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Adult Dental Anxiety: Recent Assessment Approaches and Psychological Management in a Dental Practice Setting

Abstract: Dental anxiety of patients is a common feature of the everyday experience of dental practice. This article advocates the use of regular assessment of this psychological construct to assist in patient management. Various tools, such as the Modified Dental Anxiety Scale (MDAS), are available to monitor dental anxiety that are quick to complete and easy to interpret. Patient burden is low. A new mobile phone assessment system (DENTANX) is being developed for distribution. This application and other psychological interventions are being investigated to assist patients to receive dental care routinely.

CPD/Clinical Relevance: This article provides evidence and expert opinion on the worth of regular dental anxiety assessment in dental practice using structured tools, such as the Modified Dental Anxiety Scale, and consideration of psychological intervention development.

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Dental anxiety is one of the most pertinent psychological phenomena that dentists will meet on a daily basis in their practice setting.¹ So familiar is this experience for patients and practice staff that the issue has become simply part of the clinical environment.² It is something of a surprise to the authors that more emphasis is not placed on the management of dentally anxious patients in both undergraduate and postgraduate dental

courses, although new training methods are being developed.³ There are, of course, training events on conscious sedation or intravenous sedation to manage the highly dentally anxious patient. These require ancillary facilities and staff, that are not only expensive but may not be able to assist patients in understanding how to cope with their anxiety in the longer term, other than with pharmacological support.

The assessment of dental anxiety

Assessment of dental anxiety should be a prerequisite for any visit to the dentist and can be routinely performed. There are a variety of self-report questionnaires that are simple and easy to complete. The simplest measure that has been developed is the Modified Dental Anxiety Scale (MDAS).⁴ The Dental Anxiety Scale (DAS) was a forerunner to the MDAS, although it did not have a question about the local anaesthetic injection, nor did it have a uniform answering rating

scale.⁵ These features were easily introduced into the MDAS, and tested. This measure is now commonly adopted in research studies and surveys across the UK, Europe and beyond (Figure 1). The scale is easily employed in the practice setting as it takes no longer than 2–3 minutes to complete with simple instructions (supplied say by the dental nurse or receptionist). There are normative values for people in the UK.⁶ The total score can be compared with results obtained from the last Adult Dental Survey of England, Wales and Northern Ireland. There are conversion tables for the DAS total scores to be transformed to MDAS values (and vice versa).⁷ There is no evidence that completing the MDAS significantly raises dental anxiety.^{8,9} The cut-off point that has been demonstrated to indicate where respondents would prefer additional assistance when attending the dentist for their own dental fitness is 19.¹⁰ That is patients who score 19 or above are likely to be extremely dentally anxious. Patients who are dentally phobic will nearly always be in

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CAN YOU TELL US HOW ANXIOUS YOU GET, IF AT ALL, WITH YOUR DENTAL VISIT?									
PLEASE INDICATE BY INSERTING 'X' IN THE APPROPRIATE BOX									
1. If you went to your Dentist for TREATMENT TOMORROW, how would you feel?									
Not Anxious	<input type="checkbox"/>	Slightly Anxious	<input type="checkbox"/>	Fairly Anxious	<input type="checkbox"/>	Very Anxious	<input type="checkbox"/>	Extremely Anxious	<input type="checkbox"/>
2. If you were sitting in the WAITING ROOM (waiting for treatment), how would you feel?									
Not Anxious	<input type="checkbox"/>	Slightly Anxious	<input type="checkbox"/>	Fairly Anxious	<input type="checkbox"/>	Very Anxious	<input type="checkbox"/>	Extremely Anxious	<input type="checkbox"/>
3. If you were about to have a TOOTH DRILLED, how would you feel?									
Not Anxious	<input type="checkbox"/>	Slightly Anxious	<input type="checkbox"/>	Fairly Anxious	<input type="checkbox"/>	Very Anxious	<input type="checkbox"/>	Extremely Anxious	<input type="checkbox"/>
4. If you were about to have your TEETH SCALED AND POLISHED, how would you feel?									
Not Anxious	<input type="checkbox"/>	Slightly Anxious	<input type="checkbox"/>	Fairly Anxious	<input type="checkbox"/>	Very Anxious	<input type="checkbox"/>	Extremely Anxious	<input type="checkbox"/>

Instructions for scoring (remove this section below before copying for use with patients)

The Modified Dental Anxiety Scale. Each item scored as follows:

Not anxious = 1; Slightly anxious = 2; Fairly anxious = 3; Very anxious = 4; Extremely anxious = 5

Total score is a sum of all five items, range 5 to 25: Cut-off is 19 or above which indicates a highly dentally anxious patient, possibly dentally phobic

Figure 1. Modified Dental Anxiety Scale (see www.st-andrews.ac.uk/dentalanxiety/).

this elevated sample. The exceptions to this are those patients that are needle phobics and who manage other aspects of dental care, such as the high speed drill.

