

# **Behavioral Dentistry**

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# Dental Fear and Anxiety Associated with Oral Health Care: Conceptual and Clinical Issues

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### Key points

- Dental care-related fear and anxiety are related but distinct states that exist on continua and influence how and when a patient utilizes dental treatment.
- Fears and anxieties about dental treatment can develop via a number of mechanisms and manifest in diverse ways; they are highly individualized, complex phenomena which in extreme forms can meet criteria for Specific Phobia.
- Dental care-related fear and anxiety are prevalent global public health concerns that impact oral health, systemic health, psychological/emotional health, and quality of life.
- Appropriate and comprehensive assessment of dental care-related fear and anxiety is critical for understanding an individual patient's experience, and necessary for successful reduction of the aversive states.
- A number of intervention strategies are available, including behaviorally, cognitively, educationally, and pharmaco logically oriented methods, which can be used singly or in combination, for effectively working with highly fearful and anxious patients.

## Introduction

Fear, anxiety, worry, nervousness, and even disgust associated with the dental environment and oral healthcare professionals are global and ubiquitous phenomena that impact a diverse range of patients across the life span, with impact on family, friends, coworkers, and oral health professionals. This chapter focuses on dental anxiety and fear in adults and adolescents; these phenomena in children are of critical importance, given their developmental course and natural history from childhood leading into adulthood. Chapter 14 in this volume provides information about disruptive behavior in children in the dental operatory and its relation to fear and anxiety. So commonplace are the experiences of dental anxiety and fear, in fact, that they frequently are the topics of advertisements, newspaper cartoons, stand-up comedy routines, and everyday conversations (e.g., Sonis, 1997). While it may be a common experience, and even the focus of countless jokes, dental fear and anxiety are distressing, if not debilitating, over decades, for many patients, and are of significant clinical relevance for the dental professional. Dental fear and anxiety about dental care can be daunting barriers to the utilization of treatment.

Recognized as somewhat separate states that exist along continua in the general population, dental fear and anxiety may be so extreme that the patient can be diagnosed with a Specific Phobia, or a related behavioral health problem. While highly dental-anxious/fearful patients can be placed into general categories, there are innumerable unique manifestations. In spite of advancing dental treatment technologies, dental fear and anxiety appear to be at static levels from a population-wide perspective. Across the globe, dental fear and anxiety are associated with avoidance of oral health care, and so may best be conceptualized as *dental care-related fear and anxiety*. The avoidance behavior is linked to greater oral disease and poorer oral health-related quality of life, with implications for systemic health and quality of life in general,

and is therefore a major public health problem worldwide. Understanding dental care-related fear and anxiety from both conceptual and clinical standpoints is critical for the oral healthcare professional. Appreciation of conceptual issues will inform assessment, management, and treatment of patients with high levels of dental care-related fear and anxiety.

## Conceptual Considerations

Dental treatment is a potentially stressful experience for many, even most patients. Physical (e.g., potential for pain, being closed-in) and environmental/psychological factors (e.g., lack of predictability, loss of control) make the dental situation unique and often invoke stress (Eli, 1992). Undoubtedly, some procedures are especially stressful for a great majority of patients. For example, in patients generally (i.e., not necessarily those who are highly fearful/anxious), root canal therapy and the associated pain and stress results in transitional changes in natural killer cell cytotoxicity and the subsequent development of infectious disease episodes within the following month (Logan et al., 2001).

Patients experience fear or anxiety not only during invasive procedures; in fact, patients also report experiencing fear and/or anxiety in the context of routine preventative procedures, including dental hygiene treatment (Gadbury-Amyot et al., 1996; Sullivan & Neish, 1998). Many aspects of dental treatment are perceived as uncomfortable, threatening, or disgusting by patients, including the sights, sounds, and smells associated with the dental clinic, injections, dental instruments, perceived lack of control and predictability, and dental/orofacial pain (McNeil & Berryman, 1989; de Jongh et al., 1994; Johnsen et al., 2003). Moreover, patients often feel embarrassment in regard to their anxious and fearful responses anticipating, or while receiving, dental care.

The terms "oral health care" and "dental treatment" are quite broad, and so elucidating what aspects of the general construct are emo-

tionally evocative is important in defining the "universe" of what constitutes dental fear, anxiety, and phobia. Indeed, dental fear can be quite specific, as in the case of an otherwise generally comfortable patient who becomes in need of root canal therapy, or it can be generalized to almost all aspects of treatment, and can be part of another syndrome such as panic disorder with agoraphobia (although situationally bound panic attacks can occur in the context of a Specific Phobia of dental care). Injection fear is one important and common specific type of dental care-related fear (Milgrom et al., 1997). It can be highly circumscribed and encapsulated, but also is present in many (but not all) forms of dental fear and phobia. It can be restricted to oral injections, although it can be part of fear about injections in any part of the body. Many patients who experience injection fear also suffer from fears about other aspects of dental care. Given the nature of dental care, Blood-Injection-Injury (BII) Phobia can be provoked during oral health care. While there is some overlap clinically, particularly in terms of injection fears, research suggests that dental phobia is best conceptualized as a Situational Type of Specific Phobia, independent of the BII Type (de Jongh et al., 1998). Nevertheless, the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5; American Psychiatric Association [APA], 2013) seems to require the classification of Dental Phobia as a Specific Phobia with a blood-injection-injury code, which the DSM-5 text suggests is uniquely associated with vasovagal syncope, which certainly is not the case for many or most individuals with dental phobia. This change from the earlier edition of the DSM adds confusion to the literature, in that some authors have assumed or suggested individuals with dental phobia *all* should be classified with the BII Type. There is evidence to the contrary, however, supporting the notion that the Situational Type is the most common form of Specific Dental Care-Related Phobia (de Jongh et al., 1998; Leutgeb, Schäfer, & Schienle, 2011), although some individuals certainly would fit the criteria for BII Phobia.

In general, patients fear aspects of professional oral health care, with a few having anxiety or fear about self-care (e.g., toothbrushing). Evocative aspects of dental care are specific dental stimuli and experiences, such as being supine in the dental chair; pain, anticipation of pain, or memory of pain; sight and sound of the drill; and receiving injections, along with environmental factors, such as the lack of predictability and control, inability to easily "escape" or leave the dental setting, and (largely perceived) potential for infection.

Though dental patients may report both *fear* and *anxiety* about dental treatment, it is important to note that the two are phenomena that indeed are distinct from one another, although there likely is some overlap between them (McNeil et al., 1993; Poulton et al., 2001). This distinction between dental care-related fears and anxieties, as noted by Poulton et al. (2001) and Thomson et al. (2009), is one in need of further clarification and investigation. Many of the titles of current dental fear and anxiety instruments, as well as those evaluating fears and anxieties about pain, are misnomers, in that they purport to assess anxiety or fear, but in reality likely reflect some combination of both states.

Broadly speaking, dental care-related *fear* is a distressing emotional response to treatment-related stimuli, typically characterized by physiological responsivity, feelings and reports of apprehension and/or dismay, and avoidance. The fear literature suggests that it is a robust emotion, almost always defined by immediate onset, which usually involves a salient physiological component (e.g., Craske, 2003). A severe fear response may involve panic symptoms or even a panic attack in the dental clinic. Components that predispose a patient to panic attack are (a) an inability to escape easily; (b) a reduction in controllability; and (c) a reduction in predictability.

Dental care-related *anxiety*, though akin to dental care-related fear, is a more cognitively involved emotional response to stimuli or experiences associated with dental treatment.

Generally, anxiety entails negative thoughts and worries, and with respect to exposure to evocative stimuli, often occurs distally in time (Craske, 2003). That is, dental patients are most likely to experience anxiety well prior to their dental visit as they consider elements of the dental visit that have caused or could cause discomfort, and this anxiety may wax and wane between appointments. Dental patients are most likely to experience fear immediately prior to and during the visit as they are exposed to "threatening" stimuli. At some point, there likely is even a mixture of anxiety and fear for some patients. Understanding the patient's "nervous" behavior as anxiety, fear, or a combination of the two is a crucial first step in determining strategies for intervention that will be most efficacious for improving the patient experience.

Fear and anxiety no longer are considered binary phenomena, as people do not fit neatly into "fearful" or "nonfearful" groups. Instead, fear and anxiety can be more accurately conceptualized as dimensional in nature. Contemporary models of both fear and anxiety suggest that each construct exists on a continuum (McNeil et al., 2012b). At one end of the continua, a patient may essentially have complete lack of treatment-related fear or anxiety. At the other end, a patient may have such extreme fear or anxiety that his or her symptoms are consistent with DSM criteria (e.g., APA, 2013) for Specific Phobia or another (likely anxiety) disorder. Between the two ends of the continua, there

exists a range of situation-specific dental care-related fear or anxiety experiences, including those that are "normal," those that involve only seldom and insignificant fear/anxiety behaviors, and those that involve more frequent or impairing fear/anxiety behaviors or complete avoidance. Along these spectra are patients who hate visiting the dentist, but nonetheless are able to attend appointments; that is, they experience and report fear, but do not avoid (entirely). A model of the dental fear/anxiety continua is illustrated in Figure 12.1. Considering the dental care-related fear and/or anxiety experience in this way allows clinicians to interact with patients in an individualized manner, tailoring patient management approaches to be appropriate and effective for reducing the situation-specific, idiosyncratic, and dynamic fear or anxiety experience.

