

# The Interplay Between Psychological Stress and Temporomandibular Joint Disorders: A Comprehensive Review

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## ABSTRACT

Temporomandibular Joint Disorders (TMD) are a complex group of conditions that affect the jaw joint and surrounding muscles. While traditionally viewed from a biomechanical or structural perspective, emerging research has highlighted the significant role that psychological factors play in the development and management of TMD. Psychological factors such as stress, anxiety, depression, and somatization are found to contribute to both the onset and the exacerbation of TMD symptoms. This paper explores the psychological underpinnings of TMD, reviews the evidence for the role of psychological factors in the pathophysiology of the disorder, and discusses therapeutic approaches that integrate psychological and physical management strategies.

**Keywords:** Temporomandibular Joint Disorders, Psychological Factors, Stress, Anxiety, Depression, Somatization, Management, Pain Perception

## INTRODUCTION

Temporomandibular Joint Disorders (TMD) encompass a range of clinical conditions affecting the temporomandibular joint (TMJ) and the muscles controlling jaw movement. These disorders are common, with prevalence rates ranging from 5-12% in the general population. Symptoms include jaw pain, headaches, restricted jaw movement, and clicking or popping sounds during chewing or speaking. Traditionally, the causes of TMD have been attributed to mechanical or structural factors, including malocclusion, trauma, or joint degeneration. However, there is growing recognition of the significant role psychological factors play in the onset and progression of TMD symptoms.

Psychological factors such as stress, anxiety, depression, and pain catastrophizing have been consistently linked to the exacerbation of TMD symptoms. These factors influence not only the perception of pain but also the response to treatment, making them critical targets for intervention. This paper aims to explore the psychological factors involved in TMD and their implications for treatment and management [1,2].

## PSYCHOLOGICAL FACTORS IN TMD DEVELOPMENT

The development of Temporomandibular Joint Disorders (TMD) is not solely attributable to mechanical or structural factors but is significantly influenced by psychological variables. These factors can influence the physical manifestation of TMD symptoms through a variety of mechanisms, including the modulation of pain perception, muscle tension, and coping strategies. In particular, stress, anxiety, depression, somatization, and catastrophizing play a pivotal role in both the onset and progression of TMD [3].

### Stress and Anxiety

Chronic stress has long been associated with an increased risk of developing TMD. Stress can affect the musculoskeletal system, leading to heightened muscle tension in the jaw and neck regions, which places a strain on the TMJ. Physiologically, when an individual is stressed, the body enters a heightened state of alert, leading to an increase in sympathetic nervous system activity. This, in turn, leads to muscle hyperactivity, particularly in areas like the jaw, which can result in both pain and dysfunction in the temporomandibular joint [4].

Furthermore, anxiety frequently co-occurs with TMD, with individuals suffering from heightened levels of anxiety reporting more severe symptoms. Anxiety can manifest through muscle tension and behavioral responses such as bruxism (teeth grinding) and jaw clenching, which are common contributors to TMD. In addition, individuals with anxiety may exhibit maladaptive coping strategies that exacerbate their symptoms. For example, anxiety-driven avoidance behaviors can limit the use of the jaw, which can lead to further stiffness and discomfort. Furthermore, those with generalized anxiety disorders or panic disorders may be more sensitive to perceived pain, increasing the likelihood of heightened symptomatology in TMD [5].

### Depression

Depression is a well-established risk factor for TMD, and there is a growing body of evidence demonstrating a bidirectional relationship between the two conditions. Individuals suffering from depression are more likely to experience chronic pain, including TMD-related pain, due to alterations in pain processing pathways. Depressive symptoms, such as anhedonia (loss of interest), fatigue, and sleep disturbances,

can also contribute to muscle stiffness and a reduced ability to cope with pain, resulting in a cycle of worsening symptoms.

Depression may alter the brain's processing of pain through central sensitization, a process by which the central nervous system becomes more responsive to stimuli. This means that even minor mechanical stress on the TMJ may be perceived as more intense by individuals with depression. Moreover, depression often results in emotional responses like rumination, where individuals repeatedly focus on their pain and associated symptoms. This mental focus on pain can heighten the emotional and sensory experience of discomfort, leading to increased pain intensity and greater impairment of jaw function [6,7].

Additionally, depression is associated with negative emotional states and cognitive distortions, such as catastrophizing, which can exacerbate TMD symptoms. Depressed individuals may also experience lower motivation to engage in self-care or follow treatment protocols, further complicating the management of TMD. These factors collectively contribute to a poorer prognosis and increased chronicity of TMD [8,9].

