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## THE RELEVANCE OF HYPNOSIS AND BEHAVIOURAL TECHNIQUES IN DENTISTRY

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### ABSTRACT

Dental fear is an universal phenomenon justifying the increasing relevance of psychology and the behavioral sciences to dental training and clinical practice. It has a wide-ranging and dynamic impact in patients' lives and shows some links with other anxiety disorders, as described in psychiatry, such as post-traumatic stress disorder (PTSD) and phobia.

Pharmacological sedation has been introduced and used more and more over the past two decades, in order to relieve dental anxiety and phobia and let the patient face oral surgery safely. However, its use is only a step in a much more complex approach, the aim of which is helping the patient to overcome their anxiety and get rid of it. The appropriate approach includes several steps: (1) assessing dental anxiety; (2) proper communication and ensuring patients are thoroughly informed; (3) iatrosedation to make patients comfortable and earn their trust; (4) a properly performed local anaesthesia, able to ensure a full analgesia; and (5) hypnosis and/or a wise use of drugs to ensure full anxiety control as needed.

Iatrosedation combines the principles of verbal and non-verbal communication and the emphatic approach pertaining to neurolinguistic programming. Given its effectiveness in relieving dental anxiety, it should be regarded as the essential strategy of communication with the patient.

Hypnosis is a powerful tool in dentistry. A relevant advantage, unique to hypnosis, is its twofold role: (1) achieving an effective and even deep sedation and amnesia while maintaining the patient's collaboration; and (2) treating dental anxiety and phobia, helping the patient to overcome it, as well as other associated anxiety disorders (e.g., claustrophobia). As far as eye movement desensitization and reprocessing (EMDR) is concerned, there is still a shortage of information on EMDR in dentistry, but it might be potentially useful when dental phobia is related to previous bad experiences involving PTSD components.

The superiority of hypnosis and other behavioural techniques in comparison with pharmacological sedation lies in their ability to help patients rid themselves of their dental anxiety. While pharmacological sedation only affords a temporary respite and helps the patient to cope with a single procedure, hypnosis and iatrosedation can effectively allow for both an excellent sedation in a physiological way and the treatment of patient's anxiety, helping them to get rid of their fear and other anxiety components.

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*Key words:* hypnosis, iatrosedation, psychological tests, eye movement desensitization and reprocessing, neurolinguistic programming, dentistry

## INTRODUCTION

The relevance of psychology and the behavioural sciences to dental training and clinical practice has gradually increased in the past two decades. In fact, oral surgery is a stressful experience which induces a marked increase in anxiety and expectation of suffering and pain perception immediately before any surgical procedure (Eli et al., 2000, 2003). Intraoperative anxiety and pain are the main cause of emergencies in dentistry; consequently their assessment and prevention have become an essential part of patient safety and overall quality of care.

Nowadays, an appropriate level of competence in the management of anxious patients by means of both behavioural and pharmacological techniques is considered an essential part of a dentist's training. The 2009 update of the Profile of Competences for the Graduating European Dentist (Cowpe et al., 2010) produced by the Association of Dental Education in Europe (ADEE) establishes that, on graduation, dentists are to be competent in:

- (6.22) Identifying the origins and continuation of dental fear and anxiety and managing this fear and anxiety with behavioural techniques.
- (6.23) Selecting and prescribing drugs for the management of preoperative, operative and postoperative pain and anxiety.

According to the ADEE, therefore, the behavioural sciences are a necessary part of a dentist's professional expertise.

## DENTAL ANXIETY

Dental fear is a very common phenomenon. Its incidence ranges from 10–30% of the population and depends on several factors such as nationality, socio-cultural background, previous experience, and the type of intervention involved (Gatchel, 1989; Moore et al., 1993; Kaakko et al., 1998; Berggren et al., 2000; Erten et al., 2006; Facco et al., 2008). Dental anxiety can also have a wide-ranging and dynamic impact in patients' lives as well as being responsible for avoidance behaviour (Berggren & Linde, 1984; Mellor, 1992; Hakeberg et al., 1993; Moore et al., 1996; Berggren et al., 2000; Cohen et al., 2000; Haugejorden & Klock, 2000; McGrath & Bedi, 2004).

The history of dentistry, which has been associated with pain and suffering for centuries, explains why so many people are afraid of the dentist. Dental anxiety and phobia can be learned at any age, but often occur in childhood, mainly as a result of traumatic experiences generated by a doctor's behaviour. They may also be learned indirectly from hearing or seeing the experiences of relatives and friends, or even from watching movies containing scenes of frightening dental treatments, such as the famous scene where Dustin Hoffman is tortured by having his teeth drilled in *Marathon Man* (1976) directed by John Schlesinger. In this regard, it is worth mentioning that physically restraining children and using hand-over-mouth techniques were still widely used at the end of the last century and are still used today by some dentists—and accepted by parents—despite the growing mistrust of such methods of immobilization (Adair et al., 2004; Newton et al., 2004; Eaton et al., 2005; Ramos et al., 2005).

The consequences of dental anxiety are manifold and may be severe:

- Anxiety-related avoidance can lead to poor oral health and quality of life.
- High levels of anxiety and phobia may negatively affect the dentist–patient relationship, preventing proper dental treatment and causing intraoperative complications.
- Anxiety impairs a patient’s ability to understand information they are given (Eli et al., 2008).
- A response of the sympathetic nervous system to anxiety-related stress may also be responsible for harmful emergencies, such as vasovagal syncope, hypertension, tachycardia, and cardiovascular accidents, which may become a particular problem in patients with systemic diseases (e.g. heart disease), whose anxiety may exacerbate their overall perioperative risk, making its appropriate management an essential aspect of safe dental care.

Dental anxiety and phobia are not just a fear of the dentist, a condition to consider separately from other anxiety disorders. These descriptive terms simply refer to the setting that triggers the anxiety and phobia, which have manifold endogenous and exogenous causes (Liddell & Locker, 2000). The former include several psychological disorders (such as low self-esteem, generalized anxiety, conduct disorder, panic disorder, phobia, post-traumatic stress disorder (PTSD), or multiple DSM-IV diagnoses), which are more common in patients with high levels of dental anxiety (Locker et al., 2001; Kvale et al., 2002; Locker, 2003). The exogenous factors include conditioned fear (due to previous unpleasant experiences or misinformation in the dental setting), fear of somatic intraoperative reactions and treatment outcomes, or distrust of dental professionals (Liddell & Locker, 2000). This lack of trust is usually prompted by a dentist’s inappropriate behaviour giving rise to traumatic dental treatments which make a patient feel helpless, threatened, and violated (Abrahamsson et al., 2002). Patients with severe systemic diseases also tend to have higher levels of dental anxiety related to previous experiences with the treatment of their diseases (Facco et al., 2008), and the severity of patients’ dental anxiety correlates significantly with previous negative experiences in both dentistry and other areas of medicine.

There is a close link between anxiety disorders, as defined by DSM-IV, and dental anxiety and phobia, as regards both the related symptoms and their pathophysiology. Patients with severe dental anxiety may behave like patients experiencing panic attacks, PTSD, or specific phobias (see Tables 1–3). As mentioned above, their fear may stem from prior negative dental or medical experiences, the features of which may resemble those described in cases of PTSD.

