Anxiety, Depression, Stress, and Oral Health

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Conflict of Interest Disclosure Statement

- The author reports no conflicts of interest associated with this course. She has no relevant financial relationships to disclose.

Short Description

This course seeks to identify risk screening tools to assess anxiety and depression in the patient population seeking dental care and to evaluate the link between these common mental health disorders and oral health.

Course Contents

Overview

This course seeks to discuss the interrelationship of oral health and mental health disorders, including anxiety and depression and to provide dental healthcare providers with tools to intervene and help improve overall health for individuals with both oral and mental health disorders.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Review the current data on the prevalence, severity, and therapy options for anxiety and depression.
- Identify screening tools and warning signs for anxiety and depression that can be employed by dental healthcare providers in the dental office.
- Understand the current evidence linking anxiety and depression and oral diseases, including caries and periodontal disease.
- Discuss mechanisms of interaction between antidepressant and anti-anxiety medication and treatment outcomes for periodontal disease and caries.
- Be prepared to work in an integrated interdisciplinary team to assess risk factors, screen, and refer patients who may be at risk for anxiety and depression.

Introduction

Currently, it is estimated that 350 million people worldwide live with depression (up to 5% of the global population).[1] Further, US depression rates have risen significantly in recent years, with data from 2024-2025 demonstrating that approximately 18% of adults are undergoing treatment for or have signs of depression.[2] Despite these staggering figures, mental health, anxiety, and substance use disorders are still significantly under-reported and treatment is often delayed or avoided due to stigma or embarrassment. Anxiety, depression, and stress have also been linked to poorer oral health status and treatment outcomes.[3-8] This relationship has been linked to the alterations that stress may induce on the immune system. Additionally, adequate treatment and antidepressant agents have anti-inflammatory functions that may serve to improve outcomes during periodontal therapy,[9] but their adverse effects on salivary flow may impact caries rates.[10] Because of the high prevalence of anxiety and depression in the population and the importance of adequate treatment for oral and overall health outcomes, identification, screening, and referral of at-risk patients seen in the dental office is a critical part of ensuring overall patient wellness. This course seeks to identify risk screening tools to assess anxiety and depression in the patient population seeking dental care and to evaluate the link between these common mental health disorders and oral health.

Anxiety and depression are common in the United States. In general, nearly 1 out of every 3 adults will be diagnosed with depression in their lifetime.[2] Such depressive episodes may be situational and/or clinical and depression prevalence is significantly higher in women (24%) versus men (13%).[2] Educational level, household income, and regional locality are also associated with report of depression

diagnosis.[11] Many people who experience depression also have other mental health conditions, particularly anxiety disorders, with up to 85% of individuals diagnosed with depression also meeting the criteria for an anxiety disorder.[12,1313] Anxiety and depressive disorders are moderately heritable (approximately 40%), and evidence suggests shared genetic risk across the internalizing disorders and comorbidity of both conditions can make treatment more challenging.[12,14]

Individuals with psychiatric disorders experience increased risk of systemic diseases, including diabetes mellitus, cardiovascular disease, autoimmune diseases, cancer, and chronic obstructive pulmonary disorder.[5,14-18] Chronic psychosocial stress and depression have also been shown to adversely effect therapy and outcomes of these conditions.[18] Stress and depression have also been linked to higher overall rates of morbidity and mortality within the population across a range of systemic conditions. The mechanisms for these links may be manifold.[16-18] Chronic stress, which has been associated with anxiety disorders and depression, increases systemic inflammatory burden and is associated with damage to the brain region that controls mood, including the hippocampus and prefrontal cortex, making these conditions difficult to treat.[19-24]

The interrelationship of anxiety and depression and periodontal disease is generally explained through the effects of these psychosocial conditions on the host immune response through a chronic stress mechanism.[25] A meta-analysis identified a significant association between anxiety disorders and/or depression and periodontitis.[26] The underlying reasons for this may be multifactorial, including increased xerostomia due to medications and/or an upregulation of sympathetic nervous system stimulation, a reduction in motivation for self-care behaviors, such as oral hygiene, in individuals with anxiety and depressive disorders, and/or a common inflammatory burden that may affect the host immune response.[5,26] Assessment of patients' psychological well-being is critical to understanding their current disease state and their potential response to therapy.

