

Dental Fear: One Single Clinical Question for Measurement

S. Jaakkola^{1,2,*}, P. Rautava^{2,3}, P. Alanen⁴, M. Aromaa^{2,5}, K. Pienihäkkinen⁴, H. Räihä⁶, T. Vahlberg⁷, M.-L. Mattila^{1,2} and M. Sillanpää^{2,8}

¹Dental Healthcare Clinic and Public Health Center City of Turku, Finland; ²Department of Public Health, University of Turku, Finland; ³Turku University Hospital, Finland; ⁴Institute of Dentistry, University of Turku, Finland; ⁵Turku City Hospital, Finland; ⁶Department of Psychology, University of Turku, Finland; ⁷Department of Biostatistics, University of Turku, Finland; ⁸Department of Child Neurology, University of Turku, Finland

Abstract: A new dental fear measurement instrument, the Short Dental Fear Question (SDFQ), was developed and tested for clinical practice purposes. The correlations of the SDFQ with the Dental Anxiety Scale (DAS) and the Dental Fear Survey (DFS) were tested in 15-16-year-old adolescents. The Spearman correlations (r_s) between the dental fear measurement instruments were: SDFQ – DFS: $r_s = 0.79$, $n = 26$; DFS – DAS: $r_s = 0.72$, $n = 26$; SDFQ – DAS: $r_s = 0.69$, $n = 27$. DAS and DFS mean scores were clearly higher in the SDFQ fear group than SDFQ in the relaxed group. The SDFQ is a short and compact instrument which might be convenient for the measurement of dental fear in clinical practice.

INTRODUCTION

Generally fear is defined as an individual's response to a real threatening event or dangerous situation to protect his or her life [1]. Three different terms have been used concerning apprehension in dentistry in the literature: dental fear, dental anxiety, and dental phobia. Dental fear is considered to be aroused by a real, immediately present, specific stimulus (e.g. needles, drilling), whereas in the case of anxiety, the source of the threat is unclear, ambiguous, or not immediately present [2,3] However, an individual's emotional responses are almost the same in both situations [2].

Elements of fear can be divided into two categories: subjective (including emotions and cognitions) and objective (including behavior and physiological reactions) [1]. The patient's subjective experience of dental treatment is the most important channel for his or her later behavior (e.g. avoiding or not) with relation to dentistry. Thus, knowledge of a patient's subjective dental fear is more relevant than knowledge of his or her objective dental fear when considering the development of dental health services. Development of these services has to be based on the patient's subjective feeling, which must be respected.

Many different kinds of instruments to measure dental fear have been studied [4-7]. The best known and most used dental fear instruments, the Dental Anxiety Scale (DAS) [8,9] and the Dental Fear Survey (DFS) [10-12] ("see Appendix 1 and 2"), have been used in adults, and also in adolescents [9,11-14]. However, for clinical practice purposes, they are rather long questionnaires and their interpretation takes more of the dentist's time. The dentist needs to know about the patient's possible dental fear before the first procedure to be able to choose the best way to deal with the patient. Therefore, there is a need for a short clinical dental fear instrument.

The aim of this study was to test a short dental fear instrument for measuring adolescents' dental fear in clinical practice in terms of the general population.

SUBJECTS AND PROCEDURE

The 15-16-year-old adolescents, who were scheduled for their routine dental examination at two public dental health clinics (Turku and Piikkiö) in the study area, were the target group of the study. There were 27 adolescents coming in six weeks study period in the summer 2003. Turku and Piikkiö were chosen from a representative sample of the province's municipalities; Turku represents a city and Piikkiö a rural area. All dentists were given the same instructions. Before clinical dental examinations, the adolescents were asked to self-report their dental fear, answering a questionnaire containing the Short Dental Fear Question (SDFQ) (Table 1), the DAS [8] ("see Appendix 1 and 2"), and the DFS [10] in the dentist's waiting room and to return it in a sealed envelope to the dentist, who forwarded it to the investigator (SJ). None of the adolescents refused to answer the SDFQ, DAS or DFS.

