

Psychological Stress, Anxiety, and Temporomandibular Disorders: A Structured Narrative Review with Emphasis on Young Adults

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"Cite this Article" Received: 15 March 2026; Accepted: 03 July 2026; Published: 22 July 2026

Author Contributions: Concept: FFA, YZ; Design: FFA, HA; Data Collection: YZ, HA, NZ, NUAN, AW; Analysis: FFA, NZ, NUAN; Drafting: FFA, YZ, HA, NZ, NUAN, AW.

Ethical Approval: Watim Dental College, Rawalpindi, Pakistan. **Informed Consent:** NA; **Conflict of Interest:** The authors declare no conflict of interest. **Funding:** No external funding; **Data Availability:** Available from the corresponding author on reasonable request; **Acknowledgments:** NA

ABSTRACT

Background: Temporomandibular disorders are multifactorial conditions involving the temporomandibular joints, masticatory muscles, and associated craniofacial structures. Psychological distress may contribute to symptom severity through behavioural, neuroendocrine, sleep-related, and pain-processing pathways. **Objective:** To synthesise evidence concerning the associations of psychological stress and anxiety with TMDs, with particular emphasis on young adults. **Methods:** A structured narrative review was conducted using PubMed/MEDLINE, Web of Science, and Google Scholar. Eligible evidence included observational, prognostic, interventional, and review studies evaluating stress, anxiety, or related psychosocial factors in relation to TMD diagnosis, symptoms, pain, parafunctional behaviour, functional limitation, or quality of life. Findings were synthesised thematically because of heterogeneity in populations, diagnostic criteria, psychological measures, and outcomes. **Results:** Stress and anxiety were repeatedly associated with greater TMD-related pain, muscular tenderness, clenching, bruxism, sleep disturbance, functional limitation, and psychosocial impairment. Evidence was particularly frequent among university and dental students; one Pakistani study included 346 undergraduate BDS students and reported a significant stress–TMD association. Most primary evidence was cross-sectional, preventing determination of temporality or causality. **Conclusion:** Psychological distress is clinically relevant to TMD symptom burden, but the relationship is probably bidirectional and cannot be interpreted as independently causal. Psychosocial screening may complement structured TMD assessment, particularly in patients with persistent pain or functional impairment. **Keywords:** Temporomandibular disorders; psychological stress; anxiety; young adults; bruxism; orofacial pain; biopsychosocial model.

INTRODUCTION

Temporomandibular disorders (TMDs) comprise a heterogeneous group of musculoskeletal and neuromuscular conditions affecting the temporomandibular joints, masticatory muscles, and associated craniofacial structures. Their clinical manifestations may include pain in the jaw or preauricular region, tenderness of the masticatory muscles, joint sounds, restricted or asymmetric mandibular movement, headache, and difficulty performing activities such as chewing, speaking, and prolonged mouth opening. TMDs represent an important cause of chronic non-dental orofacial pain and may adversely affect physical function, psychological well-being, and oral health-related quality of life (1,2).

The aetiology and persistence of TMDs cannot generally be explained by structural or occlusal factors alone. Contemporary models increasingly conceptualise TMDs within a biopsychosocial framework in which biological susceptibility, local biomechanical loading, behavioural patterns, emotional distress, and altered pain processing interact over time. Evidence demonstrating a high burden of psychosocial impairment among individuals with TMDs supports the inclusion of psychological and behavioural factors in both research and clinical assessment (3,4). This perspective is particularly relevant to painful TMD phenotypes, in which symptom severity may not correspond directly to the extent of identifiable structural abnormality.

Psychological stress may be associated with TMD symptoms through several interconnected behavioural and physiological pathways. Periods of elevated stress may increase awake clenching, sleep or awake bruxism, sustained contraction of the masticatory muscles, postural tension, sleep disturbance, and other oral parafunctional behaviours. Repeated or prolonged muscle activity may increase functional loading of the temporomandibular joint complex and contribute to muscle fatigue, myofascial pain, tenderness, and restricted mandibular function (5,6). Chronic stress has also been associated with altered hypothalamic–pituitary–adrenal axis activity, sympathetic nervous system activation, cortisol dysregulation, and changes in inflammatory and nociceptive processing, although the direction and clinical importance of these mechanisms remain incompletely established (5).

Anxiety may similarly influence the experience and persistence of TMD-related symptoms. Individuals with anxiety may exhibit increased muscular tension, heightened attention to bodily sensations, pain-related vigilance, somatic amplification, maladaptive coping, and reduced tolerance of persistent discomfort. Conversely, chronic orofacial pain, functional restriction, sleep disruption, and uncertainty regarding symptoms may increase psychological distress. The relationship between anxiety and TMD should therefore be regarded as potentially bidirectional rather than as evidence that anxiety independently causes temporomandibular pathology. Observational studies have nevertheless reported associations between TMD symptoms and higher levels of anxiety, stress, depression, somatisation, and impaired psychosocial functioning across clinical and community populations (7–9).

