



KEYNOTES AND RESOURCES

Episode 88 – Relationship Between Mental Health and Oral Health **July 14, 2023**

Introduction

Globally, one in every eight people (970 million) live with a mental health condition, with anxiety and depressive disorders the most common. The number of individuals living with anxiety and depressive disorders rose significantly from 2019 to 2020 because of the COVID-19 pandemic, with a 26% increase in anxiety and 28% increase in major depressive disorders. [1]

A systematic review and meta-analysis by Madigan et al. (2023), including more than 40,000 children and adolescents across twelve countries, found an increase in depression symptoms during the COVID-19 pandemic, particularly among females and those from relatively higher-income backgrounds. Anxiety symptoms increased slightly, with a small increase in anxiety symptoms for children and adolescents from relatively higher-income backgrounds. [2]

Some individuals who get COVID-19 experience post-COVID conditions (long COVID), long-term effects from the virus and health problems, including mental health conditions that can last or emerge weeks, months, or even years after infection. Mental health conditions may include depression, anxiety, psychosis, obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), and initial onset of substance use disorder. Other long COVID symptoms can include fatigue, sleep disturbances, and cognitive impairment. It is estimated long COVID occurs in at least 10% of SARS-CoV-2 infections. By June 2023, countries across the world had reported over 767 million COVID-19 cases. In Canada, over 4.6 million were reported, with over 1.6 million cases in Ontario. [3] [4] [5]

Research has shown a relationship between oral health and mental health. A mental health condition is characterized by a clinically significant disturbance in an individual's cognition, emotional regulation, or behaviour. It is usually associated with significant distress, impairment in functioning, or risk of harm. There are many different types of mental health conditions, including anxiety disorders, depression, bipolar disorder, post traumatic stress disorder (PTSD), schizophrenia, eating disorders, and obsessive-compulsive disorder (OCD), among others. [1] [6]

Mental health conditions [1] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19]

Type	Description	Signs / symptoms	Treatment
Anxiety disorders	<p>Characterized by excessive fear, worry, and related behavioural disturbances.</p> <p>Several types exist, including:</p> <p style="text-align: right;">Generalized anxiety disorder</p> <p style="text-align: right;">Panic disorder</p> <p style="text-align: right;">Social anxiety disorder</p> <p style="text-align: right;">Separation anxiety disorder</p> <p style="text-align: right;">Specific phobias</p>	<p>Symptoms severe enough to cause significant distress or impair functioning.</p> <p>Excessive worrying</p> <p>Panic attacks</p> <p>Excessive fear and worry in social situations.</p> <p>Excessive fear or anxiety about separation from those with whom the person is attached.</p> <p>Excessive and persistent fear of a specific object, situation, or activity that is generally not harmful (e.g., dental phobia).</p>	<p>Psychotherapy (e.g., cognitive behavioural therapy [CBT])</p> <p>Medication depends on age and severity (e.g., anxiolytics, antidepressants, sometimes beta-blockers to control physical symptoms)</p>
Depression	<p>Depressed mood or a loss of pleasure or interest in activities, for most of the day, nearly every day, for at least two weeks.</p> <p>Different from usual mood fluctuations and short-lived emotional responses to everyday life challenges.</p> <p>Increased risk of suicide.</p>	<p>Symptoms may include feeling sad, irritable, empty, poor concentration, feelings of excessive guilt or low self-worth, hopelessness about the future, thoughts of death or suicide, disrupted sleep, changes in appetite or weight, feeling tired or low in energy.</p>	<p>Psychotherapy (e.g., CBT)</p> <p>Medication depends on age and severity, such as antidepressants (e.g., selective serotonin reuptake inhibitors [SSRIs], serotonin-norepinephrine reuptake inhibitors [SNRIs]; tricyclic antidepressants, monoamine oxidase inhibitors [MAOIs])</p>
Bipolar disorder	<p>Alternating depressive episodes with periods of manic symptoms.</p> <p>Increased risk of suicide.</p>	<p>Depressive symptoms include depressed mood (feeling sad, irritable, empty) or a loss of pleasure or interest in activities, for most of the day, nearly every day.</p> <p>Manic symptoms may include euphoria or irritability, increased activity or energy, and other symptoms, e.g., increased talkativeness, racing thoughts, increased self-esteem, decreased need for sleep, distractibility, impulsive reckless behaviour.</p>	<p>Psychotherapy (e.g., CBT, psychoeducation, stress reduction, family-focused therapy)</p> <p>Medication (e.g., mood stabilizers, antipsychotics, antidepressants, anxiolytics)</p> <p>Electroconvulsive therapy (ECT)</p>