Ethical Aspects

Before entering the present study, the adolescents and their parents were informed about the study design and the voluntariness of participation by telephone and by post. At the same time, they were also told that the treatment offered was not conditional on involvement in the study. The Ethics Committee of Hospital District of Southwest Finland approved the study design.

Dental Fear Instruments

In the present study, we use the term dental fear to include dental fear, dental anxiety and dental phobia.

A new (SDFQ) (Table 1) and two older (DAS and DFS) ("see Appendix 1 and 2") dental fear instruments were chosen for the study. The DAS and the DFS were chosen as the gold standards with which the SDFQ was compared. The SDFQ is a short clinical instrument containing one basic

*Address correspondence to this author at the Department of Public Health, 20014, Turku University, Finland; Tel: +358 2 3338435; Fax: +358 2 3338439; E-mail: sirjaa@utu.fi

Table 1. The Short Dental Fear Question (SDFQ) and Clinical Classification (“in italics”) of Patient’s Fear

Last Time you Visited your Dentist, how did it go?	
1.	I was totally relaxed during the treatment. (<i>“relaxed”</i>)
2.	I was nervous but, nevertheless, the treatment was carried out successfully. (<i>“slightly frightened”</i>)
3.	I was nervous; the treatment could only just be carried out (<i>“moderately frightened”</i>)
4.	I was so frightened and nervous that
	a) Treatment was difficult. (<i>“severely frightened”</i>)
	b) The treatment didn’t succeed. (<i>“severely frightened”</i>)
	c) I totally missed my appointment. (<i>“severely frightened”</i>)

question supplied with four response options. The options are based on gradation; in fact, here it is a 4-point Likert scale indicating that the more fear the greater the numerical value. Option 4 a, b, c describes situations in which there are many great difficulties. In options 3, 2 and 1, the degree of difficulty decreases gradually until finally it is non-existent.

From a clinical point of view, the SDFQ option 4a: “Treatment was difficult”, indicates a patient who may think “this is the most awful thing in the world, I can’t cope with this”. He or she is extremely fearful and this kind of patient probably has no faith in the dentist. He or she may vomit or collapse during the treatment. The dentist has to choose the easiest and quickest way to carry out the treatment, and even then the treatment proceeds with great difficulty; the final result may be option 4b: “The treatment didn’t succeed”. Option 4c: “I totally missed my appointment” tells that the patient was so afraid that he or she was unable to visit the dentist. The SDFQ option 3: “I was nervous; the treatment could only just be carried out”, means that the patient’s treatment takes more time than normally. This patient is so nervous that he or she may need a break every now and then. However, in spite of this, the treatment proceeds and is completed. The dentist clearly notices that this patient is nervous because of his or her breathing, talk, muscle tension etc. On the other hand, the SDFQ option 2: “I was nervous; but nevertheless, the treatment was carried out successfully”, means that the patient is a little nervous but, perhaps nobody else is able to notice it. Thus, nervousness is his or her own experience, which does not disturb the clinical treatment. The treatment proceeds normally. The SDFQ option 1: “I was totally relaxed during the treatment” is the answer of the patient who is relaxed and confident during the treatment. This is the patient’s subjective feeling and it comes over objectively through the patient’s external appearance and behavior towards the dental staff.

According to the SDFQ options, four groups of dental fear are formed: “severely frightened” (option 4), “moder-

ately frightened” (option 3), “slightly frightened” (option 2) and “relaxed” (option 1). The combination of the “severely frightened”, “moderately frightened” and “slightly frightened” groups forms the dental fear group vs. the “relaxed” group (option 1).

The SDFQ is a new clinical dental fear instrument developed within the research group and is based on the dental fear literature [15-17] and on dentists’ clinical experience.