Some key findings have been derived from this large representative survey.¹¹ The level of extremely dentally anxious individuals is just above 1 in 10 (11.5%). Patients who score at the cut-off or higher are likely to require more time or special management. As age increases this level reduces. Dental anxiety was shown to be an important barrier to regular dental attendance. Twenty-two percent of respondents who showed extreme dental anxiety attended their dentist only when they had trouble with their teeth rather than for a regular check-up (8%).

There are various theories to understand the development and maintenance of dental anxiety.¹² Prominent

are the learning theory models where contingencies between stimuli and responses are closely linked.¹³ Critical is the traumatic experience in the past, functioning to precipitate a fearful reaction when exposed to a similar situation. The in-depth study of these linkages is not always straightforward, demonstrating the complexity, imagination and sheer variability of experience, background, vulnerability and interpretation that patients possess. For example, people with memories of physical or emotional abuse will tend to report greater dental anxiety levels.¹⁴

Communication

There is strong agreement, from professional and lay people alike, that the quality of communication between dentists and their teams of nurses, hygienists, assistants, receptionists and patients are a

crucial aide to the provision of good oral care in the practice. What is less clear are the elements that contribute to patients having their fears or anxieties allayed? Of interest are attempts to specify what components of communication might be supportive to maintaining a relaxed patient to enable treatment procedures to be completed without disruption, and the patient appreciation of the manner in which the treatment was delivered.^{15,16} The provision of information has been identified as an important area of investment for dental team members. The issue of giving reassurance, however, is less clear, although direct evidence for support is surprisingly lacking. A recent study with young children has shown that the use of reassurance may exacerbate the distress exhibited by the child rather than reduce anxiety.¹⁷ There is an urgent need to study this more closely and in order to compile clear advice for dentists and dental

staff. One important factor that has been ignored is the timing of these communicative events. Some evidence from the study quoted above has shown that the early use of reassurance is detrimental to the patient experience. Hence, there are questions of not only what to do in the treatment sessions with patients, but also when to include intervening comments. Systems have been devised to code these behaviours and the responses that dental staff make to emotional expressions by patients.¹⁶ These reliable assessment schemes with transcripts or video recordings make the analysis of the patterns of communication a scientific endeavour, as opposed to the anecdotal support which is difficult to generalize.

Use of an App: DENTANX

A randomized controlled trial of the use of the MDAS with dentally anxious patients (scoring a minimum of the cut-off value 19 or the maximum rating on any of the five questions) showed that, when dentists were provided with this information at the dental treatment session, patients were less anxious when leaving the surgery. The effect was either that the patient expected the dentist to treat him/her more carefully, or the dentist changed his/her own behaviour to be more informative or gentle in the overall approach.¹⁸ It was this non-cognitive approach that triggered the work on producing a modern device to assess dental anxiety for sharing with the patient's dentist.

A large proportion of the public in the western world now have access to their own personal mobile phone. This proportion is growing larger every year. The sheer volume of smartphone users globally has been estimated to be in excess of 500 million by 2015, and predicted in addition by 2018 to include 50% of the 3.4 billion smartphone/tablet users who have downloaded mobile health applications.¹⁹ The capability of the mobile phone is also increasing with the ability to collect self-ratings easily and export these data via *wifi* to a central repository. The trend for e-health applications appears to be unstoppable, although evidence that this market is sustainable is still being assessed and there are challenges in its use. The prospect of collecting routine dental anxiety assessments over time was considered by the authors as a possible way forward to plot dental anxiety over time. Academically, this is poorly understood other than by fairly

infrequent and crude survey approaches. The ability of an App to collect data frequently in the form of a diary presents excellent opportunities for research to explore the dynamics of dental anxiety over time.