Type	Description	Signs / symptoms	Treatment
Post-traumatic stress disorder (PTSD)	May develop after exposure to an extremely threatening or horrific event or series of events. Symptoms persist for at least several weeks and significantly impair functioning.	Re-experiencing traumatic event(s) in the present (intrusive memories, flashbacks, nightmares). Avoiding thoughts and memories of event(s), or avoiding activities, situations, or people reminiscent of the event(s). Persistent perceptions of heightened current threat.	Psychotherapy (e.g., CBT, exposure therapy, group therapy) Medications (antidepressants [e.g., SSRIs, SNRIs], anxiolytics)
Schizophrenia	Individuals with schizophrenia have a life expectancy 10-20 years below general population. Characterized by significant impairments in perception and changes in behaviour.	Persistent delusions, hallucinations, disorganized thinking, highly disorganized behaviour, or extreme agitation. May experience persistent difficulties with cognitive functioning.	Medication (antipsychotics) Psychoeducation Family interventions Psychosocial rehabilitation
Eating disorders	Several types, (e.g., anorexia nervosa, bulimia nervosa) Behaviours result in significant risk or damage to health, significant distress, or significant impairment of functioning. <u>Anorexia nervosa</u> : onset often during adolescence or early adulthood; associated with premature death due to medical complications or suicide. <u>Bulimia nervosa</u> significantly increases risk for substance use, suicidality, and health complications.	Abnormal eating and preoccupation with food as well as prominent body weight and shape concerns. <u>Anorexia nervosa</u> is characterized by self-starvation and weight loss. <u>Bulimia nervosa</u> includes episodes of bingeing, commonly followed by episodes of purging.	Family-based treatment CBT
Obsessive-compulsive disorder (OCD)	Pattern of unwanted thoughts and fears (obsessions) that lead to repetitive behaviours (compulsions), which interfere with daily activities and cause significant distress. Usually includes both obsessions and compulsions, but it is possible to have only obsession or compulsion symptoms.	Obsessions often have themes (e.g., fear of contamination or dirt; doubting; needing things orderly and symmetrical). Compulsions typically have themes (e.g., cleaning, washing, checking, counting, orderliness, following strict routines).	Exposure and response prevention (ERP), type of CBT, involving gradual exposure to a feared object or obsession (e.g., dirt) and learning ways to resist the urge to do compulsive rituals. Medications (e.g., antidepressants).

Risk factors for mental health conditions

Many factors contribute to mental health conditions including:

- Family history of mental health problems (e.g., parent, sibling).
- Early life experiences (e.g., exposure to abuse, trauma, neglect)
- Environmental influences on a fetus (e.g., exposure to drugs, alcohol, toxins, environmental stressors, inflammatory conditions)
- Having a chronic medical condition (e.g., diabetes)
- Traumatic brain injury (e.g., violent blow to the head)
- Traumatic experiences (e.g., assault, military combat)
- Alcohol or recreational drug use
- Previous mental health condition
- A person's social, economic, and educational status
- Stressful life events (e.g., financial problems, loved one's death, divorce) [20] [21]

Stress

Stress is a normal response to situational pressures or demands, and is a part of everyday life. During the natural stress response, a surge of hormones, such as adrenaline and cortisol, are released. Cortisol, the primary stress hormone, serves various functions, including preparing the body for a flight or fight situation. The stress response system is usually self-limiting and once the stressor has passed, hormone levels return to normal. [22]

However, chronic stress leads to long-term activation of the stress response system, with over exposure to cortisol and other stress hormones. Chronic stress increases risk of mental health conditions, such as anxiety, depression, substance use problems, sleep disturbances, memory and concentration impairment, and physical complaints (e.g., muscle tension, pain). It also increases risk of medical problems, such as headaches, gastrointestinal problems, compromised immune response, difficulty conceiving, weight gain, hypertension, and cardiovascular disease.¹ [22] [23]

How mental health affects oral health

Studies have shown mental health and oral health may be correlated, with direct and indirect associations between mental health conditions and periodontal disease, peri-implant disease, tooth wear, dental caries, tooth loss, orofacial pain, and soft tissue lesions. [6] [24]

Periodontal disease

Evidence suggests a positive relationship between stress, mental health conditions, and periodontal disease. For example, mental health conditions (e.g., anxiety disorders, depression, bipolar disorder, schizophrenia, substance use disorders) are associated with more severe periodontal disease, and in some cases, poorer healing outcomes to nonsurgical periodontal therapy. [25]

The link between mental health and periodontal disease was first established for necrotizing periodontal disease (NPD), formerly referred to as necrotizing ulcerative

¹ Refer to Episodes 37, 79, 80, and 81 for additional information on cardiovascular diseases.

gingivitis and necrotizing ulcerative periodontitis, and historically termed ‘trench mouth.’ Psychogenic factors (e.g., stress, anxiety, depression) predispose to NPD by decreasing host defenses and/or promoting bacterial growth, namely spirochetes and fusiform bacteria. [26] [27]

The association between stress and NPD was confirmed during the COVID-19 pandemic as a rising number of necrotizing periodontal lesions were attributed to increased general stress levels. [28] [29]

Other predisposing factors of NPD include malnutrition, insufficient sleep, inadequate oral hygiene, preexisting gingivitis, tobacco and alcohol consumption, and previous history of NPD. [27]

Psychological stress appears to be an important risk factor for periodontal disease development and progression, through mechanisms such as oral microbiome dysbiosis, immune response dysregulation, and behavioural and lifestyle changes. [30]

Periodontal disease is driven by dysbiotic microbiota. Cortisol, the body's stress hormone, increases growth of *Porphyromonas gingivalis*. *P. gingivalis* alters the host immune response, contributing to periodontal microbiome dysbiosis and amplifying the capacity of *P. gingivalis* to produce periodontitis. [24]

Further, persistence of periodontal pathogens results in a constant production of proinflammatory cytokines and other molecular mediators, which leads to periodontal tissue destruction. Chronic stress also results in immune system dysregulation, with higher levels of some cytokines and other proinflammatory mediators, increasing risk of periodontal disease. [24] [30] [31]