Young adults constitute an important population for examining these relationships. Although young adulthood is defined differently across studies, university students, dental students, healthcare trainees, and early-career professionals are frequently exposed to academic demands, examinations, occupational transitions, financial pressures, irregular sleep, prolonged screen use, and disrupted self-care routines. These exposures may coincide with psychological distress, parafunctional oral behaviours, cervical and masticatory muscle tension, and increased awareness of pain. Studies involving young-adult and student populations have reported associations between stress, anxiety, sleep disturbance, and TMD-related symptoms, although differences in participant selection, diagnostic criteria, and psychological measurement have produced variable estimates (10–16).

Interpretation of the available evidence remains challenging. Much of the literature is based on cross-sectional studies, which cannot determine whether psychological distress precedes TMD onset, develops as a consequence of persistent symptoms, or participates in a reciprocal cycle. Studies have also differed in their use of self-reported symptom questionnaires, clinical examination, the Research Diagnostic Criteria for Temporomandibular Disorders, and the Diagnostic Criteria for Temporomandibular Disorders. Psychological status has likewise been measured using heterogeneous instruments assessing perceived stress, anxiety, depression, somatisation, coping, and general emotional distress. The frequent reliance on self-report for both psychological exposure and TMD outcomes may further increase the risk of common-method and reporting bias.

Several previous reviews have examined individual components of the relationship between psychological factors and TMDs, including anxiety, depression, psychosocial impairment, bruxism, and risk factors for TMD development (3,4,17). However, clinically oriented integration of stress, anxiety, behavioural mediators, proposed neurophysiological mechanisms, and the particular circumstances of

young adults remains useful. Such integration may help clinicians avoid an exclusively mechanical interpretation of TMD while also preventing inappropriate attribution of physical symptoms solely to psychological causes.

This structured narrative review therefore aimed to synthesise current evidence concerning the associations of psychological stress and anxiety with the occurrence, severity, and functional burden of temporomandibular disorders, with particular emphasis on young adults and high-stress educational populations. It further sought to examine the behavioural and biological mechanisms proposed to underlie these associations, evaluate their implications for biopsychosocial clinical assessment and multidisciplinary management, and identify methodological limitations requiring attention in future research.

MATERIALS AND METHODS

A structured narrative review was undertaken to synthesise evidence concerning the relationships among psychological stress, anxiety, and temporomandibular disorders, with particular attention to young adults, university students, dental students, healthcare trainees, and other populations exposed to sustained educational or occupational stress. A narrative approach was selected because the available literature comprised heterogeneous study designs, populations, TMD definitions, diagnostic procedures, psychological assessment instruments, and outcome measures. The review was intended to provide a clinically focused and conceptually integrated synthesis rather than a pooled quantitative estimate of effect.

Relevant literature was identified through electronic searches of PubMed/MEDLINE, Web of Science, and Google Scholar. The search combined terms relating to temporomandibular disorders with terms relating to psychological exposures, behavioural factors, symptoms, and the population of interest. Search concepts included “temporomandibular disorders,” “temporomandibular dysfunction,” “TMD,” “TMJ dysfunction,” “psychological stress,” “perceived stress,” “anxiety,” “psychological distress,” “emotional distress,” “young adults,” “university students,” “college students,” “dental students,” “healthcare trainees,” “bruxism,” “clenching,” “oral parafunctional behaviours,” “orofacial pain,” “sleep disturbance,” and “psychosocial factors.” These concepts were combined according to the search functions of each database. Reference lists of relevant primary studies and review articles were also examined to identify additional publications of clinical or mechanistic importance.

No single historical starting date was imposed because foundational studies were considered relevant to the development of the biopsychosocial model of TMD. Greater emphasis was placed on literature published from 2016 onward to reflect contemporary diagnostic frameworks and psychological assessment practices, while recent studies were prioritised where they provided additional evidence concerning young adults, validated instruments, behavioural mechanisms, or clinical implications. Only English-language, peer-reviewed publications with sufficient methodological information to permit meaningful interpretation were considered.

Studies were eligible when they examined an association between TMDs or clinically relevant TMD symptoms and psychological stress, anxiety, emotional distress, or closely related psychosocial variables. Eligible populations included young adults and broader adult samples when the findings contributed relevant clinical, behavioural, prognostic, or mechanistic information. Studies were required to report an identifiable TMD-related outcome, including a clinical diagnosis, symptom prevalence, pain intensity, muscular tenderness, joint dysfunction, mandibular limitation, parafunctional behaviour, functional disability, treatment outcome, or quality-of-life impairment. Cross-sectional, case-control, cohort, prospective observational, and relevant interventional studies were considered. Systematic reviews and high-quality narrative reviews were used to contextualise the overall evidence, proposed mechanisms, and areas of methodological agreement or uncertainty.