*Table 1.* DSM-IV criteria for panic attack

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A panic attack is a period of intense fear or discomfort, developing abruptly and peaking within ten minutes, and requiring at least four of the following:

- a. Chest pain or discomfort.
  - b. Chills or hot flushes.
  - c. Derealization (feelings of unreality) or depersonalization (being detached from oneself).
  - d. Fear of losing control.
  - e. Feeling dizzy, unsteady, lightheaded, or faint.
  - f. Feeling of choking.
  - g. Nausea or abdominal distress.
  - h. Palpitations or tachycardia.
  - i. Paraesthesias.
  - j. Sensations of shortness of breath or smothering.
  - k. Sense of impending doom.
  - l. Sweating.
  - m. Trembling or shaking.
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*Table 2.* DSM-IV-TR criteria for post-traumatic stress disorder

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1. The person has been exposed to a traumatic event in which both of the following were present:
    - a. The person experienced, witnessed, or was confronted with an event that involved actual or threatened death or serious injury or a threat to the physical integrity of others.
    - b. The person's response involved intense fear, helplessness, or horror.
  2. The traumatic event is persistently re-experienced in at least one of the following ways:
    - a. Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions.
    - b. Recurrent distressing dreams of the event.
    - c. Acting or feeling as if the traumatic event were recurring, including a sense of reliving the experience, illusions, hallucinations, and flashback episodes.
    - d. Intense psychological distress at exposure to cues that symbolize an aspect of the traumatic event.
    - e. Physiologic reactivity on exposure to cues that symbolize or resemble an aspect of the traumatic event.

3. The person persistently avoids stimuli associated with the trauma and has numbing of general responsiveness including at least three of the following:
  - a. Efforts to avoid thoughts, feelings, or conversations associated with the trauma.
  - b. Efforts to avoid activities, places, or people that arouse recollections of the trauma.
  - c. Inability to recall an important aspect of the trauma.
  - d. Markedly diminished interest or participation in significant activities.
  - e. Feeling of detachment or estrangement from others.
  - f. Restricted range of affect.
4. Persistent symptoms of increased arousal are indicated by at least two of the following:
  - a. Difficulty falling or staying asleep.
  - b. Irritability or outbursts of anger.
  - c. Difficulty concentrating.
  - d. Hypervigilance.
  - e. Exaggerated startle response.

Note: Duration of the disturbance is more than one month. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

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*Table 3.* DSM-IV criteria for specific phobia

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1. Persistent fear that is excessive or unreasonable, cued by the presence or anticipation of a specific object or situation.
  2. Exposure provokes immediate anxiety, which can take the form of a situationally predisposed panic attack.
  3. Patients recognize that the fear is excessive or unreasonable.
  4. Patients avoid the phobic situation or else endure it with intense anxiety or distress.
  5. The distress in the feared situation interferes significantly with the person's normal routine, occupational functioning, or social activities or relationships.
  6. In persons younger than 18 years, the duration is at least six months.
  7. The fear is not better accounted for by another mental disorder.
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To give an example: a history of tooth removal in childhood without any local anaesthesia and keeping a young patient physically restrained and helpless are just the kind of 'torture' that can cause PTSD or phobia. Dental phobia may not be limited to the dental setting but can also spread to other situations prompting the same sense of helplessness, loss of control, fear of choking, or being unable to escape. Examples seen in clinical practice are patients with dental phobia who are also claustrophobic and avoid using elevators or airplanes. On the other hand, patients with primary anxiety disorders, unrelated to the dental setting in particular, may be fearful when facing dental treatments as a result of their generalized anxiety (see Table 4), and there is possible comorbidity with other disorders, such as depression.

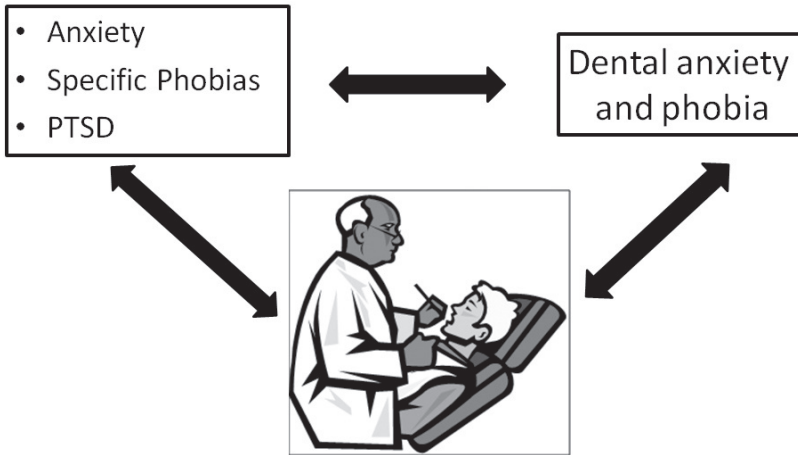
Table 4. DSM-IV criteria for generalized anxiety disorder

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1. Excessive anxiety about a number of events or activities, occurring more days than not, for at least six months. The person finds it difficult to control the worry.
  2. The anxiety and worry are associated with at least three of the following six symptoms (with at least some symptoms present for more days than not, for the past six months):
    - a. Restlessness or feeling keyed up or on edge.
    - b. Being easily fatigued.
    - c. Difficulty concentrating or mind going blank.
    - d. Irritability.
    - e. Muscle tension.
    - f. Sleep disturbance.
  3. The focus of the anxiety and worry is not confined to features of an Axis I disorder, i.e. being embarrassed in public (as in social phobia), being contaminated (as in obsessive-compulsive disorder), being away from home or close relatives (as in separation anxiety disorder), gaining weight (as in anorexia nervosa), having multiple physical complaints (as in somatization disorder), or having a serious illness (as in hypochondriasis), and the anxiety and worry do not occur exclusively during post-traumatic stress disorder.
  4. The anxiety, worry, or physical symptoms cause clinically significant distress or impairment in social or occupational functioning.
  5. The disturbance does not occur exclusively during a mood disorder, a psychotic disorder, pervasive developmental disorder, substance use, or general medical condition.
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In short, dental anxiety is by no means a straightforward, specific type of fear. It is a complex disorder with two different core causes: (1) direct or indirect traumatic experiences due to a doctor's inadequate behaviour in a dental or medical setting; and/or (2) anxiety disorders unrelated to the dental setting that make patients unable to face dental treatments. While the former may spread to several aspects of a patient's life, well beyond the dental setting, the latter may extend to dental care. Dentists and medical doctors alike have a great (though often underestimated) power and responsibility to cast themselves in the role of protective authority or torturer, depending on how they behave.

A dentist with the necessary competence and appropriate behaviour for managing anxious patients becomes a powerful authority figure; a leader, guide, and friend who can understand and empathize with their patients and help them cope with dental treatments safely and calmly, enabling them to control and gradually overcome their anxiety. Vice versa, an inappropriate (no longer acceptable) behaviour on the part of a dentist can be a harmful cause of anxiety, phobia, and PTSD, becoming a potentially lifelong source of suffering (see Figure 1). At the beginning of the 21st century, the proper management of dental anxiety and phobia is an unavoidable duty of the modern dentist (as it should be for all doctors and nurses), who must be competent in the assessment and treatment of anxiety by means of both behavioural and pharmacological methods.

