

FACTORS DETERMINING ANXIETY IN PATIENTS UNDERGOING TOOTH EXTRACTION

Type of Article: A Systematic Review

Running Title: Factors Determining Anxiety in Patients Undergoing Tooth Extraction

Sai Chaitanya Raj.B

CRI

Saveetha Dental College, Saveetha University, Chennai, India

Dr Dinesh Prabu

Department of Oral and Maxillofacial Surgery

Saveetha Dental College, Saveetha University, Chennai, India

Corresponding Author

Dr Dinesh Prabu

Department of Oral and Maxillofacial Surgery

Saveetha Dental College, Saveetha University, Chennai

162, Poonamallee High Road,

Chennai – 600077

Tamil Nadu, India.

Total number of words abstract: 399

Total number of words: 3924

Abstract: Fear and anxiety are known psychological responses to painful stimuli. These terms are used together in this study to increase the number of studies that can be included in order to make the results conducive. A third term also commonly used is phobia. These negative states of mind are common in patients seen in the field of dentistry. In a long list of fears and phobias, dental fear is ranked number 4 by prevalence. A study conducted in Australia says that only 52.8% of participants indicated no or low dental anxiety. Further research has revealed that not all dental procedures result in the similar level of anxiety. Dental surgery, especially tooth extraction is among the top 5 most feared dental treatments after the fear of being pricked for local anaesthesia. It has been derived from various studies that losing a tooth also attributes as a stimulant for anxiety. Doctors all over the world find it very challenging to deal with anxious patients. A special counselling and a session of positive words may be required before the actual dental procedure in order to change the mood of the patient and to mentally prepare the patient for the procedure. Hence, anxiety during any dental procedure must be controlled and in order to do this, the factors stimulating anxiety and fear must be identified in a standard way.

METHODS:

An electronic literature search was conducted of the PUBMED, ScienceDirect covering the period January 2004 to May 2014. Screening was performed at the full-text level. The review included all human prospective and retrospective studies, clinical trials, cohort studies, case control studies, that concluded at the least of one factor determining tooth extraction anxiety the search identified 16 articles meeting the inclusion criteria. Factors related to tooth extraction in patients were assessed: level of anxiety, pain expectations, level of disturbance when the procedure is being performed, and difficulty level of the procedure, marital status, social class, and type of local anaesthesia administered. Video was used as the method of providing information, past negative dental experiences lead to increase in anxiety among patients.

RESULTS:

Due to disagreements between studies, further investigations into the other factors are required to clarify the results. However, the absence of a single and appropriate scale that includes both the patient's evaluation and that of the doctor, hinders the rating of patient anxiety.

Keywords: dental anxiety; tooth extraction; systematic review; factors.

Introduction

Fear and anxiety are known psychological responses to painful stimuli. These terms are used together in this study to increase the number of studies that can be included in order to make the results conducive. A third term also commonly used is phobia. These negative states of mind are common in patients seen in the field of dentistry. In a long list of fears and phobias, dental fear is ranked number 4 by prevalence. A study conducted in Australia says that only 52.8% of participants indicated no or low dental anxiety. Further research has revealed that not all dental procedures result in the similar level of anxiety. Dental surgery, especially tooth extraction is among the top 5 most feared dental treatments after the fear of being pricked for local anaesthesia. It has been derived from various studies that losing a tooth also attributes as a stimulant for anxiety. Doctors all over the world find it very challenging

to deal with anxious patients. A special counselling and a session of positive words may be required before the actual dental procedure in order to change the mood of the patient and to mentally prepare the patient for the procedure. Hence, anxiety during any dental procedure must be controlled and in order to do this, the factors stimulating anxiety and fear must be identified in a standard way. Structured question:

The following focused question was developed according to the population, intervention, comparison, and outcome (PICO) study design: What are the main factors causing anxiety/fear, which can be measured using specific rating scales, in adult patients undergoing a tooth extraction procedure

Types of studies

An electronic literature search was conducted of the PUBMED, ScienceDirect covering the period January 2004 to May 2014. Screening was performed at the full-text level. The review included all human prospective and retrospective studies, clinical trials, cohort studies, case-control studies, that concluded at the least of one factor determining tooth extraction anxiety the search identified 16 articles meeting the inclusion criteria. Factors related to tooth extraction in patients were assessed: level of anxiety, pain expectations, level of disturbance when the procedure is being performed, and difficulty level of the procedure, marital status, social class, and type of local anaesthesia administered. Video was used as the method of providing information, past negative dental experiences lead to increase in anxiety among patients.

