Submitted: 06 November, 2025 Accepted: 23 December, 2025 Published: 03 May, 2026 DOI:10.22514/jocpd.2026.079

Journal of Clinical Pediatric Dentistry

ORIGINAL RESEARCH

Parafunctional habits and temporomandibular joint symptoms in children and adolescents: a retrospective study

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Abstract

Background: Parafunctional habits, such as bruxism, mouth breathing, and nail or lip biting, are common in children and may disturb the neuromuscular balance of the stomatognathic system, contributing to malocclusion and temporomandibular joint (TMJ) dysfunction. This study aimed to describe the prevalence and clinical correlates of TMJ symptoms in children and adolescents, with particular focus on their associations with parafunctional habits, malocclusion, and mandibular asymmetry. **Methods**: This retrospective cross-sectional study analyzed 190 orthodontic examination records from patients aged 6–18 years (mean = 12.34 $\pm$ 2.76 years), collected between January 2022 and March 2024. Data on parafunctional habits, TMJ symptoms, and clinical variables were extracted from standardized forms. Chi-square tests assessed associations between categorical variables, and Spearman's *rho* examined correlations with age. Binary logistic regression was used to explore variables associated with the presence of TMJ symptoms. Statistical significance was set at $p < 0.05$. **Results**: Mouth breathing was the most common parafunctional habit (34.7%), followed by nail biting (17.4%) and bruxism (14.2%). TMJ symptoms were present in 39.5% of participants, and mandibular asymmetry in 11%. Bruxism was associated with higher odds of TMJ symptoms (β = 1.03, p = 0.020, Odds Ratio (OR) = 2.79), whereas mouth breathing showed an inverse association ($\beta = -0.75$, p = 0.028, OR = 0.47). Thumb-sucking decreased with age ($\rho = -0.147$, p = 0.043), while lip-biting increased (ρ = 0.170, p = 0.019). Patients with mandibular asymmetry were more likely to have TMJ symptoms (χ^2 = 28.16, $p <$ 0.001). **Conclusions**: Parafunctional habits and TMJ symptoms were prevalent in this orthodontic population. Bruxism showed a significant association with TMJ symptoms, whereas mouth breathing was negatively associated. Incorporating systematic screening for parafunctional habits and functional deviations into orthodontic evaluations may contribute to earlier recognition of patients who could benefit from closer functional monitoring.

Keywords

Parafunctional habits; Temporomandibular joint; Bruxism; Mouth breathing; Children; Adolescents; Orthodontic evaluation

1. Introduction

Parafunctional habits are non-physiological yet repetitive behaviors performed within the oral cavity, including bruxism, mouth breathing, nail biting, and lip biting [1]. When maintained throughout craniofacial growth, these behaviors can perturb the neuromuscular balance of the stomatognathic system, leading to adverse dental and craniofacial alterations [2, 3].

Reported prevalence of these behaviors among children and adolescents varies widely (20–80%), reflecting heterogeneity in age strata, sex distribution, and diagnostic criteria [4, 5]. Bruxism and mouth breathing warrant particular concern because of their capacity to redirect craniofacial growth trajectories and to foster malocclusion [2, 6]. Specifically, habitual mouth breathing has been implicated in vertical growth tendencies, constricted maxillary arches, and increased overjet, whereas bruxism may result in occlusal wear and functional overload of the temporomandibular joint (TMJ) [2, 6, 7].

The effects of parafunctional habits extend beyond occlusal morphology and dental alignment. Repetitive strain and microtrauma associated with these behaviors may compromise the TMJ and adjacent masticatory musculature, manifesting as pain, muscular fatigue, and functional limitations [8, 9]. Several studies have also demonstrated that TMJ symptoms are relatively rare in childhood, but become more prevalent during adolescence due to hormonal changes, increased psychosocial stress, and differences in neuromuscular adaptation [7, 10, 11]. Sex differences have also been observed; females report a higher frequency of parafunctional activities and TMJ-related complaints, a pattern that has been attributed to hormonal influences and variations in pain threshold and muscle sensitivity [12].

