the moment when the dentist blows air into a cavity, I would like to cancel the appointment.				
13. When the dentist looks into my mouth, my breathing becomes faster.				
14. I want to walk out of the waiting room the moment I think the dentist will not explain what she/he is going to do in my mouth.				
15. On my way to the dentist, I feel nervous when I know my teeth will be scaled.				
16. I postpone making an appointment with the dentist as long as I can.				
17. I feel uncertain when discussing the treatment of my teeth with the dentist.				
18. When I am in the waiting room knowing the dentist is going to scale my teeth, I am unable to concentrate on a magazine.				
19. When I am on my way to the dentist and think of the smell in the dental practice, I feel uncomfortable.				
20. Before going to the dentist, I get palpitations when I think of how the dentist will be displeased at my teeth.				
21. As soon as the dentist gets his/her needle ready for the anaesthetic, I shut my eyes tight.				
22. In the waiting room, I sweat or freeze when I think of sitting down in the dentist's chair.				
23. When I am on my way to the dentist and think that she/he will say my teeth look bad, then I want to go home again.				
24. I already feel nervous at home when I know the dentist is going to give me an anaesthetic.				
25. When the dentist's chair reclines backwards, I tell myself that the treatment will not take long.				
26. In the waiting room, I feel nervous at the thought that the dentist will say my teeth are badly brushed.				
27. On my way to the dentist, I get anxious at the thought that she/he will have to drill.				
28. I already feel uncertain at home thinking of the moment when the dentist will look into my mouth.				
29. When I am sitting in the dentist's chair not knowing what is going on in my mouth, I break into a cold sweat.				
30. When I am sitting in the waiting room and thinking about the checkup, I would prefer to go home.				
31. When I am on my way to the dentist and I imagine his/her instruments, my hands become clammy.				
32. I think about cancelling the appointment if I suspect the dentist will be displeased at my teeth.				
33. I become nervous when the dentist is about to start checking my teeth.				
34. When I'm waiting for the dentist's assistant to call me in, I try to think of something else.				
35. On my way to the dentist, the idea of being in the chair already makes me nervous.				
36. I sleep badly the night before I have to have a tooth extracted.				

Fig. 9. Dental Anxiety Inventory (DAI) [46]

8. Revised version of Dental Belief Survey (DBS-R) [22]

Ten years after the development of DBS, the authors added 13 items to the original DBS and categorized them into three groups (Fig. 8). The first group, items 1 to 11, focused on content related to professionalism or ethics. The second group, items 12 to 20, addressed communication, and the third group, items 21 to 28, pertained to the feeling of control. However, the modified version, known as DBS-R, was rarely used [21]. The response system employed a five-point response scale, similar to the one used in DBS.

9. Dental Anxiety Inventory (DAI) [6]

The DAI, developed in the Netherlands in 1993,

categorizes patients' anxiety into three main aspects: time, situation, and response (Fig. 9). Under the time aspect, anxiety is assessed in four phases: at home, on the way to the dental clinic, in the waiting room, and the dental chair. The situation aspect is divided into three categories: when dental anxiety starts, during interactions with the dentist, and during actual dental treatment. The response aspect comprises emotional, physiological, and cognitive responses. To create a comprehensive assessment, 36 questions were formulated by combining one question from each aspect: time (4) x situation (3) x response (3). Responses were collected using a 5-point likert-type scale, with "complete disagreement" scored as 1 and "complete agreement" scored as 5. The overall level of

Short Dental Anxiety Inventory (SDAI)				
Instructions				
This questionnaire consists of nine statements that are related to the dentist. Would you please indicate for each statement to what extent it applies to you personally?				
You may not have been in the given situation before. In that case, please try to imagine the situation as best as you can and indicate what your reaction would be. Indicate for each statement the number belonging to the answer which matches your feelings best.				
1-----	-----2-----	-----3-----	-----4-----	-----5
Totally untrue	Hardly true	Partly true	Quite true	Completely true
1. I become nervous when the dentist invites me to sit down in the chair.				1-2-3-4-5
2. When I know the dentist is going to extract a tooth I am already afraid in the waiting room.				1-2-3-4-5
3. When I think of the sound of the drilling machine on my way to the dentist, I would rather go back.				1-2-3-4-5
4. I want to walk out of the waiting room the moment I think the dentist will not explain what she is going to do in my mouth.				1-2-3-4-5
5. As soon as the dentist gets his/her needle ready for the anaesthetic, I shut my eyes tight.				1-2-3-4-5
6. In the waiting room, I sweat or freeze when I think of sitting down in the dentist's chair.				1-2-3-4-5
7. On my way to the dentist, I get anxious at the thought that she will have to drill.				1-2-3-4-5
8. When I am sitting in the dentist's chair not knowing what is going on in my mouth, I break in a cold sweat.				1-2-3-4-5
9. On my way to the dentist, the idea of being in the chair already makes me nervous.				1-2-3-4-5