Figure 1. Relationship between dental anxiety, the dentist's behaviour and DSM-IV anxiety disorders



Sedation for invasive procedures would appear to be the essential issue from a practical point of view, but it is not just a matter of choosing the appropriate drug. In dentistry, this is only a small part of a much broader and more complex picture, which also calls for a proper behavioural approach. The first step the dentist should take is to assess a patient's anxiety, and this can easily be done with the aid of fast and effective tests.

#### ASSESSING DENTAL ANXIETY

A variety of approaches can be used to evaluate a patient's dental anxiety, including interviews and several psychological tests designed to explore general aspects of anxiety and/or specifically for measuring dental anxiety. Newton and Buck (2000) published a review of the tests available for assessing anxiety and pain in dentistry. Of the 15 tests mentioned in their review, Corah's Dental Anxiety Scale (CDAS) (Corah et al., 1978; see also Corah, 1969, 1988) proved the most widely used and validated. Since then, two other tests have been introduced and validated: (1) the Modified Dental Anxiety Scale (MDAS) by Humphris (Humphris et al., 1995, 2000; Coolidge et al., 2008, 2010), which improves on the CDAS; and (2) the Visual Analog Scale for Anxiety (VAS-A), a very fast, effective and simple non-verbal test (Luyk et al., 1988; Facco et al., 2011b). The main features of CDAS, MDAS, and VAS-A are briefly outlined below.

#### CDAS

The CDAS contains four questions on how patients feel: (1) on the day before a dental treatment, (2) in the waiting room, (3) in the dentist's chair, when the dentist is preparing the drill, and (4) in the dentist's chair when having their teeth cleaned and the dentist is about to scrape the teeth around the gums. For each question there are five answers indicating increasing levels of anxiety; the sum of the scores for the answers ranges between 4 and 20, where scores



higher than 12 identify anxious patients (Thomson et al., 1996, 1997; Kruger et al., 1998; Bedi & McGrath, 2000; Ekanayake & Dharmawardena, 2003; Sohn & Ismail, 2005) and those higher than 15 indicate phobic levels of anxiety (Newton & Buck, 2000).

The CDAS has been validated and widely used in clinical practice, enabling dental anxiety to be measured with a simple questionnaire completed by patients. It has been used for both adults (Cohen et al., 1982; Luyk et al., 1988; Neverlien, 1990; Bedi & McGrath, 2000; Hagglin et al., 2000; Klages et al., 2004; Udoe et al., 2005; Eitner et al., 2006; Erten et al., 2006; Facco et al., 2008, 2011b) and children (Neverlien, 1989; Neverlien & Backer, 1991; Bedi et al., 1992; Peretz & Efrat, 2000; Majstorovic et al., 2001), showing a high internal consistency and test-retest reliability (Corah et al., 1978), and it is available in five European languages (Dutch, German, Hungarian, Italian, and Norwegian) (Eijkman & Orlebeke, 1975; Kunzelmann & Dunninger, 1990; Neverlien, 1990; Fabian et al., 1998; Facco et al., 2008). A significant relationship has also been reported between anxiety (as revealed by the CDAS) and the American Society of Anesthesiologists' (ASA) physical status classification, suggesting a trend towards higher levels of anxiety in patients with systemic diseases (Facco et al., 2008). This is probably due to their experience of chronic disease and the related diagnostic and therapeutic medical interventions which have a negative fallout on patients' perception of dental treatments.

The CDAS has the following weaknesses, which make it far from ideal as a test, even though it is effective: (a) a narrow range of total scores (Schuurs & Hoogstraten, 1993); (b) a low resolution for intermediate levels of anxiety (Humphris et al., 1995); (c) inconsistent answers, including descriptions of both anxiety and physical reactions (Humphris et al., 1995); and (d) the lack of a question on local anaesthesia, which is an important source of anxiety in patients with a fear of needles. In addition, the CDAS only considers a dental scenario so it fails to consider relevant aspects of the multidimensional nature of dental anxiety.

### *MDAS*

The MDAS was modelled on the original CDAS, adding a fifth question about local anaesthesia (Humphris et al., 1995; see [www.st-andrews.ac.uk/dentalanxiety](http://www.st-andrews.ac.uk/dentalanxiety)) and improving the format of the answers for each question, extending the scores to range homogeneously from 'not anxious' to 'extremely anxious'. As in the CDAS, the sum of the scores obtained for the patients' answers is obtained on a Likert scale with a minimum of 5 and a maximum of 25. The MDAS has been widely used in the UK (Dailey et al., 2001) and translated into a number of world languages, including Chinese, Greek, Indian, Spanish, and Turkish (Dailey et al., 2002; Ilguy et al., 2005; Tunc et al., 2005; Acharya, 2008; Coolidge et al., 2008, 2010), while the translation into Italian is in progress. It has good psychometric properties, it is quickly completed by the patient, and scoring is easy. Tables are also available for conversions between the CDAS and the MDAS (Freeman et al., 2007), indicating a MDAS score of 14 as a threshold for clinically relevant anxiety (corresponding to a CDAS score of 12), and a cut-off of 19 as a threshold for dental phobia (corresponding to a CDAS score of 16). The MDAS is a substantial improvement over the CDAS, thanks to the greater homogeneity of answers it generates and the introduction of the fifth question about anxiety over oral injections.

## VAS-A

The concept of the visual analogue scale (VAS) was introduced in the 1960s to measure psychological states (Aitken, 1969) and pain (Ohnhaus & Adler, 1975). Nowadays it is widely accepted as a measure of pain intensity, but is also used to assess other subjective experiences. Being quick and simple to administer (taking only a few seconds), it has been widely used in clinical studies: inputting 'visual analogue scale' as a keyword in PUBMED retrieves some 5,000 papers, about 75% of which deal with pain. The VAS is a non-verbal test and is consequently unaffected by any diversity of interpretation of words and phrases; it needs no validated translation into different languages; it is easier to understand than a verbal test; and it does not limit a patient's response to within a given scenario (as do the CDAS and MDAS).

The VAS-A was introduced in 1976 (Hornblow & Kidson, 1976) and was first tested in a small sample of dental patients in 1988 (Luyk et al., 1988). Since then, it has seldom been used to assess dental anxiety (Stopperich et al., 1993; Hosey & Blinkhorn, 1995; Palmer-Bouva et al., 1998; Brand, 1999; Eli et al., 2000, 2003; Peretz et al., 2004; Campbell et al., 2005; Schwartz-Arad et al., 2007), but it has been used to test general anxiety, well-being, satisfaction, and physical concerns in other medical conditions, such as irritable bowel syndrome (Bengtsson et al., 2007), rheumatoid arthritis (Tamiya et al., 2002), pelvic disorders (Coolen et al., 2006), oocyte retrieval (Hong et al., 2003), Caesarean section (Morgan et al., 2000), and mechanical ventilation (Chlan, 2004).