Although these domains have been studied extensively, relatively fewer studies have examined them together within the same pediatric orthodontic population. A descriptive, multivariate perspective may help clarify how behavioral, morphological, and functional characteristics coexist during growth. Accordingly, the present study aimed to determine the prevalence of TMJ symptoms in children and adolescents and to explore their associations with parafunctional habits, dental malocclusion, and clinically assessed mandibular asymmetry. Rather than proposing predictive models, this study provides a contextual overview of how these commonly encountered clinical features may relate within a routine orthodontic setting.

2. Materials and methods

2.1 Study design and ethical approval

This retrospective, cross-sectional, and observational study was conducted using archival orthodontic examination records from individuals who underwent orthodontic evaluation at the Department of Orthodontics, Faculty of Dentistry, Ankara Yıldırım Beyazıt University, between January 2022 and March 2024. The study protocol was approved by the Ankara Yıldırım Beyazıt University Health Sciences Ethics Committee (Decision No: 07/1405, Date: 19 September 2025), and permission to access the institutional archive was granted by the hospital administration. No clinical interventions were performed as part of this investigation, and all data were anonymized prior to analysis.

2.2 Sample and inclusion criteria

The study population consisted of patients who presented to the orthodontic clinic within the designated period. A purposive sampling method was applied. Inclusion criteria were: (1) patients aged between 6 and 18 years; (2) absence of systemic or syndromic disorders; (3) no history of orthognathic surgery or maxillofacial trauma; and (4) complete orthodontic examination forms documenting parafunctional habits and TMJ symptoms. Records that were incomplete, unclear, non-standardized, or lacking relevant variables were excluded.

Although the standardized clinical form included items related to systemic diseases, behavioral conditions, airway problems, sleep disturbances, and medical history, patients with any documented systemic illness, syndromic condition, airway-related pathology (*e.g.*, diagnosed obstruction or chronic respiratory disease), or chronic medical treatment were excluded according to the predefined study criteria. Therefore, these sections of the form were not applicable to this medically healthy sample and were consequently not incorporated into the analytical dataset.

A priori power analysis was performed using G*Power (Version 3.1; Franz Faul, University of Kiel, Kiel, SH, Germany). Assuming a medium effect size ($w = 0.3$), a significance level of 5% ($\alpha = 0.05$), and 80% statistical power, a minimum sample size of 88 participants was determined. To enable subgroup analyses, the final sample was expanded to 190 participants. *Post hoc* power analysis confirmed a statistical power exceeding 95%.

2.3 Data collection

Data were obtained retrospectively from standardized orthodontic examination forms completed during each patient's initial clinical evaluation and archived in institutional records. Examinations were conducted in-person by orthodontic specialists or residents. Recorded variables included demographic data (age, sex), Angle's dental malocclusion classification, parafunctional habits (thumb-sucking, mouth breathing, bruxism, nail biting, lip/tongue biting), TMJ symptoms, and mandibular asymmetry. Age categories were determined based on developmental and orthodontic milestones: early mixed dentition (6–9 years), late mixed dentition and pubertal transition (10–12 years), and adolescence characterized by established permanent dentition ($\geq$13 years).

The standardized examination form contained additional sections related to systemic health, behavioral characteristics, and airway or sleep-related problems. Since the study population consisted exclusively of medically healthy children without airway pathology or chronic disease, these sections were uniformly non-contributory and therefore excluded from the analytical dataset. These variables were outside the predefined scope of the present study.

Parafunctional habits and TMJ-related subjective symptoms were assessed through clinical examination supplemented by patient and/or parent reports. Mouth breathing was evaluated using a two-step structured method: (1) caregiver report regarding habitual mouth breathing or open-mouth sleep, and (2) clinical confirmation based on resting lip posture, observed breathing pattern, and the mirror test, in which fogging patterns were assessed to distinguish nasal from oral airflow [13]. Mouth breathing was recorded only when both parental report and clinical findings were positive.

