

Association Between Sleep Bruxism and Quality of Life: A Systematic Review

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Aims: To evaluate the association between sleep bruxism (SB) and quality of life (QoL) in the general population. **Methods:** A systematic review was conducted, and studies were included with no restrictions regarding age, gender, or language. SB and general health-related QoL and/or oral health-related QoL (OHRQoL) measures in the included studies needed to be based on validated tools. The databases searched were Google Scholar, LILACS, OpenGrey, ProQuest, PubMed, Science Direct, Scopus, and Web of Science. Quality of evidence was evaluated using the Joanna Briggs Institute critical appraisal checklists and GRADE (Grading of Recommendations Assessment, Development, and Evaluation) criteria. **Results:** Fourteen studies met the inclusion criteria. Ten studies were published in English, and four in Portuguese. All studies evaluating the association of SB with health-related QoL showed no statistical significance when overall scores were considered. The overall quality of evidence was considered very low due to high heterogeneity among the studies. SB seemed not to be associated with health-related QoL, but did have a negative impact on some characteristics of OHRQoL. **Conclusion:** There is insufficient scientific evidence to support or disprove the association between SB and QoL/OHRQoL in the general population. *J Oral Facial Pain Headache 2020;34:341–352. doi: 10.11607/ofph.2687*

Keywords: *bruxism, quality of life, sleep bruxism*

BruXism consists of repetitive masticatory muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible and can be specified as either sleep bruxism (SB) or awake bruxism (AB) depending on its circadian phenotype.¹ This muscle activity is not considered a sleep disorder in healthy individuals, and it may even be considered a protective factor for individuals with sleep disorders, as it has been suggested that SB increases the air patency of the upper respiratory pathways and stimulates salivation, preventing dental erosion.²

The prevalence of SB in children has been estimated to be around 3.5% to 46.0%.³ This high variance occurs because the diagnosis of SB in children is assessed predominantly through parental reports. The prevalence of SB in adults was 7.4% in a study conducted with polysomnography (PSG),⁴ and a systematic review based on SB diagnosis adopting questionnaires, clinical assessments, and PSG or electromyographic (EMG) recordings reported a prevalence of 10% to 13%.⁵

SB outcomes include tooth wear, masticatory muscle hypertrophy, and other clinical findings, such as tongue/cheek indentation, tension headaches, and pain or fatigue in the masticatory muscles.⁶ The diagnosis of bruxism can be classified as possible, probable, or definitive: Possible bruxism is based on self-report; probable bruxism is based on self-report and/or clinical examination; and definitive bruxism is based on EMG or PSG testing.² According to the literature, PSG is considered the standard reference method for achieving an accurate diagnosis of SB.^{4,7,8}

One unanswered question in the literature is whether SB may affect individuals' quality of life (QoL) and/or oral health-related QoL (OHRQoL). The World Health Organization defines QoL as "an individual's perception of their position in life in the context of the culture and value systems in

Table 1a Descriptive Characteristics of Included Studies on Association Between Sleep Bruxism (SB) and Quality of Life (QoL) (n = 3)

Study, y	Sample/setting	Type of study	Age (y)	Objectives
Castelo et al, ²⁴ 2010	SB group: n = 25 Control group: n = 69 Public schools, Piracicaba, Brazil	Cross-sectional	6–8	To evaluate the QoL of children with SB from public schools and its association with sociodemographic characteristics and other parafunctional habits.
Lucchesi et al, 2010 ¹⁹	SB group: n = 106 (38 men/ 68 women) ^a Control group: n = 802 (367 men/ 435 women) ^a São Paulo, Brazil	Cross-sectional	20–80	To estimate the prevalence of nocturnal awakening with headache according to gender, age, and socioeconomic class and its relationship to sleep disorders, sleep parameters, anxiety, depression, fatigue, QoL, and obesity.
Manfredini et al, ²³ 2017	Proxy-reported SB: Never/rarely: n = 1,148 (588 boys/ 560 girls) Sometimes: n = 168 (91 boys/77 girls) Usually/always: n = 240 (125 boys/115 girls) Schools in Medellin, Colombia	Cross-sectional	6–13	To describe the association between proxy-reported SB and QoL in different social layers.

