

## **Anxiety and Quality of Life in Phobic Dental Patients**

N.P. Crofts-Barnes, E. Brough, K.E. Wilson, A.J. Beddis and N.M. Girdler  
*J DENT RES* 2010 89: 302 originally published online 5 February 2010  
DOI: 10.1177/0022034509360189

The online version of this article can be found at:  
<http://jdr.sagepub.com/content/89/3/302>

---

Published by:



<http://www.sagepublications.com>

On behalf of:

International and American Associations for Dental Research

**Additional services and information for *Journal of Dental Research* can be found at:**

**Email Alerts:** <http://jdr.sagepub.com/cgi/alerts>

**Subscriptions:** <http://jdr.sagepub.com/subscriptions>

**Reprints:** <http://www.sagepub.com/journalsReprints.nav>

**Permissions:** <http://www.sagepub.com/journalsPermissions.nav>

>> [Version of Record](#) - Feb 11, 2010

[Proof](#) - Feb 5, 2010

[What is This?](#)

N.P. Crofts-Barnes<sup>1\*</sup>, E. Brough<sup>2</sup>,  
K.E. Wilson<sup>2</sup>, A.J. Beddis<sup>2</sup>,  
and N.M. Girdler<sup>2</sup>

<sup>1</sup>Dental Department, Long Eaton Health Centre, Midland Street, Long Eaton, Nottingham, NG10 1NY, UK; and <sup>2</sup>Department of Sedation, School of Dental Sciences, University of Newcastle-upon-Tyne, Newcastle-upon-Tyne, NE2 4BW, UK; \*corresponding author, nicola.crofts-barnes@derbyshirecounty.pct.nhs.uk

*J Dent Res* 89(3):302-306, 2010

## ABSTRACT

Little is known about the anxiety patients experience before attending for dental treatment. The aim of this study was to determine, in dentally phobic patients, the temporal relationship of pre-operative anxiety levels, and the disruption to daily life caused by this. Twenty-four phobic and 19 comparison (non-phobic) dental patients were recruited. Four validated questionnaires were used to assess anxiety and quality of life, which each patient completed for 5 days prior to, and on the day of, treatment. Those in the experimental group were found to have significantly greater levels of dental and general anxiety, and a significantly lower quality of life compared with those in the comparison group. Significant temporal relationships were found with all of the questionnaires. Dental and general anxiety scores were significantly correlated with quality-of-life measures. This study suggests that phobic dental patients are experiencing significant increased anxiety, and significant negative quality-of-life effects, in this period.

**KEY WORDS:** anxiety, quality of life, dentistry.

DOI: 10.1177/0022034509360189

Received July 23, 2007; Last revision June 16, 2009;  
Accepted July 9, 2009

A supplemental appendix to this article is published electronically only at <http://jdr.sagepub.com/supplemental>.

# Anxiety and Quality of Life in Phobic Dental Patients

## INTRODUCTION

The 1998 Adult Dental Health Survey (Kelly *et al.*, 1998) found that 64% of respondents were nervous about some form of dental treatment, and 49% were anxious about simply going to the dentist. This fear can then lead to avoidance of dental treatment (Mellor, 1992), dental neglect (Hakeberg *et al.*, 1993), and a reduced general quality of life (Locker, 2003; McGrath and Bedi, 2004; Mehrstedt *et al.*, 2004). Eventually, dental neglect can lead to pain, when many patients seek treatment. This is often undertaken at a referral hospital under conscious sedation.

Conscious sedation is a technique used to reduce anxiety while undertaking dental treatment. However, little is known about the patient's anxiety in the period before attending for treatment under sedation. Many of the papers relating to pre-operative dental anxiety are focused on treatment modalities aimed at reducing dental anxiety, and none have included a non-anxious comparison group (Luyk *et al.*, 1988; Fox *et al.*, 1989; Litt *et al.*, 1993). Numerous studies show that dental anxiety does have an effect on quality of life (Berggren, 1993; Abrahamsson *et al.*, 2000; Locker, 2003; McGrath and Bedi, 2004; Mehrstedt *et al.*, 2004); however, these are retrospective studies, and are remote from the pre-operative period. One study discusses the impact of dental anxiety on quality of life in the days leading up to treatment (Cohen *et al.*, 2000); however, due to the fact that the data are qualitative, the frequency or severity of these quality-of-life effects is not reported. More objective research is required to assess anxiety and quality of life in anxious dental patients.