Mandibular asymmetry was assessed qualitatively during clinical examination based on frontal soft tissue symmetry and mandibular midline alignment. Panoramic radiographs from the initial visit were reviewed only to screen for obvious skeletal deviations.

To minimize inter-examiner variability and ensure consistency in data acquisition, all data coding and verification were conducted by a single calibrated investigator. Detailed operational definitions for all variables—including oral habits, breathing patterns, TMJ characteristics, and dental features—are provided in **Supplementary material** to enhance methodological transparency and reproducibility.

2.4 Definition of TMJ symptoms

TMJ symptoms were defined as the presence of any of the following: pain in the preauricular or masticatory muscle region; joint sounds (clicking or crepitation); mandibular deviation or deflection during mouth opening; or abnormal mandibular range of motion (limited $<$35 mm or excessive $>$55 mm interincisal distance).

TMJ findings were evaluated using a clinical screening procedure informed by the core examination components of the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) Axis I protocol [14], although formal DC/TMD diagnostic criteria could not be applied due to the retrospective design. Instead, a structured DC/TMD-based clinical screening approach—including standardized symptom inquiry, bilateral joint and muscle palpation, range-of-motion measurements, and evaluation of opening patterns—was applied, as detailed in **Supplementary material**.

2.5 Data security and anonymity

All data were derived from archival records without direct patient contact. Identifying information was removed before analysis, and fully anonymized datasets were used. Confidentiality was strictly maintained throughout the study, and no personal identifiers, such as names or file numbers, were included.

2.6 Statistical analysis

Analyses were performed using IBM SPSS Statistics (Version 22, IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as means ± standard deviations and minimum–maximum values for continuous variables, and as frequencies and percentages for categorical variables.

Distributions of parafunctional habits and TMJ symptoms according to categorical variables (age group, sex, dental class) were evaluated using the chi-square test. Associations between age and the presence of parafunctional habits or TMJ symptoms were examined using Spearman's rank correlation analysis.

Before regression analysis, data were screened for multicollinearity, model assumptions, and outliers using standard diagnostic procedures in SPSS. Binary logistic regression was subsequently performed to identify predictors of TMJ symptoms. Independent variables included age, sex, mandibular asymmetry, parafunctional habits, and dental classification. Regression results were reported as β coefficients, odds ratios (Exp(β)), 95% confidence intervals (CI), and significance levels. Statistical significance was set at $p < 0.05$.

3. Results

3.1 Descriptive statistics

A total of 190 patients were included in the study, with a mean age of 12.34 ± 2.76 years. Of these, 110 (57.9%) were female and 80 (42.1%) were male. The distribution of dental malocclusion was as follows: Class I in 51 patients (26.8%), Class II in 98 (51.6%), and Class III in 41 (21.6%). Based on age categories, 31 participants (16.3%) were between 6–9 years old, 69 (36.3%) were between 10–12 years old, and 90 (47.4%) were 13 years of age or older.

3.2 Distribution of parafunctional habits and TMJ findings

The most prevalent parafunctional habit was mouth breathing, observed in 66 patients (34.7%). Nail biting (17.4%), bruxism (14.2%), lip biting (12.6%), tongue biting (3.7%), and thumb-sucking (3.7%) followed in descending order. TMJ symptoms were documented in 75 participants (39.5%), while mandibular asymmetry was detected in 21 (11%).

3.3 Chi-square analyses

Chi-square tests revealed no statistically significant association between dental class and the presence of parafunctional habits (all $p > 0.05$). Similarly, no significant sex differences were observed ($p > 0.05$).