Single case reports, conference abstracts without adequate methodological detail, editorials, opinion articles, non-peer-reviewed material, and publications unrelated to psychological or behavioural aspects of TMD were excluded. Studies were also excluded when the diagnostic or symptom-assessment approach was insufficiently described, when TMD-related outcomes could not be distinguished from unrelated orofacial conditions, or when the article did not provide enough information to support interpretation of the reported relationship.

Information was extracted from eligible publications according to the analytical purpose of the review. The extracted domains included study year and setting, study design, participant characteristics, sample size where available, TMD diagnostic or symptom-assessment method, psychological construct evaluated, psychological assessment instrument, principal TMD-related outcomes, reported direction and magnitude of association, behavioural or biological mechanisms proposed by the authors, and implications for clinical assessment or management. Particular attention was given to whether TMDs were established through structured clinical criteria, such as the Research Diagnostic Criteria for Temporomandibular Disorders or the Diagnostic Criteria for Temporomandibular Disorders, or through self-reported symptoms alone.

The evidence was organised into thematic domains addressing psychological stress, anxiety, broader psychosocial correlates, sleep and parafunctional behaviours, proposed behavioural pathways, neuroendocrine and pain-processing mechanisms, vulnerability in young-adult populations, and implications for clinical practice. Findings from primary observational studies were distinguished conceptually from conclusions derived from systematic or narrative reviews. Evidence concerning association was also separated from mechanistic hypotheses and evidence relating to treatment or prognosis to minimise inappropriate causal interpretation.

Because the included literature varied substantially in design, participant characteristics, diagnostic definitions, psychological measures, and reported outcomes, the findings were synthesised narratively. Similar findings were compared across populations and measurement approaches, while methodological heterogeneity, reliance on self-reported outcomes, cross-sectional design, possible reverse causation, and potential confounding were considered when interpreting the consistency and strength of reported relationships. No quantitative meta-analysis was performed.

As this review synthesised information from previously published and publicly accessible studies and involved no recruitment of participants, collection of identifiable information, or generation of new human-subject data, institutional ethical approval and individual informed consent were not required. The review was conducted with attention to accurate source attribution, preservation of the distinction between association and causation, and clinically proportionate interpretation of the available evidence.

RESULTS

Characteristics of the Evidence

The reviewed evidence comprised cross-sectional studies, prospective observational studies, systematic reviews, meta-analyses, and narrative or mechanistic reviews. Primary studies were conducted in university students, dental students, young adults, clinical TMD populations, community-based adult samples, and working populations. The most frequently evaluated psychological domains were perceived stress, anxiety, depression, psychological distress, somatisation, coping, sleep quality, and pain-related psychological factors.

Considerable methodological variation was evident across the literature. TMD outcomes were assessed using structured clinical frameworks, including the Research Diagnostic Criteria for Temporomandibular Disorders and the Diagnostic Criteria for Temporomandibular Disorders, as well as self-reported symptoms, pain measures, functional limitation scales, and questionnaires concerning joint sounds or parafunctional oral behaviours. Psychological status was assessed using instruments such

as the Perceived Stress Scale, Depression Anxiety Stress Scales-21, self-report mental-health questionnaires, and broader psychosocial or pain-related measures. This heterogeneity prevented direct comparison of prevalence estimates and effect magnitudes across all studies.

Most primary studies were cross-sectional and therefore evaluated concurrent relationships rather than temporal or causal effects. The overall evidence indicated that higher levels of stress, anxiety, and broader psychological distress were frequently associated with a greater burden of TMD-related symptoms, particularly pain, masticatory muscle tenderness, functional limitation, bruxism, clenching, sleep disturbance, and impaired quality of life. However, the strength and clinical meaning of these relationships varied according to population, diagnostic method, psychological instrument, and TMD phenotype.

