

Review

Temporomandibular Disorders in Children and Adolescents: A Scoping Review

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Abstract

Background/Objectives: Temporomandibular disorders (TMDs) are a group of multifactorial conditions affecting the temporomandibular joints (TMJs), masticatory muscles, and associated structures. TMDs are identified as the main cause of non-dental orofacial pain in children and adolescents. This scoping review aims to explore recent evidence on prevalence, clinical presentation, associated factors, and treatment approaches of TMDs in children and adolescents. **Methods:** A systematic search was conducted across PubMed, Scopus and Embase for studies published between 2015 and 2025, following PRISMA-ScR guidelines. **Results:** Thirty-eight studies were included. TMD prevalence in children and adolescents ranged from 16.9% to 40% through clinical examination, with painful TMD rates ranging from 16.2% to 25.5%, while symptom-based surveys reported prevalences of 9–35.3%. The most frequent diagnoses were myofascial pain, myalgia, arthralgia and disc displacement with reduction. Female sex and increasing age were consistent risk factors. Psychosocial variables, such as anxiety and depression, showed strong associations with pain-related TMDs. Structural and systemic conditions such as musculoskeletal alterations, joint hypermobility, respiratory conditions and headaches/migraines were also frequently reported. Evidence on treatment appears to be limited. In juvenile idiopathic arthritis (JIA), TMJ involvement is prevalent (32.6–64%), particularly in the persistent oligoarticular subtype. **Conclusions:** TMDs in children and adolescents are prevalent and multifactorial conditions, mainly of muscular origin, presenting more frequently in adolescents and females. Psychosocial factors, functional habits, clenching, mouth breathing and systemic conditions may be associated with TMD presence or severity. Substantial heterogeneity persists in diagnostic criteria, assessment tools and outcome measures. Research on therapeutic interventions is scarce and often limited to small samples. Standardized diagnostic protocols, improvements in research consistency, longitudinal cohorts and RCTs are needed to clarify etiological pathways, validate diagnostic criteria and establish effective, evidence-based strategies for the management of TMDs in children and adolescents.

Keywords: temporomandibular disorders; children; adolescents

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1. Introduction

Temporomandibular disorders (TMDs) are a group of complex conditions involving temporomandibular joints (TMJs), masticatory muscles and related structures [1–6]. TMDs are characterized by joint and/or muscular pain, joint noises, and limited or irregular mandibular function, often accompanied by associated symptoms such as headache, neck pain, toothache, face pain, and difficulties in mouth opening or closing [1,2,4,5]. The etiology of TMDs is recognized as multifactorial, involving biological, psychological, and functional factors [6,7].

Although these disorders are most frequently observed in adults, they have also been identified as the main causes of non-dental orofacial pain in children and adolescents [5]. The prevalence of TMD in children and adolescents is loosely defined, with reported rates ranging from 4.2% to 68% [1,3–5,8]. Such variability is possibly due to the heterogeneity of assessment methods used across studies [4]. In children and adolescents, TMDs may negatively affect craniofacial growth, occlusal development, masticatory function, and quality of life [5]. Therefore, improving understanding on TMD occurrence, clinical presentation and associated risk factors during childhood is of critical importance. Since biological, psychosocial, and functional factors differ significantly between children and adolescents, distinguishing findings across age groups is essential.

Given the heterogeneity in diagnostic criteria, assessment tools and age classification across available literature, a scoping review was considered the most appropriate approach to comprehensively assess the existing evidence available on this topic. Accordingly, this scoping review aims to summarize current literature on TMDs in children and adolescents, focusing on prevalence, clinical characteristics, associated factors and treatment approaches, while identifying potential gaps in knowledge and outlining potential directions for future research. A scoping review methodology was chosen due to the heterogeneity of study designs, diagnostic criteria, age ranges, and reported outcomes, which precluded a formal systematic review and meta-analysis.

2. Materials and Methods

To identify potentially relevant studies, databases such as PubMed, Scopus and Embase were systematically searched for publications from 2015 to 2025. The most recent search was performed on 25 October 2025. The search strategies are described in Table 1.

Table 1. Search strategy used for PubMed, Scopus and Embase.

Database	Query String
PubMed	("Temporomandibular Joint Disorders"[Mesh] OR "Temporomandibular Joint Diseases" OR "TMJ Disorders" OR "TMJ Diseases" OR "TMD") AND ("Child"[Mesh] OR "Adolescent"[Mesh] OR youth OR young OR growing)
Scopus	("Temporomandibular Joint Disorders" OR "Temporomandibular Joint Diseases" OR "TMJ Disorders" OR "TMJ Diseases" OR "TMD") AND ("Child" OR "Adolescent" OR "youth" OR "young" OR "growing")
Embase	("Temporomandibular Joint Disorders" OR "Temporomandibular Joint Diseases" OR "TMJ Disorders" OR "TMJ Diseases" OR "TMD")

AND ("Child" OR "Adolescent" OR "youth" OR "young" OR "growing")

To be included in this scoping review, studies had to investigate temporomandibular disorders (TMDs) in children and adolescents. Studies were deemed eligible if they met the following inclusion criteria: published between 2015 and 2025; written in English; full text available; involved human participants; focused on a population under 18 years of age. In line with the objectives of a scoping review, studies were included regardless of heterogeneity in age ranges, sample sizes and diagnostic approaches, in order to map the breadth of available evidence in pediatric TMD research. Studies including broader age ranges were considered eligible only when data for participants under 18 years of age could be clearly extracted or disaggregated. Studies were included if they employed a study design such as randomized controlled trial (RCT), randomized controlled clinical trial (RCCT) or observational study. Papers were excluded if they did not meet the inclusion criteria or were found to be not relevant to the main objectives of this review.

The database search identified a set of studies that were screened and selected according to PRISMA-ScR guidelines [9,10], according to which a formal risk of bias assessment was not performed, as the objective of this review was to map the existing literature rather than to appraise the quality of individual studies. The citations were imported and managed using Zotero 7. First, duplicate citations were removed through Zotero's designated tool. In the first selection phase, titles and abstracts were screened to assess the studies' eligibility based on the predefined inclusion criteria. Studies considered potentially relevant were selected for full-text evaluation and retrieved through university resources. In the second selection phase, full texts of the preliminarily included studies were examined thoroughly to confirm eligibility. Study selection and data extraction were conducted by a single reviewer. In cases of uncertainty, a second reviewer was consulted, and any disagreements were discussed until consensus was reached.