Age-related differences were identified for two habits: thumb-sucking (χ^2 = 10.09, p = 0.018) and lip-biting (χ^2 = 12.21, p = 0.007). Thumb-sucking was more frequent in younger patients, while lip-biting was more common in older groups.

A significant relationship was identified between TMJ symptoms and bruxism (χ^2 = 4.24, p = 0.040). No other parafunctional habits were significantly related to TMJ symptoms (all $p > 0.05$). Patients with TMJ symptoms also demonstrated a significantly higher prevalence of mandibular asymmetry (χ^2 = 28.16, $p < 0.001$). In contrast, the distribution of TMJ symptoms did not vary significantly by age group (p = 0.514) or dental class (p = 0.165). Significant chi-square findings are summarized in Table 1.

3.4 Spearman correlation analyses

Spearman's correlation analysis revealed significant associations between age and certain parafunctional habits (Table 2). A weak negative correlation was observed between age and thumb-sucking (ρ = −0.147, p = 0.0427). A weak positive correlation was observed between age and lip-biting (ρ = 0.170, p = 0.0194). These statistically significant correlations represent minimal associations and should be interpreted with caution.

No significant correlations were found between age and mouth breathing, bruxism, nail biting, tongue biting, TMJ symptoms, or mandibular asymmetry (all $p > 0.05$).

3.5 Binary logistic regression analysis for TMJ symptoms

Binary logistic regression was conducted to examine the associations between parafunctional habits and TMJ symptoms (Table 3). Bruxism was significantly associated with higher odds of reporting TMJ symptoms (β = 1.03, p = 0.020, OR = 2.79, 95% CI: 1.19–6.69).

Mouth breathing showed a statistically significant negative association with TMJ symptoms (β = −0.75, p = 0.028, OR = 0.47, 95% CI: 0.25–0.94). Thumb-sucking (p = 0.812) and nail biting (p = 0.383) were not significantly associated with TMJ symptoms. Lip-biting and tongue-biting were excluded from the model due to insufficient sample size or incomplete records.

TABLE 1. Summary of statistically significant chi-square associations.

Variables Compared	χ^2 Value	p-Value	df
Bruxism × TMJ symptoms	4.24	0.040*	1
Thumb-sucking × Age group	10.09	0.018*	3
Lip-biting × Age group	12.21	0.007*	3
Mandibular asymmetry × TMJ findings	28.16	<0.001*	1

*df: degree of freedom; *p < 0.05 indicates statistical significance. TMJ: temporomandibular joint.*

TABLE 2. Spearman's correlations between age and parafunctional habits, TMJ findings, and mandibular asymmetry.

Variables	Spearman's ρ	p-Value
Thumb-sucking	−0.147	0.0427*
Mouth breathing	−0.063	0.3871
Bruxism	−0.005	0.9441
Nail biting	0.136	0.0608
Lip biting	0.170	0.0194*
Tongue biting	0.008	0.9129
TMJ findings	0.057	0.4330
Mandibular asymmetry	0.085	0.2451

*ρ: Spearman correlation coefficient; *p < 0.05 indicates statistical significance. TMJ: temporomandibular joint.*

TABLE 3. Binary logistic regression analysis of parafunctional habits for TMJ symptoms.

Parafunctional Habit	β (Beta)	p-Value	OR (Odds Ratio)	(95% CI)
Bruxism	1.03	0.020*	2.79	(1.19–6.69)
Mouth breathing	−0.75	0.028*	0.47	(0.25–0.94)
Thumb-sucking	0.19	0.812	1.21	(0.25–5.96)
Nail biting	−0.37	0.383	0.69	(0.30–2.39)

*β: regression coefficient; OR: odds ratio (Exp(β)); CI: confidence interval; *p < 0.05 indicates statistical significance.*

4. Discussion

This study examined the prevalence and clinical correlates of TMJ symptoms among children and adolescents, emphasizing the contribution of parafunctional habits, malocclusion, and mandibular asymmetry. The findings revealed only weak age-related differences in certain oral habits and demonstrated a statistically significant association between bruxism and the reporting of TMJ symptoms. As these results derive from cross-sectional data, they indicate associations rather than causal relationships.