Anxiety and Chronic Stress: A State of Inflammation

- Definitions, Prevalence, and Treatment of Anxiety Disorders
- The Physiology of Anxiety and Chronic Stress

Definitions, Prevalence, and Treatment of Anxiety Disorders

Anxiety disorders are defined as a negative affective state resulting from perceptions of threat, characterized by a perceived inability to predict, control, or obtain desired results in upcoming situations. Overall, it is estimated that an average of 4.4% of the global population are affected by anxiety disorders.[27,28] This estimate suggests that 356 million people experienced anxiety disorders in 2021, making it the most prevalent mental health disorder.[27,28] The prevalence varies between countries, and these disorders tend to affect women in greater numbers. . Women are approximately twice as likely to experience anxiety disorders in their lifetime with a lifetime prevalence of 23.4% compared with 14.3% lifetime prevalence in men.[29,30] Further, women report more severe anxiety symptoms than male counterparts (Figure 1).[30] This gender disparity may relate to hormonal differences and/or societal pressures, including the overwhelming percentage of at-home work performed by women, even when both partners work outside the home. It has also been noted that younger individuals experience anxiety more frequently than older cohorts.[30] The prevalence of anxiety disorders in the United States was 18.2% in 2022, which represented a significant year-over-year increase from 2019 (15.6% prevalence rate).[30] Treatment for anxiety disorders may include non-pharmacologic therapies like cognitive

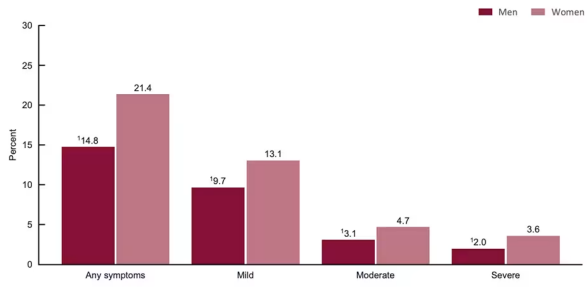

Figure 1: Gender differences in anxiety prevalence and severity in 2022. † Designates statistical significance.[30]

behavioral therapy (CBT), exposure therapy, interpersonal therapy (IPT), and others, pharmacological treatments with anxiolytic medications, or a combination of the two.[31-33] In some instances, particularly anxiety that is situational or transient, short-term treatment may be appropriate, but many individuals with more severe anxiety symptoms may require long-term ongoing treatment.[31-33] It is noted that although highly effective treatments for anxiety disorders exist, only about 1 in 4 people in need (27.6%) receive any treatment.[31]

The Physiology of Anxiety and Chronic Stress

In most individuals, stress is a response to an external cause and subsides once the situation has resolved.[5,34-36] When an individual is under acute stress, activation of the sympathetic nervous system, the body's fight-or-flight response, results in release of epinephrine, norepinephrine, and adrenocorticotropic hormone (ACTH).[34] In a short-term situation, a work deadline or on-stage performance, these transmitters allow our bodies to react quickly and perform well under pressure.[34] However, when stress is ongoing and results in chronic exposure to these hormones and neurotransmitters, it can have a deleterious effect on well-being.[36-38] Elevated cortisol levels lead to increased systemic inflammation and decreased immune function over time. Multiple stress mediators, including monoamines, neuropeptides (neuropeptide Y, calcitonin gene-related peptide, adrenomedullin), and steroid hormones transfer the stress signal to the central nervous system (CNS) through the limbic-hypothalamic-pituitary-adrenal axis.[36-38] Patients with anxiety disorders have a persistent or disproportional stress reaction to stimuli that is generally not considered threatening.[39,40] Anxiety is characterized by a "persistent feeling of apprehension or dread" and severe forms of anxiety disorders include generalized anxiety, panic disorder, phobias, social anxiety, obsessive-compulsive disorder, and post-traumatic stress disorder (PTSD).[34,35,39,40] In these cases, individuals experience chronic stress in normal situations and this produces the deleterious effects on their physiology seen in individuals exposed to long-term stressors, such as civilians in a war zone.[39,40]