Table 1. Representative Primary Studies Examining Psychological Factors and Temporomandibular Disorders

Study	Population	Design	Psychological assessment	TMD-related assessment or outcome	Principal reported finding
Augusto et al., 2016 (5)	University students in Brazil	Cross-sectional	Stress and common mental-disorder measures	TMD symptoms or dysfunction	TMD was associated with stress and common mental disorders
Ahuja et al., 2018 (6)	Dental students	Cross-sectional institutional study	Stress assessment	Stress-related TMD manifestations	Higher stress was associated with a greater burden of TMD symptoms
Owczarek et al., 2020 (7)	Undergraduate dental students	Cross-sectional	Stress and anxiety assessment	Manifestations within the stomatognathic system	Stress and anxiety were associated with stomatognathic and TMD-related manifestations
Venkatesh et al., 2021 (8)	Student population	Cross-sectional	Stress and salivary cortisol	TMD prevalence and symptoms	TMD occurrence was associated with stress and salivary cortisol levels
Alqarni et al., 2025 (9)	Clinical dental students	Cross-sectional	Psychosocial stressor scale	TMD symptoms	Psychosocial stressors were associated with TMD symptoms
de Resende et al., 2020 (15)	Adults with and without TMD	Cross-sectional	Anxiety and quality-of-life assessment	TMD diagnosis and functional burden	Anxiety and poorer quality of life were associated with TMD
Hekmati et al., 2022 (16)	Patients with TMD	Cross-sectional	Anxiety and personality traits	Clinical TMD status	Individuals with TMD demonstrated relevant anxiety and personality-related differences
Kmeid et al., 2020 (19)	Lebanese adult population	Cross-sectional	DASS-21	TMD prevalence	TMD was associated with higher depression, anxiety, and stress scores
Yadav et al., 2020 (20)	Adult clinical population	Cross-sectional	Psychosocial factors and parafunctional habits	TMD manifestations	Psychosocial factors and parafunctional behaviours were associated with TMD
Gaş et al., 2023 (24)	Turkish dental students during the COVID-19 period	Cross-sectional	DASS-21 and sleep-quality assessment	TMD symptoms	Poor sleep quality, anxiety, depression, and stress were associated with TMD
Khawar et al., 2025 (25)	undergraduate BDS students in Pakistan	Cross-sectional	Perceived Stress Scale	Temporomandibular joint dysfunction	Stress was significantly associated with temporomandibular dysfunction
Anker et al., 2023 (32)	Patients with TMD	Cross-sectional	Multiple pain-related and psychological measures	Pain burden and TMD-related disability	Pain-related factors were associated with psychological distress
Yap and Marpaung, 2023 (34)	Young adults	Cross-sectional	Psychological distress and coping measures	TMD symptoms	Psychological distress and maladaptive coping were associated with a higher TMD symptom burden
Yap and Marpaung, 2023 (35)	Young adults	Cross-sectional	Emotional distress and well-being measures	TMD severity	Greater TMD severity was associated with emotional distress and reduced eudaimonic well-being
Huttunen et al., 2019 (46)	Patients receiving treatment for TMD	Prospective observational study	Psychosocial variables	Treatment outcome	Psychosocial factors were associated with poorer treatment outcomes

Abbreviations: BDS, Bachelor of Dental Surgery; DASS-21, Depression Anxiety Stress Scales-21; TMD, temporomandibular disorder.

Evidence from Systematic and Narrative Reviews

Secondary evidence broadly supported the associations observed in primary studies. Reviews examining psychosocial impairment reported that anxiety, depression, stress, somatisation, and related psychological difficulties were common among individuals with TMDs (4,11,17). Reviews of cohort evidence identified psychological and behavioural factors among the variables potentially associated with the development or persistence of TMDs, although the strength of evidence differed across exposures and diagnostic categories (10).

Systematic reviews focusing specifically on anxiety or broader psychological factors generally found that individuals with TMDs had a higher burden of psychological symptoms than unaffected populations (11,12). A systematic review of psychological disorders in TMD populations similarly indicated an increased prevalence of psychological morbidity, although heterogeneity in diagnostic methods and study quality limited direct comparison across studies (17). Reviews examining bruxism and TMD also reported associations with stress, anxiety, and depression, but did not establish that psychological factors independently caused either condition (28).

Evidence focused on young adults indicated that stress, anxiety, depression, psychological distress, and reduced well-being were frequently associated with TMD symptoms in this population (13,34,35,44). Nevertheless, the available studies did not consistently compare young adults directly with older age groups. The evidence therefore supported the clinical relevance of young-adult populations but did not conclusively establish that young adults had a uniquely higher susceptibility than all other adults.