Data of extraction

The data were independently extracted from articles according to the theme, purposes, and questions of the present review. The following data items were collected from the selected articles: (1) year (2) area (country); (3) population features (nationality, age, sex); (4) factors examined (5) evaluation method; (6) interview features; (7) interview method

Assessment of methodological quality

The quality of all included studies was evaluated during the full-text reading stage. All methodological elements that may influence the outcomes of the study were marked and evaluated. The risk of bias in every study was evaluated according to the Cochrane Collaboration (version 5.1.0) two-part tool for assessing risk of bias.

Results

Study selection The initial search identified a total of 6202 articles. Following the screening of article titles, 1753 potentially relevant articles were identified. Independent screening of the abstracts resulted in 33 possible articles for inclusion. Following the application of the study inclusion and exclusion criteria to the 33 full-text articles, 16 articles were finally selected for the systematic review. The kappa value for inter-reviewer agreement for potentially relevant articles was 1 for titles and abstracts and >0.9 for full-text articles, indicating almost perfect agreement between the two reviewers.⁹ Exclusion of studies The reasons for the exclusion of studies after full-text assessment were as follows: full-text article not available in English ($n = 1$), dental anxiety not specific to tooth extraction anxiety ($n = 12$), dental anxiety as a factor of other occurrences ($n = 1$), and psychological conditions other than anxiety examined ($n = 3$). Quality assessment The quality assessment (Table 1) of the studies included revealed that the majority had a high risk of bias.^{10–23} Two studies were classified as having an unclear risk of bias.^{24,25} None of the studies had a low risk of bias in all categories. Types of studies Ten studies were prospective cohort studies in which questionnaires were given to participants and different follow-ups were observed.^{12–16,20–22,24,25} Six studies were controlled trials in which different factors that may increase or decrease the anxiety of tooth removal were examined^{10,11,17–19,23} (Table 2). Measurement scales used Different types of measurement scale were used to identify the anxiety level (Table 2). Most studies ($n = 7$) used only one specific measurement scale.^{11,12,17,19, 22, 23,25} Five studies used two different measurement scales^{10,13, 15,20,21} and four used three different types of measurement scale.^{14,16,18,24} Significant factors Several factors were found to be significantly associated with tooth extraction anxiety without any conflicts amongst the different studies: propensity to anxiety ($P < 0.05$),^{15,21,24} pain experience or

expectations ($P < 0.05$),^{18,20,21} level of disturbance during the procedure ($P < 0.001$),¹³ and the difficulty of the procedure ($P = 0.034$).²⁰ When the impact of marital status was assessed, the highest anxiety scores were found in single respondents (Corah's Dental Anxiety Scale (DAS) 9.41 2.24) and the lowest in divorced respondents (DAS 6.00 0.00) ($P = 0.003$).¹² Also, the examination results revealed that there was a significant difference ($P = 0.012$) in anxiety level among the various social classes of subjects, with social class determined according to the classification of Opeodu and Arowojolu.²⁷ The lowest mean anxiety score was reported for social class IV (DAS 6.5 2.42); in contrast, the highest mean anxiety score was reported for class V (DAS 9.18 2.87).¹² The preoperative information provided to the patient also showed a significant effect on patient anxiety. Anxiety levels in patients receiving verbal or written information did not differ, but information in the form of a video/movie increased patient anxiety significantly ($P < 0.05$)^{10,23} (Table 3). It is interesting to note that even knowledge of being sedated significantly increased patient anxiety ($P < 0.05$).¹⁷ In the assessment of the impact of a previous negative experience related to a dental procedure on patient anxiety, a positive correlation with dental anxiety in tooth removal patients was unanimously agreed.^{12,13,16,20,22,25} However Egbor and Akpata¹² and López-Jornet et al.¹⁶ did not show statistically significant correlations ($P = 0.209$ and $P > 0.05$, respectively), while the other authors did. Some aspects of the procedure were also identified as important factors. Significant differences were found between patients having a mandibular tooth removed and those having a maxillary tooth removed, as determined using the State-Trait Anxiety Inventory (STAI-T) scale immediately after ($P = 0.003$) and 1 week after the procedure ($P = 0.01$), with higher anxiety scores in patients who had a mandibular tooth removed. However, no significant difference was found with the STAI-S, Dental Fear Survey (DFS), or Modified Dental Anxiety Scale (MDAS)²⁸ measurement scales.¹⁶ The results revealed that patients who had two molars removed were significantly more anxious just before ($P < 0.016$) and during ($P < 0.001$) surgery than those who had one molar removed.¹⁵ The specific type of anaesthetic injection was found to affect patient anxiety,