Fig. 10. Shortened version of Dental Anxiety Inventory (SDAI) [6]

Dental Cognitions Questionnaire (DCQ)	
Beliefs about oneself and dentistry in general	
1. Dentists do as they please	8. My teeth can't be saved
2. Dentists are often impatient	9. I should be ashamed about my teeth
3. The dentist does not care if it hurts	10. My teeth might break
4. Dentists do not understand you	11. I can't stand pain
5. Dentists are often incapable	12. I am a tense person
6. Dentists think you act childish	13. I am a difficult person
7. Treatments often fail	14. I am someone with very long roots
Self-statements during treatment	
15. Everything goes wrong	27. have no control over what happens
16. This treatment will hurt	28. will die during treatment
17. My teeth will break	29. will panic during treatment
18. Something surely will go wrong	30. will faint during treatment
19. It never runs smoothly	31. will suffocate during treatment
20. I am helpless	32. can't stand this treatment for long
21. I can't control myself	33. will certainly have pain afterwards
22. I can't escape, I'm locked in	34. The filling will certainly fall out and has to be made again
23. Anaesthetics often do not work	35. This treatment fails
24. The sound of the drill frightens me	36. I become sick
25. The dentist will drill in my tongue, gums or cheek	37. The dentist will lose control over his drill
26. The nerve will be touched	38. The dentist believes that I am a difficult patient and act childish

Fig. 11. Dental Cognitions Questionnaire (DCQ) [2]

anxiety was evaluated by summing the scores. One drawback of the 36-item DAI is its length, which may make it less suitable for clinical applications [6]. Therefore, shortened versions of the DAI have also been developed to address this limitation.

10. The shortened version of Dental Anxiety Inventory (SDAI) [23]

The SDAI was developed to overcome the limitations

of the DAI, making it more suitable for clinical applications (Fig. 10). The SDAI reduces the time aspect to three phases and consists of 9 questions. Like the DAI, the responses in SDAI are collected using a 5-point likert scale. The total score ranges from 9 to 45 points. The interpretation of SDAI scores is as follows: scores of 9 to 10 indicate minimal dental anxiety, 11 to 19 suggest mild anxiety in specific situations, 20 to 27 imply moderate anxiety with some self-control, and 28 to 36

Hierarchical Anxiety Questionnaire (HAQ)					
	Relaxed (1)	Nervous (2)	Tense (3)	Anxious (4)	Nauseous from anxiety (5)
How do you feel when you imagine you have to go to the dentist tomorrow?					
You are sitting in the waiting room and are waiting to be called. How do you feel?					
Imagine you are entering the room where treatment will be provided and you can smell the typical odours.					
You are lying in the dentist's chair and the dentist enters the room.					
You and your dentist are looking at the X-rays and discussing what work needs to be done.					
How do you feel when your dentist tells you that he or she will now clean the tartar off your teeth?					
The dentist tells you that you have a cavity and that he or she will now treat it.					
The dentist changes the position of your chair and prepares an injection.					
Imagine you hear the typical sound of a dentist's drill. How do you feel?					
The dentist tells you that the cavity is too deep and the tooth must be removed.					
One of your wisdom teeth is to be removed; the injection has already been given. The dentist picks up the scalpel.					

Fig. 12. Hierarchical Anxiety Questionnaire (HAQ) [26]

signify severe dental anxiety, making regular treatment challenging. The correlation coefficient between DAI and SDAI was found to be high, indicating a strong relationship between the two scales ($r = .90$) [23].

