Research Article

Prevalence Of Bruxism And Its Association With Stress And Screen Time In Adolescents

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Abstract

Background: Bruxism, characterized by involuntary grinding or clenching of teeth, represents a significant oral health concern among adolescents. Contemporary lifestyle factors, including increased psychological stress and excessive screen exposure, may contribute to the rising prevalence of this parafunctional habit in younger populations. Objective: This cross-sectional study aimed to determine the prevalence of bruxism among adolescents and investigate its association with perceived stress levels and daily screen time. Methods: A total of 486 adolescents aged 12–18 years were recruited from six secondary schools. Bruxism was assessed using clinical examination criteria and self-reported questionnaires. Stress levels were measured using the Perceived Stress Scale-10 (PSS-10), while screen time was evaluated through a validated media use questionnaire. Statistical analyses included chi-square tests, independent t-tests, and multivariate logistic regression. Results: The overall prevalence of bruxism was 28.4% (n=138). Adolescents with bruxism demonstrated significantly higher PSS-10 scores (22.7 ± 5.3) compared to non-bruxers (16.4 ± 4.8; $p<0.001$). Mean daily screen time was significantly greater in the bruxism group (6.8 ± 2.1 hours) versus non-bruxers (4.9 ± 1.9 hours; $p<0.001$). Multivariate analysis revealed that high stress levels (OR=3.42; 95% CI: 2.18–5.36; $p<0.001$) and excessive screen time >5 hours/day (OR=2.67; 95% CI: 1.74–4.09; $p<0.001$) were independent predictors of bruxism. Conclusion: Bruxism affects a substantial proportion of adolescents, with psychological stress and prolonged screen exposure serving as significant associated factors. Comprehensive preventive strategies addressing both mental health and digital habits are warranted.

Keywords: Bruxism; adolescents; psychological stress; screen time; temporomandibular disorders; parafunctional habits.

1. Introduction

Bruxism is defined as a repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or bracing or thrusting of the mandible, occurring during sleep (sleep bruxism) or wakefulness (awake bruxism) [1]. This parafunctional habit has gained considerable attention in dental research due to its potential consequences, including tooth wear, temporomandibular disorders, headaches, and facial pain [2]. The etiology of bruxism is multifactorial, involving genetic, psychological, and environmental components that interact in complex ways [3].

Adolescence represents a critical developmental period marked by significant physiological, psychological, and social transitions. During this phase, individuals are particularly vulnerable to stress-related disorders and behavioral changes that may predispose them to parafunctional oral habits [4]. Previous epidemiological studies have reported varying prevalence rates of bruxism in adolescent populations, ranging from 15% to 40%, depending on diagnostic criteria and geographic location [5]. This variability underscores the need for continued investigation across diverse populations.

Psychological stress has been consistently identified as a major contributing factor to bruxism. Research by Manfredini et al. demonstrated significant correlations between emotional distress and bruxism severity in young adults [6]. The hypothesized mechanism involves stress-induced activation of the hypothalamic-pituitary-adrenal axis, leading to increased muscle tension and parafunctional activity [7]. Academic pressures, social challenges, and family conflicts contribute to elevated stress levels among contemporary adolescents, potentially increasing their susceptibility to bruxism [8].

The proliferation of digital devices has fundamentally transformed adolescent lifestyle patterns over the past decade. Screen time, encompassing activities such as smartphone use, computer gaming, and social media engagement, has increased dramatically among young populations [9]. Emerging evidence suggests associations between excessive screen exposure and various health outcomes, including sleep disturbances, postural problems, and psychological symptoms [10]. However, the relationship between screen time and bruxism remains underexplored in the scientific literature.

Recent studies have begun investigating the potential link between digital device usage and orofacial symptoms. Chen et al. reported increased prevalence of temporomandibular symptoms among adolescents with prolonged smartphone use [11]. Similarly, Svensson and colleagues observed associations between sedentary screen-based activities and jaw muscle fatigue [12]. These findings suggest that screen-related behaviors, including postural changes, visual strain, and associated psychological factors, may contribute to bruxism development.

Despite growing interest in this area, significant research gaps persist. Most existing studies have examined stress and screen time as isolated variables, without considering their combined effects on bruxism. Furthermore, few investigations have utilized comprehensive assessment protocols incorporating both clinical examination and validated psychometric instruments in adolescent populations. Additionally, the rapid evolution of digital technology necessitates updated epidemiological data reflecting current usage patterns.

The aim of this study was to determine the prevalence of bruxism among adolescents and to investigate its associations with perceived psychological stress and daily screen time. We hypothesized that both elevated stress levels and excessive screen exposure would be independently associated with increased bruxism prevalence.