with patients who required specific block type local anaesthesia reporting significantly higher anxiety immediately after the procedure (STAI-T; $P = 0.008$) than those who had infiltration anaesthesia; however, the difference disappeared ($P = 0.41$) over the 7 days of follow-up. In contrast, with the STAI-S, MDAS, and DFS measurement scales, no significant differences were found ($P = 0.4$, $P = 0.627$, $P = 0.36$ immediately after

Table 1. Quality assessment.^a

Ref	Sequence generation	Allocation concealment	Blinding of participants, personnel, and outcome assessors	Incomplete outcome data	Selective outcome reporting	Other sources of bias
Lago-Méndez et al. (2006) ²⁴	?	?	+	+	+	+
van Wijk et al. (2008) ¹³		+	?	+	+	+
de Jongh et al. (2008) ²⁰		?	+	+	+	+
Mugla Komerikli (2008) ²⁵		?			+	+
Kim et al. (2010) ²⁵	+	?	+	+	+	+
van Wijk et al. (2010) ¹⁵		+		+	+	+
McNeil et al. (2011) ²		+		+	+	+
de Jongh et al. (2011) ¹⁷		?	?	+	+	+
Seto et al. (2012) ⁹		+	?	+	+	+
Abdeshahi et al. (2013) ¹⁶		?		+	+	+
Lo'pez-Jornet et al. (2013) ¹²		?		?	+	+
Egbor and Akpata (2014) ²³		?		+	+	+
Torres-Lagares (2014) ¹		+	+	+	+	+
Tarazona et al. (2015) ¹¹		?	+	+	+	+
Glaesmer et al. (2015) ¹		+		+	+	+
Kazancioglu et al. (2015) ⁰		+	+	?	+	+

^a '+', low risk of bias; '?', unclear risk of bias; '-', high risk of bias

However Egbor and Akpata¹² and Lo'pez-Jornet et al.¹⁶ did not show statistically significant correlations ($P = 0.209$ and $P > 0.05$, respectively), while the other authors did. Some aspects of the procedure were also identified as important factors. Significant differences were found between patients having a mandibular tooth removed and those having a maxillary tooth removed, as determined using the State-Trait Anxiety Inventory (STAI-T) scale immediately after ($P = 0.003$) and 1 week after the procedure ($P = 0.01$), with higher anxiety scores in patients who had a mandibular tooth removed. However, no significant difference was found with the STAI-S, Dental Fear Survey (DFS), or Modified Dental Anxiety Scale (MDAS)²⁸ measurement scales.¹⁶ The results revealed that patients who had two molars removed were significantly more anxious just before ($P < 0.016$) and during ($P < 0.001$) surgery than those who had one molar removed.¹⁵ The specific type of anaesthetic injection was found to affect patient anxiety, with patients who required specific block type local anaesthesia reporting significantly higher anxiety immediately after the procedure (STAI-T; $P = 0.008$) than those who had infiltration anaesthesia; however, the difference disappeared ($P = 0.41$) over the 7 days of follow-up. In contrast, with the STAI-S, MDAS, and DFS measurement scales, no significant differences were found ($P = 0.4$, $P = 0.627$, $P = 0.36$ immediately after surgery, and $P = 0.98$, $P = 0.99$, $P = 0.49$ at the 7-day follow-up).¹⁶