11. Photo Anxiety Questionnaire (PAQ) [24]

The PAQ involves choosing one of five facial expressions (1 = relaxed to 5 = very anxious) from pictures depicting ten different situations along the timeline from one month before dental treatment to the moment treatment ends. The total score ranges from 10 to 50, and the distinctive feature is the use of pictures instead of written items for evaluation.

12. Dental Cognitions Questionnaire (DCQ) [2]

Developed in the Netherlands in 1995, the DCQ comprises 38 questions related to negative perceptions of dentists and dental care (Fig. 11). Patients respond with "Yes" (scored as 1) if they agree with the negative perception or "No" (scored as 0) if they disagree. The total score ranges from 0 to 38. Additionally, patients are asked to rate the degree of belief in each question on

a scale from 0% (I don't believe this thought at all) to 100% (I am absolutely convinced that this thought is true).

13. Hierarchical Anxiety Questionnaire (HAQ in German HAF) [25]

The HAQ, developed in Germany in 1999, consists of a total of 11 questions, including six situations commonly known to induce anxiety in dental settings (Fig. 12). It has been in used to diagnose anxiety and to differentiate between anxiety and phobia. Each question is answered on a scale from "relaxed" (1 point) to "nauseous from anxiety" (5 points), and the anxiety level is calculated by summing up the scores. Participants with scores of 30 or below are categorized as having low anxiety, those with scores between 31 and 38 have a moderate level of anxiety, and those with scores of 38 or above are classified as having high anxiety. Additionally, individuals with scores of 38 or above, who have also avoided dental treatment for more than two years, are diagnosed with dental phobia [26].

Fear of Dental Pain Questionnaire (FDPQ)	
Instruction: The items listed below describe painful dental experiences. Please look at each item and think about how FEARFUL you are of experiencing the PAIN associated with each item. If you have never experienced the PAIN of a particular item, please answer on the basis of how FEARFUL you expect you would be if you had such an experience. Circle one rating per item to rate your FEAR OF PAIN in relation to each event.	
Item no.	Translation item
1	Receiving an anesthetic in the mouth
2	Having some gum burned away
3	The dentist's hook that gets stuck behind a filling
4	Having a lump cut open in the mouth
5	The filling of a molar
6	Receiving a root canal treatment
7	Having a tooth pulled
8	A cold sensation in the mouth close to a cavity
9	An incision in the gums
10	An old filling that's being removed
11	Being drilled in the jawbone
12	Being drilled in a tooth
13	A cavity that's being explored with the dentist's hook
14	Receiving an injection in the roof of the mouth
15	Bracelets that are being tightened
16	Having a wisdom tooth extracted
17	A severe toothache.
18	A cavity that's being excavated with a rude drill

Fig. 13. Fear of Dental Pain Questionnaire (FDPQ) [27]

Short Fear of Dental Pain Questionnaire (s-FDPQ)	
Instruction: The items listed below describe possibly painful dental procedures. Please look at each item carefully and think about how FEARFUL you are of experiencing the PAIN associated with each item. If you have never experienced the PAIN of a particular item, please answer on the basis of how FEARFUL you expect you would be if you had such an experience. Circle one number per item to rate your FEAR OF PAIN in relation to each event.	
Answer scale: 1-----2-----3-----4-----5 Not at all A little A fair amount Very much Extreme	
Please circle one number per item to rate your FEAR OF PAIN in relation to each event.	
Items	Amount of fear of pain
1. Receiving an anesthetic in the mouth	1-----2-----3-----4-----5
2. Having a tooth drilled	1-----2-----3-----4-----5
3. Receiving a root canal treatment	1-----2-----3-----4-----5
4. Having a tooth pulled	1-----2-----3-----4-----5
5. Having a wisdom tooth extracted	1-----2-----3-----4-----5

Fig. 14. Short Fear of Dental Pain Questionnaire (s-FDPQ) [29]

14. Fear of Dental Pain Questionnaire (FDPQ) [27]

The FDPQ was developed in the Netherlands in 2003 as a supplement to the FPQ-III, a general pain and fear questionnaire developed in 1998 (Fig. 13) [28]. The FDPQ aims to evaluate the relationship between pain and fear specifically related to dental situations. The FDPQ consists of 18 questions related to dental pain, and participants respond on a 5-point scale ranging from "not

at all" (1 point) to "extremely" (5 points). The score ranges from 18 to 90, focusing on fear induced by dental pain as its distinctive feature.