Studies were categorized according to participants' age as children (<12 years) or adolescents (12–18 years). When studies included mixed samples, data were extracted separately when available. From each included study, the following data were extracted: first author, year of publication, country of origin, study design, study aim, study population and sample size, methods and key findings. Given the heterogeneity in age ranges, diagnostic tools and study designs, findings should be interpreted as descriptive trends rather than directly comparable estimates.

3. Results

The database search led to the identification of 424 studies. After duplicate citation removal, the remaining 384 studies were screened based on title and abstract. A total of 94 studies were assessed for eligibility by the full text. Given the descriptive nature of the included studies, results are presented narratively without formal quantitative comparisons. Of these, 56 were excluded for the following reasons: non-relevant population (participants over 18 years of age), inadequate study design or unavailability of the full text. The remaining 38 studies were deemed eligible and were included in the final analysis of this scoping review. The selection process conducted according to PRISMA-ScR guidelines is illustrated in Figure 1.

The 38 studies included in this scoping review were all published within the last decade and investigated temporomandibular disorders (TMDs) in pediatric subjects aged between 3 and 18 years old. Where data were available, prevalence and clinical characteristics were reported separately for children and adolescents. When age-specific disaggregation was not possible, this was explicitly acknowledged. These studies were conducted

across 19 countries, most frequently in Brazil ($n = 9$) and Turkey ($n = 5$), but also Italy ($n = 3$), Saudi Arabia ($n = 2$), Sweden ($n = 2$), India ($n = 2$), Denmark ($n = 2$), and Norway ($n = 2$). Studies were also conducted in China, Japan, Germany, Poland, Kazakhstan, the Netherlands, Switzerland, Colombia, Egypt, Estonia, Latvia and Spain. Regarding study design, the majority were observational studies ($n = 35$), predominantly of cross-sectional nature, while only a small number were randomized controlled clinical trials (RCCTs) ($n = 3$). The data charted from the 38 included studies is summarized in Table 2, in which studies using diagnostic protocols validated or adapted for pediatric populations are explicitly indicated.

PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only

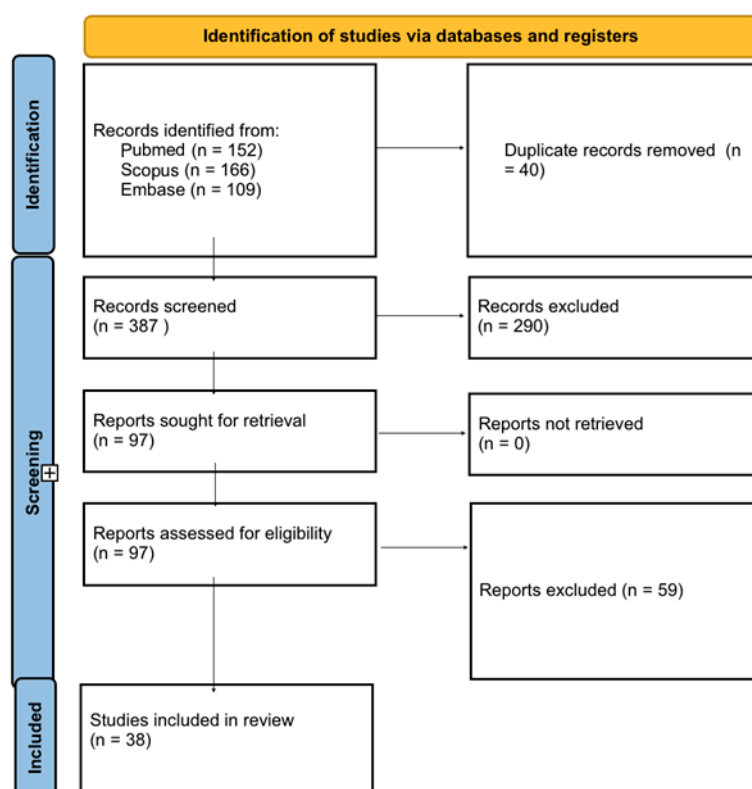


Figure 1. PRISMA-ScR flow diagram illustrating the scoping review process.

Table 2. Data charted from the included studies.

Study	Country of Origin	Study Design	Aim	Study Population	Methods	Key Findings
Al-Khotani et al. (2016) [11]	Sweden Saudi Arabia	Epidemiological, cross-sectional, randomized study	Prevalence of TMD diagnoses in children and adolescents in Jeddah, Saudi Arabia	456 participants 10–18 years old Divided by sex in two groups	Questionnaire on TMD pain Clinical examination according to RDC/TMD	124 participants diagnosed (27.2%): - Myofascial pain (15.4%) - DDwR (10%) - Arthralgia (6.6%) - Myofascial pain with limited opening (3%) - Osteoarthritis (3.7%) - Osteoarthritis (0.2%)
Al-Khotani et al. (2016) [12]	Sweden Saudi Arabia	Cross-sectional study	Association between psychosocial problems (anxious/depressed, withdrawn/depressed, somatic complaints, aggressive behavior) and TMD in children and adolescents in Jeddah, Saudi Arabia	456 participants 10–18 years old Divided by sex in two groups	Questionnaire on TMD pain Youth Self Report Scale Clinical examination according to RDC/TMD classification	Significant association in TMD-pain group (boys), anxious/depressed (10–13 y/o), somatic complaints, externalizing problem (aggressive behavior), increasing social problems

Al-Shwaikh et al. (2016) [13]	Latvia Finland	Cross-sectional study	Assess radiologic features of the TMJ in children with JIA using CBCT	95 participants (65 with JIA; 30 healthy) <17 years old	CBCT	The most prevalent feature in the JIA group is condyle surface flattening for both sides (81.5% and 90.8%). Condyle surface erosion and osteophyte were also frequent in the JIA group
Alpaydin et al. (2024) [14]	Turkey	Retrospective, cross-sectional study	Association between TMD signs/symptoms and mouth breathing	945 participants <18 years old	Sociodemographic data, allergies, malocclusion, bruxism, oral habits, breathing patterns, birth, TMD	Girls and those with bruxism, divorced parents, and MB behavior are more likely to have signs/symptoms of TMD
Braido et al. (2020) [15]	Brazil	Cross-sectional study	Investigate the association between systemic diseases and painful TMD	690 participants 12–14 years old (adolescents)	Standardized Nordic Questionnaire Clinical examination according to RDC/TMD	Painful TMD in 16.2%. Bronchitis and asthma are significantly associated with painful TMD. Presence of persistent regional and widespread body pain is more prevalent among adolescents with painful TMD vs adolescents free of TMD. No differences based on gender or pubertal stage