Mouth breathing emerged as the most prevalent habit (34.7%), consistent with previous studies that have highlighted its effects on craniofacial growth and malocclusion development [2, 3, 6]. However, mouth breathing was not associated with dental malocclusion in this study. This finding should be interpreted cautiously, as malocclusion was classified only dentally, and skeletal parameters were not available. Considering the multifactorial nature of mouth breathing [15], variability in airway status among patients may have contributed to the absence of a detectable association.

While previous research has reported a positive association between mouth breathing and TMD symptoms [16], an inverse association was observed in this study. This counterintuitive finding is more plausibly explained by the characteristics of the study sample rather than reflecting an unexpected real-world pattern. The study excluded individuals with clinically confirmed airway obstruction, adenotonsillar hypertrophy, or chronic respiratory disease. Consequently, mouth breathing in this sample primarily reflected habitual or functional patterns rather than obstructive breathing associated with structural airway impairment. Under these conditions, mouth breathing may not impose the same degree of functional or biomechanical loading on the temporomandibular joint. Nevertheless, unmeasured confounding variables—such as psychosocial stress, anxiety, or sleep quality—cannot be ruled out and may have influenced the observed relationship.

Weak age-related patterns were observed for certain habits. Thumb-sucking showed a modest decrease with age, whereas lip-biting demonstrated a slight increase—findings consistent with developmental transitions described in the literature [1]. These distributions likely reflect behavioral maturation rather than clinically meaningful functional changes. Although such habits may influence orofacial function over time, the present cross-sectional design does not allow conclusions regarding their potential contribution to TMJ loading or symptom onset.

Beyond age-related behavioral transitions, certain parafunctional habits may place a greater functional load on the temporomandibular joint. Bruxism showed a significant positive association with TMJ symptoms, consistent with previous reports suggesting that repetitive clenching or grinding may increase functional loading on the masticatory muscles and joint [8, 17]. In the present analysis, children exhibiting bruxism had higher odds of reporting TMJ symptoms; however, this finding represents an association rather than a causal relationship, given the cross-sectional design. While the underlying mechanisms cannot be determined from the available data, the observed co-occurrence reinforces the importance of routinely screening for bruxism during orthodontic evaluations.

In addition to behavioral factors, structural and morphological characteristics also appear to play a role in the manifestation of TMJ symptoms. The association between TMJ symptoms and mandibular asymmetry further emphasizes the interaction between functional imbalance and craniofacial morphology. Pinto-Wong and Arriola-Guillén [18] observed comparable results, noting that functional asymmetry exceeding 3% on panoramic radiographs was associated with TMJ alterations. Additional studies have linked asymmetry with TMJ morphology and malocclusion types [19, 20]. However, in the present study, asymmetry was assessed primarily through clinical soft-tissue evaluation with limited radiographic confirmation, and thus these findings should be interpreted with caution. Taken together, the results highlight the importance of an integrated evaluation that considers behavioral, functional, and morphological factors in orthodontic patients.

The present results indicate that TMJ dysfunction is multifactorial, involving the interplay of behavioral, developmental, and morphological elements. Recent evidence indicates that systemic inflammation, such as that observed in rheumatoid arthritis, may heighten susceptibility to TMD symptoms [21]. Similarly, Uğurluel *et al.* [22] reported associations between cardiovascular disease, increased parafunctional behaviors, and TMD symptoms. Although such systemic factors were absent by design in the medically healthy sample of this study, these findings illustrate the broader spectrum of influences that may shape individual variability in symptom presentation. These considerations underscore the importance of comprehensive assessment strategies that incorporate parafunctional habits, occlusal features, craniofacial symmetry, and potential systemic influences.