When fears arise that are considered out of proportion to the demands of the situation, cannot be explained or reasoned away, are beyond voluntary control, and lead to avoidance of the feared situation, then a phobia is said to exist (Marks, 1969). The study presented used validated questionnaires to assess anxiety and quality of life in phobic dental patients in the period before attending for dental treatment under conscious sedation. It was a prospective, comparative study, aimed at providing a quantitative picture of the anxiety patients experience. The aims of this study were to determine, in phobic dental patients scheduled to undergo dental treatment under conscious sedation, (a) the temporal relationship of experienced anxiety levels in the days prior to the dental procedure, and (b) the level of disruption to daily life activities caused by anxiety experienced in the days prior to the dental procedure.

## MATERIALS & METHODS

Approval for the study was obtained from Sunderland Local Research Ethics Committee, Newcastle-upon-Tyne Hospitals Trust, and Newcastle Primary Care Trust Research and Development Departments. The study was designed as a

prospective, comparative, quantitative survey of patient anxiety and quality of life. A power calculation using Power and Precision Software, based on the Corah Dental Anxiety Scale and a single timepoint, revealed that a sample size of 22 for each group would detect a significant difference between groups of one standard deviation (3), with 95% confidence and 90% power.

### Study Groups

Both an experimental and comparison group were included in the study.

The experimental group was recruited from patients presenting to the Sedation Department at Newcastle Dental Hospital. These patients had been referred to the department because they had a disproportionate level of dental anxiety and were considered unable to undergo dental treatment without pharmacological anxiolysis. A subjective clinical assessment was carried out to determine phobia of dental treatment following discussion with, and observation of, each patient.

The comparison group was recruited at Grainger Park Dental Practice, Newcastle. They were clinically assessed as being non-phobic of dental treatment following discussion and observation.

Inclusion criteria included the clinical assessment as above and a willingness to participate, age between 18 and 50 yrs, ASA I (fit and healthy) or II (mild to moderate systemic disease), and a need to attend for a subsequent appointment for dental treatment.

Exclusion criteria for both groups were refusal to participate, inability to attend for the treatment appointment within the time restraints of the study, and inability to understand the consent process or the questionnaires.

### Recruitment

All patients underwent an assessment visit, and if they met the inclusion criteria, they were invited to take part. A patient information leaflet was provided, and an informed consent form was signed and witnessed.

### Assessment Tools

Four valid questionnaires were used to assess general anxiety, dental anxiety, and the level of disruption to daily activities in the pre-operative period.

The Spielberger State-Trait Anxiety Inventory (STAI) provides two self-report scales (Spielberger, 1983). The State Anxiety scale evaluates how the respondent feels *right now*, at this moment; the Trait Anxiety scale evaluates how the respondents *generally* feel. Higher scores indicate higher anxiety.

The Corah Dental Anxiety Scale (Corah DAS) evaluates how the patient feels about dentistry in particular (Corah, 1969). The patient is asked to imagine him/herself in 4 different dental situations, and to rate how he/she feels, from 'calm' to 'terrified'. Higher scores indicate higher dental anxiety.

The Minor Symptom Evaluation Profile (MSEP) provides a general measure of subjective central nervous system-related symptoms that affect well-being (Dahlöf *et al.*, 1989; Dahlof, 1990). It consists of 3 components, *contentment*, *vitality*, and *sleep*. The lower the score, the better the subjects feel.

The Psychological General Well-Being scale (PGWB) also provides a measure of well-being and has 6 subscales: *anxiety*, *depressed mood*, *positive well-being*, *self-comparison*, *general health*, and *vitality* (Dupuy, 1984). The higher the score, the better the subjects feel.

All of the questionnaires used have shown high validity and reliability (Corah, 1969; Spielberger, 1983; Dupuy, 1984; Dahlöf *et al.*, 1989; Dahlöf, 1990).

### Administration of Questionnaires

Each patient was given 6 envelopes, each containing the 4 questionnaires. The patients completed the 4 anxiety questionnaires in the morning of each day, for 5 days prior to their scheduled dental treatment appointment, and on the day of treatment. All 6 envelopes were returned to the investigator on the day of the patient's initial treatment appointment.

The questionnaires were coded with the patient's identification number and A or B. The code A or B identified the patient's group, to which the investigators were blind.