P-AUQUEI = Portuguese version of the Autoquestionnaire Qualité de Vie Enfant Imagé; PedsQL = Pediatric Quality of Life Inventory; CSHQ = Children's Sleep Habits Questionnaire; WHOQOL-BREF = World Health Organization Quality of Life: Brief Version.

^aData transmitted by the authors of original studies by email.

^bStatistical analysis performed using the data bank transmitted by the authors of the original studies.

which they live and in relation to their goals, expectations, standards, and concerns.”⁹ It is a broadly ranging concept affected in a complex way by the person's physical health, psychologic state, personal beliefs, social relationships, and their relationship to salient features of their environment. The concept of OHRQoL corresponds to the impact of oral health or oral disease on the individual's daily functioning, well-being, and quality of life.¹⁰

A variety of tools to measure QoL have been utilized in epidemiologic studies. Common health-related QoL instruments are the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36)¹¹ for adults and the Pediatric Quality of Life Inventory (PedsQL 4.0)¹² for children. For OHRQoL, more common tests are the Oral Health Impact Profile (OHIP-14)¹³ and Early Childhood Oral Health Impact Scale (ECOHIS)¹⁰ for adults and children, respectively.

A recent systematic review investigated the impact of SB on OHRQoL in children up to 6 years of age and concluded that the evidence is insufficient for definitive conclusions.¹⁴ No other systematic review has been published regarding this subject with other ages of interest. Therefore, the present systematic review aimed to answer the following question: Is SB associated with health-related QoL and/or OHRQoL of the general population?

Materials and Methods

Protocol and Registration

A systematic review protocol based on PRISMA-P¹⁵ (Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols) was prepared. The systematic review protocol was registered at the International Prospective Register of Systematic Reviews (PROSPERO)¹⁶ under number CRD42017075893. This systematic review was reported in accordance with PRISMA guidelines.¹⁷

Eligibility Criteria

The inclusion criteria were: observational studies (case-control, cross-sectional, and cohort) that evaluated SB and QoL and/or OHRQoL in individuals of any age, without restrictions regarding language or period of publication. The studies could assess SB via questionnaires, clinical assessment, portable devices, and/or PSG recordings. QoL and OHRQoL needed to be evaluated using validated tools.

The exclusion criteria were: studies on AB; studies with comorbidities that may affect QoL (for example: presence of systemic disease, syndromes with neurologic impairment, headache, TMD, tinnitus); and randomized/nonrandomized clinical trials, case series, reviews, letters, conference abstracts, and personal opinions.

Instrument(s)	Statistical analyses	Findings	Main conclusion
P-AUQUEI. SB: Parental report and clinical examination (presence of tooth wear).	Unpaired <i>t</i> test/Mann-Whitney <i>U</i> test, chi-square test, and multiple logistic regression.	The mean P-AUQUEI score for children with SB did not differ significantly from that for children without such parafunction ($P > .05$). Lower maternal age at birth led to a significantly higher probability of SB in the sample ($P = .015$).	Children with SB presented QoL scores similar to those of children without the parafunction.
WHOQOL-BREF quality of life assessment. SB report and full-night polysomnography.	Multivariate logistic regression models were used for analysis of adjusted associations and interactions among the variables.	SB was not associated with a worse QoL considering the participants perception of their own QoL ($P = .137^b$).	SB is not associated with a worse general QoL.
PedsQL 4.0. SB parental report (CSHQ).	Linear-by-linear association test, Bonferroni correction for multiple comparisons, and Spearman correlation test.	Five QoL items had a significant association with reported SB in the high socioeconomic level: "Feeling afraid or scared" ($P = .0004$); "feeling angry" ($P = .003$); "forgetting things" ($P = .003$); "missing school to go to the doctor or hospital" ($P = .003$); and "missing school because not feeling well" ($P = .006$).	Neither hypothesis ([1] certain QoL features are positively correlated with SB and [2] the SB-QoL correlation, if existing, is different in the different social layers) can be supported.