Table 2. Thematic Synthesis of Psychological and Behavioural Correlates of Temporomandibular Disorders

Evidence domain	TMD-related findings reported across the literature	Interpretation supported by the reviewed evidence	Principal methodological limitation
Psychological stress	Greater pain, muscle tenderness, joint symptoms, functional limitation, clenching, and bruxism	Stress was frequently associated with greater TMD symptom burden	Predominantly cross-sectional evidence
Anxiety	Greater pain-related disability, symptom awareness, muscular tension, and psychosocial impairment	Anxiety was consistently identified as an important correlate of painful and functionally limiting TMD	Direction of the relationship remained uncertain
Depression and general distress	Higher symptom burden, poorer quality of life, and greater functional impairment	Broader emotional distress commonly co-occurred with TMD	Overlap among psychological constructs and instruments
Somatisation and pain-related cognition	Greater symptom reporting, pain vigilance, disability, and distress	Somatisation and pain-related psychological factors may influence symptom perception and persistence	Common-method and self-report bias
Parafunctional behaviours	Awake clenching, sleep or awake bruxism, and sustained masticatory muscle activity	Parafunctional behaviours may partly mediate the relationship between distress and mechanical loading	Behaviours were often self-reported rather than instrumentally confirmed
Sleep disturbance	Poorer sleep quality alongside greater stress, anxiety, and TMD symptoms	Sleep disturbance may be both a correlate and a consequence of TMD-related pain	Temporal direction could not usually be determined
Young-adult educational populations	Associations among academic stress, psychological distress, sleep disruption, and TMD symptoms	Students and trainees represented a clinically relevant high-stress population	Limited direct comparison with older or non-student adults
Treatment prognosis	Greater psychosocial burden was associated with less favourable treatment outcomes	Psychosocial assessment may contribute to prognostic evaluation	Limited prospective and intervention evidence

Psychological Stress and TMD-Related Outcomes

Across student, clinical, community, and occupational populations, higher psychological stress was generally associated with a greater prevalence or severity of TMD-related symptoms. Frequently reported manifestations included jaw pain, masticatory muscle tenderness, temporomandibular joint sounds, restricted mandibular movement, clenching, bruxism, and impaired oral function. These findings were particularly apparent in studies of university and dental students, in whom academic demands, examination pressure, disrupted sleep, and emotional strain commonly occurred alongside TMD symptoms (5–9,24,25).

In the Pakistani study by Khawar et al., 346 undergraduate BDS students were assessed using the Perceived Stress Scale, and a significant association was reported between psychological stress and temporomandibular dysfunction (25). This study provided locally relevant evidence from a young

educational population, although its cross-sectional design did not determine whether stress preceded the development of symptoms.

Evidence from broader adult populations suggested that the association was not limited to students. Work-related stress and occupational factors were also linked to TMD-related symptoms in working adults, indicating that sustained psychosocial strain may be relevant across different environments (18,30). Nevertheless, differences in occupational exposures, demographic characteristics, TMD definitions, and psychological measurements prevented direct estimation of a common effect.

Anxiety and Broader Psychological Distress

Anxiety was consistently associated with TMD-related pain, functional limitation, and psychological impairment. Individuals with TMDs frequently demonstrated higher anxiety levels, greater pain-related distress, and poorer psychosocial functioning than individuals without TMDs (11,15,16,19,32). The association appeared particularly relevant in painful TMD presentations, in which anxiety, pain vigilance, somatic amplification, and maladaptive coping could coexist with greater symptom burden.

The Lebanese population study by Kmeid et al. found that TMD was associated with depression, anxiety, and stress as measured using the DASS-21 (19). Similar associations were identified among dental students during the COVID-19 period, where anxiety, depression, stress, and poor sleep quality occurred alongside TMD symptoms (24). These findings supported an association between emotional distress and TMD but did not establish whether psychological symptoms represented antecedent risk factors, consequences of persistent pain, or components of a bidirectional relationship.

Somatisation, depression, pain catastrophising, and reduced psychological well-being were also reported in association with TMD severity and functional burden (17,26,29,33,38,39). These broader findings supported a biopsychosocial interpretation of TMD while indicating that stress and anxiety should not be examined in isolation from other emotional, behavioural, and pain-related factors.

Parafunctional Behaviours, Sleep, and Potential Mediating Pathways

Several studies associated psychological distress with awake clenching, bruxism, and other parafunctional oral behaviours (20,28,40). These behaviours may increase sustained masticatory muscle activity and mechanical loading of the temporomandibular structures. However, many studies assessed parafunctional activity through self-report, limiting the ability to distinguish perceived clenching or bruxism from objectively measured behaviour.

Sleep disturbance was another recurring correlate. Poor sleep quality was associated with higher psychological distress and a greater burden of TMD symptoms in student and clinical populations (24,31,43). The relationship was potentially reciprocal because pain may disrupt sleep, while inadequate or fragmented sleep may increase pain sensitivity, emotional distress, and muscular tension. The reviewed evidence did not permit a definitive determination of temporal direction.

Mechanistic reviews proposed that chronic psychological stress may influence hypothalamic–pituitary–adrenal axis regulation, sympathetic activity, cortisol secretion, inflammatory signalling, and central pain processing (14,41). These mechanisms were biologically plausible but were less directly established than the observational associations between psychological distress and clinical symptoms. They should therefore be interpreted as proposed explanatory pathways rather than confirmed causal mechanisms.