Two other dental fear instruments, the DAS and DFS, are lengthier, each containing many questions. The DAS gives a general overview of patient’s dental fear with four questions, each one with five alternative answers [8]. The DFS is a specific dental fear inventory with a 20-item, 5-point Likert response format [10]. The reliability of the DAS and DFS is satisfactory and their validity is generally accepted [18]. Permission to use the DFS was obtained from the author of the instrument [10]. The original English DFS instrument was first translated into Finnish and then back-translated into English by professional translators.

Statistics

The associations between the SDFQ, DAS and DFS were tested with Spearman’s correlation (r_s). The Mann-Whitney U-test was used to test the difference in DAS and DFS scores between the SDFQ fear and relaxed groups. P-values less than 0.05 were considered statistically significant. The statistical analyses were carried out using SAS/STAT® software Version 9.1.3 SP4 of the SAS System for windows.

RESULTS

The correlations among the three dental fear measurement instruments were: the SDFQ and DFS: $r_s = 0.79$ ($n = 26$, $p < 0.001$), the DFS and DAS: $r_s = 0.72$ ($n = 26$, $p < 0.001$), the SDFQ and DAS: $r_s = 0.69$ ($n = 27$, $p < 0.001$). DAS and DFS mean scores were clearly higher in the SDFQ fear group compared with the SDFQ relaxed group (Tables 2 and 3).

Table 2. The Subdivision of SDFQ Respondents into Different Fear Groups

Dental Fear Groups		N	Percent
1	Relaxed group	12	44
2	Slightly frightened group	14	52
3	Moderately frightened group	1	4
4	Severely frightened group	0	0

Table 3. SDFQ (Fear and Relaxed Group) with DAS and DFS

	Fear Group (n = 15)		Relaxed Group (n = 12)		p- value
	Mean (SD)	min – max	Mean (SD)	min – max	
DAS (max score 20)	10.1 (2.3)	6.0 – 14.0	6.8 (1.4)	5.0 – 9.0	< 0.001
DFS (max score 100)	35.1 (6.8)	25.0 – 47.0	23.6 (4.5)	20.0 – 36.0	< 0.001

DISCUSSION

The short question studied seems to measure dental fear in line with previously validated instruments. Correlations among the three dental fear measurement instruments (SDFQ, DAS, DFS) were relatively high and similar.

The SDFQ was found to work well among adolescents, who had no problems responding to it. The correlations of the SDFQ were tested with two commonly used, valid, reliable, but long dental fear measurement instruments, the DAS and DFS, with good results.

Even if the dentist would like to use more extensive dental fear instruments such as the DAS or DFS with all his or her patients, it is not realistic due to the busy clinical setting. These instruments have mostly been used for research purposes. The need of a shorter dental fear instrument has recently also been highlighted by other researchers [19]. A shorter dental fear instrument such as the SDFQ is needed as it can be included in the general anamnesis which a new patient fills in before his or her first visit to the dentist. The SDFQ will most probably detect those who are afraid of dentistry, after which it is worth using more detailed and more extensive dental fear instruments, because there are certain special methods which can be used in treatment in a threatening situation, or as tools to be used by the patient [2].

Comparisons of international dental fear measurement instruments consisting of single item questions show that the

SDFQ correlates with the DAS and DFS in the same way as the Seattle Survey Item [6,20]. When our results with the SDFQ were compared with another Finnish study [21] concerning 15-year-old adolescents, it was discovered that the distributions of adolescents into three different fear groups did not differ significantly from each other (χ^2 -test, $p = 0.1732$). This result shows that the materials correspond and are dependable in both studies. The mean DAS score was 8.6 (SD = 2.5) which is close to Kaakko *et al.*'s [22-24] study result of 8.9 (SD = 3.4). The latter mean DAS score is

thought to be a rather typical population score [22]. There were not many adolescents with severe or moderate dental fear in this study, which limits evaluation of the instrument for different cutoff points. However, the present high correlation coefficients indicate high accuracy, and therefore the test could possibly be used as a screening test.

CONCLUSION

The SDFQ might be a useful instrument for the clinical measurement of dental fear. It is compact and easy to answer and interpret, and thus convenient for use in a busy routine clinical setting for dentists and their patients and also indicate the patient's potential avoiding behavior, which has been found to be a signal of severe dental fear [17,25]. Further studies of the SDFQ are needed in clinical settings.