Campi et al. (2020) [16]	Brazil	Population-based epidemiologic study	Association between signs of painful TMD, number of tender points (TPs) and fibromyalgia in adolescents. Relationship between TPs and PPT in individuals with local, regional and widespread pain to assess the presence of central sensitization (CS)	690 participants 12–14 years old (adolescents)	Clinical examination according to the RDC/TMD Examination of TPs based on ACR diagnostic criteria from 1990 Yunus criteria to assess fibromyalgia (FM)	Significant associations between signs of painful TMD and number of TPs. Signs of association between TPs and the PPT values for local, regional, and widespread pain. No association between signs of painful TMD and fibromyalgia. Adolescents with signs of painful TMD are at increased risk of presenting with CS
Chaves, PJ et al. (2017) [17]	Brazil	Observational study	Incidence of postural problems and TMD in children and adolescents	117 participants 10–18 years old	Body weight and height and BMI calculation Postural evaluation questionnaire AAOP questionnaire Fonseca anamnestic questionnaire	Of the participants with moderate (21.8%) or severe (0.9%) TMD 56% had changes in head positioning, 64% presented shoulder elevation, 24% presented shoulder protrusion

Chaves, TC et al. (2017) [18]	Brazil	Observational study	Differences in sEMG activity of masseter, anterior temporalis and suprahyoid muscles in children with and without TMD	34 participants (17 with TMD; 17 without) 8–12 years old (children)	Fonseca anamnestic questionnaire RDC/TMD axis I sEMG: Myosystem® Br-1	Significant prevalences of pain during chewing, TMJ pain, neck pain and pain in the temples in TMD group. Lower sEMG-M/AT ratios during maximum clenching in children with TMD, preferentially used their temporalis muscles during maximum voluntary clenching
Collin et al. (2022) [19]	Sweden	Cross-sectional, cohort study	Investigate whether findings from patient history and clinical examination using RDC/TMD can be used to diagnose TMJ involvement in children with JIA	59 participants with JIA 7–14 years old	RDC/TMD CBCT	64% of the CBCTs had signs of TMJ deformity. 42% of participants reported previous self-perceived TMJ symptoms. Based on RDC/TMD and CBCT, 37% presented myofascial pain, 7% myofascial pain with limited opening, 8% DDwR, 18% arthralgia, 7% osteoarthritis, 64% osteoarthritis
De Melo Júnior et al. (2019) [20]	Brazil	Observational, cross-sectional study	Prevalence of TMD and associated factors in adolescents from Recife, Brazil	1392 participants 10–17 years old	RDC/TMD axis I and II Brazilian Economic Classification Criteria (CCEB) questionnaire	33.2% had TMD regardless of age or economic conditions. Statistically significant association between TMD and female gender, headache/migraine, chronic pain

De Paiva Bertoli et al. (2018) [21]	Brazil	Cross-sectional study	Prevalence of TMD in Brazilian adolescents	934 participants 10–14 years old	AAOP questionnaire RDC/TMD axis I	Prevalence of TMD symptoms was 34.9% (headache and neck ache (20.9%), joint sounds (18.5%)). Myofascial pain was the most prevalent TMD type (10.3%), followed by DDwR (8.0%) and arthralgia (3.5%). Significantly higher prevalence in girls
De Stefano et al. (2025) [22]	Italy	Observational cross-sectional study	Relationship between mandibular asymmetry (MA), generalized joint hypermobility (GJH), and temporomandibular disorders (TMDs) in pre-orthodontic growing individuals	74 participants 8–16 years old	PA cephalometric Beighton Score (BS $\geq$ 4) DC/TMD axis I	GJH-positive group presented higher prevalence of TMD (85.4%). MA was more frequent in the GJH-positive group (68.3%). In both groups, patients with TMD were more likely to also present MA
Demir et al. (2021) [23]	Turkey	Observational, cross-sectional study	Evaluate dental status and TMD-related symptoms in children with GJH	124 participants (62 GJH; 62 healthy controls) 6–16 years old	Beighton Score (BS $\geq$ 4) DMFT and dmft index, VPI, GBI and tooth mobility TMD evaluation	TMD-related symptom rate higher in the GJH group (clicking 35.4%, bruxism 1.6%, affected mouth opening 21%, muscle and TMJ pain 14.5%, mandibular deviation 9.6%). VPI and GBI scores higher in the GJH group

Dimitrijevic Carlsson et al. (2024) [24]	Sweden	Prospective, follow-up study	Investigate relationship between stress and changes in orofacial pain, psychosocial factors and jaw function in patients with JIA	40 participants with JIA 6–16 years old	DC/TMD questionnaires (GCPS, JFLS-8, PHQ-4, PCS, PSS, Body Pain Drawings Locations, CHAQ, JADAS-71)	Change in stress associated with change in catastrophizing, psychological distress and limitation in general function and jaw function
Fischer et al. (2020) [25]	Norway	Cross-sectional study	Prevalence of TMD in children and adolescents with JIA. Investigate potential associations between JIA and TMD	442 participants (221 with JIA; 221 healthy) 4–16 years old	Shortened versions of DC/TMD) and TMJaw	39.8% of participants with JIA and 11.3% healthy controls presented with TMD
Fischer et al. (2021) [26]	Norway	Cross-sectional study	Association between TMD signs/symptoms and CBCT findings of TMJ structural deformities in children with JIA	72 participants with JIA 4–16 years old	Shortened DC/TMD axis I Self-assessment questionnaire TMJaw CBCT	29.2% pain on palpation at the lateral pole, 56.9% TMJ pain upon jaw movement and 36.1% pain from both. Of 141 TMJs, 18.4% mild and 14.2% moderate/severe structural deformities on CBCT. No association between painful TMD and CBCT imaging features. In persistent oligoarticular type, statistical significance between TMD symptoms/signs and structural CBCT deformities was found