The Physiology of Anxiety and Chronic Stress

- Definitions, Prevalence, and Treatment of Depression
- The Link Between Stress and Depression

Definitions, Prevalence, and Treatment of Depression

Major depression is defined as a period of at least two weeks when a person experienced a depressed mood or loss of interest/pleasure in daily activities and had a majority of specified symptoms, such as sleep disruption, changes in eating patterns, decreased energy, concentration, and/or feelings of low self-worth.[41] The estimated prevalence of at least one major depressive episode among U.S. adults was 8.3% in 2021 (21 million individuals) and was highest in adults aged 18-25 (18.6%).[41] Depression is more common in females than in males and rates vary worldwide.[28,29,41] Women are 1.5 to 3-fold more likely to be diagnosed with depression than men and they report higher rates of internalized symptoms (e.g. sadness, fatigue, somatic symptoms) compared with men who report higher rates of externalized behaviors, including anger and substance abuse.[41-43] Men, despite lower rates of diagnosis rates, have significantly higher rates of suicide. Treatment types include non-pharmacologic therapy with a health professional — including development of coping mechanisms and/or support systems, medication treatment, and/or a combination of both. [44] The global 12-month/lifetime pooled treatment rate was 34.8% (95% confidence interval: 29.9, 39.9%)[43] The treatment rates were 48.3% (43.0, 53.6%) in high-income countries, 21.4% (15.1, 27.7%) in middle-income countries, and 16.8% (11.3, 23.0%) in low-income countries.[45] While depression and anxiety can be linked, they are not identical and reported depression prevalence worldwide does not align with those of anxiety, indicating that there are other factors that may play into the diagnosis of depression compared to anxiety.

The Link Between Stress and Depression

Both stress and depression have been associated with decreased function of the limbic system and prefrontal cortex as well as systemic vascular inflammation and elevated serum cytokine levels.[5,22,46] Emotional disorders, including depression/depressive state and anxiety/anxiety state, are the most frequently observed symptoms resulting from psychological stress.[25,26] In fact, 50-60% of depressed patients also meet the lifetime criteria for an anxiety disorder and anxiety disorders have been implicated in the underlying etiology of depression in many cases.[47-49] Current hypotheses regarding the interaction of stress and anxiety suggest that the relationship is bidirectional—psychological stress can lead to depression in susceptible individuals and depression may exacerbate anxiety disorders and stress. It has also been suggested that the elevated pro-inflammatory cytokines associated with psychological stress and poor coping mechanisms may worsen or contribute to depressive symptoms in some patients.[50,51] Nonpharmacological interventions, including cognitive behavioral therapy (CBT) and acceptance and commitment therapy (ACT) focus on altering coping mechanisms and mindset to improve depression perception and symptoms in susceptible individuals. Antidepressant medications also have the potential to reduce the effects of these proinflammatory cytokines on the brain and, thus, result in symptom amelioration.[52] It has also been suggested that additional deleterious habits, such as smoking and alcohol consumption, may be associated with both conditions leading to a worsening of symptoms overall.[53]

Associations of Oral Health and Anxiety and Depressive Disorders

Individuals with psychiatric disorders have higher rates of many systemic diseases than non-affected individuals.[54,55] Oral health is also reported to be significantly worse in individuals with mental illness when compared to their counterparts.[8,56] Caries, tooth loss, and periodontal disease rates are higher in those individuals with anxiety and depression compared to healthy controls.[8,56]