ACKNOWLEDGEMENTS

We thank Päivi Paunio, DDS, PhD, specialist in pediatric dentistry, for initiating this dental fear study in 1991, and for creating the development process of the SDFQ. We thank Prof. Ronald Kleinknecht for making the original Dental Fear Survey instrument available for our study. Ansa Ojanlatva PhD, docent and Kari Schultz, MA are acknowledged for translating the instrument. Olli Kaleva is thanked for the statistical operations and Pirjo Piekka for the secretarial assistance. The Finnish Dental Society Apollonia Research Fund and the Turku Health Authority Centre Research Fund supported the study.

Appendix 1. The Dental Anxiety Scale (DAS)

The following statements listed below involve tension or anxiety in the dental care situation. Picture the situation in question and circle the option that best describes the feeling(s) you have.

1. If you had to go to the dentist tomorrow, how would you feel about it?
1 I would look forward to it as a reasonably enjoyable experience.
2 I wouldn't care one way or the other.
3 I would be a little uneasy about it.
4 I would be afraid that it would be unpleasant and painful.
5 I would be very frightened of what the dentist might do.

Appendix 1. contd...

2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?	
1	Relaxed.
2	A little uneasy.
3	Tense.
4	Anxious.
5	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?	
1	Relaxed.
2	A little uneasy.
3	Tense.
4	Anxious.
5	So anxious that I sometimes break out in a sweat or almost feel physically sick.
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?	
1	Relaxed.
2	A little uneasy.
3	Tense.
4	Anxious.
5	So anxious that I sometimes break out in a sweat or almost feel physically sick.

Appendix 2. The Dental Fear Survey (DFS)

The items in this questionnaire refer to various situations, feelings, and reactions related to dental work. Please rate your feeling or reaction on these items by circling the number (1, 2, 3, 4, or 5) or the category which most corresponds to your reaction.

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	nearly 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	nearly 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	nearly every time
4. My breathing rate increases...					
	1	2	3	4	5
	never	once or twice	a few times	often	nearly every time

5. I perspire...					
	1	2	3	4	5
	never	once or twice	a few times	often	nearly every time
6. I feel nauseated and sick to my stomach...					
	1	2	3	4	5
	never	once or twice	a few times	often	nearly every time
7. My heart beats faster...					
	1	2	3	4	5
	never	once or twice	a few times	often	nearly every time
Following is a list of things and situations that many people mention as being somewhat anxiety or fear producing. Please rate how much fear, anxiety or unpleasantness each of them causes you. Use the number 1-5, from the following scale. Make a check in the appropriate space. (If it helps, try to imagine yourself in each of these situations and describe what your common reaction is.)					
	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?					
© 1978, Kleinknecht, Klepac, Alexander					

REFERENCES

<p>[1] Bay EJ, Algase DL. Fear and anxiety: a simultaneous concept analysis. <i>Nurs Diagn</i> 1999; 10: 103-11.</p> <p>[2] Milgrom P, Weinstein P, Getz T. <i>Treating fearful dental patients – a patient management handbook</i>, 2nd ed. Seattle: University of Washington 1995.</p> <p>[3] Aartman IHA, van Everdingen T, Hoogstraten J, Schuurs AHB. Self-report measurements of dental anxiety and fear in children: a critical assessment. <i>ASDC J Dent Child</i> 1998; 65: 252-8.</p>	<p>[4] Schuurs AHB, Hoogstraten J. Appraisal of dental anxiety and fear questionnaires: a review. <i>Commun Dent Oral Epidemiol</i> 1993; 21: 329-39.</p> <p>[5] Neverlien PO. Assessment of a single-item dental anxiety question. <i>Acta Odontol Scand</i> 1990; 48: 365-9.</p> <p>[6] Moore R, Birn H, Kirkegaard E, Brødsgaard I, Scheutz F. Prevalence and characteristics of dental anxiety in Danish adults. <i>Commun Dent Oral Epidemiol</i> 1993; 21: 292-6.</p>
---	---