There was a reliance on the patients to complete the questionnaires, which may have influenced the response rate. To improve compliance, the patients were given an instruction leaflet with reminders of how to complete the questionnaires, and a check-off box to enable them to record that they had completed the questionnaires on that day. No further contact was made with the patients to prompt them to complete the questionnaires.

### Data Analysis

The data were entered into SPSS for Windows 11.0. To test the significance of the results, 2 different types of tests were carried out. For analysis of significance between groups and days, repeated-measures analysis of variance was used on each questionnaire individually. This involved 3 tests being undertaken simultaneously: a test of whether there was an overall difference between the experimental and comparison groups over the 6 days; a test of whether anxiety and quality of life varied between days; and a test of whether the difference between the experimental and comparison groups varied between days. The correlation between anxiety and quality-of-life scores was tested by Pearson's correlation coefficient. The statistical significance of this result was tested by a *t* test.

## RESULTS

Forty-three patients were initially recruited into the study. Three patients were completely excluded, as they failed to complete the questionnaires on one of the days. One of the patients from the experimental group withdrew from the study. This left 21 patients in the experimental group and 18 in the comparison group. Four patients failed to complete a full set of a particular questionnaire. These patients were not excluded; however, the data for that particular questionnaire were discounted. This resulted in different numbers of participants for each questionnaire, to ensure analysis was only carried out on full datasets (see Table 1 for details).

Descriptive statistics showed the average age of those in the experimental group to be 36 yrs (range, 19 to 50), and 38 yrs for the

**Table 1.** Means and Standard Deviations of the Sums of the Values over the Six-day Observation Period

Measure	Experimental				Comparison			
	n	Mean (95% confidence interval)	Std. Deviation	Std. Error	n	Mean (95% confidence interval)	Std. Deviation	Std. Error
Corah DAS	21	16.2 (14.7, 17.7)	3.4	0.8	18	8.3 (6.9, 9.7)	2.8	0.7
STAI S-Anxiety	21	43.9 (38.4, 49.4)	12.1	2.6	17	30.8 (26.5, 35.2)	8.5	2.1
STAI T-Anxiety	21	42.1 (37.1, 47.1)	11.0	2.4	16	34.2 (28.2, 40.2)	11.3	2.8
PGWB	21	76.0 (68.5, 83.4)	16.3	3.6	18	87.6 (80.8, 94.4)	13.7	3.2
MSEP Contentment	19	290.1 (239.5, 340.7)	105.0	24.1	18	136.9 (90.0, 183.9)	94.4	22.2
MSEP Vitality	19	214.3 (177.9, 250.7)	75.5	17.3	18	95.2 (63.0, 127.3)	64.6	15.2
MSEP Sleep	19	155.3 (128.2, 182.5)	56.3	12.9	18	72.7 (47.2, 98.2)	51.4	12.1

n = number of subjects.

Std = Standard.

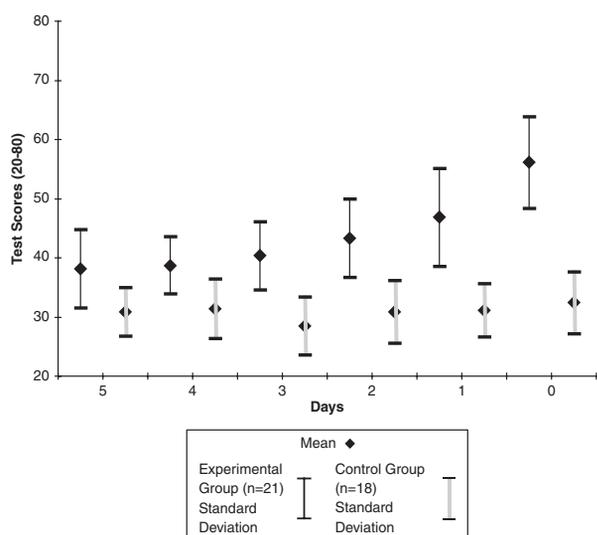
DAS = Dental Anxiety Scale.

STAI S-Anxiety = Spielberger State Anxiety Inventory.

STAI T-Anxiety = Spielberger Trait Anxiety Inventory.

PGWB = Psychological General Well-Being scale.

MSEP = Minor Symptom Evaluation Profile.



**Figure.** Test scores for the experimental and control groups over the 6 days for the Spielberger State-Anxiety questionnaire.

comparison group (range, 21 to 50). There were 15 females and six males in the experimental group, and ten females and eight males in the comparison group.