15. Short Fear of Dental Pain Questionnaire (s-FDPQ) [29]

The s-FDPQ, developed in 2006, is a shortened version of the FDPQ, designed for easier application in clinical and research settings, comprising five questions (Fig. 14).

Index of Dental Anxiety and Fear (IDAF-4C+)	
Variable	Item
Dental anxiety and fear (IDAF-4C, 8 questions)	I feel anxious shortly before going to the dentist. I generally avoid going to the dentist because I find the experience unpleasant or distressing. I get nervous or edgy about upcoming dental visits. I think that something really bad would happen to me if I were to visit a dentist. I feel afraid or fearful when visiting the dentist. My heart beats faster when I go to the dentist. I delay making appointments to go to the dentist. I often think about all the things that might go wrong prior to going to the dentist.
Phobia (IDAF-P, 5 questions)	Going to the dentist is actively avoided or else endured with intense fear or anxiety. My fear of going to the dentist has been present for at least 6 months. My fear, anxiety or avoidance of going to the dentist significantly affects my life in some way. I am afraid of going to the dentist because I am concerned I may have a panic attack. I am afraid of going to the dentist because I am generally highly self-conscious or concerned about being watched or judged in social situations.
Stimulus (IDAF-S, 10 questions)	Painful or uncomfortable procedures Feeling embarrassed or ashamed Not being in control of what is happening Feeling sick, queasy or disgusted Numbness caused by the anesthetic Not knowing what the dentist is going to do The cost of dental treatment Needles or injections Gagging or choking Having an unsympathetic or unkind dentist

Fig. 15. Index of Dental Anxiety and Fear (IDAF-4C+) [47]

Dental Fear and Avoidance Scale									
How would you rate your fear of dental treatment on the following scale?									
1	2	3	4	5	6	7	8	9	10
No fear				Moderate fear					Extreme fear
Rate the degree to which you avoid (for whatever reason) going to the dentist or dental hygienist?									
1	2	3	4	5	6	7	8	9	10
Do not avoid				Moderate avoidance					Extreme avoidance

Fig. 16. Dental Fear and Avoidance Scale (DFAS) [31]

Visual Analogue Scale for dental anxiety (VAS)		
Please mark your current level of anxiety or nervousness with a cross (X) on the dotted line.		
.....
Totally calm and relaxed	(100 mm)	Worst fear imaginable

Fig. 17. Visual Analogue Scale for dental anxiety (VAS) [33]

16. Index of Dental Anxiety and Fear (IDAF-4C+) [30]

Developed in Australia in 2010, the IDAF-4C+ questionnaire consists of three main parts: the dental anxiety and fear evaluation part (IDAF-4C), dental phobia part (IDAF-P), and dental stimulus part (IDAF-S) (Fig. 15). The IDAF-4C comprises eight items, the IDAF-P has five items, and the IDAF-S contains ten items, making

a total of 23 questions. For the IDAF-4C, respondents rate their agreement with each statement on a scale from "disagree" (1) to "strongly agree" (5). The IDAF-P requires "yes" or "no" responses, while the IDAF-S uses a 5-point response scale ranging from "not at all" (1) to "very much" (5). The IDAF-4C can be used independently and covers emotional, behavioral, physical, and cognitive anxiety-related reactions.

17. Dental Fear and Avoidance Scale (DFAS) [31]

Developed in Canada in 2011, the DFAS consists of two questions (Fig. 16). The first question assesses an individual's fear of dental treatment using a ten-point scale, ranging from 1 (no fear) to 10 (extreme fear). The second question evaluates the degree of avoidance of dental treatment for any reason, using a ten-point scale ranging from 1 (do not avoid) to 10 (extreme avoidance).

SINGLE-ITEM DENTAL ANXIETY SCALE

The Single-item scale can be independently developed as a scale but can also be created for one-time surveys. The first one introduced here, the Seattle Fear Survey Item (Seattle), is part of a survey developed for telephone surveys in 1988, so it cannot be considered a formally developed scale. However, it has been cited in other studies for comparison purposes; hence it is included for reference. VAS, Gatchel's 10-point fear scale, and DAQ (Dental Anxiety Question) are dental anxiety scales composed of single-item questions. Single-item question scales are commonly used in large-scale surveys due to their ease of use, but they have the drawback of potentially being perceived as ambiguous by patients, and their interpretations can also be somewhat unclear [16]. In addition, there is a limitation that the patient's response may vary depending on the situation or time.