### *Etiology of Dental Care-Related Fear and Anxiety*

A number of mechanisms have been proposed in order to describe the development, maintenance, and life-course of dental care-related fear and anxiety. Once thought to have direct antecedents almost always in childhood, dental care-related anxiety and fear can appear at various stages across the life span (Milgrom et al., 1988; Locker et al., 1999b; Thomson et al., 2009), although childhood onset nevertheless is the most common. While a full review of each of these hypotheses is beyond the scope of this



**Fig. 12.1.** Model of the continua of dental care-related anxiety and dental care-related fear across the general population.

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chapter, a basic examination of the major ideas will shed some light on the complex phenomena. In trying to discern the determinants of dental fear and anxiety, it is important to be cognizant that human behavior is multidetermined; it is unlikely that there is "one" factor that predisposes or produces dental anxiety or fear. It also is critical to consider whether one is trying to predict dental anxiety/fear across an entire population as a whole (including the entire continua of dental anxiety and dental fear) or for a subpopulation (e.g., persons with high dental anxiety and/or fear, people who are dental avoidant); the larger the constituent group, the more likely that factors which affect only particular subgroups will be submerged in statistical analyses and that individual difference factors will be overlooked.

### Conditioning

Dental care-related fear and anxiety may, for many patients, be conditioned via prior exposure to painful or traumatic dental experiences (Weiner & Sheehan, 1990). Fear or anxiety responses may, through classical conditioning, form and be strengthened when an association is made between dental treatment-related stimuli and aversive experiences such as pain, discomfort, or lack of control (Kent, 1985; Davey, 1989). A classic example reveals how a patient may develop a fear of the dentist or dental care-related stimuli: A tooth restoration that involves pain, accompanied by the sound of a dental drill and the smell of the dental clinic, reinforces an association between negative physical and emotional states and treatment-related stimuli, making future anxiety or fear responses more likely. When the individual returns to the dental clinic, the drill sound and smells of the office (now "conditioned stimuli") alone provoke fear.

Dental care-related fear or anxiety responses also can be learned and perpetuated through operant conditioning, in which fear or anxiety behaviors (e.g., panic symptoms, crying, squirming, and avoidance) are reinforced, either through positive reinforcement, negative reinforcement, or both. Parents, for example, may

inadvertently use positive reinforcement (essentially encouraging a behavior by doing something that is at least immediately rewarding) by being overly solicitous in response to their child's expressed fears about an upcoming dental appointment, or even agreeing with the child's prediction that it will be "terrible," instead of using distraction, focusing on the child's coping abilities, or other more positive responses. Negative reinforcement (essentially actions that remove some ongoing unpleasant situation) also can promote dental fear. For example, an already highly fearful patient who is in a dental chair, with a procedure about to be performed may squirm, complain of "nervousness," and may have high cardiovascular reactivity. The compassionate dentist might interrupt treatment and suggest the patient come back another day when the patient is feeling "up to" having the procedure. While well intentioned, the dentist's behavior actually negatively reinforces fear by removing the immediate "threat" of the procedure, delaying it until some indeterminate future time. (What might be a better strategy would be to complete at least part of the treatment, to avoid reinforcing fear behavior, and to give the patient the sense of self-efficacy in completing some dental treatment. Alternately, preventing or reducing the fear through behavioral and/or pharmacological means also might be ideal.)

This latter example not only portrays negative reinforcement, but exemplifies how Mowrer's (1939) two-factor theory of learning extends the conditioning hypotheses of the development of dental care-related fear and anxiety to explain the maintenance of the phenomena and the related treatment avoidance behavior. First, fear is conditioned to environmental cues, such as the sights, sounds, and smells of the dental office, and that conditioned fear motivates the person to leave the office (i.e., "escape"). Second, if the patient does indeed leave the office, perhaps with the encouragement of the dentist, then getting away from the cues of the dental environment counterintuitively reinforces dental fear, which will make it

more difficult for the patient to return in the future. According to this theory, conditioned fear and anxiety are maintained as a result of subsequent avoidance of treatment since avoidance permits the learned association between dental treatment-related stimuli and negative physical and emotional states to remain strong, as no opportunities to learn otherwise (i.e., that not *all* dental experiences are negative) are afforded to the patient. With treatment avoidance added to the mix, a "vicious cycle of dental fear" only exacerbates the learned fearful and anxious responses to dental treatment. Patients in such a cycle suffer from dental care-related anxiety and fear, which results in delayed dental visit attendance patterns, which yield more dental problems, thus producing symptom-driven treatment-seeking patterns (and, as a result, more painful dental treatment experiences), ultimately reinforcing the conditioned dental care-related fear or anxiety (see Weinstein, 1990; Armfield, Stewart, & Spencer, 2007).

The conditioned or learned association between previous dental trauma and dental care-related fear and anxiety may be rather specific. That is, dental care-related fear and anxiety may be unrelated to most other types of trauma. With regard to previous traumatic experiences that are not dentally related (e.g., tragic death of a loved one, violent crime, natural disaster, war), no definitive association has been found between trauma and dental care-related fear and/or anxiety (Oosterink, de Jongh, & Aartman, 2009a; Humphris & King, 2011). Nevertheless, an association has been found between previous sexual trauma (i.e., sexual assault) and dental care-related anxiety (Humphris & King, 2011).

Traumatic conditioning is regarded as neither necessary nor sufficient to describe the etiology of all fears and phobias (Mineka & Sutton, 2006). Instead, observational/vicarious learning and verbal/instructional learning also can play a role as pathways in the development and maintenance of a fear or phobia (Rachman, 1977, 1990). There is strong evidence that such a contemporary conditioning model can be

applied to dental phobias and dental care-related anxiety (see Davey, 1989). Through experience and association, patients learn to be fearful of dental treatment, dental professionals, and the dental situation. Individual differences in dental fear or anxiety conditioning are the result of both differences in experience and, quite importantly, genetic/biological differences that differentially predispose individuals to develop and maintain the fears or anxieties. Notably, patients may not be able to recall a traumatic dental visit that played some role in the development of dental care-related fear and/or anxiety even if it occurred; it is well known that accuracy of recall of events, even some salient ones, is sometimes poor (see Mineka & Sutton, 2006). Just because a patient does not remember a traumatic dental visit does not mean there has not been fear conditioning as a result of a painful or uncomfortable previous experience. Some patients with a history of traumatic dental visits and associated dental care-related fear and/or anxiety simply may not be able to remember such visits, as the memories may be forgotten, repressed, or otherwise so emotionally laden that trying to recall them is cognitively blocked.

### Social Learning

Some dental patients are fearful of dental treatment, the dental clinic, or oral healthcare providers even though they never have encountered a painful or negative experience (Milgrom, Weinstein, & Heaton, 2009). Perhaps their fears and anxieties about the dental situation have been transmitted to them via social or observational learning, or directly shared information. In such routes of anxiety/fear acquisition, people learn that dental treatment is uncomfortable, distressing, or painful via witnessing emotional arousal in others, information sharing (e.g., "Getting your wisdom teeth out really hurts!"), and/or otherwise hearing stories from parents, friends, others, or mass entertainment or media outlets. While such patients may never have had a negative dental experience themselves, they may learn from others that dental

care is threatening; therefore, the experience, or anticipation of it, may become fear- or anxiety-inducing. For example, a patient may be informed that she needs root canal therapy and, in response, demonstrates a strong fear reaction and perhaps even a desire to instead get an extraction, due to her negative perceptions of endodontic care, learned from the popular media (to which she has been exposed from an early age).

Vicarious dental care-related anxiety and fear has been documented in children, who likely learn to be fearful or anxious from parents or siblings (Melamed & Williamson, 1991). There is, in fact, evidence that parents' dental care-related fear and fear-driven dental avoidance behavior is predictive of their adolescents' fear and avoidance behavior (McNeil et al., 2013a). Intergenerational transmission of dental care-related fear and anxiety likely is, at least in part, the result of observational learning. Dental professionals, when assessing dental care-related fear and anxiety and treating fearful or anxious patients, should not assume that previous, personally experienced dental trauma exists or that socially learned fears and anxieties are any less intense or impairing than fears and anxieties that developed by way of other mechanisms. Social and observational learning can have a great impact, and in some patients, may be the primary etiological factor in the development and maintenance of dental care-related anxiety and fear.