Information Sources and Search Strategy

Controlled vocabulary (MeSH terms) and free keywords in the search strategy were defined based on the aspects of the population (all), the exposure (SB), and the outcome (QoL and/or OHRQoL). The following electronic databases were searched: LILACS (Latin American & Caribbean Health Sciences Literature), PubMed, Science Direct, Scopus, and Web of Science. A non-peer reviewed gray literature search was also performed on Google Scholar, OpenGrey, and ProQuest Dissertation and Theses Global. Word truncations and word combinations were selected and adapted for each database search (Appendix 1; appendices can be found in the online version of this article at www.quintpub.com/journals). Additionally, studies were hand searched by checking the reference lists of the included studies. Experts were consulted in order to improve search findings, following the recommendations of Greenhalgh and Peacock.¹⁸ The end search date was December 20, 2019, across all databases. All references were managed by a reference manager (EndNote X7, Thomson Reuters), and duplicate results were removed.

Study Selection

Study selection was completed in two phases. In Phase 1, two authors (J.D. and F.L.D.) independently reviewed the titles and abstracts of all identified electronic database citations. Articles that did not appear to meet the inclusion criteria were discarded. In Phase 2, the same authors applied the inclusion criteria to the full texts of the remaining articles. The reference lists of selected studies were critically assessed by

both examiners. Any disagreement in the first or second phase was resolved by discussion until a mutual agreement between the two authors was attained. When they did not reach a consensus, a third author (C.M.) became involved to make a final decision.

Data Collection Process

Two authors (J.D. and F.L.D.) independently collected the data through a pre-established data collection form. The corresponding authors of included studies were contacted if the required data were not complete. The variables consisted of participants' gender, age, SB diagnosis (yes/no), and QoL/OHRQoL data. Both studies were analyzed independently with the variables given by the authors of the original studies.^{19,20} Statistical analyses were performed using SPSS software (version 21, IBM), consisting of descriptive and chi-square analyses ($\alpha = .05$), aiming to verify statistical significance among the groups with and without SB in relation to better or worse QoL.

Data Items

The following information was recorded: author; year; sample/setting; type of study; age; objectives; instrument of diagnosis; statistical analysis; outcomes; and main conclusions (Tables 1a and 1b).

Risk of Bias in Individual Studies

The methodology of selected studies was evaluated using the Joanna Briggs Institute critical appraisal checklists for analytical cross-sectional²¹ and case-control studies.²² Two authors (J.D. and P.P.) independently assessed the

Table 1b Descriptive Characteristics of Included Studies on Association Between Sleep Bruxism (SB) and Oral Health–Related Quality of Life (OHRQoL) (n = 11)

Study, y	Sample/setting	Type of study	Age (y)	Objective(s)
de Alencar et al, ²⁵ 2017	SB group: n = 34 (17 boys/17 girls) Control group: n = 32 (10 boys/22 girls). Children seeking dental care in Rio de Janeiro, Brazil	Case-control	3–7	To assess the impact of parent-reported SB, anxiety, and sociodemographic/socioeconomic features on OHRQoL
de Almeida, ²⁶ 2016	SB group: n = 33 (19 boys/14 girls) Control group: n = 42 (23 boys/19 girls). Children seeking dental care in Porto Velho, Brazil	Cross-sectional	3–5	To evaluate the impact of SB on OHRQoL in children between 3 and 5 years of age
Antunes et al, ²⁷ 2016	SB group: n = 21 Control group: n = 40 nonbruxers Public elementary schools in Nova Friburgo, Brazil	Case-control	3–6	To assess bruxism-associated factors and bruxism impact on OHRQoL
Camara-Souza et al, ²⁸ 2019	SB group: n = 30 Control group: n = 60 nonbruxers Piracicaba, Brazil	Case-control	24–36	To compare the OHRQoL and sleep quality in individuals with and without SB
Carvalho et al, ³⁰ 2015	SB group: n = 21 Control group: n = 40 nonbruxers Public elementary schools in Nova Friburgo, Brazil	Cross-sectional	11–14	To assess QoL in relation to oral health in schoolchildren with SB report
Costa, ²⁹ 2013	SB group: n = 225 (117 boys/108 girls) Control group: n = 250 (123 boys/127 girls) Schools in Bauru, Brazil	Cross-sectional	4–5	To assess the impact of possible SB on general QoL and OHRQoL in children and their families
Perazzo et al, ²⁰ 2017 ^a	SB group: n = 205 Control group: n = 556 Campina Grande, Brazil	Cross-sectional	5	To evaluate the influence of the perceptions of parents/caretakers and children regarding OHRQoL, as well as sense of coherence (SOC) of parents/caretakers on the use of dental services among Brazilian preschoolers.
Rodrigues-Montero, ³¹ 2014	SB group: n = 70 (48 girls/22 boys) Control group: n = 300 (161 boys/ 139 girls) Public schools in Bauru, Brazil	Cross-sectional	12–15	To identify the association among malocclusion, bruxism, and QoL in adolescents