A significant correlation has been reported between the VAS-A and Spielberger's State-Trait Anxiety Inventory applied both pre- and postoperatively (Luyk et al., 1988). In a study of 98 patients receiving dental implant treatments, a significant correlation emerged between patients' scores on the VAS-A and CDAS, and their expectations of a painful experience (Schwartz-Arad et al., 2007). We tested the VAS-A by comparing it with the CDAS in a sample of over 1,000 patients undergoing oral surgery (Facco et al., 2011b). We found a close correlation between the CDAS and the VAS-A ( $r = 0.57$ ,  $p < 0.0001$ ), but the data were widely scattered, with almost all of the VAS-A scores coinciding with each CDAS score, especially in the intermediate CDAS values. A concordance index of 72% ( $p < 0.001$ ) emerged between the two tests, indicating a disagreement in the test results in 28% of cases. This was mainly due to VAS-A scores being higher than CDAS scores, suggesting greater sensitivity of the former. The VAS-A cut-offs for anxiety and phobia, obtained by means of ROC (receiver operating characteristic) curve analysis, were 5.1 and 7.0 cm, respectively.

Being a non-verbal test, the VAS-A may detect some components of dental anxiety that escape the CDAS or MDAS; a high VAS-A with a low CDAS or MDAS score may be indicative of the patient's fear of surgery proving unsuccessful or of possible complications (such as alveolar nerve damage) in patients who do not fear the dentist and the dental scenario per se. Given how quick and easy it is to administer both tests, we routinely use the VAS-A and the MDAS, classifying patients as anxious when at least one of the two tests is positive for anxiety.

In conclusion, the routine use of the above-mentioned tests enables a speedy assessment of dental anxiety, identifying patients who need special attention and anxiolytic medication for dental care.

## THE ROLE OF HYPNOSIS AND BEHAVIOURAL TECHNIQUES IN DENTISTRY

The broad spectrum of behavioural techniques potentially useful for managing dental anxiety and phobia include cognitive psychotherapy, neurolinguistic programming (NLP), iatrosedation, eye movement desensitization and reprocessing (EMDR), and hypnosis. Some of these are not for the dentist and belong to the realm of psychotherapy, but they could be useful in selected dental patients warranting referral to a psychotherapist, such as: (a) individuals with dental anxiety or phobia associated with other anxiety disorders or phobias (e.g. generalized anxiety disorder and related comorbidities); (b) patients so fearful of the dentist that they are unable to fix an appointment for a check-up; and (c) patients with complex, functional, chronic orofacial pain, which often has some psychosomatic components and may benefit from hypnosis. The way in which these methods (i.e. iatrosedation, EMDR, and hypnosis) can be used by specifically trained and skilled dentists is outlined below.

### *IATROSEDATION*

This term was introduced by Nathan Friedman (1967) to indicate 'the act of making calm by the doctor's behavior'. Behaviour, in this sense, includes a broad spectrum of verbal and non-verbal communication. The word was formulated by combining the prefix 'iatra' (pertaining to the doctor) with 'sedation' (the act of making calm).

Iatrosedation combines the principles of verbal and non-verbal communication and the emphatic approach pertaining to transformational linguistic and neurolinguistic programming, according to Bandler and Grindler (1975); it effectively adapts these to the dental scenario, enabling dentists to understand what their patients are experiencing and helping them to relieve their anxiety through a cognitive revision of their fear.

An essential component of iatrosedation involves recognizing a process of generalization and going in the opposite direction (i.e. from generalization to specific previous anxiety-inducing experiences). Generalization is a physiological process that induces individuals to extend the fear they have experienced in traumatic circumstances to other similar situations. For example, a single unpleasant experience in medical (e.g. tonsillectomy) or dental (e.g. tooth removal) settings in childhood may be generalized to other medical and/or dental scenarios, or even to other situations, giving rise to seemingly unrelated phobias, such as claustrophobia or the fear of choking.

Iatrosedation can be seen as an essential part of the way in which dentists approach their patients, helping them to cope and comforting them while providing dental care. When used effectively, iatrosedation reduces the need for pharmacological sedation, though drugs can still be used when iatrosedation is insufficient. A dentist's appropriate behaviour thus comes first, while pharmacological sedation can be used as a supplement to control anxiety where necessary. It makes no sense to resort to deeper pharmacological sedation in an effort to over-compensate for anxiety and fear caused by inappropriate professional behaviour (though sadly this is far from uncommon).

### *EMDR*

This is a psychotherapeutic technique designed for the treatment of PTSD (Shapiro, 2001, 2002; Shapiro & Maxfield, 2002; Bisson et al., 2007). EMDR has been proved empirically effective, although the mechanisms behind it are still unclear. Some studies have shown that eye

movements occurring while a patient recalls traumatic memories are less vivid and correlate with negative emotions (van den Hout et al., 2011, in press), while eye movements during EMDR reportedly activate cholinergic and inhibit sympathetic systems, bearing some similarity with the physiological changes occurring during REM (rapid eye movement) sleep (Elofsson et al., 2008).

The EMDR protocol includes eight steps. It starts with the collection and assessment of a patient's case history. Then comes the traumatic memory reprocessing, when patients are asked to recall and relive their experiences, especially in their most distressing aspects, their corresponding emotions, and their dysfunctional negative cognition of themselves. Emotion and cognition are rated respectively on a 10-point Likert scale as subjective units of disturbances (SUDs) and on a 7-point Likert scale for the validity of cognition (VAD). While recalling, patients are asked to visually track the operator's fingers moving back and forth; this is done repeatedly until the SUDs drop to zero and there is a marked improvement in the negative cognition. The session ends with a reassessment and integration of the patient's adaptive information and skills, including the definition of new targets (if necessary).

Although EMDR is primarily indicated for PTSD, it has been used in anxiety disorders, depression, and phobia (Gosselin & Matthews, 1995; Muris et al., 1998; De Jongh et al., 1999; Shapiro, 1999; Goldstein et al., 2000; Bae et al., 2008; Rosas Uribe et al., 2010), though further studies are needed to thoroughly test the effectiveness of EMDR for these disorders. EMDR is also potentially useful for dental anxiety and phobia, given its link with PTSD in some patients (i.e. in cases with previous traumatic medical and/or dental experience). There is still a shortage of information on EMDR in dentistry, however. To our knowledge, only one study on four cases is available in the literature (De Jongh et al., 2002), which reported a marked improvement in the dental anxiety in three of them after two or three EMDR sessions. We are currently investigating whether a single short session of EMDR during preoperative visits can reduce patients' levels of anxiety on the day of their dental treatment (Facco et al., study in progress). In short, there are still no clear indications on the use of EMDR in the treatment of dental anxiety and phobia, but it has promise as a potentially effective method for use in the dental setting that warrants further study.

### *HYPNOSIS*

Hypnosis can be defined as a modified state of consciousness achieved by focusing attention on an idea (called 'monoideism') as a result of a subject-hypnotist relationship (Tirone, 1983). It yields a wide range of psychic and physical phenomena. For example, hypnotized subjects may experience a feeling of heaviness or lightness of all or parts of their body (the latter can lead to arm levitation), eidetic imagination, hallucinations or attention deficits (neglect), catalepsy, paralysis or unconscious automatic movements, vasodilation, vasoconstriction, and blood flow redistribution. Hypnosis can also modulate pain perception, from hyperalgesia to analgesia.