1. Seattle fear survey item (Seattle, US) [32]

In the 1988 US telephone survey, participants were asked the question, "How do you rate your own feelings toward dental treatment?" and were given a 5-point scale to respond, ranging from 1 (not at all afraid) to 5 (terrified). Those who answered somewhat afraid/very afraid/terrified were classified as the high-fear group, while those who answered not at all afraid/a little afraid were classified as the low-fear group.

2. Visual Analogue Scale for dental anxiety (VAS) (Fig. 17) [33]

Original VAS is a method that has been used since the 1920s to quantify a patient's pain [34]. To measure dental anxiety using VAS, the question was modified to "Please mark your current level of anxiety or nervousness with a cross (X) on the dotted line." VAS is easy to use but has the drawback of unreliable reproducibility over time [35]. However, it can be used to assess how the level of anxiety changes in evolving situations [33].

3. Gatchel's 10-point fear scale (FS) [36]

In 1989, Gatchel introduced Gatchel's 10-point fear scale, which allowed patients to self-assess their level of anxiety towards dental treatment on a 10-point dental anxiety scale. A score of 1 represented "no fear," 5 represented "moderate fear," and 10 represented "extreme fear." Patients were categorized into a low fear group (scores 1-4), a moderate fear group (scores 5-7), and a high fear group (scores 8-10).

4. Dental Anxiety Question (DAQ) [37]

In 1990, DAQ was introduced by Neverlien from Norway, which is a single-item scale that assesses dental anxiety with the question "Are you afraid of going to the dentist?" with response options: 1) No, 2) A little, 3) Yes, quite, and 4) Yes, very.

DISCUSSION

The most significant influence on a patient's subsequent behavior (such as whether or not they avoid getting dental treatment) is the patient's subjective experience of the procedure [38]. Anxiety and fear towards dentistry can stem from various factors, including general uncertainty, influence from others' experiences, and personal encounters. Dentists should not overlook the possibility that their treatment may contribute to the development of pathological dental phobia. Due to the subjective and ambiguous nature of anxiety and fear, various scales have been developed over time to assess and measure them. The nature of dental anxiety is multi-component [6].