B-ECOHIS = Brazilian version of the Early Childhood Oral Health Impact Scale; OHIP-14 = Oral Health Impact Profile; AASM = American Academy of Sleep Medicine; CPQ = Child Perceptions Questionnaire; OR = odds ratio; PSQI = Pittsburgh Sleep Quality Index; ESS = Epworth Sleepiness Scale; ES = effect size.

^aStatistical analyses were performed with the data bank transmitted by the authors of the original study.

Instrument(s)	Statistical analyses	Findings	Main conclusion
B-ECOHIS SB parental report (AASM criteria)	Logistic multiple-regression analysis and unpaired Mann-Whitney <i>U</i> test.	An association was found between SB and QoL for children ($P = .027$), family ($P = .027$), and total scores ($P = .015$). Thus, trait anxiety was the variable truly responsible for the impact on QoL ($P = .012$; OR = 1.05) instead of the presence of sleep bruxism ($P = .336$; OR = 1.77).	Anxiety was the main factor that interfered in the OHRQoL of children with SB.
B-ECOHIS SB parental report (AASM criteria)	Univariate and multiple Poisson regression analyses.	The use of pacifiers by children with SB showed a 2.3% greater chance of developing SB.	SB revealed no impact on children's OHRQoL.
B-ECOHIS SB parental report (AASM criteria) and clinical examination	Student <i>t</i> test, chi-square test, and OR.	The mean B-ECOHIS scores for total scale and subscales were low and without statistical significance regardless of the evaluated group ($P < .05$). The association between presence and absence of impact with bruxism or other variables showed no statistical relationship.	SB is related to respiratory problems, dental wear, dental caries, and malocclusion, but does not significantly affect the QoL of children.
OHIP-14 SB report, clinical examination plus portable electromyography and electrocardiography examinations during sleep (Bruxoff)	Chi-square and Student <i>t</i> test. OHIP-14, PSQI, and ESS data from both groups were compared using one-way ANOVA. The standardized ES were calculated by Cohen's <i>d</i> equation.	Compared to controls, bruxers had higher total OHIP-14 scores and the highest scores in all domains ($P < .001$), revealing the negative perception of OHRQoL in this group. Bruxers had poorer sleep quality (PSQI, $P < .001$; ES = 0.82) and excessive daytime sleepiness (ESS, $P = .013$; ES = 0.65).	SB may be related to negative OHRQoL and poor sleep quality in adults.
CPQ SB parental report (AASM criteria)	Descriptive analysis, Pearson chi-square test, likelihood ratio, OR, and multiple logistic regression.	The presence of SB increased the chance of having a greater effect on QoL (OR = 1.82, 95% CI = 1.54 to 2.10).	SB had a negative impact on OHRQoL in schoolchildren.
B-ECOHIS SB parental report and clinical examination	Mann-Whitney <i>U</i> test, Kruskal-Wallis test, and Spearman correlation coefficient.	The negative value for Spearman correlation coefficient test indicated that the higher the occurrence of SB, the lower the QoL of the child and their family. There was a significant association between the occurrence of bruxism and OHRQoL ($P = .00$), family OHRQoL ($P = .00$), and general OHRQoL ($P = .00$).	Bruxism showed a negative impact on OHRQoL in children and their families.
Scale of Oral Health Outcomes for Five-Year-Old Children. SB parental report (AASM criteria)	Descriptive analysis followed by Poisson regression analysis ($\alpha = 5\%$).	SB did not significantly impact OHRQoL ($P = .289^a$).	SB is not associated with a negative impact on OHRQoL in preschoolers.
OHIP-14 SB self-report (AASM criteria) and Tooth Wear Index	Chi-square, Spearman correlation, Mann-Whitney <i>U</i> , and Kruskal-Wallis tests.	Self-reported bruxism was found in 18.9% of adolescents. Bruxism, crowding, open bite, molar relationship, and maxillary misalignment were related to worse QoL ($P < .05$).	Bruxism and some types of malocclusion interfere in adolescents' QoL.