Some of the above-mentioned effects of hypnosis are clearly helpful in the dental setting, given the need to manage anxiety, pain, and neurovegetative reactions (e.g. changes in heart rate and blood pressure, gag reflex). A particular advantage, unique to hypnosis, is the ability to achieve these effects, even reaching states of deep sedation and amnesia, while keeping the

patient cooperative (they can open their eyes and mouth, move, speak, walk, and act just like a person in normal conditions, even in the deepest states of hypnosis).

Inducing hypnosis is quite a quick and easy procedure in the hands of an expert dentist-hypnotist, taking no more than five minutes, during which patients are led to focus their attention on a single idea, excluding any other external or internal stimuli. During induction, suggestions of general well-being, deep relaxation, heavy eyelids, deep and even breathing are usually delivered, inducing patients to concentrate on their internal environment and disregard external stimuli. Their state of hypnosis can be checked by means of several clinical signals, such as arm levitation, the easing of facial tension, the dropping of the lower jaw with the mouth slightly open, and a slower breathing rate.

The time taken for subsequent inductions can be considerably reduced by means of post-hypnotic conditioning. Thus, in clinical practice, inducing states of hypnosis at dental sessions after the first time becomes very quick and easy, enabling the dentist-hypnotist to get patients to relax completely within seconds—much more quickly than it takes to ensure pharmacological sedation.

In addition to a state of relaxation, a hypnotic focused analgesia (HFA) can be obtained for use in surgical procedures. Previous studies of ours showed that HFA can be effectively reached for the purposes of oral surgery, leading to a far higher pain threshold in most cases: it can raise the average dental pain threshold by about 220% and ensure full analgesia in up to 45% of individuals, as well as preventing the hemodynamic changes induced by painful stimuli (Casiglia et al., 2007; Facco et al., 2009, 2011a, study in progress). HFA also makes it possible to reduce or abolish the gag reflex, which can severely hamper dental treatments (Patel et al., 2000; Gaspar et al., 2002; Eitner et al., 2005; Facco, unpublished data).

HFA is not simply a psychological dissociation from pain perception; it actually blocks pain processing as a whole, preventing the cardiovascular responses to pain stimuli and thereby protecting patients against surgical stress. This is the feature that enables hypnosis to stand comparison with pharmacological sedation. It is worth emphasizing that cardiovascular responses to trigeminal painful stimuli may yield exactly the opposite effects of those induced by pain in other somatic areas: the well-known sympathetic response to pain in non-trigeminal areas is characterized by vasoconstriction and tachycardia, while painful stimuli delivered to the trigeminal area can cause vasodilation and bradycardia via the trigemino-cardiac reflex, making hemodynamic syncope the most common emergency in dentistry (Prabhakar et al., 2008, 2009; Schaller et al., 2009).

The analgesic and tranquilizing potential of hypnosis makes it a safe and effective tool in the hands of the modern, well-trained dentist, who should be competent in assessing and managing anxiety. It can also improve patient safety by reducing the cardiovascular response to dental pain, limiting the risk of syncope, and offering patients adequate protection without any need for sedative drugs.

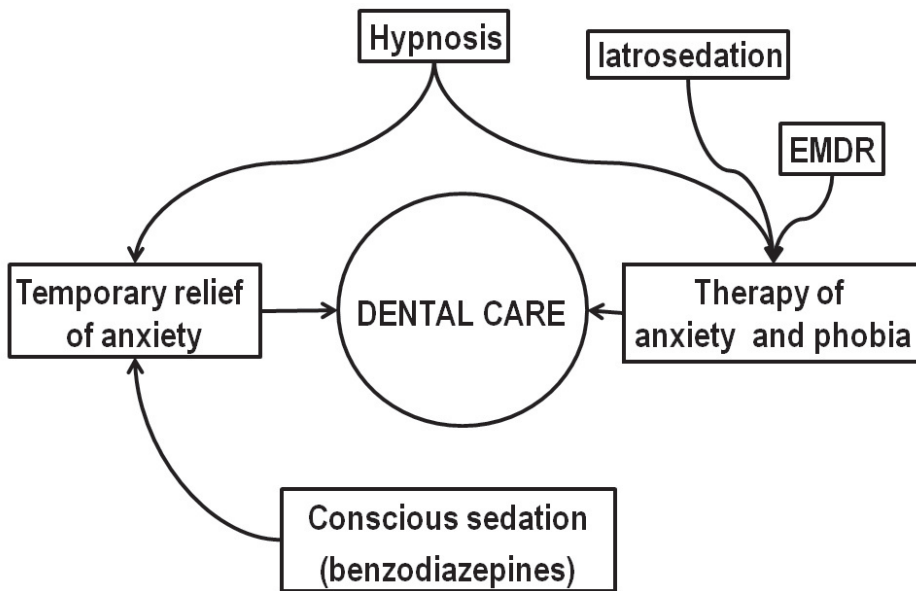
## CONCLUSION

In conclusion, managing dental anxiety is of paramount importance in clinical practice, being essential to patients' safety and the overall quality of their care. Pharmacological sedation is the most widely used procedure in dentistry, being traditionally seen as more suitable for surgical procedures (like general anaesthesia in medicine). It should be emphasized that our

ideal—actually a feasible and recommended goal—is dental care completely free from pain, anxiety, and stress. This target does not demand deep sedation or general anaesthesia (apart from a small group of particular cases with special needs, such as uncooperative patients). The General Dental Council (1997, 2005) and the European Federation for the Advancement of Anaesthesia in Dentistry uphold the concept of 'conscious sedation', which can be safely obtained by both pharmacological (oral and intravenous administration of benzodiazepines and/or nitrous oxide inhalation) and behavioural means.

It is important to remember that conscious sedation is not just a matter of choosing the most effective drug, which is only one essential aspect of a much wider process. Managing dental anxiety is a structured process involving several steps: (1) assessing dental anxiety; (2) proper communication and ensuring patients are thoroughly informed (Manani et al., 2010); (3) iatrosedation to make the patient comfortable and earn their trust; (4) a properly performed local anaesthesia (including all available techniques) to ensure total analgesia in all cases; and (5) hypnosis and/or a wise use of drugs to ensure full anxiety control as needed. Any weak link in this chain can cause avoidable suffering and distrust in the patient and give rise to clinical emergencies, as well as having possibly lifelong psychological consequences.

*Figure 2.* Role of pharmacological and non-pharmacological techniques for managing dental anxiety



Iatrosedation and hypnosis are no less powerful than drugs and should be considered among our primary tools, enabling us to do away with, or considerably reduce, the need for sedative drugs. The superiority of iatrosedation and other behavioural techniques lies in their ability to help patients rid themselves of their dental anxiety (see Figure 2), improving their autonomy, self-assurance, and well-being. While pharmacological sedation only affords a temporary respite and helps them to cope with a single procedure, hypnosis can effectively contribute to the



achievement of both targets; that is, facing the operation and recovering from fear. It may also enable patients to use autohypnosis independently for any future invasive procedures.