Franco-Micheloni et al. (2015) [27]	Brazil	Cross-sectional study	Describe TMD epidemiologic profile and subtypes, identify associated factors in young adolescents	3117 participants 12–14 years old (adolescents)	RDC/TMD axis I–II questionnaire on associated factors	30.4% TMD diagnosis, 25.2% painful; mainly muscular and chronic. Female sex, headache, bruxism, clenching, and parental separation significantly associated
Ibragimova et al. (2023) [28]	Kazakhstan	Observational study	Compare TMD prevalence in children with mental delay and healthy peers	659 participants (110 MDD; 331 institutionalized; 218 family) 7–18 years old	Observational analysis	TMD in 40.1% MDD, 32.6% institutions, 35.3% family; prevalence increased with age, symptoms more frequent in girls
Jin et al. (2024) [29]	China	Retrospective study	Investigate short-term effects and long-term prognosis of physical therapy in adolescent patients with TMD and the factors influencing long-term symptoms	286 participants with TMD 12–18 years old (adolescents)	TMD education and physical therapy (TENS, LLLT, shortwave therapy, manual therapy and exercises) Data on pain intensity (VAS), maxillofacial tenderness, MMO, mouth opening deviation, TMJ noise	After physical therapy the improvement rate was 94.1%. 52.8% of the patients continued to experience TMD-related symptoms. Adolescents with oral parafunctional habits face a higher risk of developing symptoms during long-term follow-up

Karibe et al. (2015) [30]	Japan	Population-based, cross-sectional study	Relationship between TMD symptoms and other orofacial pain conditions, daily activities and trait anxiety	1415 participants 11–15 years old	Questionnaire based on TMD symptoms Questionnaires on daily activities State-Trait Anxiety Inventory for Children-Trait (STAIC-T) scale	TMD symptoms associated with other orofacial pain conditions, particularly neck pain. Diurnal clenching strongly associated with TMD symptoms. TMD symptoms only weakly associated with trait anxiety
Kaur et al. (2020) [31]	India	Randomized controlled trial	Compare clinically relevant outcomes of ramus-condyle unit reconstruction using CCG and TDDO for pediatric TMJA	24 patients with TMJA 3–16 years old	Random allocation to CCG (control) or TDDO (intervention) groups	Equal success can be achieved in RCU reconstruction using either CCG or TDDO in pediatric patients with TMJA
Kobayashi et al. (2017) [32]	Brazil	Observational, case-control study	Evaluate salivary alpha-amylase (sAA), cortisol levels and anxiety symptoms in children and adolescents with and without TMD	76 participants 7–14 years old	DC/TMD MASC questionnaire Collection of saliva samples (cortisol and sAA)	Children with TMD scored higher in anxiety symptoms, no difference was observed in the salivary stress biomarkers between children with and without TMD. No significant correlation was observed between the MASC total score and the salivary cortisol and sAA levels

Macri et al. (2022) [33]	Italy Spain	Transversal study	Prevalence of TMD in children and adolescents, evaluate correlation with occlusal variables	411 participants 7–15 years old	Occlusal assessment RDC/TMD axis I	Significant association between TMDs and deep bite (43.43%), increased overjet (41.41%), and posterior crossbite (23.23%). Most frequently reported symptoms: awake bruxism, sleep bruxism, deviations during opening and diagnosis: myalgia 60%, DDwR 23.2%, arthralgia 17.2%
Marpaung et al. (2018) [34]	Netherlands Indonesia	Cross-sectional, population-based study	Prevalence rates of pain-related TMD and TMJ sounds in Dutch adolescents. Determine biological, psychological, social risk factors for both TMJ pain and sounds	4235 participants 12–18 years old (adolescents)	Questionnaire on demographics, sleep and awake bruxism, signs and symptoms of TMD, psychosocial and behavioral factors. Questionnaire on oral habits	Prevalence of pain-related TMDs was 21.6% and of TMJ sounds was 15.5%. Predictors of TMD pain: female gender, increasing age, sleep bruxism, lip or cheek biting, stress, sadness. Predictors of TMJ sounds: female gender, increasing age, awake bruxism, lip or cheek biting
Miranda et al. (2021) [35]	Brazil	Cross-sectional study	Verify difference between masticatory muscles' electrical activity, stress signals and posture in preadolescents and adolescents with and without TMD	24 participants 11–18 years old	Anthropometric measurements, psychological stress analysis, RDC/TMD, postural evaluation, EMG	Greater activation of the temporal muscles in the TMD group during the inactive period of chewing. Female gender was prevalent in TMDG. No difference for postural variables

Niibo et al. (2024) [36]	Estonia	Case-control study	Address potential role of genetic susceptibility factors in TMJ-JIA	263 participants (55 JIA patients; 208 healthy) 5–13 years old	Genotyping using the Illumina HumanOmniExpress BeadChip, arrays (Illumina, San Diego, CA, USA)	Six loci were identified as being associated with the risk of TMJ-JIA in Estonian JIA patients: CD6 rs3019551, SLC26A8/MAPK14 rs9470191, NLRP3 rs2056795 and MAP2K4 rs7225328
Pihut et al. (2022) [37]	Poland	Randomized controlled trial	Compare effectiveness of two physiotherapeutic rehabilitation methods in adolescents with TMD	68 participants with TMDs 14–17 years old (adolescents)	RDC/TMD. Manual therapy in group I, kinesiotherapy in group II	Results show a beneficial effect of both physiotherapeutic procedures in terms of functional rehabilitation
Rauch et al. (2020) [38]	Germany	Cross-sectional study	Assess prevalence of symptoms and signs of TMD in German adolescents	1116 participants 10–18 years old	Questionnaire on TMD symptoms; DC/TMD; pubertal status assessment according to Tanner stages	Most reported symptoms were headaches (55.7%) and TMJ sounds (17.6%). Major clinical sign was TMJ sounds (31.9%). Gender comparisons revealed higher increase in TMD symptoms and signs during pubertal development in females
Rentsch et al. (2023) [39]	Switzerland	Cross-sectional study	Prevalence of TMD and oral habits in children aged 7–14 years	239 participants 7–14 years old	Shortened symptoms questionnaire DC/TMD	The self-reported prevalence of TMD was 18.8%. Most frequently reported oral habits were nail biting (37.7%), teeth clenching (32.2%) and grinding (25.5%), increasing with age. DDwR and myalgia were the most common diagnoses