Table 1. Dental anxiety or fear scale

Title	Year	Country	Items	Response	Scoring methods and cut off point	Characteristics	Strengths	Weaknesses
Corah Dental Anxiety Scale (DAS) [7]	1969	US	4	Five point scale	Sum (4-20) 4=no fear 5-8=low fear 9-14=moderate fear 15-20=high fear	To the best of our knowledge, it is the first scale for dental anxiety. Most commonly used internationally in dentistry.	Relatively concise evaluation method.	DAS does not address the relationship between dentists and patients with DAF. DAS does not adequately capture the multifaceted nature of DAS.
Modified Dental Anxiety Scale (MDAS) [12]	1995	UK	5	Five point scale 1=Not anxious 2=Slightly anxious 3=Fairly anxious 4=Very anxious 5=Extremely anxious	Sum (5-25)	Developed by modifying Corah's Dental Anxiety Scale (DAS)	An item assessing the patient's mood during local anesthesia was added to Corah's DAS, and the response options were simplified.	Same as DAS
Gale's Ranking Questionnaire (RQ) [13]	1972	US	29		Ranking	RQ is composed of 3 part. Parts 2 and 3 evaluate DAF. The second part is a single item, rating the patient's anxiety level, and the third part consists of 25 items. Patients are asked to rank 25 possible dental situations in order from most to least fearful.	It is meaningful in terms of identifying factors that cause anxiety in the patient.	Considering only Part 2, it is no different from a single-item scale. In Part 3, there was little difference in the ranking of dental anxiety provoking factors between the high and low dental anxiety groups. Therefore, it cannot be used to assess the patient's anxiety level.
Dental Fear Survey (DFS) [14]	1973	US	27	Five point rating 1 or 2; low fear 4 or 5; high fear			Two questions on behavioral responses (dental avoidance) and five questions on physiological responses are included in the questionnaire.	There's no items about the cognitive and affective reaction. The dentist's remarks and their relationship with patients are not included. There is no standardized instruction and no norm data is provided.
Modified Dental Fear Survey in 20 items (MDFS) [16]	1984	US	20	Five point rating		The part that asked about the anxiety level of the patient's acquaintances was removed.		
Dental state anxiety scale (DSAS) [17]	1982	US	20	Four point scale 1=not at all 4=very much		A variant of the STAI (State-Trait Anxiety Inventory) often used by psychologists to assess people's anxiety levels	Emphasis on the psychological aspect of anxiety itself	
Dental Belief Survey (DBS) [19]	1985	US	15	Five point likert scale		Focus on the anxiety evoked in relation to the dentist		
Revised version of the Dental Belief Survey (DBS-R) [22]	1995	US	28	Five point likert scale	Sum 28 (highly positive) - 140 (highly negative)	Ten years after the presentation of the DBS, the authors modified the scale and added 13 items.		However, this new version has not been used in other research centres.
Dental Anxiety Inventory (DAI) [6]	1993	Netherlands	36	Five point likert scale (1) "I totally disagree" to (5) "I totally agree"	Sum (range 36 to 180)	Facet approach -A time facet A with four elements (a1 in the dental chair>a2 in the waiting room>a3 on the way to the dentist>a4 at home) -A situation facet B with three elements (b1 introductory aspects of dental anxiety=b2 [professional] interaction between dentist and patient<b3 actual dental treatment) -A reaction facet C with three elements (c1 emotional feelings>c2 physical reactions=c3 cognitive reactions)		A drawback of the facet design is that this method leads to rather lengthy questionnaires. The DAI is therefore not primarily appropriate for dental offices.

(continued)

Title	Year	Country	Items	Response	Scoring methods and cut off point	Characteristics	Strengths	Weaknesses
Shortened version of the DAI (SDAI) [23]	1993	Netherlands	9	Five point likert scale	Sum (range 9 to 36) 9-10; patient is hardly or not at all anxious for dental treatment 11-19; patient is somewhat anxious, or experiences anxiety for only a specific aspect of the dental treatment 20-27; patient is anxious and tense, but is able to control his or her anxiety during treatment 28-36; patient is extremely anxious and unable to undergo normal dental treatment	The time facet was reduced to three levels.		
Photo Anxiety Questionnaire (PAQ) [24]	1993	Netherlands	10	Five point rating (1=relaxed to 5=very anxious)	Sum of all ratings (range 10-50)	The non-verbal response scale includes five images of different-looking people. Anxiety scores are ordered chronologically from one month prior to dental treatment to immediately following dental treatment.		
Dental Cognitions Questionnaire (DCQ) [2]	1995	Netherlands	38	yes(1)/no(0)	"Yes"-responses on the items are summed Total negative cognition score (range 0-38)	38 negative cognitions (beliefs and self-statements) concerning dental care - The first section of the questionnaire provides a list of 14 negative presumptions about the patient and dentistry in general - 24 unfavorable remarks about oneself that relate to how one thinks while receiving treatment make up the second segment.		
Hierarchical Anxiety Questionnaire (HAQ) [25]	1999	Germany	11	Five levels of anxiety -From relaxed (1 points) -To anxious to the point of feeling ill (5 points)	Sum (range 11-55) The patients are divided into three groups: - Group 1 low level of anxiety to 30 points - Group 2 medium level of anxiety from 31 to 38 points - Group 3 high level of anxiety >38 points	Primary German instrument to screen patients with anxiety or even phobia Contains six treatment situations that illustrate the circumstances that cause patients to become anxious the most frequently.		
Fear of Dental Pain Questionnaire (FDPO) [27]	2003	Netherlands	18	Five-point Likert-type scale 1. not at all 2. a little 3. a fair amount 4. very much 5. Extremely	Sum (range 18-90)	It focused on fear derived from pain-related experiences.	5-min. to complete the questionnaire	
Short Fear of Dental Pain Questionnaire (s-FDPO) [29]	2006	Netherlands	5	Five point likert scale disagree (1) to strongly agree (5)	Sum (range 5-25)			
Index of Dental Anxiety and Fear (IDAF-4C+) [30]	2010	Australia	23	Five point likert scale From disagree (1) to strongly agree (5)		Contains 3 modules that measure DAF, dental phobia, and feared dental stimuli - 'C' for four components: emotional, behavioral, physiological, and cognitive - '++' for the added modules: phobia (IDAF-P) and stimulus (IDAF-S) modules		