CONFLICTING RESULTS

Some of the results were identified as conflicting, since different findings were obtained in different reports. Disagreement between significant and non-significant differences were obtained for the following factors: gender (Table 4), level of education, 10, 12, 16, 20, 25 duration of the procedure, 10, 13, 16 and the effect of hypnosis. 11, 19 The most important mismatches, in the authors' opinion, were those related to studies obtaining opposite results. This occurred for age 10, 12, 14, 20, 25 and time after the procedure. 10, 11, 13, 16, 20, 22, 25 Studies investigating age as a factor reported three different results: no significant correlation ($P > 0.05$), 10, 14, 20, 25 a positive significant correlation ($P = 0.034$ with STAI-T), 14 and a negative significant correlation ($P = 0.000$). 12 The time after the procedure as a factor non-significantly correlated with anxiety was reported only once 13 (Table 5). Most authors reported lower anxiety at various times after the procedure than before it. 10, 11, 20, 22, 25 In contrast López-Jornet et al. reported lower patient anxiety prior to tooth extraction than immediately afterwards, but lower anxiety scores at the 7-day follow-up. 16

NO SIGNIFICANT DIFFERENCES

Factors such as area of residence, 12 separate preoperative consultation, 18 number of anaesthetic injections, 13, 18 and the extent of the surgery 13 were evaluated in papers included in present review, but none of them showed a significant effect on patient anxiety ($P > 0.05$).

Table 2. Type of information provided as a factor predicting tooth extraction anxiety.

Study	Scale used	Verbal group		Wr./Verb + D ^a		Video group		Outcomes	P-value
		b		b		b			1–3
Torres-Lagares ²³ et al. (2014)	VAS (1–5)	0.97	1.21	0.29	0.97	0.57	1.43	Patient anxiety levels decreased after the provision of verbal ¹ and written ² information, and increased in the video ³ group; the difference was statistically significant	$P = 0.000$ $P = 0.022$
Kazancioglu et al. (2015)	¹ 0 DAS	11.34	2.433	9.21	2.02	16.11	3.74	Video information patients were significantly more anxious before the procedure than patients in the verbal and written information groups	$P < 0.05$
Kazancioglu et al. (2015)	¹ 0 STAI-S	33.54	34.41	30.01	22.45	48.54	34.41	Video information patients were significantly more anxious before the procedure than patients in the verbal and written information groups	$P < 0.05$

VAS, visual analogue scale; DAS, Dental Anxiety Scale; STAI-S, State-Trait Anxiety Inventory.

^aWritten information in Torres-Lagares et al.; verbal information with details in Kazancioglu et al.

^bMean change scores.

Table 3. Gender as a factor predicting tooth extraction anxiety.

Study	Scale used ^a	Males (mean SD)	Females (mean SD)	Outcomes	P-value
Lago-Me'ndez et al. (2006) ²⁴	DAS	8.68 2.996	9.47 3.334	NSD	>0.05
Kim et al. (2010) ¹	DAS	13.32 2.98	13.24 2.98	NSD	0.846
Tarazona et al. (2015) ¹⁴	DAS	7.4 2.09	10.5 2.75	Females showed significantly higher DAS scores	0.006
Egbor and Akpata (2014) ¹²	DAS	7.37 1.88	8.76 2.84	Females showed significantly higher DAS scores	0.00
Muglali and Komerik (2008) ²⁰	DAS	N/A	N/A	Females showed significantly higher DAS scores	<0.001
Kazancioglu et al. (2015) ¹⁰	DAS	N/A	N/A	Females showed significantly higher DAS scores	<0.05
Total	DAS	10.377 3.877	11.083 3.474	Females showed significantly higher DAS scores	0.0311
van Wijk et al. (2010) ¹⁵	S-DAI	16.69 7.34	22 9.93	Females showed significantly higher S-DAI scores	<0.05
de Jongh et al. (2011) ²²	S-DAI	16.6 7	21.1 9.4	Females showed significantly higher S-DAI scores	<0.05
de Jongh et al. (2008) ¹³	S-DAI	N/A	N/A	NSD	N/A
van Wijk et al. (2008) ¹⁸	S-DAI	N/A	N/A	Females showed significantly higher S-DAI scores	<0.05
Total	S-DAI	16.664 7.243	21.706 9.769	Females showed significantly higher S-DAI scores	<0.0001
Lago-Me'ndez et al. (2006) ²⁴	STAI-T	15.2 7.555	20.16 8.421	Females showed significantly higher STAI-T scores	<0.05
Tarazona et al. (2015) ¹⁴	STAI-T	16.47 6.94	18.79 9.3	NSD	0.41
Kazancioglu et al. (2015) ¹⁰	STAI-T	N/A	N/A	NSD	N/A
Total	STAI-T	16.063 7.167	19.317 8.997	Females showed significantly higher STAI-T scores	0.0081
Lago-Me'ndez et al. (2006) ²⁴	STAI-S	18.68 7.459	19.53 8.722	NSD	>0.05
Muglali and Komerik (2008)	STAI-S	N/A	N/A	Females showed significantly higher STAI-S scores	0.013
Tarazona et al. (2015) ¹⁴	STAI-S	20.62 10.35	25.17 12.51	Females showed significantly higher STAI-S scores	0.05
Kazancioglu et al. (2015) ¹⁰	STAI-S	N/A	N/A	Females showed significantly higher STAI-S scores	<0.05
Total	STAI-S	19.998 9.562	23.001 11.537	NSD	0.0585
Tarazona et al. (2015) ¹⁴	APAIS	12.25 4.27	18.70 3.68	Females showed significantly higher APAIS scores	0.00
Lago-Me'ndez et al. (2006) ²⁴	DFS	33.28 13.532	36.38 13.063	NSD	>0.05