Restrepo et al. (2021) [40]	Colombia	Cross-sectional study	Association between psychological factors (anxiety, depression and somatization) and TMD in adolescents living in urban and rural zones of Colombia	180 participants 12–15 years old (adolescents)	DC/TMD axis I and II	40% presented some type of TMD. Pain-related TMDs were the most common (25.5%), particularly myalgia. Statistically significant associations between TMD and anxiety, depression and somatization were found in subjects from rural zones. No associations between psychological aspects and TMD in subjects from urban zones
Romani et al. (2018) [41]	Italy	Observational, cross-sectional study	Prevalence of TMD in candidates for orthodontic treatment. Evaluate relationship between psychological factors and TMD	106 participants 8–16 years old	Orthognatodontic evaluation. Psychological evaluation (RCMAS). Fonseca Anamnestic Index (FAI)	86.79% had at least one sign or symptom of TMD, 82% girls and 32% boys. 11.3% of TMD patients and 26.4% with joint sounds had high or medium anxiety levels. Positive correlation between TMD and increased overbite (class II)
Roychoudhury et al. (2021) [42]	India	Randomized controlled trial	Mandibular growth and functional outcome after gap arthroplasty (GA) or reconstructive arthroplasty with costochondral graft (CCG) in pediatric TMJA	56 patients with TMJA 3–16 years old	Random allocation to treatment (CCG group and GA group)	Growth and jaw functions were better after reconstructive arthroplasty with CCG rather than GA in pediatric TMJA management

Stoustrup et al. (2020) [43]	Denmark Canada	Cohort study	Cumulative incidence of arthritis-induced orofacial symptoms, dysfunction, and dentofacial deformities in growing individuals with JIA	351 participants with JIA 4–10 years old (children)	Data retrieved from the Aarhus JIA TMJ cohort register, containing standardized longitudinal observational data on patients with JIA	Orofacial symptoms and dysfunctions were common at 36 months and 5 years after JIA onset, with incidence of 38% and 53%, respectively. Dentofacial deformities were found in 35% of subjects at 36 months and were significantly associated with the presence of orofacial dysfunction
Stoustrup et al. (2025) [44]	Denmark	Prospective, observational, cohort study	Efficacy of biologics in combination with methotrexate (MTX) or leflunomide (LEF) on JIA-related TMJA	18 participants with JIA-related TMJ arthritis 9–17 years old	MRI-based inflammation score and deformity score	Decrease in orofacial symptoms; improvement in TMJ function related to MIO; reduced inflammation score on MRI, improvement or stable deformity score in 47% of the TMJs
Topaloglu-Ak et al. (2022) [45]	Turkey	Cross-sectional study	Assess sleep habits, bruxism, TMD, and caries in children	100 participants 6–13 years old	CSHQ, intraoral exam, Helkimo index	TMD (9%) linked to bruxism and bedtime resistance and sleep behavior problems
Torul et al. (2024) [46]	Turkey	Cross-sectional study	Presence and severity of TMD signs/symptoms, relationship to parafunctional behaviors, malocclusion, anxiety, socio-demographic traits in pediatric population	162 participants 5–15 years old	Demographic variables; Fonseca Anamnestic Index (FAI); clinical examination; State-Trait Anxiety Scale for Children (STAI-C)	The frequency of TMD signs and symptoms reported was 19.7%. Significant relationship between the presence of TMD signs and symptoms, parafunctional habits and anxiety was found

Yelken Kendrici et al. (2024) [47]	Turkey	Cross-sectional study	Relationship between TMD, stomatognathic system and spine through a multidisciplinary approach	100 participants (50 AIS; 50 healthy) 12–18 years old (adolescents)	DC/TMD Ultrasound evaluation of TMJ and masseter muscles	The incidence of TMD was significantly higher in the scoliosis group compared to the control group
Zanaty et al. (2016) [48]	Egypt	Observational, prospective study	Airway changes in patients with mandibular hypoplasia with TMJA after mandibular distraction osteogenesis surgery	30 participants with micrognathia and TMJA 8–17 years old	Radiographic evaluation and polysomnography before and 6 months after DO surgery	Polysomnography after DO confirmed correction of airway obstruction in all patients. Results suggest that the distraction of a hypoplastic mandible is a good surgical option for the treatment of OSA due to micrognathia and TMJA

3.1. TMD Prevalence in Children and Adolescents

Out of the 38 studies included, 17 assessed the prevalence and clinical presentation of temporomandibular disorders (TMDs) in children and adolescents.

Most of these studies examined populations including exclusively [15,27,34,40] or predominantly [11,20,21,28,30,33,35,38,39,41,45,46] adolescents (12–18 years old), while only Chaves et al. (2017) [18] examined a population of exclusively children (<12 years old).

The methodologies employed were heterogeneous, including self-report TMD symptom questionnaires, such as the Standardized Nordic Questionnaire, the Fonseca Anamnestic Index (FAI), the American Academy of Orofacial Pain (AAOP) questionnaire or the Helkimo anamnestic and clinical dysfunction index, and clinical examinations according to the original Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) protocol [49]. Only six studies used the 2014 Diagnostic Criteria for Temporomandibular Disorders (CD/TMD) protocol [50], which was only validated in children and adolescents in 2021 [3]. Two studies also incorporated electromyography (sEMG) analysis.

Overall TMD prevalence ranged from 16.9% to 40% across studies using clinical examination [11,15,20,21,27,33,39,40,46], with painful TMD rates ranging from 16.2% to 25.5% [15,27,40], while symptom-based surveys reported prevalences of 9–35.3% [21,28,30,34,39,41,45,46]. According to De Paiva Bertoli et al. (2018) [21], Macrì et al. (2022) [33] and Rentsch et al. (2023) [39], TMD prevalence appears lower (16.9–24.1%) among participants aged 7–15 years old. In contrast, Al-Khotani et al. (2016) [11], De Melo Júnior et al. (2019) [20], Franco-Micheloni et al. (2015) [27], Restrepo-Serna et al. (2021) [40] and Torul et al. (2024) [46] reported higher prevalence rates (27.2–40%) among participants from 5–18 years old.

The most frequent diagnoses were myofascial pain [11,18,21,35], myalgia [33,39,40], arthralgia [11,18,21,33,39] and disc displacement with reduction (DDwR) [11,18,21,33,35,39]. The most frequently reported symptoms were headache/migraine [15,20,21,27,38,39,41], neck ache [15,21,30,38], TMJ sounds [21,34,38,39,41], pain on muscle or TMJ palpation [28,38,39,41], and mandibular deviation during mouth opening [33].

sEMG analyses also revealed altered muscle activity patterns in TMD patients, with significantly lower masseter/temporalis activation ratios during maximum clenching [18] and increased activation of the temporal muscles during the inactive period of chewing [35].

According to Ibragimova et al. (2023) [28] and Marpaung et al. (2018) [34], TMD prevalence seems to increase with age and diagnoses such as DDwR and myofascial pain were more common in adolescents [11,21,40]. TMDs were consistently more prevalent in female participants [11,20,21,28,34,35,38,41], presenting frequently myofascial pain [11,21] or DDwR [21]. However, Braido et al. (2020) [15] and Restrepo-Serna et al. (2021) [40] reported no correlation between TMD and gender or pubertal stages.