### Somatization and Catastrophizing

Somatization is the tendency to experience and communicate psychological distress through physical symptoms. This phenomenon is often observed in individuals with TMD, as many patients report not only jaw pain but also a range of other somatic complaints, including headaches, neck pain, and back pain. Somatization can complicate the clinical picture of TMD, as patients may not always recognize the psychological component of their symptoms, making diagnosis and treatment more challenging.

The relationship between somatization and TMD is multifactorial. One explanation lies in the common neural pathways involved in the perception of physical and emotional pain. Individuals with a high tendency toward somatization may be more prone to experience and report physical symptoms in response to stress or emotional distress. This can lead to a heightened focus on bodily sensations, which amplifies the perception of pain. Moreover, individuals with somatization may be more likely to adopt maladaptive coping mechanisms, such as avoiding activities that could trigger or exacerbate their symptoms, ultimately resulting in reduced jaw mobility and functional impairment [10].

Catastrophizing, which involves the expectation that the worst possible outcome will occur and the tendency to ruminate over negative experiences, is another psychological factor closely linked to TMD. Catastrophizing can increase the emotional impact of pain, leading to a cycle of amplified suffering. Studies have shown that patients with TMD who engage in high levels of catastrophizing report more severe pain and disability. This psychological response can exacerbate the physical manifestations of TMD by creating a heightened state of emotional distress that negatively affects the body's ability to manage pain effectively.

Research has demonstrated that individuals who catastrophize about their TMD-related pain often experience greater muscle tension, heightened sensitivity to pain, and more severe symptoms overall. Catastrophizing also reduces an individual's ability to engage in helpful coping strategies or respond effectively to treatment, further complicating the management of the disorder. Additionally, those who catastrophize are less likely to engage in rehabilitative behaviors, such as physical therapy, or adopt proactive lifestyle changes, leading to a greater persistence of TMD symptoms [11].

### Trauma and Psychological History

A history of trauma, particularly early-life stress or physical trauma such as whiplash or jaw injury, has also been associated with an increased risk of developing TMD. Childhood abuse, neglect, and other forms of psychological trauma can shape an individual's pain perception and emotional responses later in life, contributing to the development of chronic pain conditions like TMD.

Psychologically traumatic experiences can affect the way the brain processes sensory information, leading to a heightened sensitivity to pain and increased emotional distress in response to jaw-related discomfort. Traumatic stress can also cause alterations in brain function, including dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, which is involved in the stress response. These neurobiological changes may exacerbate TMD symptoms, particularly in individuals with predisposing psychological vulnerabilities [12].

Additionally, individuals who have experienced trauma may develop maladaptive coping mechanisms, such as avoidance, hypervigilance, or dissociation, which can prevent effective treatment and exacerbate symptoms. For instance, those who have a history of trauma may avoid physical activity or jaw

movements that could otherwise alleviate symptoms, further perpetuating the cycle of pain and dysfunction associated with TMD [13].

### THE ROLE OF PSYCHOLOGICAL FACTORS IN PAIN PERCEPTION

Psychological factors have a profound impact on the perception of pain, including pain associated with Temporomandibular Joint Disorders (TMD). Pain perception is not merely a sensory experience; it is shaped by emotional, cognitive, and psychological elements. The biopsychosocial model of pain posits that pain is influenced not only by physical damage but also by an individual's emotional responses, psychological state, and social context. This model is particularly relevant in the case of TMD, where psychological distress is intimately intertwined with the sensory experience of pain [14].

#### Central Sensitization

One of the key mechanisms by which psychological factors influence pain perception is **central sensitization**, a process by which the central nervous system (CNS) becomes hyperresponsive to pain signals. Chronic psychological stress, anxiety, and depression can lead to sensitization of the pain pathways in the brain, amplifying the perception of pain even in the absence of significant physical injury. In TMD, this process results in an exaggerated response to stimuli from the jaw, neck, and surrounding muscles, making individuals with TMD more sensitive to both mechanical and emotional stressors.

Research indicates that central sensitization may increase the intensity of pain and the duration of symptoms in TMD patients. For example, studies have shown that individuals with higher levels of psychological distress exhibit greater pain intensity and more frequent pain episodes related to TMD. Influence of Anxiety and Depression on Pain Sensitivity [15].

Anxiety and depression contribute to altered pain processing by influencing the emotional and cognitive aspects of pain. Anxiety heightens the body's stress response, leading to muscle tension and hyperactivity in the sympathetic nervous system. This heightened physiological state may not only increase the severity of pain but also reduce the individual's ability to manage it. Similarly, depression often leads to heightened pain sensitivity through a complex interaction of neurotransmitters, including serotonin and norepinephrine, which regulate both mood and pain perception.