It is also well-established that adults with mental health disorders like anxiety and depression and less likely to engage with dental healthcare professionals and seek dental care and they report less frequent health dental home care habits when compared to individuals without mental health disorders.[54] Additionally, anxiety and depression have been associated with higher rates of deleterious habits including alcohol and tobacco consumption, which can impact their oral health status.[55] Furthermore, many individuals report that dental visits are anxiety inducing. It has been estimated that 20-30% of the US population reports being "somewhat" or "very" nervous about dental procedures and up to 12% of adults are characterized as dental phobic.[56]

Oral Health is a major determinant of general health, self-esteem, and quality of life, but for patients with mental health disorders, oral healthcare has a low priority for individuals suffering with mental illness. Further, poor oral health may negatively affect mood, confidence/self-esteem, and impact mental health.[57,58] In individuals with severe mental illness, the one-year prevalence of suboptimal oral health (oral dryness, dental caries, periodontal disease, DMFT, oral cancer/precancer) was 32% and lifetime prevalence was 61%.[57]

Influence of Psychosocial Factors on Periodontal Diseases and Tooth Loss

Many studies suggest that psychosocial stress and ineffective coping mechanisms can influence the onset and progression of chronic inflammatory conditions, such as periodontitis.[4,5,46,56-64] The role of stress in some acute periodontal conditions, such as necrotizing periodontal diseases, is well-established through both temporal associations of disease onset and a stressor and biological measurements, e.g., urinary cortisol levels.[65-67] High rate of progression (Grade C) periodontitis (formerly called "aggressive periodontitis") and chronic periodontitis have both been associated with stress and depression.[56-64,68,69] Increasing salivary cortisol levels have been linked to worsening periodontal disease parameters and tooth loss, adjusted for other behavioral and stress variables and increasing stress/distress

and depression were linked to periodontal disease severity in a dose-dependent fashion.[60] Increased coping mechanisms seemed to mitigate this interaction.[4] The mechanisms of these interactions is less clear, but several hypotheses have been proposed.[5] Chronic stress and depression reduce immune responsiveness, and this may result in more periopathogenic bacteria leading to increased periodontal tissue destruction.[5] Psychosocial disorders, including anxiety disorders and depression, have also been associated with increased levels of systemic pro-inflammatory cytokines, which may potentiate the action of the initiating bacterial insult and worsen the host-mediated periodontal destruction.[5] Finally, chronic stress and depression may result in alterations in health-related behaviors, including oral hygiene, smoking, and dietary intake.[5] Individuals with high stress levels who did not brush their teeth during stressful periods were at increased risk of tooth loss when compared to individuals who maintained oral hygiene despite increasing stress and anxiety.[60] This may indicate that a combination of factors stemming from underlying psychosocial disorders interact resulting in deterioration of systemic and, potentially, oral health as well (Figure 3).[5] The interaction of psychosocial stress, anxiety, and depression on periodontal health may be related to an increase in pro-inflammatory markers and systemic diseases.

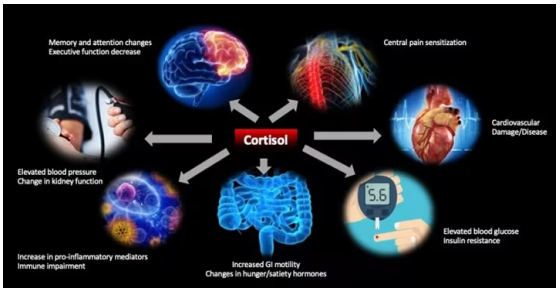

Figure 3. Model of the Effects of Psychosocial Stress on Oral and Overall Health.[5,82]

Influence of Anxiety and Depression on Dental Caries

In addition to the behavioral factors that may reduce oral hygiene measures and result in poor adherence to professional dental preventative measures in patients suffering with anxiety and depression,[7,70,71] sympathetic stimulation in patients with anxiety and chronic stress has been associated with reduced salivary flow.[72,73] Xerostomia is also a known side effect of many antidepressant and anxiolytic medications.[10] Finally, simple carbohydrate intake is elevated in those individuals who are experiencing anxiety and depression.[74] All of these factors may combine to increase the risk of caries in individuals with depression and anxiety disorders.