3.2. Associated Factors

Thirteen studies investigated factors potentially associated with TMDs in children and adolescents, including psychosocial, behavioral or functional aspects. Methods used included standardized mental health questionnaires such as the Youth Self Report Scale, the State-Trait Anxiety Inventory for Children-Trait scale and the Revised Children's Manifest Anxiety Scale, as well as salivary stress biomarker (cortisol, sAA) analysis.

Overall, the risk of developing painful TMD appeared higher in patients with mental health problems such as anxiety and depression [12,34,40,41,46].

Anxiety and depression were reported more frequently in adolescents with painful TMDs [34,40,41], specifically in cases of myalgia and DDwR [40], and in females [41]. In contrast, Al-Khotani et al. (2016) [12] unexpectedly found a stronger association between

TMDs and anxiety/depression in a younger age group (10–13 years old), possibly due to a tendency to report extreme pain scores. However, other studies reported weaker or absent associations: Karibe et al. (2015) [30] found only a weak link between anxiety and TMD symptoms, Miranda et al. (2021) [35] observed no significant differences in stress signs between TMD and control groups, and Kobayashi et al. (2017) [32] detected no differences in salivary stress biomarkers between children and adolescents with and without TMD.

Additionally, TMD symptoms were more common in children with mental disabilities compared with healthy controls [28]. Other factors associated with an increased risk of TMDs included divorced parents [14,27] and sleep behavior problems [45]. Several studies also reported significant associations between TMDs in children and adolescents and parafunctional habits such as nocturnal bruxism, diurnal clenching, lip or cheek biting and mouth breathing [14,27,30,33,34,45,46].

3.3. Systemic Conditions

Twelve studies investigated possible associations between TMDs in children and adolescents and structural or systemic conditions, including malocclusion, postural and musculoskeletal alterations, generalized joint hypermobility (GJH), respiratory diseases, fibromyalgia and other chronic pain conditions.

Macrì et al. (2022) [33] observed a significant association between TMDs and occlusal alterations, such as deep bite, increased overjet and posterior crossbite, whereas Romani et al. (2018) [41] and Torul et al. (2024) [46] observed no statistically significant association between TMD and malocclusion.

Multiple studies investigated associations between TMD and postural and musculoskeletal alterations. Chaves et al. (2017) [17] reported postural deviations (head protrusion, head tilt to the side, shoulder elevation, shoulder protrusion) among children and adolescents with moderate or severe TMD and Yelken Kendrici et al. (2024) [47] reported higher prevalence of TMDs in adolescents affected by idiopathic scoliosis. In contrast, Miranda et al. (2021) [35] found no significant differences in postural variables between TMD and control groups.

According to De Stefano et al. (2025) [22] and Demir et al. (2021) [23], children and adolescents affected by GJH presented higher prevalence of TMDs and mandibular asymmetry, and the coexistence of the latter with GJH significantly amplified TMD risk [22].

Braido et al. (2020) [15] observed that respiratory conditions such as bronchitis and asthma were significantly associated with painful TMDs in adolescents.

Chronic pain conditions, such as headaches and migraines, seemed to be commonly associated with TMDs in children and adolescents [20,27]. Braido et al. (2020) [15] reported that adolescents with TMDs were more likely to report persistent regional or widespread body pain, while Campi et al. (2020) [16] found significant associations between painful TMD and number of tender points (TPs), as well as pain pressure threshold (PPT) values for local, regional, and widespread pain, suggesting an increased risk of developing central sensitization (CS). However, no association between fibromyalgia and TMD was found [16].

3.4. TMD Treatment

Five studies investigate outcomes and summarize and map the available evidence of different therapeutic interventions for temporomandibular disorders (TMDs) in children and adolescents, ranging from conservative physiotherapy to surgical reconstruction in TMJA patients.

Individualized comprehensive physiotherapy programs, including TENS, LLLT, shortwave therapy, manual therapy and exercises, showed overall long-term positive

outcomes. Jin et al. (2024) [29] reported a 94.1% improvement rate, although symptoms persisted in 52.8% of the patients, likely due to uncorrected parafunctional habits. Pihut et al. (2022) [37] reported that both manual therapy and kinesiotherapy led to significant clinical improvement, supporting the role of conservative therapy in pediatric TMD management.

Surgical interventions were primarily assessed in cases of pediatric temporomandibular joint ankylosis (TMJA). Kaur et al. (2020) [31] found comparable success rates between costochondral graft (CCG) and transport disc distraction osteogenesis (TTDDO) in ramus–condyle unit reconstruction, while Roychoudhury et al. (2021) [42] reported superior growth and functional outcomes with CCG compared to gap arthroplasty (GA). Additionally, Zanaty et al. (2016) [48] reported that distraction osteogenesis effectively corrected airway obstruction secondary to micrognathia and TMJA, as confirmed by postoperative polysomnography.

3.5. TMJ Involvement in JIA Patients

Eight studies investigated TMJ involvement in children and adolescents with juvenile idiopathic arthritis (JIA), addressing clinical and radiological features, associated psychological factors, genetic susceptibility and treatment outcomes. The methodologies used were heterogeneous, including mental health questionnaires, clinical examinations according to the original RDC/TMD protocol [49] or the new CD/TMD protocol [50–52], CBCT and MRI imaging.

CBCT imaging consistently revealed a high prevalence of TMJ structural alterations in JIA patients (32.6–64%) [19,25], such as condyle surface flattening, erosions and osteophytes, found more frequently in female subjects [13].

TMD diagnoses in JIA patients included osteoarthritis, myofascial pain, myofascial pain with limited opening, DDwR, arthralgia and osteoarthritis [19], with overall higher prevalence compared to healthy peers [25]. TMD symptoms reported included pain on palpation, pain on TMJ movement, chewing limitation and TMJ sounds [26,43], more frequent in subjects with the persistent oligoarticular JIA subtype [26] or treated with synthetic and biologic disease-modifying antirheumatic drugs (DMARDs) [25].

Psychological factors also played a role in TMD development in children and adolescents. Dimitrijevic Carlsson et al. (2024) [24] observed that increasing stress and catastrophizing over time were associated with greater functional limitation.

On a genetic level, Niibo et al. (2024) [36] identified six loci (CD6, SLC26A8/MAPKs14, NLRP3, MAP2K4) potentially linked to TMJ involvement in JIA patients.