Stress impacts immune responses that increase susceptibility to infection, potentially contributing to periodontitis progression. In an animal model of depression, periodontal ligature-induced bone loss was greatly increased while subjects exhibited responses consistent with depression. It has also been demonstrated that excess cortisol levels may delay periodontal wound healing. [28] [32]

Stress and several mental health conditions (e.g., anxiety disorders, depression, bipolar disorder, schizophrenia) appear to be accompanied by a low-grade chronic inflammation. Systemic effects of inflammation have been shown to adversely impact systemic health, influencing conditions such as diabetes and cardiovascular disease. Therefore, it is conceivable low-grade chronic inflammation may be involved in a bidirectional relationship between stress, mental health conditions, and periodontal as well as peri-implant diseases. [25] [33]

Stress and mental health conditions can indirectly affect periodontal health through health-damaging behavioural and lifestyle modifications as a result of the mental health condition or a coping-related response, such as:

- Poor oral self-care resulting in dental plaque biofilm buildup.

- Poor compliance with periodontal treatment appointments, post-operative treatment suggestions, and periodontal maintenance appointments.
- Tobacco smoking increases risk and severity of periodontal disease. Smokers also respond less favourably to periodontal treatment. The presence of nicotine in the blood results in vasoconstriction blocking nutrients from reaching periodontal tissues and inhibiting oral neutrophil² function. Tobacco smoking slows surgical wound healing, increasing risk of tooth loss and periodontal disease relapse.
- Cannabis and e-cigarette use. (See below for more details).
- Unhealthy diet, which may include an increase in carbohydrate-rich foods and soft food consumption, increasing plaque accumulation. Overconsumption of high-fat foods can lead to increased cortisol production and immunosuppression. Inadequate vitamin and mineral intake through an unbalanced diet can impair wound healing and has been shown to impact periodontal tissue health and regenerative capacity.
- Bruxism,³ which may be an aggravating factor for periodontitis.
- Unhealthy alcohol use. Alcohol consumption can increase risk of xerostomia, which impacts oral health. Alcohol drinkers, especially those with periodontitis, have higher proportions of red-complex (i.e., *P. gingivalis*) and orange-complex (i.e., *F. nucleatum*) bacteria in shallow to deep pockets compared with nondrinkers. Individuals with a history of alcohol misuse are at an increased risk of malnutrition and poor oral self-care. Heavy alcohol consumption is also associated with an increased risk of developing oral cancer.⁴
- Inadequate sleep quality, which is significantly associated with severe periodontal disease. [26] [29] [32] [34] [35] [36] [37] [38] [39] [40]

These findings suggest stress management and adequate treatment of mental health conditions may be a valuable adjunct in periodontal treatment. Thus, it is important to consider stress in clients with periodontal and peri-implant disease. Client education on the effects of stress on oral health is essential, along with making referrals for clients exhibiting psychological stress or depression. [30]

Cannabis use⁵

Evidence shows depression is strongly associated with cannabis use, with regular cannabis use being twice as common among individuals with mental health conditions. There is also some evidence cannabis use may lead to depression onset; however, strong evidence points to the inverse association that depression may lead to the onset or increase in cannabis use frequency. Frequent cannabis use has also been associated with an increased risk of anxiety disorders and suicide. [41] [42] [43] [44]

² Neutrophils make up 55-70% of all leukocytes and are one of the first cell types to travel to a site of infection. They help fight infection by ingesting microorganisms and/or releasing antimicrobial factors from specific granules. Neutrophils, along with macrophages, are the main phagocytic cells of the body. They also recruit, activate, and program other immune cells. Refer to Episodes 44 and 45 for more information on the immune system.

³ Refer to Episode 82 for additional information on bruxism.

⁴ Refer to Episodes 9, 76, 77, and 78 for additional information on oral cancer.

⁵ Refer to Episode 58 for additional information on cannabis use and oral health.

In Canada, where cannabis has been legal and regulated since 2018, between 30-50% of individuals who used nonmedical cannabis pre-pandemic increased their frequency of use during the pandemic. This estimate was higher among those with depression, anxiety, and/or suicidality. The shifts in cannabis use may indicate a coping-related response to emergent stress, anxiety, depression, and other health problems exacerbated by the pandemic. [45] [46]

Gravelly et al. (2023) examined the prevalence of cannabis use and depressive symptoms among Canadian adults who smoke cigarettes. Co-consumers of cannabis and cigarettes were more likely to report depressive symptoms and high-risk alcohol consumption. However, only depression, and not cannabis use, was associated with greater motivation to quit smoking and greater perceived dependence on cigarettes. The authors concluded tobacco cessation treatment may require multi-pronged strategies to address mental health, alcohol misuse, and cannabis use. [41]

Cannabis use may also increase risk of developing mental health conditions, such as psychosis or schizophrenia, especially in those who:

- Start using cannabis at a young age
- Use cannabis daily or almost every day
- Have a personal or family history of psychosis and/or schizophrenia

Cannabis use, especially cannabis smoking, has been associated with poor oral health. Cannabis is usually smoked longer and has a higher combustion temperature compared to tobacco, which can impact oral health. However, identifying the oral effects of cannabis alone is complicated by the concurrent use of cannabis with tobacco, alcohol, and other drugs; poor oral selfcare; and infrequent oral healthcare visits associated with cannabis use. [47] [48]

Cannabis use is also associated with:

- Xerostomia, which can contribute to periodontal disease and dental caries
- Increased cariogenic food consumption as tetrahydrocannabinol (THC) is an appetite stimulant
- Increased caries compared to nonusers, especially in cleansable smooth surfaces
- Higher decayed, missing, and filled teeth (DMFT) scores
- Periodontal disease (e.g., due to xerostomic effect, poor home care, heat from cannabis combustion), which appears to follow a dose-dependent relation
- Alveolar bone loss
- Erythematous gingivitis, gingival hyperplasia
- Leukoedema, leukoplakia, erythroplakia, keratosis, stomatitis, uvulitis
- Candidiasis
- Nicotinic-like tooth staining [20] [48]

E-cigarette use

Some individuals may vape in response to stress. Results of the Canadian Tobacco and Nicotine Survey (2021) showed vaping to reduce stress was reported as the main reason for vaping among 15-19 years (33%) compared with 58% of those aged 25 and

older who reported using vaping to reduce, quit, or avoid returning to smoking. Among adults 20-24 years, 25% vaped to reduce stress. [49] [50]

As mentioned, research has shown common motivation among youth to use e-cigarettes include stress relief. Research has also shown adolescents who vape were more likely to have mental health conditions (e.g., depression, suicidality). [51] [52]

Research has indicated e-cigarette use can contribute to the development of periodontal diseases, peri-implantitis, oral carcinoma, and dental caries.⁶ [53] [54] [55]

Peri-implant disease

It can be inferred the relationship between mental health conditions, stress, and peri-implant disease are similar to those reported with periodontal disease, including increased health risk behaviours, such as smoking and lack of compliance with home and professional care.

Chronic stress is associated with delayed wound healing of peri-implant soft and hard tissues, thus favouring poor osseointegration. There is also strong evidence of increased risk of developing peri-implantitis in individuals with a history of periodontitis, and as discussed, there is an association between periodontal disease and mental health conditions. [25] [28] [56]

Associations between dental implant failure and antidepressant medications have been found, particularly with selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), and tricyclic antidepressants. [25]

SSRIs have an anabolic effect on bone, reducing turnover, which may explain the increase in implant failure. Also, a common side effect of antidepressants is xerostomia, which may cause brushing discomfort, resulting in increased plaque accumulation and peri-implant disease development. [25]

Research has shown SNRIs yielded a higher risk of implant failure than SSRIs. Although the link between serotonin and bone metabolism appears clearer, it is not the same for norepinephrine. It has been demonstrated in mice that lack of norepinephrine reuptake can lead to reduced bone formation and increased bone resorption, leading to poor bone mass and suboptimal bone mechanical properties. Similarly, it is suggested tricyclic antidepressants increase risk of implant failure through serotonin and norepinephrine pathways. However, there have been limited studies and more research is required. [25] [57] [58]

Tooth wear⁷

Tooth wear is irreversible loss of hard tooth structure caused by factors other than those responsible for dental caries. Tooth wear is observed clinically as attrition, abrasion, erosion, or a combination. [59]

⁶ Refer to Episode 19 for discussion on vaping and oral health.

⁷ Refer to Episode 82 for discussion on tooth wear.

It is estimated 35-38% of individuals with an eating disorder have clinical signs of erosion, typically on the palatal surfaces of anterior teeth due to vomiting, increasing risk of dental caries and tooth sensitivity. In addition to eroding teeth, excessive vomiting leads to dehydration and reduced salivary flow, both of which increase erosion. Chipped anterior teeth may also be detected from using objects (e.g., toothbrushes, spoons, combs) to induce vomiting [24] [60] [61]

Higher use of alcohol and tobacco, often seen in those living with depression, can also cause erosion as a result of gastroesophageal reflux disease (GERD).⁸ [24]

There is also an association between mental health conditions and awake bruxism, with a significant increased risk of awake bruxism occurring during episodes of stress or anxiety. Studies have shown individuals who experience bruxism exhibit certain psychological traits (e.g., stress, anxiety, manic depressive symptoms, mood disorders). It is suggested bruxism may be considered a marker for chronic stress. [26] [62] [63]

Tooth wear, caused by friction against the tooth with an extrinsic agent, is often associated with OCD. Individuals living with OCD may feel driven to brush or floss excessively, which may lead to gingival irritation, gingival recession (increasing tooth sensitivity and dental caries risk), and tooth abrasion. [24] [64]

Dental caries

Dental caries risk is increased by xerostomic effects of psychotropic medications (e.g., antidepressants, antipsychotics, anxiolytics). Also, those living with mental health conditions often present with more tooth decay secondary to health damaging behaviours that may involve decreased oral self-care, poor diet, and smoking. Smoking has been shown to enhance growth of cariogenic microorganisms (e.g., *Streptococcus mutans*) and decrease buffering capacity of saliva. Additionally, bulimia can affect the parotid gland, resulting in a decreased saliva rate and increasing caries risk. [24] [65]

Tooth loss

A systematic review by Kisely et al. (2015) addressed the association between poor oral health and common mental health conditions (e.g., depression, generalized anxiety disorder, PTSD). The study demonstrated a significant association between common mental health conditions and tooth loss, with those with a mental health condition experiencing 2.8 odds of edentulism compared to the general population. Rates of dental decay were also higher for those with common mental health conditions. [6] [66]

In addition, increased dental caries and tooth loss can lead to more frequent pain, social isolation, and low self-esteem, thereby, reducing quality of life, and in turn, decreasing mental and overall health. [6]

Xerostomia

Antipsychotics, anxiolytics, tricyclic antidepressants, and other antidepressants are among a number of drugs associated with dry mouth. Potential lifestyle causes of

⁸ Refer to Episode 60 for additional information on GERD.

xerostomia include alcohol, tobacco use, cannabis use, and excessive caffeine consumption.