SD, standard deviation; NSD, no significant difference; N/A, not available.

^a DAS, Dental Anxiety Scale; S-DAI, short version of the Dental Anxiety Inventory; STAI, State-Trait Anxiety Inventory (STAI-T or STAI-S); APAIS, Amsterdam Preoperative Anxiety and Information Scale; DFS, Dental Fear Survey

Table 5. Time after the procedure as a factor predicting tooth extraction anxiety.

Study	Scale used ^a	Before		Immediately after		1 week after		1 month after	Outcomes	P-value
Muglali and Komerik (2008)	2 0 DAS	10.01	3.30	7.73	3.01	8.13	2.63	N/A	Dental anxiety was lower immediately after and 1 week after than before the procedure	P < 0.001
Muglali and Komerik (2008)	2 0 STAI-S	42.17	9.82	34.64	8.48	32.17	8.48	N/A	Dental anxiety was lower immediately after ¹ and 1 week after ² than before the procedure	P < 0.001 P < 0.006
Kim et al. (2010) ²⁵	DAS	13.28	2.98	13.25	3.14	N/A		N/A	Dental anxiety was lower after the procedure than before the procedure	P < 0.01
de Jongh et al. (2011)	2 2 S-DAI	18.8	8.6	17.6	8.2	16.2	7.8	16.6 8.6	Dental anxiety immediately after, 1 week after, and 1 month after was lower than before the procedure	P < 0.05
Lo'pez-Jornet et al. (2013)	1 6 STAI-S	24.84	4.96	24	5.04	25.31	5.81	N/A	NSD	P > 0.05
Lo'pez-Jornet et al. (2013)	1 6 STAI-T	24.59	6.27	25.63	5.68	24.71	6.14	N/A	Dental anxiety was significantly lower 1 week after than immediately after the procedure	P = 0.044
Lo'pez-Jornet et al. (2013)	1 6 MDAS	8.74	4.51	9.91	5.73	8.33	4.52	N/A	Dental anxiety immediately after was higher than before the procedure ¹ and anxiety 1 week after was lower than immediately after the procedure ²	P = 0.023 P = 0.001
Lo'pez-Jornet et al. (2013)	1 6 DFS	35.11	16.11	37.84	17.08	34.34	15.31	N/A	Dental anxiety immediately after was higher than before the procedure ¹ and anxiety 1 week after was lower than immediately after the procedure ²	P = 0.002 P = 0.001

Glaesmer et al. (2015)	¹ 1	VAS	4.8	2.6	2	2.0	N/A	N/A	Dental anxiety was lower immediately after the procedure than before the procedure	N/A	
Kazancioglu et al. (2015)	¹ 0	DAS	11.34	2.43	6.3	1.76	8.38	3.67	N/A	Dental anxiety was lower immediately after and 1 week after than before the procedure	P = 0.04
Kazancioglu et al. (2015)	¹ 0	STAI-S	33.54	34.41	23.81	23.33	28.02	14.30	N/a	Dental anxiety was lower immediately after and 1 week after than before the procedure	P = 0.03
de Jongh et al. (2008) ¹³		S-DAI	N/A		N/A		N/A		N/A	NSD	P = 0.200

N/A, not available; NSD, no significant difference.

^a DAS, Dental Anxiety Scale; STAI, State-Trait Anxiety Inventory (STAI-T or STAI-S); S-DAI, short version of the Dental Anxiety Inventory; MDAS, Modified Dental Anxiety Scale; DFS, Dental Fear Survey; VAS, visual analogue scale.