2.Materials and Methods

Study Design and Setting

This cross-sectional observational study was conducted between September 2023 and February 2024 in six randomly selected secondary schools across an urban metropolitan area. The study protocol was approved by the Institutional Ethics Committee (Protocol No. IRB-2023-0847) and conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from parents/guardians, and assent was obtained from all participating adolescents.

Sample Size Calculation

Sample size was calculated using the formula for prevalence studies, assuming an estimated bruxism prevalence of 25%, precision of 4%, and 95% confidence level. This yielded a minimum required sample of 450 participants. Accounting for potential incomplete responses and dropouts (10%), the target recruitment was set at 500 participants.

Participants

Adolescents aged 12–18 years enrolled in grades 7–12 were eligible for inclusion. Inclusion criteria comprised: (1) age between 12 and 18 years; (2) ability to understand and complete questionnaires; (3) willingness to undergo clinical oral examination. Exclusion criteria included: (1) current orthodontic treatment; (2) history of maxillofacial trauma or surgery; (3) diagnosed neurological or psychiatric disorders requiring medication; (4) craniofacial anomalies or syndromes; (5) current use of psychotropic medications that might affect muscle activity.

Data Collection Instruments

Bruxism Assessment: Bruxism was evaluated using a combination of clinical examination and self-report questionnaire based on the American Academy of Sleep Medicine criteria. Clinical indicators included: (a) presence of tooth wear facets inconsistent with age; (b) masseter muscle hypertrophy upon palpation; (c) tongue indentations; (d) linea alba on buccal mucosa. Self-reported symptoms included awareness of teeth grinding or clenching during sleep (reported by family members) or wakefulness, morning jaw stiffness, and temporal headaches. Participants meeting at least two clinical signs and/or reporting at least one self-reported symptom were classified as probable bruxers.

Stress Assessment: Perceived stress was measured using the Perceived Stress Scale-10 (PSS-10), a validated instrument assessing the degree to which situations in one's life are appraised as stressful. The scale comprises 10 items rated on a 5-point Likert scale (0=never to 4=very often), yielding total scores ranging from 0 to 40. Higher scores indicate greater perceived stress. Participants were categorized as having low stress (PSS-10 ≤13), moderate stress (PSS-10 14–26), or high stress (PSS-10 ≥27).

Screen Time Assessment: Daily screen time was evaluated using a modified version of the Adolescent Sedentary Activity Questionnaire. Participants reported average daily hours spent on: (a) smartphones; (b) computers/laptops; (c)

television; (d) tablets; (e) video gaming devices. Total screen time was calculated by summing all categories. Excessive screen time was defined as >5 hours daily, consistent with current pediatric recommendations.

Demographic and Covariates: A structured questionnaire collected information on age, sex, grade level, parental education, family structure, academic performance, sleep duration, and caffeine consumption.

Clinical Examination Procedure

All clinical examinations were performed by two calibrated examiners (inter-examiner kappa=0.84) in school health rooms under standardized lighting conditions. Participants were seated upright, and examination followed a systematic protocol. Tooth wear was assessed using the Basic Erosive Wear Examination index modified for attrition. Masticatory muscle palpation was performed bilaterally with standardized pressure (approximately 1 kg).

Statistical Analysis

Data were analyzed using SPSS version 27.0 (IBM Corporation, Armonk, NY). Descriptive statistics were presented as frequencies and percentages for categorical variables, and means with standard deviations for continuous variables. Normality was assessed using the Kolmogorov-Smirnov test. Comparisons between groups were performed using independent samples t-tests for continuous variables and chi-square tests for categorical variables. Multivariate binary logistic regression analysis was conducted to identify independent predictors of bruxism, adjusting for potential confounders. Odds ratios (OR) with 95% confidence intervals (CI) were calculated. Statistical significance was set at $p<0.05$ for all analyses.

3.Results

Participant Characteristics

Of the 500 adolescents initially recruited, 486 completed all study components, yielding a response rate of 97.2%. The mean age was 14.8 ± 1.9 years, with 52.3% (n=254) females and 47.7% (n=232) males. Demographic characteristics are presented in Table 1.

Table 1: Demographic Characteristics of Study Participants (N=486)

Variable	n (%) or Mean ± SD
Age (years)	14.8 ± 1.9
Sex	
Male	232 (47.7%)
Female	254 (52.3%)
Grade Level	
Middle school (7–9)	246 (50.6%)
High school (10–12)	240 (49.4%)
Parental Education	
High school or below	148 (30.5%)
University degree	247 (50.8%)
Postgraduate degree	91 (18.7%)
Family Structure	
Two-parent household	398 (81.9%)
Single-parent household	72 (14.8%)
Other arrangements	16 (3.3%)
Academic Performance	
Above average	167 (34.4%)
Average	241 (49.6%)
Below average	78 (16.0%)

Variable	n (%) or Mean ± SD
Sleep Duration (hours/night)	7.2 ± 1.3
Caffeine Consumption (cups/week)	4.6 ± 3.8

Prevalence of Bruxism

The overall prevalence of probable bruxism was 28.4% (n=138; 95% CI: 24.4%–32.6%). Sleep bruxism was identified in 18.5% (n=90), awake bruxism in 6.2% (n=30), and combined sleep-awake bruxism in 3.7% (n=18). Prevalence was significantly higher among females (32.3%) compared to males (24.1%; χ^2=4.12; p=0.042). No significant difference was observed between middle school and high school students (27.2% vs. 29.6%; p=0.547).