Xerostomia can result in several oral issues such as:

- Increased risk of dental caries, periodontal disease, candida infections, and traumatic ulcerations.
- Increased difficulty in speech, eating, swallowing, and retaining dentures due to lack of lubrication, which can result in decreased food intake and poor nutrition.
- Increased discomfort with brushing resulting in increased plaque accumulation, heightening risk of dental caries, periodontal and peri-implant diseases. [24] [67] [68]

Chronic orofacial pain

Chronic orofacial pain can manifest in variety of different ways, including burning mouth syndrome, atypical odontalgia, and temporomandibular disorder (TMD). [24]

Burning mouth syndrome

Burning mouth syndrome (BMS) is an idiopathic chronic pain disorder characterized by persistent burning sensation in clinically normal oral mucosa and without a detectable organic cause (e.g., blood chemistry abnormalities). However, stress, anxiety, and depression may play critical roles in this condition.

Burning sensations usually present bilaterally and with fluctuating intensity. The tip and anterior two-thirds of the tongue are most commonly involved. Other areas often involved include the lips, palate, and lateral border of the tongue. BMS negatively impacts quality of life, occurs more often in females, especially in those who have experienced menopause (prevalence increases with age), and is rarely diagnosed in females younger than 30 years. Etiology remains unknown. However, it seems likely both physiological and psychological factors play a role in causing, perpetuating, and/or exacerbating BMS. Clinical management is complex and there is no standard treatment protocol, but both physiological and psychological components of the symptoms should be addressed. [24] [69] [70] [71]

Candela et al. (2022) investigated the impact of the COVID-19 pandemic upon individuals with BMS. The researchers found the pandemic worsened anxiety, sleep quality, and pain intensity (burning sensation) among individuals with BMS. [72]

Atypical odontalgia

Atypical odontalgia⁹ is characterized by chronic pain in a tooth or teeth, or in a site where teeth have been extracted, or following endodontic treatment, occurring without an identifiable cause. The pain may spread over time to involve wider areas of the face or jaws.

The pain is described as a persistent and unremitting throbbing or aching in a tooth, teeth, or extraction site, which is not significantly affected by hot or cold food exposure,

⁹ Atypical odontalgia is also known as atypical facial pain, persistent idiopathic facial pain, phantom tooth pain, and neuropathic orofacial pain.

or by chewing or biting. Pain intensity can vary from very mild to very severe and may or may not be relieved by local anesthetic. Pain felt in a tooth or teeth persists despite treatment aimed to relieve the pain (e.g., filling, root canal, or extraction). There is typically no identifiable cause to explain the pain and it often follows or is associated with a history of a dental procedure (e.g., root canal, tooth extraction). On occasion, the pain can occur without any reason. It is important to recognize atypical odontalgia to prevent unnecessary and ineffective dental treatment.

Although atypical odontalgia etiology is not known, it is probably multifactorial, and may include genetic predisposition, age, and sex. It is more common in females, and is found most often in the middle-aged to older age group. Some studies have found an association between atypical odontalgia and mental health conditions. [24] [73] [74] [75] [76]

Miura et al. (2018) reported around half (46%) of individuals with atypical odontalgia had depression (15%), anxiety disorders (10%), bipolar disorder (3%), or schizophrenia (2%), but this may be reflective of the prevalence of these conditions in the general population. [76]

The actual pathologic mechanism may be dysfunction of the nerves that carry pain sensations from the teeth and jaws and is triggered by dental manipulation. The psychological factors could be secondary to the pain. [73]

Tricyclic antidepressants (e.g., amitriptyline) and serotonin and norepinephrine reuptake inhibitors are often used to treat atypical odontalgia. Although these are antidepressant medications, they are primarily used for their pain-relieving properties and not for their antidepressant effects. Other drugs used to treat chronic pain conditions, such as gabapentin and baclofen, may also be prescribed. Generally, treatment is successful in reducing the pain but not eliminating it completely. Studies using botulinum toxin¹⁰ show good results in pain remission. Pharmacologic approaches may be combined with CBT, coping strategies, relaxation techniques, and biofeedback. [24] [73] [74] [75] [76]

Temporomandibular disorder

Temporomandibular disorder (TMD) is an umbrella term that refers to chronic pain and dysfunction of the temporomandibular joint (TMJ), muscles, and innervation. The prevalence of TMD is between 5-34% and is more common in younger and female individuals. It can be caused by muscle tension, arthritis, injury to the jaw or face, grinding or clenching of the teeth, or stress. Stress can cause tension in the TMJ, which can lead to pain and other TMD symptoms. It can also cause the jaw muscles to tighten, making it difficult to open and close the mouth. To help manage TMD, it is important to reduce stress. This can include relaxation techniques, such as deep breathing, yoga, and meditation, and seeking medical attention when needed. [24] [77] [78] [79] [80]

¹⁰ Refer to Episode Episode 54 for discussion on botulinum toxin use in dentistry.