Early recognition of parafunctional habits and airway-related problems requires a broader interdisciplinary approach. Pediatric dentists and preventive dentistry specialists often serve as first-line clinicians in identifying harmful oral habits, airway-related breathing patterns, or developing malocclusions. Pediatricians may also observe early signs during well-child examinations. Evidence suggests that many of these problems are most effectively addressed when recognized before ages 6–8 years, a period during which interceptive and preventive strategies tend to yield the greatest benefit [23, 24]. Strengthened collaboration among pediatric dentists, pediatricians, otorhinolaryngologists, and orthodontists may facilitate earlier detection, timely referral, and more effective interceptive management, ultimately contributing to improved long-term functional outcomes.

4.1 Clinical implications

Orthodontic assessments should extend beyond skeletal and dental evaluation to include systematic screening for parafunctional habits and TMJ symptoms. Recognizing the significant association between bruxism and TMJ symptoms may help emphasize the value of early habit-related preventive counseling in routine orthodontic practice. Interdisciplinary cooperation—particularly among orthodontists, pediatric dentists, and otorhinolaryngologists for patients exhibiting mouth breathing—may enhance diagnostic accuracy and guide appropriate referral pathways. In addition, recognizing the association between TMJ symptoms and mandibular asymmetry may support early detection of functional deviations and contribute to more precise orthodontic planning.

4.2 Limitations

Several limitations must be acknowledged. Chief among them is the cross-sectional design, which prevents any determination of causality and increases susceptibility to reporting bias, particularly given the reliance on clinical observation and parental reporting. Additionally, the absence of imaging and standardized DC/TMD criteria for TMJ evaluation reduces diagnostic specificity. Another important limitation involves the use of Angle's dental classification alone, as cephalometric parameters were inconsistently recorded. This may have obscured relevant skeletal discrepancies. Moreover, the lack of data on psychosocial variables—such as stress, anxiety, or sleep disturbances—restricted the ability to account for potential confounding. The low frequency of some habits further limited statistical power. Lastly, being a retrospective single-center study, external generalizability remains limited. Prospective, multi-institutional studies with standardized tools are warranted to improve diagnostic accuracy and broader applicability.

5. Conclusions

This study demonstrated a high prevalence of parafunctional habits and TMJ symptoms among pediatric and adolescent orthodontic patients. Bruxism showed a significant association with TMJ symptoms, whereas mouth breathing showed an inverse association in this sample. Age-dependent patterns were also evident, with thumb-sucking more common in younger children and lip-biting more frequently observed among adolescents. These findings reinforce the multifactorial nature of TMJ dysfunction and emphasize the value of incorporating behavioral, morphological, and functional assessments into routine orthodontic examinations.

Although this study did not establish specific diagnostic thresholds or standardized screening criteria, greater clinical attention to parafunctional habits and related functional patterns may support earlier identification of patients at increased risk for TMJ involvement. Routine chairside assessment of mouth breathing, mandibular asymmetry, and parafunctional habits may enhance clinical decision-making and support preventive counseling. Furthermore, early recognition of these behaviors by pediatric and preventive dental practitioners may facilitate timely referral and interceptive management during key periods of craniofacial growth and development.

Future research incorporating validated psychosocial and sleep-related measures may provide a more comprehensive understanding of the associations between parafunctional habits and temporomandibular disorders. Combined with standardized diagnostic protocols, these measures may help clarify the complex interplay of behavioral, psychological, and morphological factors in pediatric TMJ dysfunction.

ABBREVIATIONS

TMJ, temporomandibular joint; DC/TMD, Diagnostic Criteria for Temporomandibular Disorders; OR, odds ratio; SPSS, Statistical Package for the Social Sciences; χ^2, chi-square; ρ, Spearman correlation coefficient; β, regression coefficient; CI, confidence interval.