### Relationship between the Two Study Groups

The experimental group had significantly higher total mean anxiety scores over the 6 days, compared with the comparison group, for the Corah DAS ( $p < 0.001$ ), State ( $p = 0.001$ ) and Trait Anxiety scores ( $p = 0.038$ ) (Table 1).

The mean score in all 3 dimensions of the MSEP was significantly higher for the experimental group, indicating a poorer quality of life ( $p < 0.001$  for all dimensions). The PGWB score was lower for the experimental group, indicating a poorer quality of life, and this difference was significant ( $p = 0.022$ ) (Table 1).

### The Temporal Relationship

The comparison group scores for all of the questionnaires (apart from the Corah DAS) remained fairly stable over the 6 days.

The experimental group showed a steady increase (MSEP, State and Trait Anxiety) or decrease (PGWB) in scores from days 4 to 0. This change indicated an increase in anxiety and decrease in quality of life. These observations are illustrated for the State Anxiety scores (Fig.), and for all of the questionnaires in the Supplemental Appendices 1-7.

Both the experimental and comparison group Corah DAS scores remained fairly stable until day 0, when they both showed an increase, by 0.66 and 0.50, respectively. This effect of days was shown to be significant for the Corah DAS ( $p = 0.017$ ), State ( $p < 0.001$ ), Trait ( $p = 0.047$ ), MSEP ( $p < 0.001$  for all 3 dimensions), and PGWB ( $p < 0.001$ ) scores.

In all of the measures, apart from the Corah DAS and the Spielberger Trait Anxiety Inventory, there was a steady increase in the difference in mean scores between the experimental and comparison groups on each day, up to the day of treatment (Table 2). The difference in scores between the experimental and comparison groups was shown to vary significantly from day to day for the State Anxiety ( $p < 0.001$ ), Trait Anxiety ( $p = 0.010$ ), PGWB ( $p < 0.001$ ), MSEP *contentment* ( $p < 0.001$ ), *vitality* ( $p < 0.001$ ), and *sleep* ( $p < 0.001$ ) scores, but not the Corah DAS ( $p = 0.307$ ).

### Correlation between Anxiety and Quality-of-Life Scores

There were significant correlations between the Corah DAS and the MSEP *contentment* and *sleep* scores. There were weaker non-significant correlations with the PGWB and MSEP *vitality* scores.

There were significant correlations between the Spielberger State Anxiety Inventory and the PGWB, MSEP *contentment* and *vitality* scores, and a weaker non-significant correlation with the MSEP *sleep* scores (Table 3).

## DISCUSSION

The results of the study show the extent of pre-operative anxiety that phobic patients experience in the days leading up to dental treatment. This is especially marked with regard to dental

**Table 2.** Parameter Estimates: Difference between Groups (95% confidence interval) on Each Day

	Day 5	Day 4	Day 3	Day 2	Day 1	Day 0
Corah DAS	7.1 (4.7, 9.5)	8.1 (5.9, 10.2)	8.1 (6.1, 10.1)	7.8 (5.6, 10.0)	8.0 (5.9, 10.1)	8.2 (6.1, 10.3)
STAI S-Anxiety	7.3 (-0.3, 14.8)	7.4 (0.8, 13.9)	11.9 (4.5, 19.0)	12.0 (4.4, 20.4)	15.7 (6.7, 24.8)	23.7 (14.8, 32.5)
STAI T-Anxiety	7.7 (-0.0, 15.4)	6.4 (-0.8, 13.5)	6.3 (-1.4, 14.0)	8.0 (-0.05, 16.0)	7.7 (-0.5, 15.9)	11.7 (3.8, 19.6)
PGWB	-6.8 (-15.9, 2.2)	-7.0 (-16.2, 2.2)	-10.4 (-20.9, 0.0)	-11.9 (-23.5, -0.4)	-15.2 (-25.9, -4.5)	-18.7 (-30.2, -7.2)
MSEP Vitality	74.0 (25.1, 122.8)	73.9 (26.5, 121.2)	94.9 (49.4, 140.5)	126.7 (65.0, 188.5)	158.1 (98.8, 217.4)	187.3 (124.7, 249.9)
MSEP Contentment	85.5 (15.9, 155.2)	85.1 (21.8, 148.4)	122.3 (53.5, 191.1)	159.9 (70.9, 248.9)	199.5 (119.2, 279.9)	266.5 (181.6, 351.5)
MSEP Sleep	57.8 (14.6, 100.9)	39.6 (-2.4, 81.6)	67.5 (29.6, 105.4)	86.9 (45.6, 128.2)	116.7 (70.0, 163.4)	127.4 (82.8, 172.1)

Day = Number of days before treatment.  
 Day 0 = Day of treatment.  
 DAS = Dental Anxiety Scale.  
 STAI S-Anxiety = Spielberger State Anxiety Inventory.  
 STAI T-Anxiety = Spielberger Trait Anxiety Inventory.  
 PGWB = Psychological General Well-Being scale.  
 MSEP = Minor Symptom Evaluation Profile.