Research by Imbriglio et al. (2020) found guided music listening (i.e., listening to relaxing music or self-selected favourite music) reduced the intensity of wake-time tooth clenching episodes up to 55% in participants with TMD. [81] [82]

Symptoms of TMD include:

- Pain in the masticatory muscles and/or jaw joint (most common symptom).
- Pain that spreads to the face, temples, ears, or neck.
- Jaw stiffness.
- Limited movement or locking of the jaw.
- Painful clicking, popping, or grating in the TMJ when yawning, chewing, opening or closing the mouth.
- Ringing in the ears, hearing loss, or dizziness.
- A change in the way the upper and lower teeth fit together.
- Neck pain and headaches that can not be explained. [77] [83] [84]

Research has shown self-reported TMD was higher among individuals with borderline and clinically diagnosed anxiety and depression scores. [79]

A retrospective cohort study by Liou et al. (2023) explored the relationships between TMDs and major depressive disorder and anxiety disorders. In individuals with TMD, a threefold higher risk for developing subsequent major depressive disorder and a sevenfold higher risk for developing anxiety disorders were observed compared with those without TMD. Major depressive disorder and anxiety disorders were also shown to be predictive of subsequent TMD development, indicating a bidirectional association. [85]

A systematic review by Minervini et al. (2023) evaluated the prevalence of TMD sign and symptoms among war veterans diagnosed with PTSD. The psychological trauma associated with war can lead to PTSD and other mental health issues, including anxiety and depression. War can also have a profound impact on physical health. The authors found exposure to war can, directly or indirectly, increase the risk of developing TMJ dysfunction and TMD signs and symptoms. [80]

Additional research by Minervini et al. (2023) revealed an association between the COVID-19 pandemic and increased incidence of TMDs. The systematic review showed the state of uncertainty in which individuals lived during the pandemic, especially through stress, created muscle hyperactivity and aggravated bruxism, which are causal factors and symptoms of temporomandibular dysfunction. [86]

These studies highlight the importance of multidisciplinary care, consisting of oral health clinicians, medical providers, and mental health specialists as well as timely referrals to appropriate healthcare providers for comprehensive TMD management. [85] [86]

Soft tissue lesions

Oral manifestations of eating disorders include bruising and/or injury to the mouth (e.g., palatal lesions) as a result of induced vomiting. Soft tissue lesions, angular cheilitis,

candidiasis, and glossitis may also be noted due to malabsorption of nutrients from poor diet or constant purging behaviours. [61]

As previously discussed, those living with mental health conditions have a higher tendency to smoke and consume alcohol. Tobacco and alcohol are risk factors for oral cancer and their synergistic use significantly increases risk of oral squamous cell carcinoma. Infrequent oral healthcare appointments decrease the opportunity to identify potentially cancerous lesions in a timely manner possibly resulting in poorer prognosis. [24]

Oral healthcare use

Tiwari et al. (2022) investigated the associations between mental health status, oral health status, and oral healthcare utilization. Poor oral health status among participants was associated with poor mental health, age, socioeconomic status, and not visiting an oral health clinician at regular intervals. [6]

Evidence suggests individuals who have experienced a mental health condition underutilize oral healthcare. Reasons contributing to underutilization include:

- Stigma of mental illness, feelings of shame
- Severity of mental illness
- Lack of income and health insurance
- Dental fear, anxiety, or phobia
- Restlessness in the waiting room
- Difficulty accessing services
- Transportation barriers
- Lack of time to seek oral healthcare services
- Mistrust towards oral healthcare providers
- Oral health team's attitudes toward mental illness
- Oral health team's lack of knowledge and skill in treating clients with mental health conditions.
- Reluctance of oral health clinicians to provide care to those with mental health conditions
- Psychiatrists and psychologists lack of training in screening for oral health. They may only become aware of problems if their patients verbally complain of dental symptoms. [6] [87] [88] [89]

Wright et al. 2020 found the top two barriers to receiving care were cost and fear of oral healthcare services. [87]

A recent survey (2023) of American adults over 50 years indicated a link between and oral health, with mental health challenges contributing to a lack of oral care. Among participants who often experience feelings of anxiety and depression, the survey found:

- Over one quarter (27%) had not seen an oral health provider in more than two years.
- 60% worried about being negatively judged based on the appearance of their teeth.
- Over half (57%) felt shame about their oral health and appearance of their teeth.

Among participants who experienced any feelings of depression or hopelessness frequently or on occasion in the last six months, the survey found:

- 35% were likely to neglect brushing and flossing when feeling depressed.
- 37% stated tooth pain intensified feelings of depression or hopelessness. [90]

Oral-brain axis

Over the last decade, scientists have explored the association between gut microbiota and the brain to understand mental health conditions, particularly depression. There is increasing evidence showing gut microbiota has an important function in modulating brain function and, therefore, behaviour. The connection has been termed the brain-gut axis. A growing body of evidence supports an important role for alterations in the brain-gut-microbiome axis in the etiology of depression and other mental health conditions. Furthermore, research has shown individuals with major depressive disorder who took probiotic supplements along with standard antidepressant medication had reduced symptoms. [25] [91] [92] [93]

Given the oral cavity is the start of the digestive system, it is not unreasonable to consider the potential role of the oral microbiome in mental health. However, there has been little research investigating the effect of oral microflora on the central nervous system and mental health. [25]