- [7] Ter Horst G, de Wit CA. Review of behavioral research in dentistry 1987-1992: dental anxiety, dentist-patient relationship, compliance and dental attendance. *Int Dent J* 1993; 43: 265-75.
- [8] Corah NL. Development of a dental anxiety scale. *J Dent Res* 1969; 48: 596.
- [9] Corah NL, Gale EN, Illig SJ. Assessment of a dental anxiety scale. *J Am Dent Assoc* 1978; 97: 816-9.
- [10] Kleinknecht RA, Klepac RK, Alexander LD. Origins and characteristics of fear of dentistry. *J Am Dent Assoc* 1973; 86: 842-8.
- [11] Kleinknecht RA, Thorndike RM, McGlynn FD, Harkavy J. Factor analysis of the dental fear survey with cross-validation. *J Am Dent Assoc* 1984; 108: 59-61.
- [12] McGlynn FD, McNeil DW, Gallagher SL, Vrana S. Factor structure, stability, and internal consistency of the Dental Fear Survey. *Behav Assess* 1987; 9: 57-66.
- [13] Milgrom P, Vignehsa H, Weinstein P. Adolescent dental fear and control: prevalence and theoretical implications. *Behav Res Ther* 1992; 30: 367-73.
- [14] Bedi R, Sutcliffe P, Donnan PT, McConnachie J. The prevalence of dental anxiety in a group of 13- and 14-year-old Scottish children. *Int J Paediatr Dent* 1992; 2: 17-24.
- [15] Frankl SN, Shiere FR, Fogels HR. Should the parent remain with the child in the operator? *J Dent Child* 1962; 29: 150-63.
- [16] Johnson R, Baldwin DC, Jr. Relationship of maternal anxiety to the behavior of young children undergoing dental extraction. *J Dent Res* 1968; 47: 801-5.
- [17] Berggren U, Meynert G. Dental fear and avoidance: causes, symptoms, and consequences. *J Am Dent Assoc* 1984; 109: 247-51.
- [18] Stouthard MEA, Mellenbergh GJ, Hoogstraten J. Assessment of dental anxiety: a facet approach. *Anxiety Stress Coping* 1993; 6: 89-105.
- [19] Viinikangas A, Lahti S, Yuan S, Pietilä I, Freeman R, Humphris G. Evaluating a single dental anxiety question in Finnish adults. *Acta Odontol Scand* 2007; 65: 236-40.
- [20] Milgrom P, Fiset L, Melnick S, Weinstein P. The prevalence and practice management consequences of dental fear in a major US city. *J Am Dent Assoc* 1988; 116: 641-7.
- [21] Rantavuori K, Lahti S, Hausen H, Seppä L, Kärkkäinen S. Dental fear and oral health and family characteristics of Finnish children. *Acta Odontol Scand* 2004; 62: 207-13.
- [22] Murtomaa H, Gyenes M. Fear, anxiety, pain in dentistry. Budapest: Dental Press Hungary Kft 2002.
- [23] Kaakko T, Milgrom P, Coldwell SE, Getz T, Weinstein P, Ramsay DS. Dental fear among university employees: implications for dental education. *J Dent Educ* 1998; 62: 415-20.
- [24] Kaakko T, Milgrom P, Coldwell SE, Getz T, Weinstein P, Ramsay DS. Dental fear among university students: implications for pharmacologic research. *Anesth Prog* 1998; 45: 62-7.
- [25] Emphasis. Overcoming dental fear: strategies for its prevention and management. *J Am Dent Assoc* 1983; 107: 18-27.

Received: April 30, 2008

Revised: December 23, 2008

Accepted: June 03, 2009

© Jaakkola *et al.*; Licensee *Bentham Open*.

This is an open access article licensed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted, non-commercial use, distribution and reproduction in any medium, provided the work is properly cited.