Findings in Young Adults

Young adults, particularly university students, dental students, and healthcare trainees, were prominently represented in the reviewed literature. Studies in these groups commonly reported relationships among psychological stress, anxiety, sleep disturbance, parafunctional behaviours, and

TMD symptoms (5–9,13,24,25,34,35,44). Young-adult studies also identified associations between TMD severity, maladaptive coping, emotional distress, and reduced well-being (34,35).

Despite the consistency of these within-population associations, the evidence did not establish that young adults experienced a greater psychological contribution to TMD than older adults. Most studies did not include direct age-stratified comparisons, and many recruited convenience samples from educational institutions. The findings therefore indicated that young adults were an important population for screening and research, rather than demonstrating a uniquely elevated age-related risk.

Clinical and Prognostic Evidence

Psychosocial factors were associated not only with symptom burden but also with functional outcomes and response to treatment. Prospective evidence suggested that greater psychosocial difficulty could be associated with less favourable TMD treatment outcomes (46). Systematic evidence concerning interventions also indicated that treatment of TMD could influence anxiety and depression outcomes, although intervention types and psychological measures varied substantially (36).

The available findings supported consideration of psychological distress, sleep quality, coping, and parafunctional behaviours during TMD assessment. However, the evidence did not justify interpreting psychological screening instruments as independent diagnostic tests for either TMD or psychiatric disorders. Clinical application therefore required integration of psychosocial information with a structured history, physical examination, recognised TMD diagnostic criteria, and referral for formal psychological assessment when clinically indicated.