## REFERENCES

- Abrahamsson KH, Berggren U, Hallberg L, Carlsson SG (2002). Dental phobic patients' view of dental anxiety and experiences in dental care: a qualitative study. *Scandinavian Journal of Caring Sciences* 16: 188–196.
- Acharya S (2008). Factors affecting dental anxiety and beliefs in an Indian population. *Journal of Oral Rehabilitation* 35: 259–267.
- Adair SM, Waller JL, Schafer TE, Rockman RA (2004). A survey of members of the American Academy of Pediatric Dentistry on their use of behavior management techniques. *Pediatric Dental Journal* 26: 159–166.
- Aitken RC (1969). Measurement of feelings using visual analogue scales. *Proceedings of the Royal Society of Medicine* 62: 989–993.
- Bae H, Kim D, Park YC (2008). Eye movement desensitization and reprocessing for adolescent depression. *Psychiatry Investigation* 5: 60–65.
- Bandler R, Grindler J (1975). *The Structure of Magic*. Vol. 2: *A Book about Communication and Change*. Palo Alto, CA: Science and Behavior Books.
- Bedi R, McGrath C (2000). Factors associated with dental anxiety among older people in Britain. *Gerodontology* 17: 97–103.
- Bedi R, Sutcliffe P, Donnan PT, McConnachie J (1992). The prevalence of dental anxiety in a group of 13- and 14-year-old Scottish children. *International Journal of Paediatric Dentistry* 2: 17–24.
- Bengtsson M, Ohlsson B, Ulander K (2007). Development and psychometric testing of the Visual Analogue Scale for Irritable Bowel Syndrome (VAS-IBS). *BMC Gastroenterology* 7: 16.
- Berggren U, Linde A (1984). Dental fear and avoidance: a comparison of two modes of treatment. *Journal of Dental Research* 63: 1223–1227.
- Berggren U, Pierce CJ, Eli I (2000). Characteristics of adult dentally fearful individuals: a cross-cultural study. *European Journal of Oral Sciences* 108: 268–274.
- Bisson JI, Ehlers A, Matthews R, Pilling S, Richards D, Turner S (2007). Psychological treatments for chronic post-traumatic stress disorder: systematic review and meta-analysis. *British Journal of Psychiatry* 190: 97–104.
- Brand HS (1999). Anxiety and cortisol excretion correlate prior to dental treatment. *International Dental Journal* 49: 330–336.
- Campbell C, Hosey MT, McHugh S (2005). Facilitating coping behavior in children prior to dental general anesthesia: a randomized controlled trial. *Paediatric Anaesthesia* 15: 831–838.
- Casiglia E, Schiavon L, Tikhonoff V, Haxhi NH, Azzi M, Rempelou P et al. (2007). Hypnosis prevents the cardiovascular response to cold pressor test. *American Journal of Clinical Hypnosis* 49: 255–266.
- Chlan LL (2004). Relationship between two anxiety instruments in patients receiving mechanical ventilatory support. *Journal of Advanced Nursing* 48: 493–499.
- Cohen LA, Snyder TL, LaBelle AD (1982). Correlates of dental anxiety in a university population. *Journal of Public Health Dentistry* 42: 228–235.

- Cohen SM, Fiske J, Newton JT (2000). The impact of dental anxiety on daily living. *British Dental Journal* 189: 385–390.
- Coolen JC, Florisson JM, Bissett IP, Parry BR (2006). Evaluation of knowledge and anxiety level of patients visiting the colorectal pelvic floor clinic. *Colorectal Disease* 8: 208–211.
- Coolidge T, Arapostathis KN, Emmanouil D, Dabarakis N, Patrikiou A, Economides N et al. (2008). Psychometric properties of Greek versions of the Modified Corah Dental Anxiety Scale (MDAS) and the Dental Fear Survey (DFS). *BMC Oral Health* 8: 29.
- Coolidge T, Hillstead MB, Farjo N, Weinstein P, Coldwell SE (2010). Additional psychometric data for the Spanish Modified Dental Anxiety Scale and psychometric data for a Spanish version of the Revised Dental Beliefs Survey. *BMC Oral Health* 10: 12.
- Corah NL (1969). Development of a dental anxiety scale. *Journal of Dental Research* 48: 596.
- Corah NL (1988). Dental anxiety: assessment, reduction and increasing patient satisfaction. *Dental Clinics of North America* 32: 779–790.
- Corah NL, Gale EN, Illig SJ (1978). Assessment of a dental anxiety scale. *Journal of the American Dental Association* 97: 816–819.
- Cowpe J, Plasschaert A, Harzer W, Vinkka-Puhakka H, Walmsley AD (2010). Profile and Competences for the Graduating European Dentist: Update 2009. *European Journal of Dental Education* 14: 193–202.
- Dailey YM, Humphris GM, Lennon MA (2001). The use of dental anxiety questionnaires: a survey of a group of UK dental practitioners. *British Dental Journal* 190: 450–453.
- Dailey YM, Humphris GM, Lennon MA (2002). Reducing patients' state anxiety in general dental practice: a randomized controlled trial. *Journal of Dental Research* 81: 319–322.
- De Jongh A, Ten Broeke E, Renssen MR (1999). Treatment of specific phobias with eye movement desensitization and reprocessing (EMDR): protocol, empirical status, and conceptual issues. *Journal of Anxiety Disorders* 13: 69–85.
- De Jongh A, van den Oord HJ, Ten Broeke BE (2002). Efficacy of eye movement desensitization and reprocessing in the treatment of specific phobias: four single-case studies on dental phobia. *Journal of Clinical Psychology* 58: 1489–1503.
- Eaton JJ, McTigue DJ, Fields HW Jr, Beck M (2005). Attitudes of contemporary parents toward behavior management techniques used in pediatric dentistry. *Pediatric Dentistry* 27: 107–113.
- Eijkman MA, Orlebeke JF (1975). De factor 'angst' in de tandheelkundige situatie. *Nederlandse Tijdschrift voor Taandheekunde* 82: 114–123.
- Eitner S, Wichmann M, Holst S (2005). A long-term therapeutic treatment for patients with a severe gag reflex. *International Journal of Clinical and Experimental Hypnosis* 53: 74–86.
- Eitner S, Wichmann M, Paulsen A, Holst S (2006). Dental anxiety: an epidemiological study on its clinical correlation and effects on oral health. *Journal of Oral Rehabilitation* 33: 588–593.
- Ekanayake L, Dharmawardena D (2003). Dental anxiety in patients seeking care at the University Dental Hospital in Sri Lanka. *Community Dental Health* 20: 112–116.
- Eli I, Baht R, Kozlovsky A, Simon H (2000). Effect of gender on acute pain prediction and memory in periodontal surgery. *European Journal of Oral Sciences* 108: 99–103.
- Eli I, Schwartz-Arad D, Baht R, Ben-Tuvim H (2003). Effect of anxiety on the experience of pain in implant insertion. *Clinical Oral Implants Research* 14: 115–118.