Wingfield et al. (2021) found an increase of 21 bacterial taxa, including *Neisseria* spp. and *Prevotella nigrescens*, while 19 taxa had a decreased abundance in salivary microbiome of individuals with depression. However, more research is needed to determine if such shifts play a role in the etiology of depression. [92]

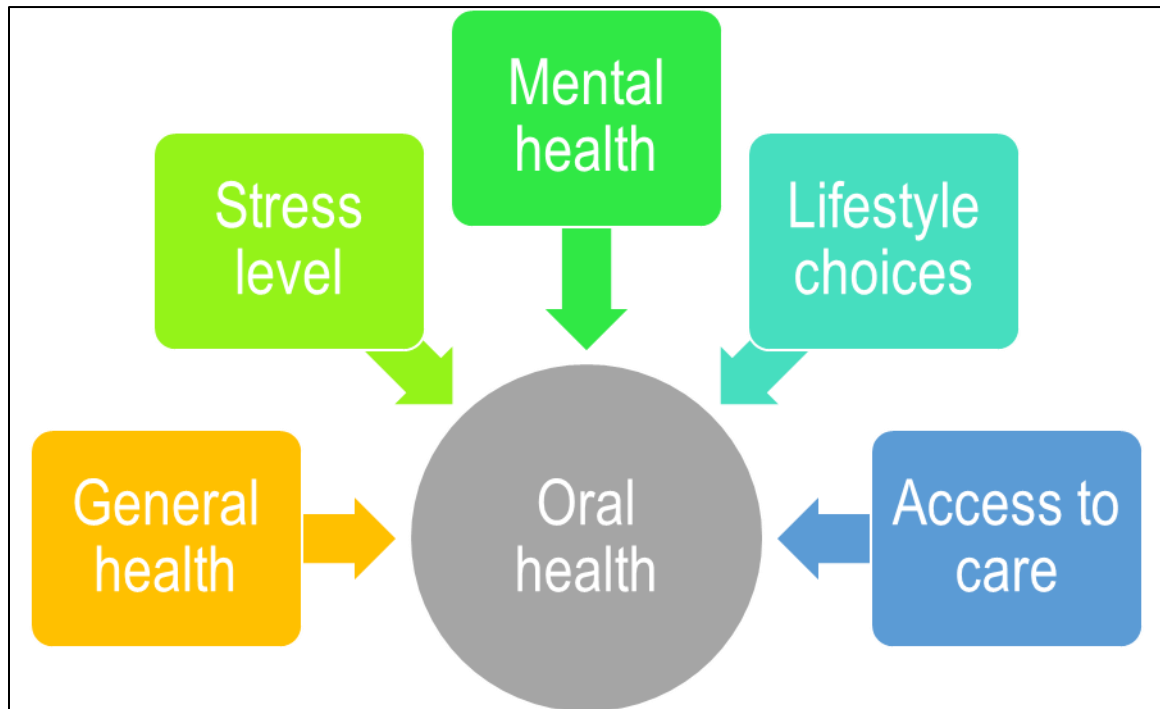
A review by Paudel et al. (2022) discussed the bidirectional transmission of bacteria between the oral cavity and the gut and interactions within the microbiota-oral-brain axis. Evidence suggests the presence of a microbiota-oral-gut-brain axis that acts during psychological stress. Nonetheless, future studies are required to understand the complex interactions between psychological stress and oral and gut microbiomes. [94]

Management of clients with mental health conditions

Management strategies are client-specific because etiology of mental health conditions, such as dental anxiety, is multifactorial. Dental anxiety can arise due to multiple factors, such as previous negative or traumatic experience, especially in childhood; vicarious learning from anxious family members or peers; lack of understanding; exposure to frightening portrayals of dentistry in the media; the coping style of the person; and the vulnerable position of lying back in a dental chair.

Some common fears giving rise to dental anxiety are fear of pain, blood-injury fears, lack of trust or fear of betrayal, fear of being ridiculed, fear of the unknown, fear of choking and/or gagging, a sense of helplessness in the dental chair, and lack of control during dental treatment. Effective strategies are built on good communication skills, rapport, and trust building, which are essential for treating clients with mental health conditions. [95]