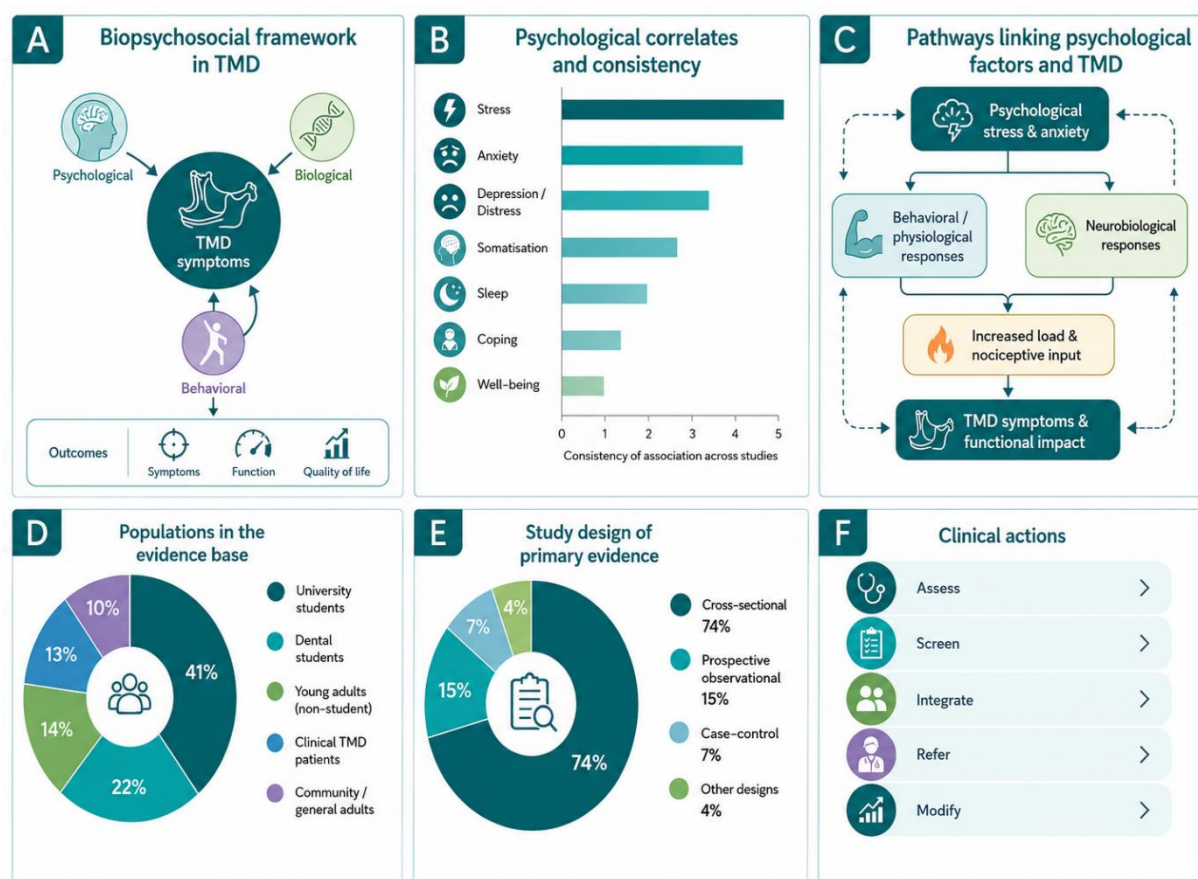


Figure 1 presents a six-panel synthesis of the relationship between psychological factors and temporomandibular disorders. Panel A illustrates the biopsychosocial framework in which psychological, biological, and behavioural factors converge on TMD symptoms and influence pain, function, and quality of life. Panel B shows the relative consistency of reported associations, with stress and anxiety demonstrating the strongest relationships, followed by depression or distress, somatisation, sleep disturbance, coping, and well-being. Panel C depicts the proposed pathways through which psychological stress and anxiety may trigger

behavioural, physiological, and neurobiological responses, increase mechanical and nociceptive loading, and contribute to TMD symptoms and functional impairment through potentially reciprocal feedback loops. Panels D and E summarise the populations and study designs represented in the evidence base, with university students forming the largest population group and cross-sectional studies comprising the predominant design. Panel F translates these findings into clinical actions, including assessment, psychosocial screening, integrated care, referral when indicated, and modification of contributory behavioural and lifestyle factors.

DISCUSSION

This structured narrative review identified a broadly consistent association between psychological stress, anxiety, and the clinical burden of temporomandibular disorders. Across student, community, occupational, and clinical populations, individuals reporting greater psychological distress commonly experienced more severe pain, masticatory muscle tenderness, parafunctional behaviours, sleep disturbance, functional limitation, and impaired quality of life. These findings supported a biopsychosocial interpretation of TMDs but did not establish that stress or anxiety independently caused temporomandibular pathology. Most primary studies were cross-sectional, and the temporal direction of the observed relationships therefore remained uncertain.

The findings were consistent with previous research demonstrating that psychological and psychosocial impairment frequently co-occurred with TMDs. Systematic and observational evidence has linked TMDs with anxiety, depression, somatisation, emotional distress, and reduced quality of life (4,11,15–17,19). Studies involving young adults further demonstrated associations between TMD symptoms, maladaptive coping, emotional distress, and reduced psychological well-being (13,34,35,44). The convergence of these findings across populations and instruments strengthened the evidence for a clinically meaningful relationship, although methodological heterogeneity prevented a precise estimate of its magnitude.

Psychological stress appeared to be particularly relevant to pain-related and muscular manifestations of TMD. Studies involving university and dental students associated higher stress levels with jaw pain, muscular tenderness, joint symptoms, clenching, bruxism, and functional impairment (5–9,24,25). The study by Khawar et al. included 346 undergraduate dental students and reported a significant association between perceived stress and temporomandibular dysfunction (25). Similar findings in student populations from other settings suggested that the relationship was not confined to a single geographic or cultural context. Nevertheless, convenience sampling and self-reported outcomes limited generalisability, and the possibility that existing pain increased perceived stress could not be excluded.

Anxiety was also repeatedly associated with TMD symptom burden. Individuals with TMDs frequently demonstrated greater anxiety, psychological distress, pain-related disability, and reduced psychosocial functioning than unaffected individuals (11,15,16,19,32). Anxiety may influence symptom experience through heightened pain vigilance, somatic amplification, muscular tension, emotional dysregulation, and maladaptive coping. However, persistent orofacial pain, impaired mastication, sleep disruption, uncertainty regarding symptoms, and repeated healthcare use may themselves increase anxiety. The stress–anxiety–TMD relationship should therefore be interpreted as potentially reciprocal rather than unidirectional.

Parafunctional oral behaviours represented one plausible pathway linking psychological distress with TMD symptoms. Stress and anxiety have been associated with awake clenching, bruxism, and increased masticatory muscle activity (20,28,40). Repetitive muscular loading may contribute to fatigue, tenderness, myofascial pain, and restricted mandibular movement. The strength of this explanation was limited by the frequent reliance on self-reported bruxism and clenching rather than instrumental assessment. Self-reported parafunctional behaviour may reflect genuine activity, increased awareness of oral habits, or greater symptom vigilance, and these possibilities cannot readily be separated in cross-sectional studies.

Sleep disturbance was another important correlate. Poor sleep quality occurred alongside higher levels of stress, anxiety, depression, and TMD symptoms in student and clinical populations (24,31,43). Sleep

disruption may increase pain sensitivity, reduce emotional regulation, and contribute to muscular tension, while TMD-related pain may interfere with sleep initiation and maintenance. The available evidence was therefore compatible with a bidirectional cycle in which pain, sleep disturbance, and psychological distress reinforced one another. Longitudinal studies are required to determine whether sleep disturbance precedes symptom onset, develops as a consequence of TMD, or performs both roles in different patients.