Discussion

The aim of the present review was to identify reliable factors determining patient anxiety related to tooth extraction procedures in order to make it easier for the surgeon to predict a patient's anxiety and carefully select the procedural methods. On reviewing the papers included herein, some of the factors were found to be quite relevant in predicting a patient's anxiety in relation to tooth extraction; however many factors are still in need of better evaluation. Gender was the most frequently assessed factor in this review. However some conflicts were found: most studies that assessed the impact of gender on patient anxiety, showed a significant relationship, 10,12,14,15,18,20,22,24 but some of these did not find a significant relationship when a different measurement scale was used 10,14,24. The problem of conflict may be due to the suitability of the scale. Data synthesis between studies using the same measurement scales was performed to identify reliable results. All the significant results showed women to be more anxious than men. These results are not surprising, since many different authors have reported that females are more prone to various general anxiety disorders 29–32 and dental anxieties 33–35 than males. Wabnegger et al. investigated structural differences in the brain between males and females in order to ascertain why females are more prone to dental phobia.

With regard to further research, there is a great need to develop and validate a specific measurement scale that includes both the patient and the doctor in the rating process and that can reliably rate anxiety in patients undergoing tooth extraction procedures. The conflicts between the different studies measuring the same factors should be resolved with further studies. The possible effect of non-dental stress should be considered while measuring anxiety in the dental office. The type of tooth extraction should be considered before combining the results from all patients, as this may differ in provoking anxiety.

References:

1. Armfield JM, Heaton LJ. Management of fear and anxiety in the dental clinic: a review. *Aust Dent J* 2013;58:390–407. <http://dx.doi.org/10.1111/adj.12118>.
2. Oosterink FM, de Jongh A, Hoogstraten J. Prevalence of dental fear and phobia relative to other fear and phobia subtypes. *Eur J Oral Sci* 2009;117:135–43. <http://dx.doi.org/10.1111/j.1600-0722.2008.00602.x>.
3. Armfield JM. Towards a better understanding of dental anxiety and fear: cognitions vs. experiences. *Eur J Oral Sci* 2010;118:259–64. <http://dx.doi.org/10.1111/j.1600-0722.2010.00740>.
4. Oosterink FM, de Jongh A, Aartman IH. What are people afraid of during dental treatment? Anxiety-provoking capacity of 67 stimuli characteristic of the dental setting. *Eur J Oral Sci* 2008;116:44–51. <http://dx.doi.org/10.1111/j.1600-0722.2007.00500.x>.
5. Siegel K, Schrimshaw EW, Kunzel C, Wolfson NH, Moon-Howard J, Moats HL, et al. Types of dental fear as barriers to dental care among African American adults with oral health symptoms in Harlem. *J Health Care Poor Underserved* 2012;23:1294–309. <http://dx.doi.org/10.1111/j.1600-0722.2007.00500.x>.
6. Brahm CO, Lundgren J, Carlsson SG, Nilsson P, Hultqvist J, Haegglin C. Dentists' skills with fearful patients: education and treatment. *Eur J Oral Sci* 2013;121:283–91. <http://dx.doi.org/10.1111/eos.12017>.
7. Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *J Clin Epidemiol* 2009;62:1006–12.
8. Higgins JP, Green S. *Cochrane handbook for systematic reviews of interventions*, version 5.1.0. The Cochrane Collaboration; 2011.
9. Viera AJ, Garrett JM. Understanding interobserver agreement: the kappa statistic. *Fam Med* 2005;37:360–3.