**Table 3.** Correlations of Anxiety Measures with Quality-of-Life Measures using the Mean Scores over the 6 Days in the Experimental Group

Anxiety Measures	Quality-of-Life Measures	Pearson Correlation	Significance (2-tailed)
Corah DAS (n = 21)	+ PGWB (n = 21)	-0.4	P = 0.055
	+ MSEP Contentment (n = 19)	0.5	P = 0.047
	+ MSEP Vitality (n = 19)	0.3	P = 0.263
	+ MSEP Sleep (n = 19)	0.5	P = 0.019
STAI S-Anxiety (n = 21)	+ PGWB (n = 21)	-0.8	P < 0.001
	+ MSEP Contentment (n = 19)	0.8	P < 0.001
	+ MSEP Vitality (n = 19)	0.7	P < 0.001
	+ MSEP Sleep (n = 19)	0.4	P = 0.074

n = number of subjects.  
 DAS = Dental Anxiety Scale.  
 STAI S-Anxiety = Spielberger State Anxiety Inventory.  
 PGWB = Psychological General Well-Being scale.  
 MSEP = Minor Symptom Evaluation Profile.

anxiety. The authors recognize that the CDAS has now been largely superseded by the Modified Dental Anxiety Scale (MDAS) and in further studies would choose to use the later tool. The reader is directed to conversion tables (Freeman *et al.*, 2007) that enable the CDAS score to be converted to the MDAS score so that comparison with other work is more plausible. Elevated state anxiety is also shown in the experimental group, compared with the comparison group.

Previous studies have linked high levels of dental anxiety with high levels of general anxiety (Hall and Edmondson, 1983; Kaakko *et al.*, 1998). Interestingly, this study has shown that there may also be a difference in phobic dental patients' proneness to anxiety, as shown by a higher mean trait score in the experimental group.

The difference over the 6 days between groups was significant for psychological general well-being, *contentment*, *vitality*, and *sleep*. This indicates that patients with an elevated dental

and general anxiety do have a reduced quality of life in regard to these dimensions, compared with non-phobic dental patients.

The study also found temporal relationships with all of the measures in the experimental group. This is the first time these relationships have been identified, and shows that pre-operative quality of life and anxiety levels in the phobic dental patient are dynamic. It has also identified a possible start to these negative temporal effects, which could facilitate further research.

An unexpected result was the temporal relationship with trait anxiety. Since this is an underlying personality trait, we would expect it to be relatively stable. This may be an error due to the sample size.

For all but the Trait Anxiety Inventory and the Corah DAS, temporal relationships were demonstrated in regard to the difference in means between the two groups from day to day. This shows that those in the experimental group were becoming relatively more anxious, and experiencing a relatively greater effect on their quality

of life, compared with those in the comparison group. Interestingly, those in the comparison group had an increase in dental anxiety comparable to those in the experimental group on the day of treatment. These temporal effects are unique findings, which have not previously been researched.

The observations seen in this study further confirm the link among dental anxiety, general anxiety, and quality of life. Previous studies have shown a relationship between dental anxiety and quality of life (Berggren, 1993; Abrahamsson *et al.*, 2000; Locker, 2003; Mehrstedt *et al.*, 2004). By demonstrating positive and negative correlations, this study confirms the findings of the above papers, although not all of these findings were significant. Another unique finding of the study was the significant relationship between dental anxiety and sleep.

A stronger relationship was shown between general anxiety and quality of life, which was particularly marked with psychological general well-being, contentment, and vitality. These observations are consistent with reports from a quality-of-life study in regard to general anxiety (Strine *et al.*, 2005) and with the symptoms one would expect from generalized anxiety.

In conclusion, the results of this study suggest that dentally phobic patients, in the pre-operative period, have greater dental and general anxiety and a poorer quality of life, compared with non-phobic dental patients.