Stress Levels and Screen Time

The mean PSS-10 score for all participants was 18.2 ± 5.6. Participants with bruxism demonstrated significantly higher stress scores (22.7 ± 5.3) compared to those without bruxism (16.4 ± 4.8; t=12.14; p<0.001). High stress levels (PSS-10 ≥27) were present in 34.8% of bruxers versus 8.6% of non-bruxers.

Mean total daily screen time was 5.5 ± 2.1 hours. Adolescents with bruxism reported significantly greater screen exposure (6.8 ± 2.1 hours) compared to non-bruxers (4.9 ± 1.9 hours; t=9.47; p<0.001). Smartphone use constituted the largest component (mean 3.2 ± 1.4 hours), followed by computer/laptop (1.4 ± 0.9 hours), television (0.6 ± 0.5 hours), and gaming devices (0.3 ± 0.4 hours).

Table 2: Comparison of Stress and Screen Time Between Bruxism and Non-Bruxism Groups

Variable	Bruxism (n=138)	Non-Bruxism (n=348)	t/χ^2	p-value
PSS-10 Score	22.7 ± 5.3	16.4 ± 4.8	12.14	<0.001*
Stress Category			56.82	<0.001*
Low (≤13)	12 (8.7%)	98 (28.2%)		
Moderate (14–26)	78 (56.5%)	220 (63.2%)		
High (≥27)	48 (34.8%)	30 (8.6%)		
Total Screen Time (hours/day)	6.8 ± 2.1	4.9 ± 1.9	9.47	<0.001*
Screen Time Category			38.64	<0.001*
≤3 hours	14 (10.1%)	89 (25.6%)		
3–5 hours	32 (23.2%)	128 (36.8%)		
>5 hours	92 (66.7%)	131 (37.6%)		
Smartphone Use (hours/day)	4.1 ± 1.5	2.9 ± 1.2	8.92	<0.001*
Computer Use (hours/day)	1.7 ± 1.0	1.3 ± 0.8	4.56	<0.001*
Sleep Duration (hours/night)	6.6 ± 1.2	7.4 ± 1.2	-6.43	<0.001*

*Statistically significant at p<0.05

Multivariate Analysis

Binary logistic regression analysis identified several independent predictors of bruxism after adjusting for demographic variables and potential confounders (Table 3).

Table 3: Multivariate Logistic Regression Analysis for Predictors of Bruxism

Variable	Adjusted OR	95% CI	p-value
Sex (Female vs. Male)	1.48	0.96–2.28	0.076
Age (per year increase)	1.06	0.93–1.21	0.384
Stress Level			
Low (reference)	1.00	—	—
Moderate	2.14	1.08–4.24	0.029*
High	3.42	2.18–5.36	<0.001*
Screen Time			
≤3 hours (reference)	1.00	—	—
3–5 hours	1.59	0.79–3.20	0.194
>5 hours	2.67	1.74–4.09	<0.001*
Sleep Duration			
≥8 hours (reference)	1.00	—	—
6–8 hours	1.72	1.02–2.90	0.041*
<6 hours	2.31	1.24–4.31	0.008*
Caffeine Consumption (high vs. low)	1.38	0.89–2.14	0.152
Academic Performance (below average)	1.56	0.91–2.68	0.108

*Statistically significant at $p<0.05$; OR: Odds Ratio; CI: Confidence Interval

The model demonstrated good fit (Hosmer-Lemeshow test: $\chi^2=6.84$; $p=0.554$) and explained 31.4% of variance in bruxism (Nagelkerke $R^2=0.314$).

4.Discussion

This study provides contemporary evidence regarding the prevalence of bruxism among adolescents and its associations with psychological stress and screen time. Our findings revealed that approximately one in four adolescents (28.4%) exhibited probable bruxism, with both stress and excessive screen exposure emerging as significant independent predictors.