(continued)

Title	Year	Country	Items	Response	Scoring methods and cut off point	Characteristics	Strengths	Weaknesses
Dental Fear and Avoidance scale (DFAS) [31]	2011	Canada	2	Ten point rating scale 1 (no fear/avoidance) 5 (moderate fear/avoidance) 10 (extreme fear/avoidance)	Subjects who scored 4 or less out of 10 ; low or normal level of fear or avoidance Scores of 5 or higher reflected individuals with moderate to extreme anxiety, corresponding to a clinically significant level of dental anxiety	Designed to assess both cognitive and behavioural dimensions of dental anxiety to distinguish individuals with normal anxiety from those with a pathological or clinically significant level of dental anxiety.	Simple, easy to administer screening tool that asks subjects to separately rate their degree of fear and avoidance related to dental treatment	
Single item								
Visual analog scale (VAS) for dental anxiety [33]	1988	US	1	10 centimeter	Left end means "totally calm and relaxed" Right end means "Worst fear imaginable"		Single-item surveys were employed in surveys aimed at large populations primarily for the convenience of research.	It can only convey the whole feeling of dental anxiety or one specific component.
Seattle fear survey item (Seattle) [32]	1988	US	1	Five point scale - Not at all afraid - A little afraid - Somewhat afraid - Very afraid - Terrified	High-fear category - Somewhat afraid - Very afraid - Terrified Low-fear category - Not at all afraid - A little afraid			
Gatchel's 10-Point Fear Scale (FS) [36]	1989	US	1	Ten point scale 1 represented "nofear" 5 represented "moderate fear" 10 represented "extreme fear"	1-4 = low fear 5-7 = moderate fear 8-10 = high fear			
Single-item Dental Anxiety Question (DAQ) [37]	1990	Norway	1	Four alternative answers	1 No 2 A little 3 Yes, quite 4 Yes, very			

When researching the history of dentistry, we can easily find numerous pictures that depict dentists as devils or portray the fear associated with dental treatment even before the academic development of dentistry [39]. Through these images, we can understand that patients already had a significant fear of dental treatment even before dental anxiety was quantified. This can be attributed to various factors that acted in combination, such as pain, the proximity of the oral cavity to the head, the visual fear associated with metallic instruments, the enduring auditory fear throughout the treatment, and the tactile discomfort when instruments touch the teeth.

According to this review, the development of dental anxiety scales has been ongoing since 1969 and continues to the present day (Table 1). Before conducting a review of the numerous DAF scales, I believed that there was no perfect scale and, therefore, no definitive scale that

could be considered the "right" answer. However, upon gathering and examining all the scales in one place, I came to the realization that each scale approaches DAF with its own set of criteria and perspectives. This is fundamentally because DAF is an intangible concept, which cannot be easily grasped or measured directly. As a result, it takes on a multicomponent nature, as it is expressed in various ways and through different components. In other words, DSAS aimed to understand DAF based on the patient's sensations and experiences, while DBS focused on the doctor-patient relationship. DCQ placed greater emphasis on the cognitive aspects related to dentistry, and FDPQ concentrated on the fear induced by pain. HAQ primarily focused on situations known to trigger DAF in dentistry. Of course, there are also scales that aim to comprehensively evaluate the multicomponent aspects of DAF. Despite some limi-

tations, DAS, which is widely cited today, also aims to understand DAF from multiple angles. Similarly, DAI considered temporal aspects, situational aspects, and reactive aspects in order to understand DAF. In the case of DFS, it aimed to assess various aspects related to DAF in patients. This includes behavioral aspects such as avoidance, which is commonly observed in highly anxious patients. Additionally, DFS evaluated the physiological changes associated with anxiety and identified the dental stimuli that trigger these changes. IDAF-4C also comprehensively assesses emotional, physiological, behavioral, and cognitive changes triggered by anxiety. It includes separate sections to provide additional evaluation for patients displaying dental phobia (IDAF-P) and for assessing dental stimuli that induce DAF (IDAF-S). The number of items in the scales varies from 1 to 38, and responses are predominantly measured using a 4-5 point likert scale. The scores for each item are aggregated to quantify the level of patient anxiety. The development of numerous dental anxiety scales can be seen as a series of processes in which dentists show interest in patients' DAF. When dentists demonstrate concern for patients' DAF, it is possible that patients' DAF may be alleviated even to some extent.