A study found that in Finnish adults between [35-54] depression was significantly associated with the number of decayed teeth.[8] This is consistent with previous studies that demonstrated that the severity of depression was associated with increased numbers of decayed teeth in adults.[7,70,74] It is thus critical that oral health be considered an integral part of physical and psychological health and emphasis be placed upon collaboration between oral and medical healthcare professionals to result in ideal treatment outcomes. Further, in a study that evaluated oral health and depression, controlling for confounders such as alcohol and tobacco consumption, demographic data, mental health treatment, and systemic health, depression was found to be a risk factor for caries [OR 1.27 (1.13,1.44)], tooth loss [OR 1.31 (1.24, 1.37)], and total edentulism [OR 1.17 (1.02, 1.34)].[77]

Implications for Anxiety and Depression Medications on Periodontal Disease Progression and Therapy

Stress and depression have been associated with negative treatment outcomes in patients with periodontal disease.[4,5,26] Baseline levels of depression have been found to be predictive of the proportion of residual periodontal probing depths and tooth loss between 1 and 5 years post-treatment.[75] In patients receiving periodontal maintenance, occupational stress was associated with greater clinical attachment

loss.[76] These studies indicate that psychosocial disorders should be identified and addressed prior to and during therapy to insure optimal treatment results.

Studies have indicated that antidepressant medications, particularly SSRIs and SNRIs, were associated with reduced levels of bleeding on probing (BOP) and clinical attachment loss in patients with depression and periodontitis.[77,78] Furthermore, animal studies indicate that administration of antidepressant medications resulted in an amelioration of bone loss in animals with induced periodontitis exposed to stressful stimuli that made it approximately equivalent to those who were not exposed to the stressor.[79,80] Given the overall underreporting, under-diagnosis, and inadequate treatement of anxiety disorders and depression, co-management of individuals with periodontitis and depression/anxiety by mental healthcare professionals and the dental team can insure best outcomes for patients.

Identification of At-risk Patients in the Dental Office: Screening and Referral

A readily available screening tool that allows dentists to assess level of depression is critical to identify the high number of individuals with undiagnosed mental disorders. A recent investigation demonstrated that dentists can effectively evaluate patients to identify both undiagnosed and undertreated depression with an eight question survey instrument, the Patient Health Questionnaire Depression Scale (PHQ8) (Figure 4).[81,82] This may allow for dental healthcare practitioners to evaluate levels of depression in their patients and to refer patients to appropriate medical healthcare professionals. Furthermore, education and resources should be provided for individuals who are treating patients with diagnosed anxiety and depression so that they can discuss the oral implications of these diseases and the medications used to treat the diseases with patients to allow for continued monitoring and treatment of patients' oral health. [83]

SMRC Self-Management Resource Center

Personal Health Questionnaire Depression Scale (PHQ-8)

Over the **last 2 weeks**, how often have you been bothered by any of the following problems?
*(circle **one** number on each line)*

How often during the past 2 weeks were you bothered by...	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself, or that you are a failure, or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3

Scoring

If two consecutive numbers are circled, score the higher (more distress) number. If the numbers are not consecutive, do not score the item. Score is the sum of the 8 items. If more than 1 item missing, set the value of the scale to missing. A score of 10 or greater is considered major depression, 20 or more is severe major depression.

Figure 4. A Simplified Screening Tool for Depression/Anxiety."83

Summary

Poor oral health in individuals with common psychological problems remains a prevalent and unaddressed problem. Patients with anxiety, chronic stress, and depression experience increased risk for caries, periodontal disease and tooth loss. These conditions can have a significant effect of overall quality of life. Painful, unesthetic dentition and missing teeth may worsen social isolation and self-esteem as well as result in problems with mastication and phonetics. For individuals who are suffering from psychological illnesses, this could contribute to increased severity of their psychological symptoms. Given the multiple facets associated with the interaction of oral health and anxiety and depression, a multi-pronged, interdisciplinary approach should be applied.