### Biological Influences

It is important to note that biological factors can have a part in the development and maintenance of dental care-related fear and anxiety in some individuals, or may be protective factors in others. Consistent with contemporary thought in psychology and behavioral neuroscience, individual biological and genetic factors can be seen as predisposing certain patients to be more or less likely to develop dental care-related fear and/or anxiety and/or other forms of psychopathology. Essentially, genetic differences make some patients more susceptible

than others to develop fears and/or anxieties through the learning-, cognitive-, personality-, and/or pain-based etiological mechanisms. Though there is a limited literature on the role of genetics and other biological factors in the etiology of dental care-related fear and anxiety, initial work suggests that they may serve as a diathesis (or vulnerability) for the development and/or maintenance of high levels of fear and anxiety.

The vulnerability may be more general, such as with neuroticism, which is a fairly heritable trait, and one that is associated with dental care-related anxiety (Vassend, Roysamb, & Nielsen, 2011). Or, the risk may be more specific, such as a predisposition to pain sensitivity and/or local anesthetic insensitivity, which is related to a genetic variation (Binkley et al., 2009). At present, this preliminary literature suggests that dental care-related fear is heritable (e.g., Ray et al., 2010; Randall et al., 2012), with the suggestion that biologically, dental care-related fear is intimately tied to fear of pain (Randall et al., 2012).

### Cognitive Factors

For many fearful or anxious dental patients, cognitions play a key part in their experience; misperceptions, negative thoughts, and patterns of thinking that include worries about danger or lack of control are common in individuals with anxiety disorders. Patients with greater levels of dental care-related fear and anxiety often engage in catastrophizing or misappraising dental treatment as more dangerous than it is, overestimating the likelihood of negative outcomes that may result from dental treatment. Such cognitions, if frequent and severe enough, produce a particularly negative response to dental treatment. Some categories of misperceptions which often predict patient anxiety/fear include uncontrollability, unpredictability, dangerousness, and disgustingness (Armfield, 2010c). In general, catastrophizing and lack of cognitive control are critical moderators of dental care-related anxiety and fear (de Jongh et al., 1994). Current cognitive models

of dental care-related fear suggest that abnormal fear may be acquired through a cognitive vulnerability, whereby a pattern of thinking that involves consistent misperceptions of stimuli as overly threatening yields the development of clinically significant levels of dental care-related fear and anxiety (Armfield, 2006). This cognitive vulnerability likely is the result of previous experiences and a genetic/biological predisposition that interacts with the environment. Understanding how a patient perceives all aspects of the dental treatment experience, encouraging realistic and appropriate appraisals, and correcting misperceptions when necessary, may be a critical aspect of anxiety/fear reduction for some patients. If these individuals view the dental treatment experience more accurately, they may be less likely to perceive relatively neutral stimuli or occurrences as threatening or traumatic and therefore will be less likely to develop fears or anxieties related to dental treatment.

Beliefs about dental treatment generally, and providers specifically, are important in understanding the development and maintenance of dental care-related fear and anxiety for some dental patients (Milgrom et al., 2009). Cognitions related to the appraisal of dental professionals and the dental profession may make an individual patient more or less likely to be fearful of or anxious about dental treatment; negative beliefs about dental treatment and unfavorable attitudes toward dental professionals are strongly correlated with dental care-related anxiety/fear (Doerr et al., 1998). Beliefs that affect dental care-related fear and anxiety and impact treatment-seeking patterns generally center on attitudes of trust/distrust, judgments about dentist-patient communication, and desire for control (Abrahamsson, Ohrn, & Hakeberg, 2009).

Beliefs about predictability and control in the dental situation can be important elements of dental care-related fear and anxiety. For some patients in particular, perceived lack of control may be an especially critical variable when considering the etiology of the fear and/or anxiety.

For example, patients who have a high desire for control and low perceived control in the dental situation report the highest degrees of dental care-related anxiety and distress, a finding that is observed when patients anticipate dental care that is either imminent or not immediate (Logan et al., 1991). Women, as a group, have a greater desire for control as well as a more profound perception of lack-of-control in dental settings, relative to men, who have less desire for control and sense less lack-of-control in that setting (Liddell & Locker, 1997). Similarly, younger adults desire more control and perceive a lesser degree of control during dental treatment than do older adults (Liddell & Locker, 1997). The *desire* for control and the *perception* of lack of control, then, are cognitions that can partially account for dental care-related fear and anxiety in some people.

### Personality

Many decades ago, mental health professionals utilizing a psychodynamic framework suggested that dental care-related fear and anxiety was the manifestation of specific unconscious drives/motivations and unresolved internal conflicts. Without significant evidence for those claims, the approach changed, to postulate that personality factors (i.e., stable, consistent, and predictable behavior patterns), broadly, were important to understanding the etiology of dental care-related fear and anxiety. Nevertheless, early work in approaching these problems from a personality perspective was not particularly useful in terms of understanding the specific etiologies of dental care-related fear and anxiety, or in devising efficient assessment and treatment strategies. The focus in the field then shifted to behavior. More recent work utilizing personality assessment in the dental care-related anxiety and fear arena, however, has been more productive. Certain personality traits, such as neuroticism, can predispose individuals to develop and maintain fears or anxieties in general, and/or about dental treatment in particular (Vassend et al., 2011). Contemporary approaches to conceptualizing and assessing

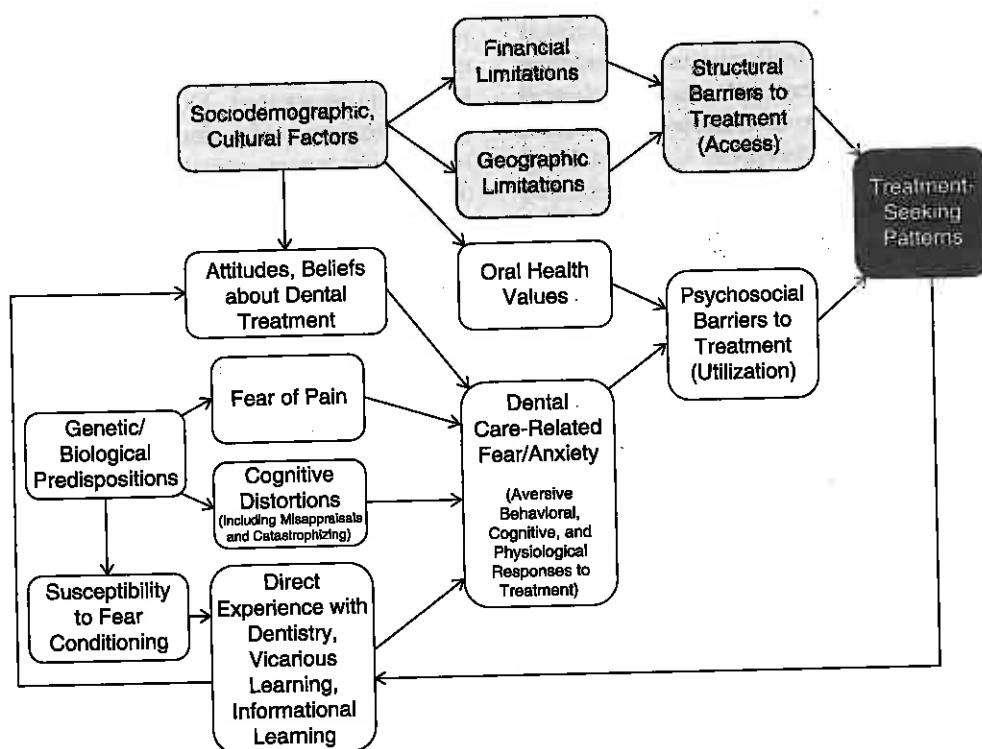
personality in this area have yielded important findings, such as that individuals with stable, long-standing dental care-related anxiety and fear seem to have a mixture of etiological factors, including personality features, such as being easily stressed, experiencing strong negative emotions, and being less sociable with others (Thomson et al., 2009).