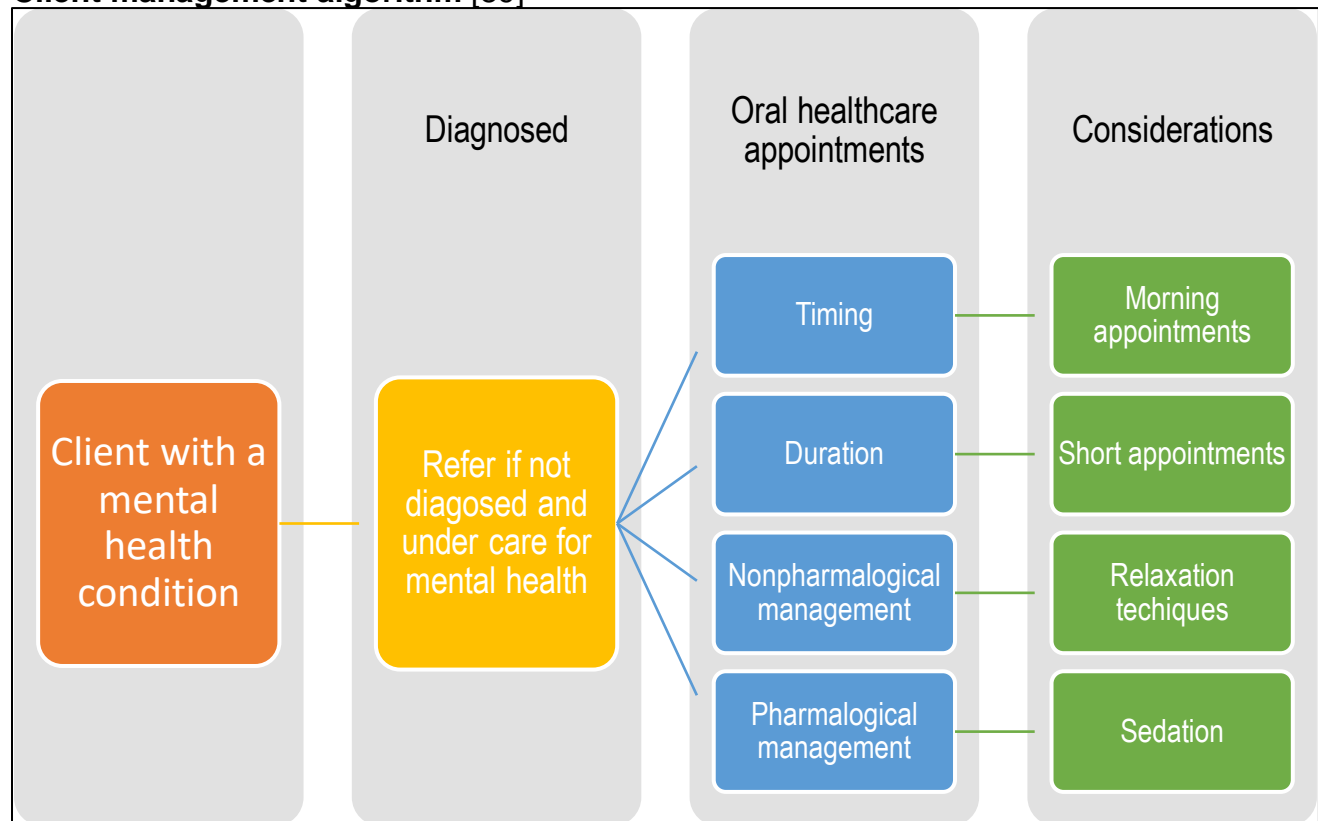
Facets of oral health



Strategies to help treat clients with mental health conditions may include:

- Increasing knowledge on mental health conditions and undergoing additional training as needed.
 - Identifying clients' previous experiences with oral health treatment, including their main fears, worries, and expectations.
 - Referring to medical and/or mental health practitioners if an undiagnosed mental health condition is suspected.
 - Utilizing extreme empathy and patience.
 - Knowledge of side effects from drugs prescribed for mental health conditions (e.g., xerostomia) and strategies to help alleviate.
 - Consultations with clients' mental health providers as required
 - Regular oral health appointments to evaluate oral hygiene status and to reduce the burden of disease progression, which includes emphasizing prevention.
 - Short appointments (may need multiple) or longer appointments to accommodate client questions, concerns, tolerance, etc.
 - Timing of appointments (e.g., morning) and seeing clients on time to help prevent client distress.
 - Utilizing 'tell-show-do.'
 - Nonpharmacological management (e.g., relaxation techniques, listening to music).
 - Pharmacological management (e.g., sedation) may require consultation and referral.
- [89] [95]

Client management algorithm [89]



Take home messages

- Oral health practitioners will encounter clients with mental health conditions due to its increasing prevalence. Thus, it is important to be aware of oral manifestations that may arise in clients with mental health conditions and to create an environment where clients feel comfortable discussing their stress levels and mental health.
- An interdisciplinary-team approach to client care should include referral to a medical or mental healthcare practitioner when indicated.
- There is also a need to bridge the professional gap among practitioners of oral and mental health to facilitate early referrals to oral health practitioners when oral health problems arise.
- Consider stress among the risk factors of periodontal and peri-implant diseases and the potential for decreased efficacy in treatments.
- Understanding the relationship between mental health conditions, periodontal diseases, and peri-implantitis may allow for improvements in the prevention and treatment of these diseases.

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Client resources

Find mental health support, Ontario Ministry of Health
<https://www.ontario.ca/page/find-mental-health-support>

Crisis resources, CAMH
<https://www.camh.ca/en/health-info/crisis-resources>

Ontario Shores Centre for Mental Health Sciences

- [List of mental health and community programs in Ontario](#)
- [Finding help in Ontario](#)

National Eating Disorder Information Centre (NEDIC)
<https://nedic.ca/>

Mental health and wellness, Health Canada
Services and information
<https://www.canada.ca/en/public-health/topics/mental-health-wellness.html>

Additional Resources

Anxiety and anxiety disorders, CDHO factsheet, September 16, 2021, p 1-4
https://www.cdho.org/Advisories/CDHO_Factsheet_Anxiety_and_Anxiety_Disorders.pdf

Anxiety disorders, CDHO advisory, September 16, 2021, p 1-18
https://www.cdho.org/Advisories/CDHO_Advisory_Anxiety_Disorders.pdf

Bipolar disorder, CDHO factsheet, February 6, 2022, p 1-4
https://www.cdho.org/Advisories/CDHO_Factsheet_Bipolar_Disorder.pdf

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