- Eli I, Schwartz-Arad D, Bartal Y (2008). Anxiety and ability to recognize clinical information in dentistry. *Journal of Dental Research* 87: 65–68.
- Elofsson UO, von Scheele B, Theorell T, Sondergaard HP (2008). Physiological correlates of eye movement desensitization and reprocessing. *Journal of Anxiety Disorders* 22: 622–634.
- Erten H, Akarlan ZZ, Bodrumlu E (2006). Dental fear and anxiety levels of patients attending a dental clinic. *Quintessence International* 37: 304–310.
- Fabian TK, Kelemen P, Fabian G (1998). [Introduction of the concept of Dental Anxiety Scale in Hungary. Epidemiologic studies on the Hungarian population]. *Fogorvosi Szemle* 91: 43–52.
- Facco E, Casiglia E, Masiero S, Tikhonoff V, Giacomello M, Zanette G (2011a). Effects of hypnotic focused analgesia on dental pain threshold. *International Journal of Clinical and Experimental Hypnosis* 59: 454–468.
- Facco E, Casiglia E, Zanette G, Masiero S, Bacci C, Lapenta AM (2009). Effects of hypnosis on dental pain threshold. Preliminary report. *Pain Practice* 9: 47–48.
- Facco E, Zanette G, Favero L, Bacci C, Sivoletta S, Cavallin F et al. (2011b). Toward the validation of visual analogue scale for anxiety. *Anesthesia Progress* 58: 8–13.
- Facco E, Zanette G, Manani G (2008). Italian version of Corah's Dental Anxiety Scale: normative data in patients undergoing oral surgery and relationship with the ASA physical status classification. *Anesthesia Progress* 55: 109–115.
- Freeman R, Clarke HM, Humphris GM (2007). Conversion tables for the Corah and Modified Dental Anxiety Scales. *Community Dental Health* 24: 49–54.
- Friedman N (1967). Iatrosedation. In McCarthy F (ed.) *Emergencies in Dental Practice*. Philadelphia, PA: W.B. Saunders Co. Available at <http://www.dentalfearcentral.org/media/iatrosedation.pdf> (accessed 8 October 2012).
- Gaspar J, Fejerdy L, Fabian TK (2002). [Psychic aspects of the overactive gag reflex (gagging) in connection with a clinical case]. *Fogorvosi Szemle* 95: 199–203.
- Gatchel RJ (1989). The prevalence of dental fear and avoidance: expanded adult and recent adolescent surveys. *Journal of the American Dental Association* 118: 591–593.
- General Dental Council (1997). *Maintaining Standards: Guidance to Dentists on Professional and Personal Conduct*. Available at <http://www.gdcarf.com/Newsandpublications/Publications/Publications/MaintainingStandards%5B1%5D.pdf> (accessed 8 October 2012).
- General Dental Council (2005). *Standards for Dental Professionals*. Available at <http://www.gdc-uk.org/Newsandpublications/Publications/Publications/StandardsforDentalProfessionals%5B1%5D.pdf> (accessed 8 October 2012).
- Goldstein AJ, de Beurs E, Chambless DL, Wilson KA (2000). EMDR for panic disorder with agoraphobia: comparison with waiting list and credible attention-placebo control conditions. *Journal of Consulting and Clinical Psychology* 68: 947–956.
- Gosselin P, Matthews WJ (1995). Eye movement desensitization and reprocessing in the treatment of test anxiety: a study of the effects of expectancy and eye movement. *Journal of Behavior Therapy and Experimental Psychiatry* 26: 331–337.
- Hagglin C, Hakeberg M, Ahlqwist M, Sullivan M, Berggren U (2000). Factors associated with dental anxiety and attendance in middle-aged and elderly women. *Community Dentistry and Oral Epidemiology* 28: 451–460.

- Hakeberg M, Berggren U, Carlsson SG, Grondahl HG (1993). Long-term effects on dental care behavior and dental health after treatments for dental fear. *Anesthesia Progress* 40: 72–77.
- Haugejorden O, Klock KS (2000). Avoidance of dental visits: the predictive validity of three dental anxiety scales. *Acta Odontologica Scandinavica* 58: 255–259.
- Hong JY, Kang IS, Koong MK, Yoon HJ, Jee YS, Park JW et al. (2003). Preoperative anxiety and protocol requirement in conscious sedation for ovum retrieval. *Journal of Korean Medical Science* 18: 863–868.
- Hornblow AR, Kidson MA (1976). The visual analogue scale for anxiety: a validation study. *Australian and New Zealand Journal of Psychiatry* 10: 339–341.
- Hosey MT, Blinkhorn AS (1995). An evaluation of four methods of assessing the behaviour of anxious child dental patients. *International Journal of Paediatric Dentistry* 5: 87–95.
- Humphris GM, Freeman R, Campbell J, Tuutti H, D'Souza V (2000). Further evidence for the reliability and validity of the Modified Dental Anxiety Scale. *International Dental Journal* 50: 367–370.
- Humphris GM, Morrison T, Lindsay SJ (1995). The Modified Dental Anxiety Scale: validation and United Kingdom norms. *Community Dental Health* 12: 143–150.
- Ilguy D, Ilguy M, Dincer S, Bayirli G (2005). Reliability and validity of the Modified Dental Anxiety Scale in Turkish patients. *Journal of International Medical Research* 33: 252–259.
- Kaakko T, Milgrom P, Coldwell SE, Getz T, Weinstein P, Ramsay DS (1998). Dental fear among university students: implications for pharmacological research. *Anesthesia Progress* 45: 62–67.
- Klages U, Ulusoy O, Kianifard S, Wehrbein H (2004). Dental trait anxiety and pain sensitivity as predictors of expected and experienced pain in stressful dental procedures. *European Journal of Oral Sciences* 112: 477–483.
- Kruger E, Thomson WM, Poulton R, Davies S, Brown RH, Silva PA (1998). Dental caries and changes in dental anxiety in late adolescence. *Community Dentistry and Oral Epidemiology* 26: 355–359.
- Kunzelmann KH, Dunninger P (1990). Dental fear and pain: effect on patient's perception of the dentist. *Community Dentistry and Oral Epidemiology* 18: 264–266.
- Kvale G, Raadal M, Vika M, Johnsen BH, Skaret E, Vatnelid H et al. (2002). Treatment of dental anxiety disorders: outcome related to DSM-IV diagnoses. *European Journal of Oral Sciences* 110: 69–74.
- Liddell A, Locker D (2000). Changes in levels of dental anxiety as a function of dental experience. *Behavior Modification* 24: 57–68.
- Locker D (2003). Psychosocial consequences of dental fear and anxiety. *Community Dentistry and Oral Epidemiology* 31: 144–151.
- Locker D, Poulton R, Thomson WM (2001). Psychological disorders and dental anxiety in a young adult population. *Community Dentistry and Oral Epidemiology* 29: 456–463.
- Luyk NH, Beck FM, Weaver JM (1988). A visual analogue scale in the assessment of dental anxiety. *Anesthesia Progress* 35: 121–123.
- McGrath C, Bedi R (2004). The association between dental anxiety and oral health-related quality of life in Britain. *Community Dentistry and Oral Epidemiology* 32: 67–72.
- Majstorovic M, Skrinjaric I, Glavina D, Szivovicza L (2001). Factors predicting a child's dental fear. *Collegium Antropologicum* 25: 493–500.