#### Pain-Related Factors

For many patients, dental care-related fear and anxiety has some basis in either pain (i.e., orofacial pain sensitivity) and/or perceptions of or fears about pain. Heightened pain sensitivity may be responsible for the development of dental care-related fear or anxiety in patients who experience objectively similarly painful procedures as other, nonfearful or nonanxious patients (Bernstein, Kleinknecht, & Alexander, 1979; Wardle, 1982). Patients with a lower dental pain threshold and/or tolerance may, through behavioral or conditioning mechanisms, develop impairing dental care-related fear or anxiety as a result of exposure to what would be considered by others to be relatively painless procedures. It may be important for the dental practitioner to identify such patients and to pay particular attention to their comfort level as to limit the opportunities for fear/anxiety conditioning. Interestingly, a number of studies suggest that the experience of dental pain is, to some extent, also dependent on dental care-related fear and/or anxiety; patients with higher levels of fear and/or anxiety report more intense and long-lasting pain during dental injections (e.g., van Wijk & Makkes, 2008; van Wijk & Hoogstraten, 2009) and routine procedures, including scaling (e.g., Sanikop, Agrawal, & Patil, 2011; Tickle et al., 2012). Differential pain sensitivity can be both a precursor to, and the product of, dental care-related fear and anxiety. Relatedly, fear of pain has been found to be an important component of dental care-related anxiety (McNeil & Berryman, 1989; McNeil et al., 2001), and as already noted, these constructs are biologically linked in heritability analyses (Randall et al., 2012). Additionally, fear

of dental pain, specifically, is an important element of dental care-related fear/anxiety (van Wijk & Hoogstraten, 2003). That is, fearing the pain associated with dental treatment (and not necessarily even experiencing painful procedures), may predispose or reinforce fears or anxieties about dental professionals and dental treatment. Being particularly fearful of the *pain* associated with dental treatment, and not the actual treatment *per se*, can result in avoidance of clinic visits. The interplay of fear of pain, pain sensitivity, and anxiety is complex and important (see Chapter 7, Environmental, Emotional, and Cognitive Determinants of Dental Pain) and should be considered when assessing and treating dental care-related fears and anxieties.

Taken together, these etiological hypotheses highlight the complex nature of dental care-related fear and anxiety. To complicate the situation further, dental care-related fear and anxiety are not necessarily stable traits, as they can fluctuate with time as a result of shorter-term emotional states (i.e., depression), psychosocial factors (e.g., divorce, work-related stress), or as a result of new experiences and/or intervention. Paired with other psychosocial factors, as well as sociodemographic factors, the impact of dental care-related fear and anxiety on patient treatment-seeking behavior can be extreme, even life-threatening, in relation to avoidance of necessary dental care. Figure 12.2 presents a model that accounts for many of the concepts discussed here and provides some organizational context through which to better understand dental care-related fear and anxiety and their relation to utilization of oral health care. There are other models of dental anxiety/fear that focus on the vicious cycle (Weinstein, 1990; Armfield et al., 2007) or on cognitive aspects (Armfield, Slade, & Spencer, 2008). Dental care-related fear and anxiety generally are static, although they can change across the life span, but apparently only in some individuals (Thomson et al., 2009). The variables depicted in the conceptual model may change via dental experience, other life events, or psychosocial intervention.



**Fig. 12.2.** Conceptual model of the impact of dental care-related fear and anxiety on treatment-seeking patterns, and relation to associated variables.

### *Classification of Patients with Dental Care-Related Fear and Anxiety*

Efforts have been made to produce categories based on the etiology and/or manifestation of dental care-related fear and anxiety. One method of classifying people with dental care-related anxiety involves placing the anxious/fearful individual into one of two etiological categories: exogenous or endogenous (Weiner & Sheehan, 1990). Individuals characterized as having exogenous dental care-related anxiety are thought to have developed anxiety/fear as a result of conditioning through traumatic experiences or observational learning, while individuals characterized as having endogenous dental care-related anxiety/fear are thought to have developed dental-specific distress as a result of some other underlying mood or anxiety

disorder. Considering typical ages of onset of dental care-related anxiety/fear, groups with distinct characteristics seem to surface, providing support for an exogenous versus endogenous classification system (Locker et al., 1999b). Across groups, individuals with child-, adolescent-, and adult-onset dental care-related anxiety and fear show similar psychological, behavioral, and cognitive reactions to dental treatment. Nevertheless, a family history of dental care-related distress and traumatic dental experiences (characteristic of exogenous anxiety) is predictive of child-onset dental care-related anxiety/fear, while trait anxiety, multiple fears, and a general hostility and mistrust toward dentists (characteristic of endogenous anxiety) is predictive of adolescent- and adult-onset dental care-related anxiety/fear (Locker et al., 1999b).

Another classification system, one with strong clinical applicability, has been forwarded by Milgrom et al. (1985). Known as the "Seattle System," this method of categorizing patients with dental care-related anxiety and fear places individuals into one of four categories based on the etiology and experienced symptoms of their fear or anxiety: (a) conditioned fear of dental treatment; (b) fear of physiological arousal during dental treatment (e.g., racing heart, panic, fainting); (c) generalized anxiety and/or multiple phobias; or (d) distrust of dentists. The Seattle System is a classification framework that has been evaluated in several fearful and/or phobic samples, with results demonstrating its clinical utility (e.g., Moore, Brodsgaard, & Birn, 1991; Roy-Byrne et al., 1994; Locker, Liddell, & Shapiro, 1999a).

Yet another approach to classification has involved dental patients across the continuum of anxiety and fear. Focusing on fear of pain and its relation to dental care-related anxiety and fear (e.g., McNeil & Berryman, 1989), cluster analytic techniques identified three subgroups of oral surgery patients: (a) high fears of both pain and dental care, (b) high fear of pain but low fear of dental care, and (c) low fears of both pain and dental care (McNeil et al., 2013c).

Finally, using a longitudinal approach, Thomson et al. (2009; Poulton et al., 2001) have identified various trajectories of dental care-related anxiety across three decades of life. Included in this conceptualization are individuals comprising the following trajectories (with percent of the total sample noted in parentheses): (a) stable nonanxious low anxiety (39%), (b) stable nonanxious medium anxiety (38%), (c) adult-onset anxious (8%), (d) recovered (2%), (e) stable anxious (7%), and (f) late-adolescent-onset anxious (6%). Of note is how well this approach maps onto the various child-, adolescent-, and adult-onset types determined by Locker et al. (1999b). Also noteworthy is the very small proportion of individuals who have recovered from problem levels of dental anxiety/fear. This work on the natural history of dental anxiety is of vital importance to the

field, as it is not mired in cutoff scores, and allows a view of the development, as well as maintenance or recovery from, varying levels of dental anxiety across the life span.

## Epidemiological Considerations

Both dental care-related fear and anxiety are prevalent phenomena with far-reaching and clinically relevant implications. In the USA, approximately 45% of adults report at least moderate levels of dental care-related fear (Dionne et al., 1998). Between 5% and 10% of the same population indicates that they avoid necessary and accessible dental treatment as a result of this dental care-related anxiety/fear (Milgrom et al., 2009). Similar statistics have been observed in other parts of the world, including Australia (Armfield, Spencer, & Stewart, 2006), Denmark (Moore et al., 1993), India (Kumar et al., 2009), Japan (Domoto et al., 1988), the Netherlands (ten Berge et al., 2002), Singapore (Chellappah et al., 1990), and Sweden (Klingberg, Berggren, & Noren, 1994). Compared to other fears and phobias, dental care-related fear and phobia are common; dental care-related fear ranks the fourth most reported fear, after snakes, heights, and physical injuries, and dental phobia ranks third most prevalent after acrophobia (i.e., fear of heights) and arachnophobia (i.e., fear of spiders; Oosterink, de Jongh, & Hoogstraten, 2009b). When studied in terms of anxiety, versus fear, meta-analysis results suggest that between 10% and 20% of American adults report a high level of dental care-related anxiety (Smith & Heaton, 2003). Though there have been immense improvements in both the quality of and comfort associated with dental treatment, there apparently has been no decrease in the nationwide prevalence of dental care-related anxiety in the USA since the 1950s (Smith & Heaton, 2003).

Dental care-related anxiety/fear is associated with a number of demographic and psychosocial variables. Perhaps most profound are gender differences. There is a consistent finding

across most groups that women report higher levels of dental care-related anxiety/fear and fear of dental pain, and that men report lower levels of such anxieties/fears (e.g., Moore et al., 1993; Liddell & Locker, 1997; Doerr et al., 1998; Craske, 2003; Heft et al., 2007). This finding may be the result of actual gender differences in the experience of dental care-related fear/anxiety or the result of a reporting bias whereby men report less fear than women in order to acquiesce to gender role norms or expectations (e.g., to avoid looking "weak" or "scared"; Pierce & Kirkpatrick, 1992; Unruh, 1996; Holtzman et al., 1997). Gender differences in communication styles also may be at play (Street, 2002). Still, reporting and communication differences/biases do not completely account for the gender difference (Fredrikson et al., 1996; Abrahamsson, Berggren, & Carlsson, 2002; Craske, 2003). Whether these robust self-report differences are evident in overt behavior and psychophysiological response is an area deserving of greater attention.

Changes in dental fear/anxiety across the life span are not well understood, although both longitudinal (Thomson et al., 2009) and cross-sectional (Oosterink et al., 2009b) data suggest it is stable in most people, across decades, perhaps with some variation. Like other fears/anxieties, there are developmental changes across childhood and adolescence (e.g., Oliveria & Colares, 2009). There are suggestions that dental fear/anxiety levels are higher until the early 20s (Oosterink et al., 2009b) and then increase again in mid-life (Oosterink et al., 2009b) with decreases in later life (Locker & Liddell, 1991; Armfield et al., 2006).