Moreover, individuals with depression tend to focus more on negative emotional experiences, exacerbating the sensation of pain. This is known as pain catastrophizing, a cognitive distortion in which individuals expect the worst possible outcome and ruminate over their pain, making it more intense and persistent. Studies have shown that patients with TMD who engage in pain catastrophizing report more severe pain and greater disability compared to those with lower levels of catastrophizing [4].

### **Emotional Amplification of TMD Symptoms**

The emotional response to pain in TMD is often amplified by fear avoidance and hypervigilance. Fear avoidance occurs when individuals perceive their jaw pain as a threat, which may lead them to avoid certain jaw movements or activities. This avoidance behavior can perpetuate jaw dysfunction and pain. Similarly, hypervigilance, characterized by an exaggerated focus on bodily sensations, can cause individuals to interpret normal sensations as threatening, thereby worsening the pain experience.

The emotional distress associated with TMD symptoms can create a cycle of pain–emotion interaction, wherein pain exacerbates negative emotions, and negative emotions further intensify pain. This vicious cycle can make TMD a chronic and debilitating condition for many patients [16].

## **PSYCHOLOGICAL APPROACHES TO THE MANAGEMENT OF TMD**

Given the significant influence of psychological factors on TMD, addressing these components in treatment is essential for improving outcomes. Psychological interventions aim to modify maladaptive behaviors, thoughts, and emotions that contribute to pain and dysfunction. Several psychological approaches have been shown to be effective in the management of TMD, including Cognitive Behavioral Therapy (CBT), Mindfulness-Based Interventions, Biofeedback, and Psychopharmacological Approaches [17].

### **Cognitive Behavioral Therapy (CBT)**

Cognitive Behavioral Therapy (CBT) is one of the most widely studied psychological treatments for TMD. CBT is based on the premise that negative thoughts and behaviors contribute to pain perception and emotional distress. It helps patients identify and modify maladaptive thought patterns and behaviors, providing more effective coping strategies. CBT has been shown to be particularly effective in reducing pain

catastrophizing, which is a major contributor to the severity of TMD symptoms.

For instance, a study by Poveda et al. (2019) demonstrated that CBT could significantly reduce pain intensity and improve jaw function in TMD patients by targeting the emotional and cognitive aspects of pain perception. CBT has also been shown to reduce anxiety and depression in TMD patients, improving overall well-being and quality of life.

Research indicates that mindfulness-based therapies can help individuals with TMD improve pain tolerance, reduce pain intensity, and enhance psychological well-being. In a study by Turner et al. (2018), participants who completed an MBSR program experienced a significant reduction in pain severity and reported improvements in coping with TMD symptoms [18].

### **Biofeedback**

Biofeedback is a technique that helps patients gain control over physiological functions, such as muscle tension, by providing real-time feedback on bodily processes. For TMD, biofeedback can be used to help patients reduce jaw muscle tension, which is a key contributor to pain and dysfunction. Patients can learn to relax the muscles surrounding the TMJ, thereby alleviating pain and improving jaw mobility.

Biofeedback has been shown to be effective in treating TMD, particularly in individuals who experience muscle hyperactivity and tension. A study by Sarlani et al. (2020) found that biofeedback, in combination with relaxation training, reduced muscle tension in the jaw and improved pain outcomes in TMD patients [14].

### **Psychopharmacological Interventions**

In some cases, psychopharmacological treatments may be necessary to address the psychological symptoms associated with TMD. Antidepressants, particularly Selective Serotonin Reuptake Inhibitors (SSRIs), are commonly prescribed to manage depression and anxiety in TMD patients. SSRIs help regulate neurotransmitters that influence both mood and pain sensitivity, thereby improving the overall emotional and physical experience of TMD.

Anti-anxiety medications, such as benzodiazepines or buspirone, may also be prescribed on a short-term basis to help manage acute anxiety symptoms that contribute to jaw tension and pain. However, psychopharmacological treatments

are often most effective when combined with psychotherapy or other behavioral interventions. Research supports the use of pharmacotherapy for TMD patients who also suffer from comorbid psychological disorders, as it can enhance the effectiveness of other therapeutic modalities [9,15].

## CONCLUSION

The development and progression of Temporomandibular Joint Disorders (TMD) are significantly influenced by psychological factors, including stress, anxiety, depression, and maladaptive cognitive patterns such as catastrophizing. These factors contribute to altered pain perception and exacerbate the symptoms of TMD, making psychological interventions an essential part of treatment. Cognitive Behavioral Therapy, mindfulness-based interventions, biofeedback, and psychopharmacological treatments are all effective tools for addressing the psychological components of TMD and improving patient outcomes. By integrating these psychological approaches into TMD management, healthcare providers can offer a more holistic treatment strategy that addresses both the physical and emotional aspects of the disorder, leading to better long-term outcomes for patients.

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## CONFLICTS OF INTEREST

The authors declare that no conflict of interest.

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