The routine assessment of dental anxiety, however, may have a clinical benefit, especially when this is used by the dental team. To support this view, a four-year follow-up of dentally anxious patients in the Manchester area (UK) who attended a specialist public dental service were more likely to attend regularly with a general practitioner if the quality of the communication was excellent. Patients were more confident in their ability to cope if dentists acknowledged that their patients had had a difficulty in the past and were willing to discuss their patients' anxieties about any invasive treatments that might be necessary on that visit with them. Distress was raised when dentists apparently withdrew this subject in their interactions with patients. Patients regarded this behaviour as an indication that dentists had forgotten their potential difficulty to manage treatment.²⁰ The message therefore is to check with patients how anxious they are, hence the possible benefit of using a diary method of a recognized assessment of dental anxiety that can be easily visually displayed and related to the dental team members.

The DENTANX App has been developed by the current authors over a period of two years and will shortly become available for download following a clinical validation phase. The App has had detailed design and software internal to its workings to enable users to load their answers to the MDAS at regular time intervals if they wish, including pain levels and details of dental appointments made and future arrangements (Figure 2). These data can be kept by the mobile phone user or shared. The 'push' data facility sends encrypted coded data to a safe server for collection of anonymized data. An analysis of the collection of a large amount of dental anxiety ratings, coupled with pain ratings and details of dental treatment received over durations of time, it is hoped will advance our knowledge of the dynamics of this psychological construct. Further details of the application can be found: **dentanx.cs.st-andrews.ac.uk/**

Psychological management of dental anxiety

Patients who experience high levels of dental anxiety are not only distressed in a dental environment, such as a dental surgery, but also their ability to receive treatment in the conventional way is less. A large variety of techniques and approaches have been designed, although surprisingly the quality of the evidence is not very high.¹² A 5-year follow-up of patients provided with either sedation, cognitive behavioural therapy (CBT) or applied relaxation were found to be over 80% satisfied with their anxiety management treatment to receive oral care, regardless of technique.²¹ This might be evidence for showing that the relationship with the dentist and the team of staff might be an important factor. Of interest, however, is the possibility that the financial costs of providing sedation compared to other psychological approaches may be higher. This issue of acceptability and service affordability has been identified by researchers with younger patients.²² In a study of very dentally anxious patients referred for IV sedation but provided with CBT, it was found that patients on follow-up had not required IV sedation in the past 5 years that the psychological service had been provided and resulted in potential savings to the public dental service.²³ A critical review of the literature on interventions in dental anxiety has concluded that cognitive approaches, relaxation, and increasing patients' sense of control when receiving dental care are effective, especially in combination with repeated, graduated exposure.²⁴ Patients who are dentally anxious, and receive a psychological intervention prior to an attempt to receive dental treatment, have been found to have an advantage in their ability to receive treatment routinely.²⁵ It has been stated that we need additional high quality investigations to furnish important evidence to support the routine use of these techniques.