Differences across socioeconomic status also are not well studied. Nevertheless, most evidence supports the idea that segments of the population who are of lower socioeconomic status have greater levels of dental anxiety/fear (Armfield et al., 2006). Lower income level is associated with greater dental anxiety/fear (Doerr et al., 1998); the relation with educational level is more uncertain (Stouthard & Hoogstraten, 1990).

The prevalence of dental care-related anxiety and fear is alarming and is a global public health issue, given the impact of the phenomenon on dental treatment-seeking and, ultimately oral, physical, and psychological health. Individuals who receive fewer than one dental checkup per year are more likely to be highly anxious than individuals who receive more frequent checkups (Doerr et al., 1998), and, controlling for sociodemographic variables, fear of dental pain and fear of dental treatment is correlated with avoiding scheduling dental appointments and utilizing dental treatment (Meng et al., 2007). Generally speaking, dental care-related fear and anxiety are associated with avoidance of dental visits (Armfield et al., 2007). This avoidance of treatment is related to greater incidence of decayed and missing teeth and a lower incidence of filled and functional teeth (Schuller, Willumsen, & Holst, 2003). Poorer oral health resulting from the avoidance of treatment and untreated oral disease may worsen cardiovascular disease and diabetes, among other systemic health concerns (Williams et al., 2008), and can even negatively affect the health of an unborn fetus (Offenbacher et al., 1996; Gaffield et al., 2001). Additionally, dental care-related fear and anxiety and associated oral health complications may result in dissatisfaction with one's dentition and lower perceived quality of life, self-esteem, and morale (Doerr et al., 1998; Locker, 2003; Crofts-Barnes et al., 2010). Clearly, dental care-related fear and anxiety should be considered and addressed by the dental professional as they are psychosocial barriers to dental treatment that can greatly impact the physical and psychological well-being of patients.

## **Assessment of Dental Care-Related Fear and Anxiety**

Evaluation in this area is a key process in that it allows for an overarching understanding of the constructs of dental fear, anxiety, and phobia and any developmental or other change over

time; the careful evaluation and monitoring of the individual patient; and the testing of pharmacologic, behavioral, and integrated methods for treatment of clinically significant levels of these anxieties and fears. Since dental care-related fears and anxieties present themselves uniquely across patients, comprehensive assessment is essential in understanding the phenomena across populations and cultures globally, and to garner an idiographic understanding of each patient so that the individual may be afforded a more tailored and comfortable treatment experience. Assessment of *degree* or *level* of anxiety and/or fear is necessary, as patients may fall anywhere on a dental care-related fear or anxiety continua (i.e., not just in a fearful vs. nonfearful category). Cutoff scores for dental fear and anxiety questionnaires are commonplace, yet are problematic, both in the clinic and for research purposes, in that they promote a categorical, rather than a dimensional view of anxiety and fear. Moreover, use of cutoff values, instead of continuous scores, allows for misclassification bias, in that individuals who are just below or just above the cutoff differ very little (Thomson et al., 2009), and can limit statistical analyses, from a research viewpoint.

Both scientifically and clinically, dental care-related anxiety and fear, like other types of anxiety and fear, are manifested in three systems of expression: verbal report, overt behavior, and psychophysiological response (Lang, 1968). For research purposes, the most thorough-going assessments involve more than one of these modalities, and include more than one method of assessment of each (i.e., multimodal and multitemethod). In clinical practice, however, including even a single dental fear/anxiety item in a health history may be the most realistic possibility. Across these modalities, individuals can manifest fear intensely in one area, and little or not at all in another. Nevertheless, the individual still is fearful or anxious, even if he is not a physiological responder, or manifests fear primarily in overt behavior (e.g., avoidance, rudeness to the dental staff; "white knuckle" grasping of the arm of the dental chair) while

protesting that he is "not afraid." At present, verbal reports, specifically self-administered Likert-type paper/pen-and-pencil questionnaires, are the overwhelmingly prevalent means of assessment of dental care-related anxiety and fear. Nevertheless, the field seems to be frozen in time in terms of a seemingly blind allegiance to verbal report assessment.

### *Verbal Report Assessment of Dental Care-Related Fear and Anxiety*

There have been a number of self-report instruments of varying lengths developed for the assessment of dental care-related fear and anxiety. Only some the major instruments can be described here, but comprehensive reviews are available from Schuurs and Hoogstraten (1993), Aartman et al. (1998), Newton and Buck (2000), and Armfield (2011). An early questionnaire created and validated for the purposes of measuring degree of dental care-related anxiety was Corah's Dental Anxiety Scale (DAS; Corah, 1968), one of the most commonly used measures for assessing dental care-related fear and anxiety, primarily because of its short length. The DAS is a 4-item measure on which patients indicate the severity of their likely responses to dentally related situations. The scale is very widely used; internal consistency and test-retest reliability are high (Corah, Gale, & Illig, 1978; Newton & Buck, 2000). A modified version of the DAS (Modified Dental Anxiety Scale [MDAS]; Humphris, Morrisson, & Lindsay, 1995), which instead contains five items, including one about a dental injection, also has a high degree of demonstrated reliability and validity (Newton & Buck, 2000). Both instruments have been criticized, however, for inadequate assessment, related to content and construct validity, incompletely measuring the domain of dental care-related anxiety and fear (e.g., Schuurs & Hoogstraten, 1993; Armfield, 2010b). One of the issues for the field is that the DAS and MDAS have been so widely used that they seemingly have come to define what dental anxiety and fear constitute; these constructs, however, are

much broader than can be comprehensively measured by a 4- or 5-item questionnaire.

The Dental Fear Survey (DFS; Kleinknecht, Klepac, & Alexander, 1973) is a 20-item self-report measure of fearful and anxious reactions to dental situations. The instrument contains three subscales (behavioral avoidance, physiological responses, and fear of specific stimuli), is widely used in behavioral dentistry research, and has well-evidenced reliability and validity (McGlynn et al., 1987; Smith & Moore, 1995; Heaton et al., 2007). It has been translated into many languages other than English, making it more widely available to researchers and clinicians alike. The DFS has considerable utility in its clear assessment of dental care-related fear and anxiety in multiple domains and provides information that allows the dental professional to tailor management strategies to individual patients.

In response to theoretical and practical limitations of existing dental care-related fear and anxiety assessment instruments, Armfield (2010a) developed the Index of Dental Anxiety and Fear (IDAF-4C<sup>t</sup>). This 23-item instrument contains three modules: one that measures dental anxiety and fear, another which measures dental phobia, and a third that measures feared dental stimuli. Internal consistency, test-retest reliability, and validity were demonstrated to be good in instrument development studies. Though the measure is very new, it is a promising new development in verbal report dental care-related fear and anxiety assessment. The scale has strong theoretical underpinnings, is relatively short while maintaining good psychometric properties, and can provide specific information about the anxiety- and fear-evoking dental treatment-related stimuli and experiences.

Given the ever-growing time demands in health care, it may be the case that a lengthy self-report assessment of dental care-related fear and/or anxiety simply is not possible. Providers who do not want to abandon standardized dental care-related fear/anxiety assessment altogether may find utility in single-item self-

report assessment tools in order to gain some knowledge of patients' level of dental care-related fear or anxiety. The final, omnibus item (Question 20) of the DFS is one such item; it correlates quite highly with the full-scale score of the DFS (Kleinknecht & Bernstein, 1978). The IDAF-4C<sup>t</sup> also has a single item for assessing dental care-related fear and anxiety. The Dental Anxiety Question (DAQ; Neverlien & Backer Johnsen, 1991) is another one-question measure that seems to correlate well with other self-report measures of dental care-related fear. While other single items have been proposed, these three single-item measures have the strongest psychometric basis.

It is important to note that even though single-item self-report assessment instruments may be appealing because of their efficiency and minimal burden on the patient, they offer relatively sparse information about a patient's dental care-related fear or anxiety. Ideally, dental professionals would use single-item measures to screen for patients who may have elevated levels of dental care-related fear and/or anxiety and would follow up with longer, more comprehensive self-report assessment instruments, as well as other assessment strategies, in order to gain a complete understanding of the patient's fears and/or anxieties. It is strongly recommended that such measures be included as part of standard health histories; it is important to note that the wording and response options for the items should not be changed. Being careful to utilize the exact wording of these assessment tools maintains their psychometric properties, ensuring their utility, reliability, and validity.