Regarding treatment, Stoustrup et al. (2025) [44] observed that biologic therapy with TNFi in addition to cDMARDs (MTX, LEF) in children and adolescents affected by JIA proved effective over a period of 2 years, reporting fewer orofacial symptoms, improved function (MIO), and significantly reduced inflammation and deformity scores on MRI. These findings should be interpreted as preliminary and hypothesis generating, as they are derived from a limited number of studies with small sample sizes and heterogeneous methodologies. For the time being, conservative management approaches remain the most appropriate first-line treatment option for TMDs in the pediatric population, based on the currently available evidence.

4. Discussion

This scoping review mapped current evidence on temporomandibular disorders (TMDs) in children and adolescents, providing an overview on prevalence, associated factors and treatment outcomes across 38 studies published in the last decade. The available

evidence highlights relevant knowledge gaps, particularly regarding standardized diagnostic protocols and longitudinal data in pediatric populations.

Overall, findings confirm that TMDs are a multifactorial condition present during childhood, influenced by biological, psychosocial, and functional factors. Despite heterogeneity in study designs and diagnostic criteria, most studies reported a substantial prevalence of TMD diagnoses and symptoms in pediatric populations, highlighting the clinical relevance of early detection and management to prevent consequences on growth, development and quality of life [5,51]. The use of heterogeneous diagnostic approaches, particularly self-reported questionnaires not specifically adapted for younger children, may have limited the accurate differentiation between muscular and joint pain. This is especially relevant in pediatric populations, where symptom reporting and pain localization may be less reliable.

4.1. TMD Prevalence in Children and Adolescents

Some studies suggested a higher prevalence of muscular disorders in adolescents compared to children; however, inconsistent diagnostic criteria and heterogeneous assessment methods limit definitive conclusions. TMD prevalence rates in children and adolescents aged 5–18 years old ranged between 16.9% and 40%, with lower rates for painful TMDs (16.2–25.5%). Symptoms-based surveys reported rates between 9% and 35.5%. Higher rates were found in studies with larger sample sizes (456–3117 participants) and wider age ranges (5–18 years old), conducted in Saudi Arabia, Turkey, Brazil and Colombia, whereas lower rates were reported in studies with smaller sample sizes (239–934 participants) and narrower age ranges (7–15 years old) from Brazil and Europe. Prevalence estimates based solely on self-reported symptoms appear to underestimate the actual occurrence of TMD, consistent with findings reported by Mélou et al. (2023) [5]. The prevalence range identified in this review was narrower than those reported in previous reviews [1,3,8], possibly due to the inclusion of more recent and methodologically homogeneous studies. Nonetheless, the variability observed may still be influenced by differences in sample size, age range and geographic location across studies. The heterogeneity in age range did not allow for the determination of distinct prevalence estimates for children and adolescents.

The most frequent diagnoses were myofascial pain, myalgia, arthralgia, and disc displacement with reduction (DDwR), supporting current evidence that TMD in younger individuals is primarily of muscular origin, with a lower incidence of intraarticular disorders [5,40]. TMDs seem to appear more frequently among adolescents [3,28,34,51], particularly DDwR and myofascial pain, however, this may reflect biases related to children's limited ability to express discomfort and poor time awareness, reducing the reliability of questionnaire-based assessments commonly used in this age group.

Furthermore, TMDs were more prevalent in females [11,20,21,28,34,35,38,41], possibly due to the role of hormonal changes and neuropsychological factors [3–5,51,53]. These sex-related differences should be interpreted in the context of pubertal development and psychosocial maturation, rather than as isolated biological effects. However, two studies reported no correlation between TMD and gender or pubertal stage [15,40]. The wide variability in diagnostic methods, sample characteristics, and geographic contexts limits the direct comparability of the findings, indicating that the reported prevalence estimates should be interpreted with caution.

4.2. Associated Factors

Psychological stress, anxiety and depression behaviors were frequently associated with pain-related TMDs, supporting the biopsychosocial model of orofacial pain and emphasizing the need for comprehensive evaluation [3,5–7,51]. However, no consistent

evidence emerged regarding biological stress marker analysis [32], reflecting the complexity of the psychophysiological mechanisms involved. Anxiety and depression seemed more prevalent in adolescents with painful TMDs [34,40,41] rather than children.

Parafunctional habits in children and adolescents, such as bruxism, clenching and mouth breathing, were also consistently associated with TMD occurrence and persistence [5,34,51]. It was not possible to identify the most prevalent oral habit in the two age groups, as the reviewed studies involved mixed samples including both children and adolescents (5–17 years old), failing to report results separately for each age group.

4.3. Systemic Conditions

Occlusal alterations (deep bite, increased overjet, posterior crossbite) [33] and musculoskeletal deviations (head and shoulder postural changes, scoliosis, joint hypermobility) [16,17,22,23,35,47] were reported in children and adolescents with TMD, although malocclusion's causal role remains debated [41,46,54–59].

Generalized joint hypermobility (GJH) and mandibular asymmetry seem to increase TMD risk, suggesting a potential role for connective tissue laxity in TMD development [22]. Associations between TMDs and respiratory diseases (asthma, bronchitis) [15] and chronic pain conditions (headache, migraine) [20,27] were also reported in adolescents, in agreement with current literature [38]. However, no association between fibromyalgia and TMD was found [16].

4.4. TMD Treatment

Evidence regarding treatment options for temporomandibular disorders in children and adolescents is limited and heterogeneous; only a small number of studies investigated therapeutic interventions, but they involved small samples, short follow-up periods, or lacked control groups. These factors restrict the generalizability of findings [1,5].

Conservative management showed the most consistent positive outcomes; physiotherapy protocols (TENS, low-level laser therapy, shortwave therapy, manual therapy and targeted exercises) were associated with reductions in pain and improvements in jaw function [29,37]. However, long-term symptoms persisted in a lot of patients, suggesting that parafunctional habits may limit therapeutic efficacy. The lack of standardized treatment protocols makes it difficult to compare studies.

Interventions for temporomandibular joint ankylosis (TMJA) represented the most invasive end of the therapeutic options. Surgical approaches demonstrated favorable functional outcomes and improved mandibular growth, but the evidence remains scarce, and studies often differ in surgical indications, age of intervention, follow-up duration and outcome measures [31,42,48,60].