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References

1. Harding A, Vernazza CR, Wilson K, Harding J, Girdler

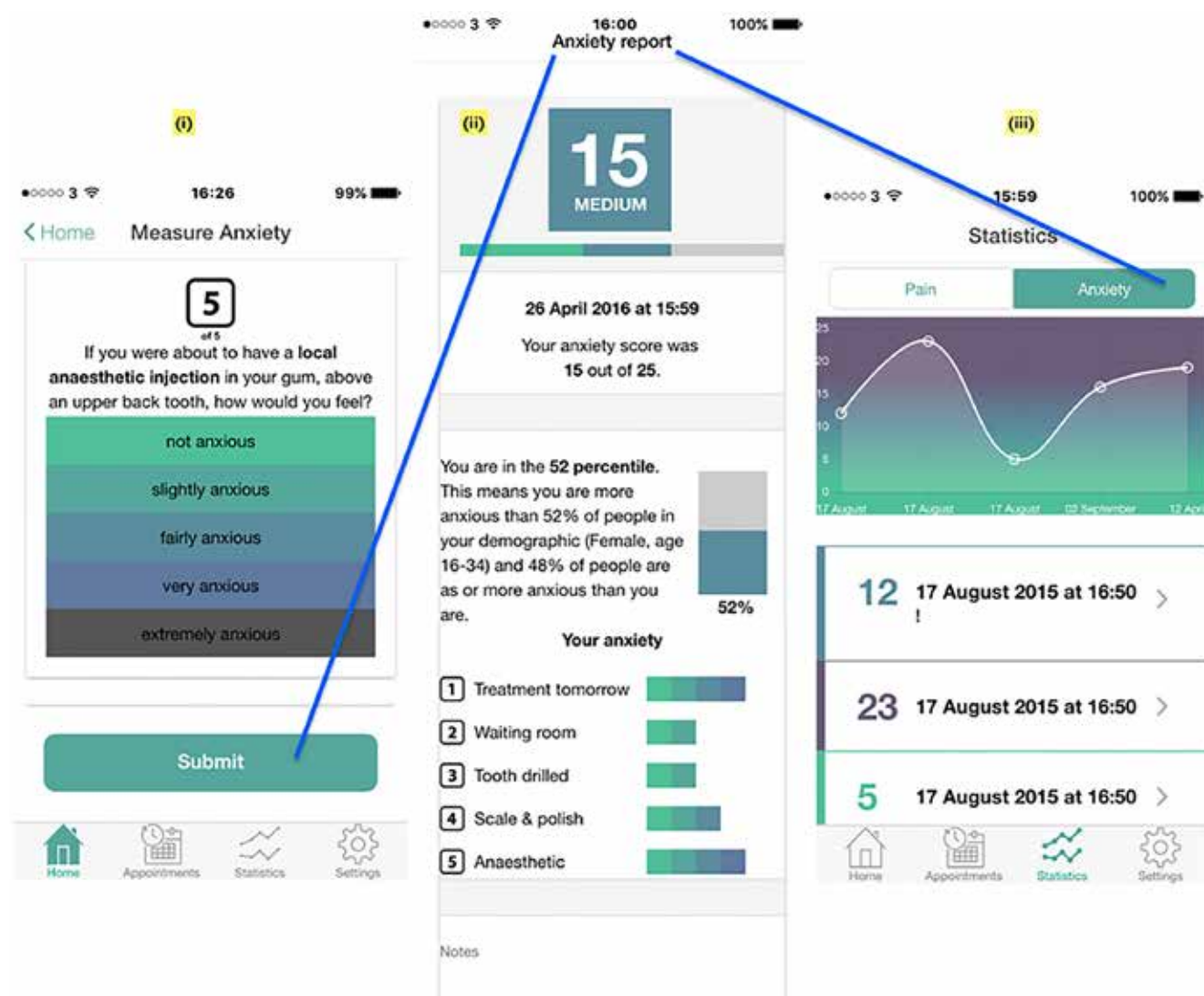


Figure 2. Three screen shots, from left to right with 'button press' indicators to trigger the following screens: (i) entry of MDAS scores; (ii) request for summary score and profile; and (iii) longitudinal chart.

NM. What are dental non-attenders' preferences for anxiety management techniques? A cross-sectional study based at a dental access centre. *Br Dent J* 2015; **218**(7): 415–421. doi:10.1038/sj.bdj.2015.249.

- Rafique S, Banerjee A, Fiske J. Management of the petrified dental patient. *Dent Update* 2008; **35**(3): 196–207, 4 passim.
- Quinn S, Herron D, Menzies R, Scott L, Black R, Zhou Y *et al*. The Video Interaction Guidance approach applied to teaching communication skills in dentistry. *Eur J Dent Educ: official journal of the Association for Dental Education in Europe*. 2015. doi:10.1111/eje.12146.
- Humphris G, Morrison T, Lindsay SJE. The Modified Dental Anxiety Scale: UK norms and evidence for validity. *Community Dent Hlth* 1995; **12**(3): 143–150.
- Corah NL. Development of a dental anxiety scale. *J Dent Res* 1969; **48**: 596.
- Humphris G, Crawford JR, Hill K, Gilbert A, Freeman R. UK population norms for the modified dental anxiety scale with percentile calculator: adult dental health survey 2009 results. *BMC Oral Health* 2013; **13**: 29. doi:10.1186/1472-6831-13-29.
- Freeman R, Clarke H, Humphris G. Conversion tables for the Corah and Modified Dental Anxiety Scales. *Community Dent Hlth* 2007; **24**(1): 49–55.
- Humphris G, Clarke H, Freeman R. Does completing a dental anxiety questionnaire increase anxiety? A randomised controlled trial with adults in general dental practice. *Br Dent J* 2006; **201**(1): 33–35.
- Humphris G, Hull P. Do dental anxiety questionnaires raise anxiety in dentally anxious adult patients? A two wave panel study. *Prim Dent Care* 2007; **14**(1): 7–11.
- King K, Humphris G. Evidence to confirm the cut-off for screening dental phobia using the Modified Dental Anxiety Scale. *Soc Sci Dent* 2010; **1**(1): 21–28.
- Hill KB, Chadwick B, Freeman R, O'Sullivan I, Murray JJ. Adult Dental Health Survey 2009: relationships between dental attendance patterns, oral health behaviour and the current barriers to dental care. *Br Dent J* 2013; **214**(1): 25–32. doi:10.1038/sj.bdj.2012.1176.
- Carter AE, Carter G, Boschen M, AlShwaimi E, George R. Pathways of fear and anxiety in dentistry: a review. *World J Clin Cases* 2014; **2**(11): 642–653. doi:10.12998/wjcc.v2.i11.642.
- Beaton L, Freeman R, Humphris G. Why are people afraid of the dentist? Observations and explanations. *Med Princ Pract (international journal of the Kuwait University, Health Science Centre)* 2014; **23**(4): 295–301. doi:10.1159/000357223.