Other related constructs also frequently are measured via verbal report and are important to the understanding of dental care-related anxiety and fear. The Revised Dental Beliefs Survey (DBS; Smith et al., 1984; Coolidge et al., 2005) is a 28-item self-report measure of feelings about and reactions to dental work, dentistry, and dental professionals. It assesses cognitions about the dental situation in three domains: professionalism, communication, and lack of

control. The instrument has demonstrated reliability and validity (e.g., Kvæle et al., 2004a; Coolidge et al., 2005; Abrahamsson et al., 2009) and is useful in evaluating the patient's potential mistrust of the provider or discomfort with feeling out-of-control. Relatedly, the Dental Cognitions Questionnaire (DCQ; de Jongh et al., 1995) assesses the nature of negative thoughts related to dental treatment. Frequency and believability of such cognitions are measured using this 38-item self-report instrument; a total cognitions frequency score and believability score both can be calculated. The Fear of Pain Questionnaire-III (FPQ-III; McNeil & Rainwater, 1998) is a 30-item self-report measure of pain-related fear. The instrument consists of three subscales: severe pain, minor pain, and medical pain, with some items that specifically address dental pain. Patients indicate how fearful they are of experiencing the pain associated with each of a number of painful experiences (dental and nondental). There is good support for the three-factor solution of the FPQ-III and good evidence for reliability and validity (Osman et al., 2001; Roelofs et al., 2005). A shorter, 9-item version of the FPQ-III exists, the Short Form of the Fear of Pain Questionnaire (SF-FPQ) and may be of more utility in general screening. Developed as the "dental version" of the FPQ-III, the Fear of Dental Pain Questionnaire (van Wijk & Hoogstraten, 2003) is a 21-item self-report instrument that specifically assesses fear of dental pain. Psychometric work suggests that the measure taps fear of dental pain as a single dimension; originally created in Dutch, there is a short, 5-item version in English (van Wijk et al., 2006).

#### *Behavioral Assessment of Dental Care-Related Fear and Anxiety*

The assessment of overt behavior among adult patients in the waiting room and dental operatory truly is in its infancy. Some research has been devoted to dentists' evaluation of highly anxious/fearful patients, but primarily with children (e.g., ten Berge et al., 2002). There has

been limited work to assess patients' overt behaviors, with some findings to suggest certain "nervous" behaviors, such as leg-swinging by highly anxious/fearful patients awaiting dental treatment, while in the waiting room (Kleinknecht & Bernstein, 1978).

The dental situation necessarily restricts the range of possible overt behaviors that might be assessed. Facial expressions offer a rich source of emotional and pain-related information which would be accessible during much, but not all, of dental treatment. Amount and content of spontaneous speech (e.g., humor, question-asking), eye closures, use of the hands, speed at which a patient sits in the dental chair, asking for breaks during procedures, and many other behaviors may provide a bounty of data about dental care-related fear and anxiety. Nevertheless, the most important overt behaviors on which to focus are the ones that lead to an empty dental chair—avoidance, delaying appointments, or "escaping" from appointments by late cancellations or rescheduling.

#### *Physiological Assessment of Dental Care-Related Fear and Anxiety*

Psychophysiological responses frequently are manifested in the context of dental care, although there are significant individual differences in degree of autonomic reactivity (Brand, 1999). In working with patients, dental professionals may observe perspiration on the palms, forehead, or upper lip, and may note increased respiration rate, and may detect high heart rate or blood pressure (Milgrom et al., 2009). The inclusion of psychophysiological measures in investigations of dental fear/anxiety, however, is infrequent, likely due in part to the relative complexity of recording and analyzing such data, and integrating them with other measures (i.e., self-report and behavior). Nevertheless, such information is a valuable source for a comprehensive, multimodal understanding of dental anxiety, fear, and phobia. Cardiovascular responses in association with dental care have been extensively studied (Brand &

Abraham-Inpijn, 1996). Specificity of responses among high dental anxiety/fear participants has been demonstrated with skin conductance (Lueken et al., 2011); forehead muscle tension and heart rate also have been found to vary with the severity of dental fear/anxiety (Lundgren, Berggren, & Carlsson, 2001). There also has been some focus on the intensity, organization, and pattern of psychophysiological response among individuals with high dental anxiety/fear and/or dental phobia, relative to other types of phobia (e.g., McNeil et al., 1993; Leutgeb et al., 2011; Lueken et al., 2011). These data are consistent with the idea that, across the population of individuals with dental phobia, the disorder is most typically a situational type, although as already noted, DSM-5 (APA, 2013) appears to compel its diagnosis with a blood-injection-injury code. A minority of individuals with dental phobia, of course, may be better classified as the BII type, with the vasovagal syncope response.

#### *Other Approaches to the Assessment of Dental Care-Related Fear and Anxiety*

Brief and efficient methods other than self-report are needed to broaden the scope of assessment for dental care-related anxiety and fear. The Dental Fear Interview (Vrana, McNeil, & McGlynn, 1986) is a semistructured interview designed to assess dental care-related fear. Targets of the interview include the scope, etiology, and the specific or generalized nature of dental fear/phobia, along with related avoidance behavior. Advantages include the opportunity to establish rapport during the interview, to ask individualized follow-up questions in areas of particular concern, and to observe nonverbal behavior during answering by the patient or participant.

To truly advance the field, new, even novel, approaches, beyond self-report must be developed. The field of cognitive psychology and neuroscience offer various methods that do not rely on conscious self-evaluation, but rather

depend on natural science variables (e.g., reaction time) that reflect cognitive biases and other processes. As one example, Stroop color-naming tests have been developed, using dental words as emotionally evocative stimuli (Muris, Merckelbach, & de Jongh, 1995; Johnsen et al., 2003; McNeil et al., 2013b). In such applications, response time has been measured across dental phobic patients versus healthy controls, contrasting dental and neutral words.

#### **Interventions for Dental Care-Related Anxiety, Fear, and Phobia**

The uniqueness of the dental situation requires specialized, expert interpersonal, communication, and "chairside" skills on the part of dental professionals, and all staff working with dental patients. Like pain or potential pain in the dental operatory, it also is critical to prevent or manage fear and anxiety. Appropriate management of the dental care-related fear or anxiety will increase the likelihood that the more highly fearful or anxious patient will have a comfortable experience, thus providing learning opportunity that dental treatment is not necessarily threatening, uncomfortable, painful, or distressing. Over time, such opportunities may help to quell fear or anxiety responses, ultimately improving treatment-seeking patterns and treatment adherence, with positive implications for oral, systemic, and psychological health.

For a majority of dental patients, the level of discomfort falls within a range on the anxiety/fear continua that can be adequately managed by a competent oral health provider. Strategies for managing such levels of fear or anxiety are based on basic psychological principles such as clear and sensitive communication, psychoeducational approaches, relaxation, distraction, accurate appraisal of threat or danger, and other coping skills. Another chapter of this book is dedicated to the "chairside" strategies for reducing dental care-related fear and/or anxiety,

techniques which may be used by the oral healthcare provider during treatment. Described here are approaches and interventions that may be particularly appropriate for especially fearful or anxious (or even phobic) dental patients, though they certainly have relevance and applicability to patients who have any degree of fear and/or anxiety. Asking about dental anxiety and fear on intake forms (perhaps through the use of a psychometrically supported single-item anxiety/fear screening question) and in health histories can demonstrate concern about the patient's comfort. A key ingredient of each of these fear- or anxiety-reducing strategies is high-quality rapport. Using clear, sensitive but direct, and honest communication strategies with patients is one important component of rapport-building, along with numerous others, such as facing the patient and making eye contact, rather than focusing on a paper chart or computer screen and keyboard. Experts have suggested that the content of initial rapport-building not be "small talk," but rather focus on the patient's concerns, expectations, and treatment-related interests (Milgrom et al., 2009). Demonstrating that the patient is heard and understood will convey empathy and compassion that can facilitate rapport-building, reduce acute dental care-related fear and/or anxiety, and prepare the patient for other interventions to prevent or manage dental care-related fear and anxiety.

In addition to chapters elsewhere in this volume, there are a number of other resources that are useful for more comprehensive reviews of strategies for working with highly fearful, anxious, and/or phobic patients: (a) *Oral Psychophysiology: Stress, Pain, and Behavior in Dental Care* (Eli, 1992); (b) *The Psychology of Dental Care* (Kent & Blinkhorn, 1991); (c) *Treating Fearful Dental Patients: A Patient Management Handbook* (Milgrom et al., 2009); (d) "Dental Fears in General Practice: New Guidelines for Assessment and Treatment" (Milgrom & Weinstein, 1993); and (e) *The Fearful Dental Patient: A Guide to Understanding and Managing* (Weiner, 2011).

### ***Behavioral, Cognitive-Behavioral, and Educational Interventions***

There is a host of interventions, such as psychoeducation, stimulus control, social praise, modeling, behavioral control, exposure therapy, relaxation, paced breathing, systematic desensitization, stress inoculation training, hypnosis, and biofeedback, which can be used to prevent or reduce dental care-related fear and anxiety. A meta-analysis of behavioral interventions (Kvale, Berggren, & Milgrom, 2004) indicated that such approaches yield reductions in self-reported dental care-related anxiety/fear with medium to large effect sizes, and that reductions are maintained over the long term, at least four years. In that review, interventions were categorized as behavioral, cognitive, or educational in nature. About half of the 38 reviewed studies used some combination of these approaches. This same system is used here to categorize various psychosocial principles and approaches.