Biological mechanisms provided additional plausibility but remained less firmly established than the observational associations. Chronic stress has been proposed to alter hypothalamic–pituitary–adrenal axis regulation, sympathetic nervous system activity, cortisol secretion, inflammatory signalling, and central pain processing (14,41). Central sensitisation may also contribute to persistent pain by increasing responsiveness to nociceptive input, particularly in patients with prolonged emotional distress or comorbid pain conditions. These mechanisms should be regarded as explanatory hypotheses rather than definitive causal pathways because direct biomarker and longitudinal evidence remained limited.

Young adults were prominently represented in the evidence base, particularly university students, dental students, and healthcare trainees. These groups may experience academic pressure, examinations, irregular sleep, prolonged screen use, disrupted routines, and limited opportunities for recovery. Such circumstances may coincide with psychological distress, postural loading, clenching, and other behaviours relevant to TMD symptoms. However, the reviewed studies rarely compared young adults directly with older age groups. The evidence therefore demonstrated that young adults were an important population for assessment and prevention but did not prove that they were uniquely more susceptible than all other adults.

The findings had several clinical implications. Assessment of TMD should not be restricted to occlusion, joint structure, or local mechanical findings. A comprehensive evaluation may also consider stress, anxiety, sleep quality, coping, pain-related cognition, and parafunctional oral behaviours, particularly in patients with persistent pain or disproportionate functional impairment. Psychosocial screening should complement rather than replace a structured history, clinical examination, and recognised TMD diagnostic criteria. Screening instruments may identify patients who require further evaluation but should not be used independently to diagnose psychiatric disorders.

Management may benefit from a proportionate biopsychosocial approach. Patient education, behavioural modification, sleep support, stress-management strategies, physiotherapy, and psychological referral may be considered according to the patient's presentation and level of psychosocial burden. Evidence that psychosocial factors may influence treatment outcomes further supports their inclusion in prognostic assessment (46). Nevertheless, the reviewed association studies did not establish the comparative effectiveness of individual psychological or behavioural interventions. Recommendations concerning cognitive behavioural therapy, mindfulness, relaxation training, or multidisciplinary care should therefore be based on appropriate intervention evidence and individual clinical need rather than on psychological screening results alone.

This review had several strengths. It integrated evidence concerning stress, anxiety, sleep, coping, parafunctional behaviour, neurophysiological mechanisms, and clinical implications rather than examining each domain in isolation. It also emphasised young adults and educational populations, who were frequently represented in the primary literature. The synthesis distinguished observational associations from proposed mechanisms and avoided interpreting psychological distress as the sole explanation for TMD symptoms.

Several limitations should be considered. The review was structured narratively rather than conducted as a formal systematic review or meta-analysis. The available studies were methodologically heterogeneous, and many used cross-sectional designs, convenience samples, or self-reported TMD outcomes. Differences in diagnostic criteria, psychological instruments, age definitions, and outcome

measures reduced comparability. The inclusion of both primary studies and review articles created a risk of overlapping evidence, while restriction to English-language publications may have introduced language bias. Formal quantitative pooling and risk-of-bias grading were not undertaken. Publication bias was also possible because studies reporting positive psychological associations may have been more likely to appear in the literature. These limitations reduced the certainty of the conclusions and precluded causal inference.

Future research should prioritise longitudinal cohort studies using standardised DC/TMD assessments and validated psychological measures. Studies should distinguish painful muscular TMD, arthralgia, disc displacement, and degenerative joint disease rather than treating all TMD presentations as a single outcome. Direct comparisons among age groups would clarify whether young adults have a distinct vulnerability profile. Research should also examine potential confounders, including sex, depression, chronic pain comorbidity, sleep disorders, medication use, socioeconomic factors, and objectively assessed bruxism. Mechanistic studies incorporating cortisol, autonomic measures, inflammatory markers, and quantitative sensory testing may help clarify the biological pathways involved. Randomised trials are required to determine whether interventions targeting stress, anxiety, sleep, or coping produce clinically meaningful improvements in TMD-related pain and function.

CONCLUSION

Psychological stress and anxiety were consistently associated with greater TMD-related pain, parafunctional behaviour, sleep disturbance, functional limitation, and psychosocial burden across diverse populations. Young adults and students represented clinically relevant high-stress groups, although the available evidence did not establish that they were uniquely more susceptible than older adults. Because most studies were cross-sectional, the direction and causality of these relationships remained uncertain. Integrating proportionate psychosocial screening with structured TMD assessment may support more comprehensive clinical evaluation, particularly in patients with persistent pain or substantial functional impairment.

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