The presence of dental and general anxiety shows a relationship to quality of life. Although there is insufficient evidence to conclude that dental anxiety specifically has an effect on all aspects of quality of life, the study does suggest a relationship.

Although the sample size in this study is small, and therefore the conclusions must be interpreted with some caution, the results have highlighted important differences between the phobic and non-phobic dental patient, in the pre-operative period. It has also further confirmed the link between dental anxiety and quality of life.

## ACKNOWLEDGMENTS

This research was sponsored by Merck, Sharp and Dohme, Ltd, Clinical Pharmacology Europe, Harlow, Essex. No fees were paid to the investigators.

## REFERENCES

- Abrahamsson KH, Berggren U, Carlsson SG (2000). Psychosocial aspects of dental and general fears in dental phobic patients. *Acta Odontol Scand* 58:37-43.

- Berggren U (1993). Psychosocial effects associated with dental fear in adult dental patients with avoidance behaviours. *Psychol Health* 8:185-196.
- Cohen SM, Fiske J, Newton JT (2000). The impact of dental anxiety on daily living. *Br Dent J* 187:385-390.
- Corah N (1969). Development of a dental anxiety scale. *J Dent Res* 48:596.
- Dahlöf C (1990). Minor Symptoms Evaluation (MSE) Profile—a questionnaire for assessment of subjective CNS-related symptoms. *Scand J Prim Health Care Suppl* 1:19-25.
- Dahlöf C, Dimenäs E, Olofsson B (1989). Documentation of an instrument for assessment of subjective CNS-related symptoms during cardiovascular pharmacotherapy. *Cardiovasc Drugs Ther* 3:919-927.
- Dupuy HJ (1984). The Psychological General Well-Being (PGWB) index. In: Assessment of quality of life in clinical trials of cardiovascular therapies. Wenger NK, Mattson ME, Furberg CF, Elinson J, editors. New York: Le Jacq Publishing, pp.170-183.
- Fox E, O'Boyle C, Barry H, McCreary C (1989). Repressive coping style and anxiety in stressful dental surgery. *Br J Med Psychol* 62(Pt 4): 371-380.
- Freeman R, Clarke HM, Humphris GM (2007). Conversion tables for the Corah and Modified Dental Anxiety Scales. *Community Dent Health* 24:49-54.
- Hakeberg M, Berggren U, Gröndahl HG (1993). A radiographic study of dental health in adult patients with dental anxiety. *Community Dent Oral Epidemiol* 21:27-30.
- Hall N, Edmondson HD (1983). The aetiology and psychology and dental fear. *Br Dent J* 154:247-252.
- Kaakko T, Milgrom P, Coldwell SE, Getz T, Weinstein P, Ramsay DS (1998). Dental fear among university employees: implications for dental education. *J Dent Educ* 62:415-420.
- Kelly M, Steele J, Nuttall N, Bradnock G, Morris J, Nunn J, *et al.* (1998). The Adult Dental Health Survey 1998. London, UK; HMSO.
- Litt MD, Nye C, Shafer D (1993). Coping with oral surgery by self-efficacy enhancement and perceptions of comparison. *J Dent Res* 72: 1237-1243.
- Locker D (2003). Psychosocial consequences of dental fear and anxiety. *Community Dent Oral Epidemiol* 31:144-151.
- Luyk NH, Weaver JM, Beck FM, Loetscher CA, Sacks J (1988). The effectiveness of flurazepam as night sedation prior to the removal of third molars. *Int J Oral Maxillofac Surg* 17:347-351.
- Marks IM (1969). Fears and phobias. London, UK: Academic Press.
- McGrath C, Bedi R (2004). The association between dental anxiety and oral health-related quality of life in Britain. *Community Dent Oral Epidemiol* 31:67-72.
- Mehrstedt M, Tonnie S, Eisentraut I (2004). Dental fears, health status and quality of life. *Anesth Prog* 51:90-94.
- Mellor AC (1992). Dental anxiety and attendance in the North-West of England. *J Dent* 20:207-210.
- Spielberger DC (1983). Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press.
- Strine TW, Chapman DP, Kobau R, Balluz L (2005). Associations of self-reported anxiety symptoms with health-related quality of life and health behaviours. *Soc Psychiatry Psychiatr Epidemiol* 40:432-438; *erratum in Soc Psychiatry Psychiatr Epidemiol* 40: 680, 2005.