- Manani G, Facco E, Favero G, Favero L, Mazzoleni S, Stellini E et al. (2010). Patients' appreciation for information on anesthesia and anxiolysis in dentistry. *Minerva Stomatologica* 59: 489–506.
- Mellor AC (1992). Dental anxiety and attendance in the north-west of England. *Journal of Dentistry* 20: 207–210.
- Moore R, Birn H, Kirkegaard E, Brodsgaard I, Scheutz F (1993). Prevalence and characteristics of dental anxiety in Danish adults. *Community Dentistry and Oral Epidemiology* 21: 292–296.
- Moore R, Brodsgaard I, Mao TK, Kwan HW, Shiau YY, Knudsen R (1996). Fear of injections and report of negative dentist behavior among Caucasian American and Taiwanese adults from dental school clinics. *Community Dentistry and Oral Epidemiology* 24: 292–295.
- Morgan PJ, Halpern S, Lam-McCulloch J (2000). Comparison of maternal satisfaction between epidural and spinal anesthesia for elective Cesarean section. *Canadian Journal of Anesthesia* 47: 956–961.
- Muris P, Merckelbach H, Holdrinet I, Sijtsenaar M (1998). Treating phobic children: effects of EMDR versus exposure. *Journal of Consulting and Clinical Psychology* 66: 193–198.
- Neverlien PO (1989). [Fear and dental apprehension among school-age children in a rural district]. *Den Norske Tannlaegeforenings Tidende* 99: 574–578.
- Neverlien PO (1990). Normative data for Corah's Dental Anxiety Scale (DAS) for the Norwegian adult population. *Community Dentistry and Oral Epidemiology* 18: 162.
- Neverlien PO, Backer JT (1991). Optimism-pessimism dimension and dental anxiety in children aged 10–12 years. *Community Dentistry and Oral Epidemiology* 19: 342–346.
- Newton JT, Buck DJ (2000). Anxiety and pain measures in dentistry: a guide to their quality and application. *Journal of the American Dental Association* 131: 1449–1457.
- Newton JT, Patel H, Shah S, Sturmey P (2004). Attitudes towards the use of hand over mouth (HOM) and physical restraint amongst paediatric specialist practitioners in the UK. *International Journal of Paediatric Dentistry* 14: 111–117.
- Ohnhaus EE, Adler R (1975). Methodological problems in the measurement of pain: a comparison between the verbal rating scale and the visual analogue scale. *Pain* 1: 379–384.
- Palmer-Bouva C, Oosting J, deVries R, Abraham-Inpijn L (1998). Stress in elective dental treatment: epinephrine, norepinephrine, the VAS, and CDAS in four different procedures. *General Dentistry* 46: 356–360.
- Patel B, Potter C, Mellor AC (2000). The use of hypnosis in dentistry: a review. *Dental Update* 27: 198–202.
- Peretz B, Efrat J (2000). Dental anxiety among young adolescent patients in Israel. *International Journal of Paediatric Dentistry* 10: 126–132.
- Peretz B, Nazarian Y, Bimstein E (2004). Dental anxiety in a students' paediatric dental clinic: children, parents and students. *International Journal of Paediatric Dentistry* 14: 192–198.
- Prabhakar H, Ali Z, Rath GP (2008). Trigemino-cardiac reflex may be refractory to conventional management in adults. *Acta Neurochirica (Wien)* 150: 509–510.
- Prabhakar H, Ali Z, Singh GP (2009). Asystole may be the most severe sequela of the trigemino-cardiac reflex: a comment on 'Asystole due to trigemino-cardiac reflex: a rare complication of trans-sphenoidal surgery for pituitary adenoma'. *Journal of Clinical Neuroscience* 16: 1508.

- Ramos MM, Carrara CF, Gomide MR (2005). Parental acceptance of behavior management techniques for children with clefts. *Journal of Dentistry for Children (Chicago)* 72: 74–77.
- Rosas Uribe ME, Lopez Ramirez EO, Jarero MI (2010). Effect of the EMDR psychotherapeutic approach on emotional cognitive processing in patients with depression. *Spanish Journal of Psychology* 13: 396–405.
- Schaller B, Cornelius JF, Prabhakar H, Koerbel A, Gnanalingham K, Sandu N et al. (2009). The trigemino-cardiac reflex: an update of the current knowledge. *Journal of Neurosurgical Anesthesiology* 21: 187–195.
- Schuurs AH, Hoogstraten J (1993). Appraisal of dental anxiety and fear questionnaires: a review. *Community Dentistry and Oral Epidemiology* 21: 329–339.
- Schwartz-Arad D, Bar-Tal Y, Eli I (2007). Effect of stress on information processing in the dental implant surgery setting. *Clinical Oral Implants Research* 18: 9–12.
- Shapiro F (1999). Eye movement desensitization and reprocessing (EMDR) and the anxiety disorders: clinical and research implications of an integrated psychotherapy treatment. *Journal of Anxiety Disorders* 13: 35–67.
- Shapiro F (2001). *Eye Movement Desensitization and Reprocessing: Basic Principles, Protocols, and Procedures*. New York: Guilford Press.
- Shapiro F (2002). EMDR 12 years after its introduction: past and future research. *Journal of Clinical Psychology* 58: 1–22.
- Shapiro F, Maxfield L (2002). Eye movement desensitization and reprocessing (EMDR): information processing in the treatment of trauma. *Journal of Clinical Psychology* 58: 933–946.
- Sohn W, Ismail AI (2005). Regular dental visits and dental anxiety in an adult dentate population. *Journal of the American Dental Association* 136: 58–66.
- Stopperich PS, Moore PA, Finder RL, McGirl BE, Weyant RJ (1993). Oral triazolam pretreatment for intravenous sedation. *Anesthesia Progress* 40: 117–121.
- Tamiya N, Araki S, Ohi G, Inagaki K, Urano N, Hirano W et al. (2002). Assessment of pain, depression, and anxiety by visual analogue scale in Japanese women with rheumatoid arthritis. *Scandinavian Journal of Caring Sciences* 16: 137–141.
- Thomson WM, Poulton RG, Kruger E, Davies S, Brown RH, Silva PA (1997). Changes in self-reported dental anxiety in New Zealand adolescents from ages 15 to 18 years. *Journal of Dental Research* 76: 1287–1291.
- Thomson WM, Stewart JF, Carter KD, Spencer AJ (1996). Dental anxiety among Australians. *International Dental Journal* 46: 320–324.
- Tirone G (1983). [The hypnotic state: a psychophysiological dimension or a useless concept?]. *Minerva Medica* 74: 2147–2151.
- Tunc EP, Firat D, Onur OD, Sar V (2005). Reliability and validity of the Modified Dental Anxiety Scale (MDAS) in a Turkish population. *Community Dentistry and Oral Epidemiology* 33: 357–362.
- Udoye CI, Oginni AO, Oginni FO (2005). Dental anxiety among patients undergoing various dental treatments in a Nigerian teaching hospital. *Journal of Contemporary Dental Practice* 6: 91–98.
- van den Hout MA, Bartelski N, Engelhard IM (in press). On EMDR: eye movements during retrieval reduce subjective vividness and objective memory accessibility during future recall. *Cognition and Emotion*.

van den Hout MA, Engelhard IM, Rijkeboer MM, Koekebakker J, Hornsveld H, Leer A et al. (2011). EMDR: eye movements superior to beeps in taxing working memory and reducing vividness of recollections. *Behaviour Research and Therapy* 49: 92–98.

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