The observed prevalence aligns with recent systematic reviews reporting pooled estimates between 22% and 31% for adolescent bruxism [13]. However, considerable methodological heterogeneity exists across studies, complicating direct comparisons. Our use of combined clinical and self-report criteria represents a strength, as reliance on either method alone may result in underestimation or overestimation [14]. The higher prevalence observed in females corresponds with findings by Saczuk et al., who reported similar sex-based differences potentially attributable to hormonal factors and differential stress responses [15].

The strong association between perceived stress and bruxism represents a central finding of this investigation. Adolescents with bruxism demonstrated PSS-10 scores approximately 38% higher than their non-bruxing counterparts. This relationship persisted after multivariate adjustment, with high stress levels conferring more than threefold increased odds of bruxism. These results corroborate the stress-bruxism paradigm supported by neurophysiological research [16]. Catecholamine release during stress responses may increase muscle tone and facilitate parafunctional activity through central and peripheral mechanisms [17].

The contemporary adolescent experience involves unprecedented academic, social, and technological pressures that may amplify stress-related bruxism risk. Wieckiewicz and colleagues documented similar associations in young adult

populations, emphasizing the role of psychosocial factors in bruxism etiology [18]. Our findings extend this evidence to younger age groups, highlighting the importance of stress management interventions in adolescent oral health promotion.

Excessive screen time emerged as another significant predictor, with adolescents exceeding five hours daily demonstrating 2.67-fold increased bruxism odds. This association may operate through multiple pathways. First, prolonged device use often involves forward head posture and cervical flexion, potentially increasing masticatory muscle tension [19]. Second, screen-based activities before bedtime can disrupt circadian rhythms and sleep architecture, factors known to influence sleep bruxism [20]. Third, social media use and online activities may themselves constitute stress sources, particularly among adolescents susceptible to cyberbullying or social comparison [21].

The observed relationship between reduced sleep duration and bruxism further supports the screen time connection, as excessive device use commonly displaces sleep time. Serra-Negra et al. demonstrated that sleep quality significantly influences bruxism prevalence in pediatric populations [22]. Our findings of shorter sleep duration among bruxers (6.6 vs. 7.4 hours) align with recommendations emphasizing adequate sleep as protective against parafunctional habits [23].

The interaction between stress and screen time warrants consideration. Digital devices may serve as both stressors and maladaptive coping mechanisms, creating complex feedback loops. Adolescents experiencing stress may increase screen engagement for distraction or social support, inadvertently exacerbating risk factors [24]. Conversely, excessive screen use may impair stress regulation capabilities, particularly when displacing physical activity or face-to-face social interaction [25].

Clinical implications of these findings are substantial. Dental professionals should incorporate psychosocial assessment into bruxism evaluation protocols, recognizing that parafunctional habits often reflect broader lifestyle and mental health concerns [26]. Interdisciplinary approaches involving psychologists, educators, and families may prove more effective than isolated dental interventions. Furthermore, guidance regarding healthy screen habits should become a standard component of adolescent preventive counseling [27].

Several limitations merit acknowledgment. The cross-sectional design precludes causal inference regarding the directionality of observed associations. Self-reported screen time may be subject to recall bias, though validation studies suggest acceptable accuracy for habitual behaviors. Our clinical bruxism assessment, while standardized, did not include polysomnographic confirmation, which remains the gold standard for sleep bruxism diagnosis but is impractical for epidemiological research. Finally, unmeasured confounders, including genetic predisposition and detailed sleep quality parameters, may influence results.

Future research should employ longitudinal designs to elucidate temporal relationships between stress, screen habits, and bruxism development. Objective screen time measurement using device tracking applications would enhance accuracy. Investigation of specific screen activities (social media, gaming, educational content) may reveal differential associations. Additionally, intervention studies targeting stress reduction and screen time limitation could establish efficacy of preventive approaches.

5.Conclusion

This study demonstrates that bruxism affects a substantial proportion of adolescents, with nearly three in ten exhibiting probable bruxism based on clinical and self-report criteria. Psychological stress and excessive screen time were identified as significant independent predictors, each conferring substantially elevated odds of bruxism even after adjustment for demographic and lifestyle factors. The findings underscore the multifactorial nature of bruxism and highlight the importance of contemporary lifestyle factors in its etiology.

These results carry important implications for clinical practice and public health. Dental professionals should adopt comprehensive assessment approaches that consider psychosocial context when evaluating adolescent patients presenting with signs or symptoms of bruxism. Furthermore, preventive strategies should extend beyond traditional oral health education to encompass stress management techniques and guidance regarding healthy digital habits. Collaborative efforts involving healthcare providers, educators, and families are essential for addressing the complex interplay of factors contributing to adolescent bruxism.

As digital technology continues to permeate adolescent life and academic pressures intensify, proactive measures to mitigate bruxism risk factors become increasingly urgent. Future research should prioritize longitudinal investigation and intervention development to establish evidence-based prevention and management protocols for this prevalent condition.

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