The available literature highlights a substantial gap in high-quality clinical research on pediatric TMD management. Until stronger evidence emerges, conservative therapy remains the preferred first-line option, while surgical interventions should be reserved for severe structural conditions such as TMJA. Short-term improvements observed with physical therapies may partly reflect symptomatic relief, while recurrence may occur when contributing habits and behavioral factors are not concurrently addressed.

4.5. TMJ Involvement in JIA Patients

According to current literature, TMJ involvement in patients under 16 years old with juvenile idiopathic arthritis (JIA) is quite frequent (17–87%) but is rarely symptomatic [61,62], thus both radiological and clinical examinations are essential for accurate assessment and early diagnosis [19]. In this review, TMJ involvement was detected on CBCT in 32.6–64% of cases [19,25], with radiologic findings such as condyle surface flattening, erosions and osteophytes. Common TMD diagnoses included osteoarthritis, myofascial

pain, DDwR, arthralgia and osteoarthritis [19], accompanied by symptoms such as pain on palpation, pain on TMJ movement, chewing limitation and TMJ sounds [26,43], more frequent in subjects with the persistent oligoarticular JIA subtype [26] or treated with synthetic and biologic disease-modifying antirheumatic drugs (DMARs) [25].

Stress was also associated with higher functional limitations [24]. Also, genetic predisposition has been suggested by Niibo et al. (2024) [36] and biologic therapy with TNFi in addition to cDMARDs (MTX, LFE) demonstrated promising results, supporting the hypothesis that immunosuppressive treatment has the potential to reduce MRI-verified TMJ inflammation [44]. Both findings require further exploration to validate and expand on these preliminary observations.

4.6. Implications for Clinical Practice

Given the relatively high prevalence of TMDs in children and adolescents, early recognition and routine screening during dental and orthodontic examinations are essential, particularly in adolescents, who appear to exhibit higher rates of painful TMDs. However, difficulty expressing pain and symptom duration should be considered when assessing children.

A multidisciplinary approach should be adopted, as psychological stress, anxiety and depression are frequently associated with painful TMDs and may contribute to symptom persistence. Parafunctional habits, such as bruxism, clenching and mouth breathing, are consistently associated with TMD occurrence. When appropriate, referrals to mental health professionals, speech therapists and ENT specialists should be considered.

In patients with other conditions, such as musculoskeletal deviations, scoliosis, GJH and chronic respiratory and pain disorders, a comprehensive assessment is recommended, as these factors may modulate TMD risk or symptom severity. In individuals with JIA, periodic evaluation of TMJ involvement and coordination with pediatric rheumatologists are advised.

For the time being, conservative management approaches remain the most appropriate first-line treatment option for TMDs in the pediatric population.

4.7. Critical Analysis of the Evidence

Despite the growing number of studies on TMD in children and adolescents, a critical analysis of the available evidence highlights several methodological weaknesses that limit the robustness of our review. The absence of age-adapted clinical guidelines reflects not only limited evidence but also the lack of integration between orofacial pain research and developmental psychology.

The heterogeneity in diagnostic criteria, assessment tools, and age groups considered limited a direct comparison between studies and contributions. The prevalence of cross-sectional studies reduces the possibility of identifying true causal relationships between TMD and the biological, psychological, and functional factors. The inconsistent use of validated protocols such as DC/TMD, the reliance on self-reported questionnaires, often not adapted to the pediatric group, and the limited geographical sector of some populations constitute additional bias.

Therapeutic research has small sample sizes, short follow-ups, and a lack of standardization of interventions, making it difficult to establish robust clinical recommendations. In conclusion, there is a need for longitudinal studies, with harmonized diagnostic definitions and methodologies, to enable significant improvements in the understanding, diagnosis, and management of TMD in children and adolescents.

4.8. Limitations

Several limitations should be considered when interpreting the finding of this scoping review. First, the methodological standards [9]. Second, the inclusion criteria may have not been detailed enough, resulting in the inclusion of studies with heterogeneous sample sizes, age ranges and diagnostic approaches, complicating comparability of results. In addition, the age restriction on participants under 18 years old may have led to the exclusion of potentially relevant studies involving individuals up to 19 years old, that could still be considered late adolescents. In addition, the age restriction to participants under 18 years may have led to the exclusion of some studies including late adolescents (18–19 years), particularly when age-specific data could not be disaggregated. Finally, most of the included studies adopted a cross-sectional design, inherently limiting methodological quality. Although appropriate for estimating prevalence and identifying potential associations, cross-sectional studies do not allow causal inferences and are often susceptible to selection and information biases [63,64].

5. Conclusions

Temporomandibular disorders are a relatively frequent condition in children and adolescents. TMDs in younger patients seem to be mainly of muscular origin, presenting more frequently in adolescents and in females, although inconsistencies across diagnostic methods and age classifications limit firm conclusions.

Evidence suggests that psychosocial factors, functional habits, clenching, mouth breathing and systemic conditions may be associated with TMD presence or severity. However, these associations are drawn predominantly from cross-sectional studies, preventing any inference on causality.

Substantial heterogeneity persists in diagnostic criteria, assessment tools and outcome measures, reducing comparability among studies. Research on therapeutic interventions is scarce and often limited to small samples. TMJ involvement in juvenile idiopathic arthritis (JIA) remains an important clinical concern, yet longitudinal data on disease progression and treatment are limited.

This scoping review highlights the need for standardized diagnostic protocols and improvements in research consistency. Future studies should prioritize well-designed longitudinal cohorts and randomized controlled trials to clarify etiological pathways, validate diagnostic criteria and establish effective, evidence-based strategies for the management of TMDs in children and adolescents. Given the predominance of cross-sectional evidence, all observed associations should be interpreted descriptively and cannot be considered indicative of causal relationships. Overall, the findings of this scoping review should be interpreted as descriptive and hypothesis generating, rather than as a basis for clinical recommendations.

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Abbreviations

The following abbreviations are used in this manuscript:

TMD	Temporomandibular Disorder
TMJ	Temporomandibular Joint
DDwR	Disc Displacement with Reduction
sEMG	Surface Electromyography
GJH	Generalized Joint Hypermobility
TMJA	Temporomandibular Joint Ankylosis
CCG	Costochondral Graft
DMARDs	Disease-modifying Antirheumatic Drugs
cDMARDs	Conventional Disease-modifying Antirheumatic Drugs
TNFi	Tumor Necrosis Factor Inhibitor
MIO	Maximum Interincisal Opening
MRI	Magnetic Resonance Imaging
JIA	Juvenile Idiopathic Arthritis

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