10. Kazancioglu HO, Tek M, Ezirganli S, Demirtas N. Does watching a video on third molar surgery increase patients' anxiety level? *Oral Surg Oral Med Oral Pathol Oral Radiol* 2015;119:272–7. <http://dx.doi.org/10.1016/j.oooo.2014.10.012>.
 11. Glaesmer H, Geupel H, Haak R. A controlled trial on the effect of hypnosis on dental anxiety in tooth removal patients. *Patient Educ Couns* 2015;98:1112–5. <http://dx.doi.org/10.1016/j.pec.2015.05.007>.
 12. Egbor PE, Akpata O. An evaluation of the sociodemographic determinants of dental anxiety in patients scheduled for intra-alveolar extraction. *Libyan J Med* 2014;9:25433. <http://dx.doi.org/10.3402/ljm.v9.25433>.
 13. de Jongh A, Olff M, van Hoolwerff H, Aartman IH, Broekman B, Lindauer R, et al. Anxiety and post-traumatic stress symptoms following wisdom tooth removal. *Behav Res Ther* 2008;46:1305–10. <http://dx.doi.org/10.1016/j.brat.2008.09.004>.
 14. Tarazona B, Tarazona-A´lvarez P, Pen˜arrocha-Oltra D, Rojo-Moreno J, Pen˜arrochaDiago M. Anxiety before extraction of impacted lower third molars. *Med Oral Patol Oral Cir Bucal* 2015;20:246–50. <http://dx.doi.org/10.4317/medoral.20105>.
 15. van Wijk AJ, de Jongh A, Lindeboom JA. Anxiety sensitivity as a predictor of anxiety and pain related to third molar removal. *J Oral Maxillofac Surg* 2010;68:2723–9. <http://dx.doi.org/10.1016/j.joms.2010.06.174>.
 16. Lo´pez-Jornet P, Camacho-Alonso F, SanchezSiles M. Assessment of general pre and postoperative anxiety in patients undergoing tooth extraction: a prospective study. *Br J Oral Maxillofac Surg* 2013;52:18–23. <http://dx.doi.org/10.1016/j.bjoms.2013.01.004>.
 17. Seto M, Sakamoto Y, Takahashi H, Kita R, Kikuta T. Does planned intravenous sedation affect preoperative anxiety in patients? *Int J Oral Maxillofac Surg* 2012;42:497–501. <http://dx.doi.org/10.1016/j.ijom.2012.09.014>.
 18. van Wijk A, Lindeboom J. The effect of a separate consultation on anxiety levels before third molarsurgery. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2008;105:303–7. <http://dx.doi.org/10.1016/j.tripleo.2007.07.028>.
 19. Abdeshahi SK, Hashemipour MA, Mesgarzadeh V, Shahidi Payam A, Halaj Monfared A. Effect of hypnosis on induction of local anaesthesia, pain perception, control of haemorrhage and anxiety during extraction of third molars: a case–control study. *JCraniomaxillofac Surg* 2013;41:310–5. <http://dx.doi.org/10.1016/j.jcms.2012.10.009>.
 20. Muglali M, Komerik N. Factors related to patients' anxiety before and after oral surgery. *J Oral Maxillofac Surg* 2008;66:870–7. <http://dx.doi.org/10.1016/j.joms.2007.06.662>.
 21. McNeil DW, Helfer AJ, Weaver BD, Graves RW, Kyle BN, Davis AM. Memory of pain and anxiety associated with tooth extraction. *J Dent Res* 2011;90:220–4. <http://dx.doi.org/10.1177/0022034510385689>.
 22. de Jongh A, van Wijk AJ, Lindeboom JA. Psychological impact of third molar surgery: a 1-month prospective study. *J Oral Maxillofac Surg* 2011;69:59–65. <http://dx.doi.org/10.1016/j.joms.2010.05.073>.
 23. Torres-Lagares D, Heras-Meseguer M, Azca´rate-Vela´zquez F, Hita-Iglesias P, Ruiz-de-Leo´n-Herna´ndez G, Herna´ndez-Pacheco E, et al. The effects of informed consent format on preoperative anxiety in patients undergoing inferior third molar surgery. *Med Oral Patol Oral Cir Bucal* 2014;19:270–3. <http://dx.doi.org/10.4317/medoral.19480>.
 24. Lago-Me´ndez L, Diniz-Freitas M, Senra-Rivera C, Seoane-Pesqueira G, Ga´ndara-Rey JM, Garcia-Garcia A. Dental anxiety before removal of a third molar and association with general trait anxiety. *J Oral Maxillofac Surg* 2006;64:1404–8. <http://dx.doi.org/10.1016/j.joms.2006.05.030>.
 25. Kim YK, Kim SM, Myoung H. Independent predictors of satisfaction in impacted third molar surgery patients. *Community Dent Oral Epidemiol* 2010;38:274–86. <http://dx.doi.org/10.1111/j.1600-0528.2010.00532.x>.
- Corah NL. Development of a dental anxiety scale. *J Dent Res* 1969;48:596.