When talking about the prevalence of DAF, it cannot be denied that there are, of course, cultural and racial differences. However, it is difficult to directly compare results obtained using different measurement scales. There are studies comparing results using different scales in the same population. When the prevalence of DAF was investigated using FS and DAS among adults in large cities in Sweden, the correlation between the two was 0.81 (the same subject answered each of the two scales) [40].

The results of comparing DAS, summary item of DFS (“In general, how fearful are you of having dental work done?”), and Seattle fear survey items for Danish adults were DAS-DFS ($r_s = 0.72$), DAS-Seattle ($r_s = 0.68$), and DFS-Seattle ($r_s = 0.78$) [41]. However, 78% of respondents who answered “terrified” and “very afraid”

in the Seattle item and 95% of respondents who answered “very much” and “much” afraid in the DFS item answered DAS scores “ ≥ 15 ”. On the other hand, only 34% and 50% of those who responded “somewhat afraid” to the Seattle and DFS items, respectively, were the same as the subjects who answered DAS 14-12. These results showed somewhat different concordance according to the degree of anxiety.

In a study targeting the Toronto population in Canada, when DAS, Seattle item, and FS were compared in the same subject, Spearman rank correlation coefficients between the three measures were all high and significant. (DAS vs Seattle; 0.78, DAS vs FS; 0.77, Seattle vs FS; 0.74). However, the kappa values reveal rather low (DAS-Seattle; 0.48, DAS-FS ; 0.56, Seattle-FS ; 0.37). Therefore it was concluded that there is no gold standard of dental anxiety scale [42]. This is because the emotional/physiologic/behavioral/cognitive response of anxiety reflected in the questions for each scale is different, and as a result, patients' answers vary, which can lead to differences in prevalence [43,44].

While developing IDAF-4C+, Pearson's r correlation with DAS and single-item dental fear (asked about the amount of fear or distress that would be felt if the person were to go to a dentist now) was obtained (IDAF-DAS; 0.84, IDAF-single item; 0.57, DAS-single item; 0.58) [30].

Another problem is the criterion of the cut-off point is presented differently for each scale, and accordingly, the prevalence may be measured more or less [42]. However, dental anxiety is a continuous concept, and it is a very important issue where to place the cut-off point in a study to compare people with and without anxiety. Therefore, it is good to investigate the patient's anxiety level using multiple scales and consider whether the patient shows emotional/physiologic/behavioral/cognitive responses due to anxiety [42], among the scales developed later, all of these characteristics of anxiety are included in the scale [30]. However, some of these scales have the disadvantage of being somewhat complicated for clinical application, and a short version is also released

separately.

Although there is a difference in the prevalence calculated by each scale, if the actual clinician consistently uses a certain scale and cut-off point, there will be no great difficulty in distinguishing whether a patient has dental anxiety or not [42].

In conclusion, what is the gold standard of the dental anxiety scale? After collecting all the scales under the name of the dental anxiety scale, there were many differences between the scales. Some scales focus on the pain caused by dental procedures, others focus on the relationship between patients and dentists, and most scales focus on the clinical situation that can be experienced in dentistry. A significant part of the criticism of DAS, which has hitherto been most used in dentistry, is that it does not reflect the multicomponents of dental anxiety. From a personal point of view, it is judged that the improvement of that part is best reflected in "IDAF-C+". In addition, "IDAF-C+" is largely divided into IDAF-C (8 items), IDAF-phobia (5 items), and IDAF-stimulus (10 items). In other words, it can be appropriately divided and applied depending on the case. Therefore, despite having 23 items, the subjective feeling that the questionnaire is long is somewhat relieved.

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Seong In Chi: Conceptualization, Data curation, Investigation, Methodology, Validation, Visualization, Writing - original draft, Writing - review & editing

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