Clinical Recommendations:

1. Physicians and mental healthcare providers should consider the effects of oral health within the focus on the physical health of patients with psychological illnesses. Identification of potential oral health issues, advice on dietary intake and oral hygiene, and early dental referral are critical to address and manage oral health in individuals with psychosocial illnesses.

2. Identification of individuals with depression and anxiety in the dental office and an understanding of the effects that these conditions have on common oral health conditions is critical, given the stigma associated with mental health disorders and the large number of individuals who are undiagnosed, untreated, or undertreated.

3. Developing relationships with primary care providers and/or mental health professionals to allow for bidirectional referrals to optimize physical and mental wellness of patients is critical.

4. Risk assessment for caries and periodontal disease should be undertaken to allow dental healthcare and medical professionals to discuss artificial salivary products, administration of high fluoride dentifrices and gels, and increased dental maintenance intervals based upon the patients' individualized risks and conditions.

5. Additional recommendations to reduce overall levels of stress in patients with depression and anxiety may include addressing coping mechanisms, increased social networks, and physical exercise and should be reinforced by both medical and oral healthcare providers.

Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: *www.dentalcare.com/en-us/ce-courses/ce653/test*

1. Approximately how many individuals live with depression worldwide?

A. 102 million
B. 257 million
C. 322 million
D. 549 million

2. Anxiety and depression are often comorbid. What percentage of individuals diagnosed with depression also meet the criteria for an anxiety disorder?

A. 20%
B. 40%
C. 60%
D. 80%

3. Individuals with anxiety and depression have higher rates of many systemic diseases. Which of the following has NOT been shown to be higher in individuals with psychosocial disorders?

A. Diabetes Mellitus
B. Autoimmune Disorders
C. Cardiovascular Disease
D. All of the above are linked to depression and anxiety.

4. Periodontitis and anxiety/depressive disorders have been linked. What is thought to be the underlying etiology of this association?

A. Increased inflammatory burden through a stress mechanism
B. Decreased self-care, including oral hygiene
C. Increased xerostomia through sympathetic nerve activation and/or antidepressive medications
D. All of the above have been thought to play a role.

5. Stress signals are transmitted through the limbic-hypothalamic-pituitary-adrenal axis to the CNS via all of the following neurotransmitters EXCEPT:

A. Serotonin
B. Stress hormones
C. Neuropeptide Y
D. Monoamines

6. Stress, in particular chronic stress, may increase depressive symptoms through which of the following mechanisms?

A. Increase in deleterious habits and a concomitant decrease in overall self-esteem
B. Stress induces a systemic hyperinflammatory state which may, in susceptible individuals, lead to depression
C. Poor coping mechanisms may worsen both stress and depression
D. All of the above have been purported to cause the interaction between stress and

depression.

7. Studies have shown that depression is associated with higher rates of caries in patients 35-54.

A. True
B. False

8. In patients undergoing active periodontal maintenance therapy, baseline levels of depression were predictive of increased BOP and probing depths between 1 and 5 years after initial therapy. Occupational stress was not associated with increased clinical attachment loss over 5 years.

A. Both statements are true.
B. Both statements are false.
C. The first statement is true, the second statement is false.
D. The first statement is false, the second statement is true.

9. In both animal and human models, antidepressant use was associated with decreased clinical attachment loss, bone loss, and BOP.

A. True
B. False

10. Assessment of mental health disorders in the dental office allows for a fuller understanding of overall risk factors. Which of the following is a tool that can be used to assess depressive symptoms in the dental office?

A. PHQ8
B. SPQR
C. NEWT
D. OWL

11. Interdisciplinary care for individuals with depression and anxiety disorders is critical. If a patient is diagnosed with depression and/or anxiety, which of the following should be undertaken by his/her medical healthcare provider to improve oral health outcomes?

A. Discussion of the interaction between psychosocial disorders and oral health
B. Discussion of possible oral side effects of anti-depressive medications and mechanisms to mitigate their deleterious effects
C. Early referral for dental care
D. All of the above.

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Additional Resources

- No Additional Resources Available

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