AVAILABILITY OF DATA AND MATERIALS

The datasets generated and analyzed during the current study are not publicly available due to institutional data protection policies and patient confidentiality regulations. However, anonymized data may be made available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTIONS

TBT—conceived and designed the research study, collected and analyzed the data, and drafted the manuscript. KAÇ—verified the data analysis, contributed to the review, and critically revised the manuscript for important intellectual content. Both authors read and approved the final version of the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was reviewed and approved by the Ankara Yıldırım Beyazıt University Health Sciences Ethics Committee (Decision No: 07/1405, Date: 19 September 2025). Authorization for archival data access was obtained from the hospital administration. Given the retrospective nature of the study, the Health Sciences Ethics Committee of Ankara Yıldırım Beyazıt University waived the requirement for written informed consent. All patient data were anonymized prior to analysis.

ACKNOWLEDGMENT

Not applicable.

FUNDING

This research received no external funding.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.jocpd.com/files/article/2049762288699621376/attachment/Supplementary%20material.pdf.

REFERENCES

[1] Garde JB, Suryavanshi RK, Jawale BA, Deshmukh V, Dadhe DP, Suryavanshi MK. An epidemiological study to know the prevalence of deleterious oral habits among 6 to 12-year-old children. Journal of International Oral Health. 2014; 6: 39–43.

[2] Grippaudo C, Paolantonio EG, Antonini G, Saulle R, La Torre G, Deli R. Association between oral habits, mouth breathing and malocclusion. Acta Otorhinolaryngologica Italica. 2016; 36: 386–394.

[3] Santos Barrera M, Ribas-Perez D, Caleza Jimenez C, Cortes Lillo O, Mendoza-Mendoza A. Oral habits in childhood and occlusal pathologies: a cohort study. Clinics and Practice. 2024; 14: 718–728.

[4] Laganà G, Masucci C, Fabi F, Bollero P, Cozza P. Prevalence of malocclusions, oral habits, and orthodontic treatment need in a 7- to 15-year-old schoolchildren population in Tirana. European Journal of Paediatric Dentistry. 2013; 14: 8–12.

[5] Mehdipour A, Aghaali M, Janatifar Z, Saleh A. Prevalence of oral parafunctional habits in children and related factors: an observational cross-sectional study. International Journal of Clinical Pediatric Dentistry. 2023; 16: 308–311.

[6] Paduano S, Bucci R, Rongo R, Silva R, Michelotti A. Prevalence of temporomandibular disorders and oral parafunctions in adolescents from public schools in southern Italy. CRANIO®. 2020; 38: 370–375.

[7] LeResche L. Epidemiology of temporomandibular disorders: implications for the investigation of etiologic factors. Critical Reviews in Oral Biology & Medicine. 1997; 8: 291–305.

[8] Motghare V, Kumar J, Shivalingesh KK, Kushwaha S, Anand R, Gupta N, *et al.* Association between harmful oral habits and signs and symptoms of temporomandibular joint disorders among adolescents. Journal of Clinical and Diagnostic Research. 2015; 9: ZC45–ZC48.

[9] Abe S, Kawano F, Matsuka Y, Masuda T, Okawa T, Tanaka E. Relationship between oral parafunctional and postural habits and the symptoms of temporomandibular disorders: a survey-based cross-sectional cohort study using propensity score matching analysis. Journal of Clinical Medicine. 2022; 11: 6396.

[10] Minervini G, Franco R, Marrapodi MM, Fiorillo L, Cervino G, Cicciù M. Prevalence of temporomandibular disorders in children and adolescents evaluated with diagnostic criteria for temporomandibular disorders: a systematic review with meta-analysis. Journal of Oral Rehabilitation. 2023; 50: 522–530.

[11] Da Silva CG, Pachêco-Pereira C, Porporatti AL, Savi MG, Peres MA, Flores-Mir C, *et al.* Prevalence of clinical signs of intra-articular temporomandibular disorders in children and adolescents: a systematic review and meta-analysis. The Journal of the American Dental Association. 2016; 147: 10–18.e8.