14. Humphris G, King K. The prevalence of dental anxiety across previous distressing experiences. *J Anxiety Disord* 2010. doi:S0887-6185(10)00189-1 [pii] 10.1016/j.janxdis.2010.09.007.
15. Zhou Y, Black R, Freeman R, Herron D, Humphris G, Menzies R *et al*. Applying the Verona coding definitions of emotional sequences (VR-CoDES) in the dental context involving patients with complex communication needs: an exploratory study. *Patient Educ Couns* 2014; **97**(2): 180–187. doi:10.1016/j.pec.2014.07.023.
16. Wright A, Humphris G, Wanyonyi KL, Freeman R. Using the verona coding definitions of emotional sequences (VR-CoDES) and health provider responses (VR-CoDES-P) in the dental context. *Patient Educ Couns* 2012; **89**(1): 205–208. doi:10.1016/j.pec.2012.05.006.
17. Zhou Y, Humphris GM. Reassurance and distress behavior in preschool children undergoing dental preventive care procedures in a community setting: a multilevel observational study. *Ann Behav Med* (a publication of the Society of Behavioral Medicine) 2014; **48**(1): 100–111. doi:10.1007/s12160-013-9566-7.
18. Dailey Y, Humphris G, Lennon M. Reducing patients' state anxiety in general dental practice: a randomized controlled trial. *J Dent Res* 2002; **81**(5): 319–322.
19. Jahns R-G. 500m people will be using healthcare mobile applications in 2015. 2010. research2guidance.com/500m-people-will-be-using-healthcare-mobile-applications-in-2015/. (Accessed 24 March 2015).
20. Dailey YM, Crawford AN, Humphris G, Lennon MA. Factors affecting dental attendance following treatment for dental anxiety in primary dental care. *Prim Dent Care* 2001; **8**(2): 51–56.
21. Willumsen T, Vassend O. Effects of cognitive therapy, applied relaxation and nitrous oxide sedation. A five-year follow-up study of patients treated for dental fear. *Acta Odontol Scand* 2003; **61**(2): 93–99.
22. Kebriaee F, Sarraf Shirazi A, Fani K, Moharreri F, Soltanifar A, Khaksar Y *et al*. Comparison of the effects of cognitive behavioural therapy and inhalation sedation on child dental anxiety. *Eur Archiv Paed Dent* (official journal of the European Academy of Paediatric Dentistry) 2015; **16**(2): 173–179. doi:10.1007/s40368-014-0152-x.
23. Davies JG, Wilson KI, Clements AL. A joint approach to treating dental phobia: a re-evaluation of a collaboration between community dental services and specialist psychotherapy services ten years on. *Br Dent J* 2011; **211**(4): 159–162. doi:10.1038/sj.bdj.2011.674.
24. Gordon D, Heimberg RG, Tellez M, Ismail AI. A critical review of approaches to the treatment of dental anxiety in adults. *J Anxiety Disord* 2013; **27**(4): 365–378. doi:10.1016/j.janxdis.2013.04.002.
25. Wide Boman U, Carlsson V, Westin M, Hakeberg M. Psychological treatment of dental anxiety among adults: a systematic review. *Eur J Oral Sci* 2013; **121**(3pt2): 225–234. doi:10.1111/eos.12032.