#### **Behavioral Interventions**

As a part of good practice, dental professionals typically keep needles and syringes out of sight before, during, and after treatment and take special care in bringing a syringe toward the face and mouth such that the patient is not able to easily see them. Based on the principle of "stimulus control," this masking or hiding of fear cues can prevent the eliciting of a fear response and can offer a more comfortable treatment experience.

Social praise is another part of good practice, in which the practitioner acknowledges appropriate behaviors, or coping behaviors, particularly after a patient undergoes uncomfortable aspects of treatment. Utilizing a *labeled praise* is the most effective of social praise, as it communicates clearly what the patient did that elicited the practitioner's response. It also serves to elicit positive feelings, and thus enhances the relationship between patient and provider. For example, a dentist may say to her patient,

following an injection: "You were able to stay so still during the injection; that's wonderful!" This praise serves as a reinforcer, making positive, appropriate responses to fear-provoking stimuli more likely in the future, essentially training the patient to behave in a desirable manner during once-feared situations and ultimately making his or her experience less distressing.

Modeling is based on the understanding that many behaviors are learned via observation and perpetuated through subsequent reinforcement. A dentist or dental hygienist might model appropriate behavior, including positive coping statements (e.g., While keeping my mouth open, I tell myself: *I can do it*) during a potentially uncomfortable or fear-provoking dental experience. For example, as part of a tell-show-do chain, the dental hygienist could demonstrate how an instrument will be used to scale teeth, making certain to portray calm, collected reactions and suggesting positive thoughts throughout the demonstration. Alternatively, a dental professional could show a fearful dental patient a video recording of a model patient who copes well while undergoing a fear-inducing procedure. According to Weiner (2011), using modeling in the dental clinic provides a vicarious experience in which the patient learns that reinforcement will follow appropriate behavior, and offers information to familiarize the patient with the upcoming treatment.

Behavioral control involves giving the patient opportunities to make decisions before and during treatment, to stop for a break when needed, or to guide certain aspects (e.g., the pace) of treatment. As lack of control (as well as lack of predictability) is a key determinant of anxiety and fear, as well as pain, allowing patients a role in decision making can help to ameliorate anxiety and fear. (See Chapter 7 on dental pain in this volume for a more complete discussion of behavioral control, and as noted later, on informational control issues.)

Based on the conceptualization that irrational fears are, at least in large part, learned and can therefore be "unlearned," various

approaches have been utilized to help patients learn to approach rather than avoid dental care, and to cope effectively while in the operatory. Most of the existing literature has focused on systematic desensitization (Kavle et al., 2004a), a process in which a patient first learns a relaxation strategy, and then is gradually "exposed" to fear-evoking stimuli (e.g., the dental chair, sound of the drill), typically in a stepwise fashion. Prompting new conditioning to take place helps patients to learn that stimuli that once evoked fear are not so threatening, and to develop coping abilities that allow them to successfully participate in dental treatment. These strategies may need to be tailored, depending on the cultural background of the patient and/or the culture in which dental treatment is being performed (Milgrom & Heaton, 2013).

Various relaxation strategies, even pharmacologic ones, can be employed with systematic desensitization. (See Chapter 10 on chairside methods for working with highly fearful/anxious patients in this volume for a discussion of relaxation methods.) Relaxation training and practice can be used alone, or as a part of systematic desensitization, to help highly fearful/anxious dental patients. One method in particular deserves mention, given its suitability for the dental situation. Paced breathing (Fried, 1993) can be used chairside to induce relaxation, with minimum time needed for instructing the patient. Briefly, the patient can be instructed while supine in the dental chair, even in the middle of a procedure. Slow, diaphragmatic breathing is taught, often with the dental professional demonstrating (i.e., using participant modeling) while instructing the patient. Counting up and/or down and using relaxing words (e.g., *calm*) as cues, the patient can be advised to continue use of paced breathing throughout procedures, or to induce relaxation during systematic desensitization.

The *sine qua non* of systematic desensitization and other psychosocial approaches to fear and anxiety reduction, however, are exposure therapy. Necessary, and sometimes sufficient, exposure has an enormous body of literature

demonstrating its efficacy and effectiveness (Foa & Kozak, 1985; Ost, 1996; McNeil, Kyle, & Nurius, 2012a). One of the primary purposes of relaxation in systematic desensitization may be to make exposure more palatable for patients (McNeil et al., 2012a). Exposure therapy is particularly relevant to the oral healthcare professional and often is used as a "common sense" approach, one that is sensible to both the patient and provider, in that the patient can gradually become accustomed to receiving necessary care. Often, an exposure-based treatment approach to reducing or eliminating a crippling fear or phobia of the dental situation involves creating a "fear hierarchy," a list of each of those feared stimuli and experiences that are associated with dental treatment, arranged in order from least distressing to most distressing. Taking an imaginal (i.e., the patient imagines the experiencing the situation or stimulus), *in vitro* (i.e., the patient experiences aspects of the situation or stimulus in a neutral environment such as a workroom or therapist's office), or *in vivo* (i.e., the patient physically experiences the situation or stimulus) approach, the clinician guides the patient through the hierarchy, supporting the patient as he or she is made to encounter each of the feared stimuli until habituation occurs and the patient no longer experiences fear or anxiety in his or her presence. In one possible approach, the patient is exposed to each stimulus in the hierarchy one at a time, only after preceding stimuli are conquered. This "face your fears" approach is similar to systematic desensitization, but does not require the learning and use of a relaxation technique. The patient learns that once-feared stimuli are not as threatening as once thought and, therefore, do not need to be avoided in the future.

Utilizing exposure therapy for dental care-related fear or dental phobia sometimes may require that the patient has multiple visits to the clinic before actual treatment may begin. For example, a highly fearful patient may report to the clinic and simply wait in the reception area, then, on a second visit, may report to the clinic just to conquer the fear of sitting in the dental

chair, and then, on a third visit, may sit in the dental chair and allow the dentist to bring a mouth mirror up to the mouth before returning for a fourth visit to finally receive the necessary dental treatment. Some of these individual exposure sessions may provide opportunities for rehearsal, a learning experience when the dental professional and patient can "practice" a procedure without actually completing it, giving the patient insight into what he or she can expect, allowing a sense of self-efficacy that will lead to successful treatment later.

Theoretically, exposure need not be gradual, although it likely is more acceptable to both patients and providers when conducted in that way. One-session exposure treatments have been tested for phobic disorders other than that related to dental care (Öst, 1989), but dental patient and provider acceptance of such approaches are uncertain and may accentuate concerns about patient refusal and dropout.

Biofeedback is another approach that can be helpful for certain highly fearful or anxious dental patients. Using apparatus of varying degrees of complexity, biofeedback provides information, typically in real time, to patients who are learning to monitor and control physiological reactivity. Biofeedback procedures involve measuring physiological arousal—for example heart rate, sweat gland activity, or muscle tension—through the use of electronic monitoring and recording machines. Patients who have learned to manage their physiological arousal can observe and alter their management strategies using the feedback provided by the technology. This approach can enhance the ability to engage in relaxation and other physiological management strategies, and also may offer distraction that can further aid in the reduction of dental care-related fear and anxiety symptoms. Biofeedback in the dental clinic and other medical settings has demonstrated efficacy and utility (e.g., Hirschman, 1980; Oliver & Hirschman, 1982; Milgrom et al., 2009).

A method with a long history of use in dentistry is hypnosis (Gow, 2011). Requiring specialized training for professionals utilizing this

technique, hypnosis is a viable option for some patients who are open to this approach to coping with fears and anxieties about dental treatment. Briefly, hypnosis involves utilizing suggestions and imaginative experiences, communicated by the dental professional to the patient, in order to alter perceived aspects of the experience, including emotions, cognitions, and behavior (Gow, 2011). Training in self-hypnosis can be helpful for patients to learn durable coping strategies. Interested readers can consult Chapter 6 on hypnosis in this volume, and work by Kroger and Yapko (2007), Brown (2009), or Gow (2011) for more information about the use of hypnosis in dental practice.

### Cognitive Interventions

Targeting misappraisals of the dental situation (e.g., catastrophizing) or distrust may be particularly warranted for some patients. Many patients who are especially fearful of or anxious about dental work have irrational, overly negative, or catastrophic ideas about procedures that are to be performed. Sometimes these misappraisals are the result of misinformation (e.g., hearing others talk about the pain associated with root canal therapy) and at other times are perpetuated, as suggested by the Cognitive Vulnerability Model (Armfield et al., 2008) and other cognitive models of fear and anxiety, by a tendency to overthink and to catastrophize.