[12] Atsü SS, Güner S, Palulu N, Bulut AC, Kürkçüoğlu I. Oral parafunctions, personality traits, anxiety, and their association with signs and symptoms of temporomandibular disorders in adolescents. African Health Sciences. 2019; 19: 1801–1810.

[13] Primarti RS, Fatma A, Jayanti CNR, Musnamirwan IA, Setiawan AS. Mouth breathing and its impact on sleep breathing disorders in children: a cross-sectional study in Bandung, Indonesia. Clinical, Cosmetic and Investigational Dentistry. 2025; 17: 435–444.

[14] Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP, *et al.*; International RDC/TMD Consortium Network, International association for Dental Research; Orofacial Pain Special Interest Group, International Association for the Study of Pain. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for clinical and research applications: recommendations of the International RDC/TMD Consortium Network* and Orofacial Pain Special Interest Group†. Journal of Oral & Facial Pain and Headache. 2014; 28: 6–27.

[15] Milanesi JM, Berwig LC, Marquezan M, Schuch LH, de Moraes AB, da Silva AMT, *et al.* Variables associated with mouth breathing diagnosis in children based on a multidisciplinary assessment. Codas. 2018; 30: e20170071.
[16] Alpaydin MT, Alpaydin T, Torul D. Do symptoms and signs of temporomandibular disorders have an association with breathing pattern: a cross-sectional study on Turkish children and adolescents. BMC Oral Health. 2024; 24: 721.
[17] Motta LJ, Guedes CC, De Santis TO, Fernandes KP, Mesquita-Ferrari RA, Bussadori SK. Association between parafunctional habits and signs and symptoms of temporomandibular dysfunction among adolescents. Oral Health and Preventive Dentistry. 2013; 11: 3–7.
[18] Pinto-Wong S, Arriola-Guillén LE. Prevalence of mandibular, condylar and ramus asymmetry in panoramic radiographs of adult individuals: a cross-sectional study. Journal of Clinical and Experimental Dentistry. 2024; 16: e1332–e1338.
[19] Dygas S, Szarmach I, Radej I. Assessment of the morphology and degenerative changes in the temporomandibular joint using CBCT according to the orthodontic approach: a scoping review. BioMed Research International. 2022; 2022: 6863014.
[20] Yan ZB, Wan YD, Xiao CQ, Li YQ, Zhang YY, An Y, *et al.* Craniofacial morphology of orthodontic patients with and without temporomandibular disorders: a cross-sectional study. Pain Research and Management. 2022; 2022: 9344028.
[21] d'Apuzzo F, Rotolo RP, Fordellone M, Cuomo G, Jamilian A, Nucci L, *et al.* Temporomandibular disorders and serological tests in patients with rheumatoid arthritis. Applied Sciences. 2023; 13: 11488.
[22] Uğurluel C, Şermet Elbay Ü, Elbay M, Babaoğlu A. Comparison of signs and symptoms of temporomandibular disorders and parafunctions in children with and without cardiovascular diseases. Journal of Clinical Pediatric Dentistry. 2023; 47: 74–81.
[23] Arat Maden E, Eker İ. Pediatricians' knowledges, attitudes and practices on parafunctional oral habits and orthodontic problems in children. Clinical and Experimental Health Sciences. 2021; 11: 834–841.
[24] Koufatzidou M, Koletsi D, Basdeki EI, Pandis N, Polychronopoulou A. Pediatricians' awareness on orthodontic problems and related conditions—a national survey. Progress in Orthodontics. 2019; 20: 33.

How to cite this article: Tulca Büyükpatır Türk, Kübra Arslan Çarpar. Parafunctional habits and temporomandibular joint symptoms in children and adolescents: a retrospective study. Journal of Clinical Pediatric Dentistry. 2026; 50(3): 243-249. doi: 10.22514/jocpd.2026.079.