Helping patients to identify irrational thoughts and the emotions they produce is one step in cognitive restructuring. Perceived "dangerousness" and "disgustingness" of aspects of dental treatment (Armfield et al., 2008) could be a specific focus of these interventions. It may be particularly difficult for the patient to share negative, irrational thoughts with his provider, as it may be embarrassing, or potentially critical of the dentist or hygienist. The provider prompting and answering questions, and providing corrective information is another step along the way, along with helping the patient to rationally examine the evidence for irrational expectations. A practical example illustrates the use of such a technique: A patient who is fearful of

dental treatment because she believes that the drill is *very* likely to "hit a nerve" and cause shocking, highly intense pain, might first be asked to describe her fears in detail. She also could share whether this event has ever occurred to her. The dentist might then describe what is done to prevent such an occurrence, as well as educating the patient about local anesthesia, its benefits and limitations, including comments about the rarity of such an event. The dentist then could challenge the patient's misperception by respectfully pointing out the likely reality, and then asking her to assess the likelihood of the drill "hitting a nerve" in her case. This type of cognitive restructuring can be used not only to change patient expectations about dangerousness, potential risks, and disgust, but also to help fearful patients view threatening stimuli, such as needles, sharp instruments, or sutures, in a more realistic and accurate fashion.

### Psychoeducation

Providing patients with information is an essential component of ethical practice, in explaining recommended treatment plans, outlining risks and benefits, and obtaining informed consent. Working in the dental setting requires a high level of communication and other instructional skills, as trying to impart information in a way that it can be "heard" and comprehended (i.e., cognitively encoded, processed, analyzed, and decided or acted upon) by highly fearful and anxious patients certainly is a challenge. Securing a signature on a treatment plan or form alone truly is not proper or ethical practice, if the patient is so anxious or fearful that she does not understand what he or she is signing.

A variety of means to share information should be considered, based on the educational level and wishes of the patient, including film, written materials, and web-based approaches. Nevertheless, even with many advanced technological approaches available, the interaction between provider and patient still is of paramount importance, and often provides the best means to work effectively with patients to help

them become educated about dental procedures and other aspects of oral health care.

For those individuals whose fear or anxiety seems related to uncertainty, not knowing what might happen during dental procedures, it may be especially helpful to interact with them by providing informational control (Milgrom et al., 2009), that is, by sharing information in a psychologically sensitive fashion. This psychoeducational approach helps to increase predictability in the dental situation. It should be noted, however, that patients differ, according to their coping style, on how much information they want, and when. As already noted, see Chapter 7 on dental pain in this volume for a more complete discussion of predictability and control, including both informational and behavioral control issues.

One promising approach that is consistent with a psychoeducational approach and can "set the stage" for a highly fearful/anxious patient to receive needed dental care is motivational interviewing (MI; Miller & Rollnick, 2013). MI provides a framework for engaging and respectful interactions with patients, allowing oral healthcare providers (and others working in health care) to assist them in establishing goals and deciding upon health behavior changes and courses of action to deal with health problems (Ramseier & Suvan, 2010). Using an MI approach to interact with highly anxious/fearful dental patients to help prepare them for dental care is a promising area, one that is in need of empirical research.

### ***Pharmacological and Integrative Interventions***

There is a demonstrated need and demand for anxiety/fear control and sedation in highly fearful dental patients (Dionne et al., 1998; Chanpong, Haas, & Locker, 2005). Though behavior therapy for dental phobia typically is rated by patients as more acceptable than sedation (Newton, Naidu, & Sturmey, 2003; Forbes, Boyle, & Newton, 2012), many patients benefit from pharmacological fear- or anxiety-reducing

strategies. Evidence suggests, for example, that moderate (conscious) sedation produces the desired effects of less pain and anxiety, and memory of those emotions (Wilson et al., 2013). Of course, behavioral interventions may provide longer-lasting reductions in levels of dental care-related fear and anxiety, as pharmacological interventions do not necessarily offer opportunities to learn positive and effective self-coping strategies. It is recommended that the least invasive (i.e., behavioral or cognitive-behavioral) interventions be utilized initially with the understanding that nitrous oxide, anti-anxiety medications, sedation, or even general anesthesia may be necessary for the extremely fearful, anxious, or phobic patient. For example, deep sedation or general anesthesia (i.e., "sleep dentistry") may be required in order to provide necessary, urgent care to the phobic patient who will avoid treatment unless he or she can be "put under."

Recent research also indicates that pharmacological and behavioral approaches can be used in tandem in order to yield reduction in dental care-related fear. Use of an integrated approach involving a pretreatment behavioral exposure session, followed by sedative dental treatment, has been suggested by Milgrom and Heaton (2007). Such an approach allows patients to develop coping skills that can be used to manage their own anxiety/fear, improves the efficacy of the sedative medication, and ultimately reduces necessary dosages of the medication. Similarly, current work is identifying how medications such as D-cycloserine may be used to enhance the efficacy of behavioral interventions such as exposure therapy for dental care-related fear (see Heaton, McNeil, & Milgrom, 2010). Milgrom et al. (2009) suggest that four basic steps should be taken in order to decide whether to utilize pharmacological agents and what type to use: (1) Assess patients' experiences with, and feelings about, medications; (2) Determine what the drug is being used for; (3) Identify what the patient will be doing/thinking during treatment and communicate the necessity for the patient to cope, even if

utilizing a pharmacological agent; and (4) Encourage patients, through real-time coaching, to use behavioral strategies and to take an active role in coping throughout treatment, while under the influence of the pharmacological agent. A number of pharmacological strategies, including nitrous oxide-oxygen analgesia, oral premedications, moderate (conscious) sedation, and deep sedation can be used in tandem with psychological approaches, and good chairside manner, for the management of dental care-related fear and anxiety.

## Summary

Dental care-related fear and anxiety, and their extreme manifestations in dental phobia, are prevalent, severe, and long-lasting problems that negatively impact affected individuals, their families, workplaces, and communities, as well as oral care professionals and healthcare systems. The problems are so broad that they should be approached from a global public health perspective, in addition to the important work with individual patients who suffer tremendously from dental care-related anxiety and fear. There is a pressing need to develop more efficient and effective assessment and treatment strategies for these syndromes, some of which can be translated and integrated into traditional oral healthcare practice. Dental anxiety, fear, and phobia most often have been studied in industrialized, English-speaking nations, although some reports based on other peoples and lands now are appearing in the literature. There is a need to understand these phenomena and their treatment from a broader cultural lens.

Dental care-related fear and anxiety are separate, but related and often intertwined, states that exist on continua. They can be of phobic proportions and even can lead to life-threatening avoidance of needed care. The experience of dental care-related fear and anxiety affects how patients understand their dental visits, perceive pain and other sensations related to dental

treatment, and, perhaps most importantly, utilize available professional oral health care.

Dental care-related fear and anxiety are individual experiences that may result from any of a number of mechanisms, each with greater or lesser influence, depending on a particular person's environment and previous experiences. Negative, even traumatic dental experiences can be part of the genesis of dental anxiety and fear, but a majority of patients are conditioned or otherwise learn to respond anxiously and fearfully to dental care in other ways. While there is a minority of individuals whose phobic concerns about dental care are best captured by a blood-injection-injury or blood-injury-illness type of Specific Phobia, or other psychopathological clinical syndromes, across the population, dental phobia would be best conceptualized as a Specific Phobia, Situational Type, contrary to DSM-5 (APA, 2013).

Critical for the effective treatment of dental care-related fear and/or anxiety is a conceptualization of the phenomenon as complex, multifaceted, culturally influenced, and highly individualized, utilizing an assessment of the nature of the fears/anxieties based on such a conceptualization. Oral health professionals can improve the quality of care and treatment utilization patterns by a comprehensive understanding of both the conceptual and clinical issues related to dental care-related fear and anxiety.

Patients with varying degrees of dental care-related fear and/or anxiety, and with diverse manifestations of such states, usually benefit from behavioral, cognitive, and educational interventions; exposure is the *sine qua non* of these approaches. Changes as a result of these psychosocial approaches typically are long-lasting, decrease avoidance behavior, and enhance regular attendance at oral healthcare appointments. Pharmacological approaches are essential in helping anxious, fearful, and/or phobic dental patients receive needed care, and can be used in an integrated fashion with psychoeducational, behavioral, and cognitive interventions.

Future research is needed to clarify the similarities and differences in dental care-related anxieties and fears. Assessment strategies that do not rely solely on verbal report also are needed, as is efficient screening (e.g., with psychometrically valid 1-item questions) in everyday practice. Needed are more effective and efficient psychosocial treatment strategies, specifically utilizing exposure, and particularly ones that can be employed by frontline oral healthcare professionals.

Prevalent and broad-ranging global public health problems, dental fear, anxiety, and phobia impair quality of life for many people across the world. Most needed are cultural shifts and societal-wide developments that change the portrayal of oral health care as essential, comfortable, and life-enhancing.

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