Table 1b Descriptive Characteristics of Included Studies on Association Between Sleep Bruxism (SB) and Oral Health–Related Quality of Life (OHRQoL) (n = 11) (continued)

Study, y	Sample/setting	Type of study	Age (y)	Objective(s)
Sarit et al, ³⁴ 2019	SB group: n = 38 (24 boys/14 girls) Control group: n = 70 (50 boys/20 girls) Schools in Mangaluru, India	Case control	12–15	To assess the impact of bruxism on OHRQoL
Silva et al, ³² 2017	SB group: n = 29 (19 boys/10 girls) Control group: n = 59 (30 boys/29 girls) Children seeking dental care, Federal University of Piauí, Brazil	Cross-sectional	2–5	To assess SB impact on OHRQoL in children in accordance with the perception of their parents/guardians
Thetakala et al, ³⁵ 2018	SB group: n = 67 Control group: n = 145 Male prisoners, India	Cross-sectional	18–80	To determine the prevalence of active SB and its impact on OHRQoL among inmates in Central Penal Institution, Mysore, India

B-ECOHIS = Brazilian version of the Early Childhood Oral Health Impact Scale; OHIP-14 = Oral Health Impact Profile; AASM = American Academy of Sleep Medicine; CPQ = Child Perceptions Questionnaire; OR = odds ratio; PSQI = Pittsburgh Sleep Quality Index; ESS = Epworth Sleepiness Scale; ES = effect size.
^aStatistical analyses were performed with the data bank transmitted by the authors of the original study.

quality of each included study. Disagreements between the reviewers were resolved by a third author (C.M.). The possible answers to each of the risk of bias questions were yes, no, or unclear. Risk of bias was categorized as high if a study achieved a total score (percentage of “yes” responses) of up to 49%; moderate if a study achieved a total score of 50% to 69%; and low if the total score was 70% or higher. RevMan 5.3 software (The Cochrane Collaboration) was used to generate figures.

Synthesis of Results

The synthesis of the results was performed qualitatively. Results can be seen in Tables 1a and 1b.

Confidence in Cumulative Evidence

The overall quality of evidence was assessed using the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) criteria.²³

Risk of Bias Across Studies and Additional Analyses

Clinical, methodologic, and statistical heterogeneity were assessed to decide if performing a meta-analysis would be plausible.

In two studies,²⁰ it was necessary to perform additional statistical analyses because the data concerning SB and QoL were unavailable in the articles. Chi-square tests were applied to the data to assess statistical significance ($\alpha = .05$). SPSS software was used for this purpose.

Results

Study Selection

During the initial search (Phase 1), 1,670 different citations were identified across five electronic databases. After careful evaluation of the abstracts, only 26 studies were deemed potentially useful and selected for Phase 2 assessment. A total of 100 additional citations from Google Scholar and 1 from OpenGrey were evaluated, and two experts were consulted for additional literature that may have been missed. Of these studies, only 2 were deemed appropriate for Phase 2 assessment. No additional study that might have been inadvertently missed by the search procedures was identified after further reviewing the reference lists. Therefore, 28 studies were screened in Phase 2 (Fig 1). Of these studies, 14 were subsequently excluded (Appendix 2), and another 14 were retained for the final qualitative synthesis. Two articles^{19,20} did not have the objective of evaluating the impact of SB on QoL; nonetheless, they reported that the variables were collected in their studies. The corresponding authors were contacted by email and kindly transmitted the data.

Study Characteristics

The included studies were all published in the last 10 years and came from three different countries: Brazil,^{19,20,24–32} Colombia,³³ and India.^{34,35} Thirteen studies^{19,20,24–34} included men and female women, and one study³⁵ evaluated only men. Eleven stud-

Instrument(s)	Statistical analyses	Findings	Main conclusion
CPQ SB self-report (AASM criteria) and clinical examination	Likelihood ratio test and chi-square test.	There was no statistically significant association between any of the variables and overall OHRQoL score. However, bruxism was significantly associated with the domain related to emotional well-being ($P < .05$, OR = 3.03, 95% CI = 1.32–6.96).	Bruxism had a significant impact on OHRQoL subscales, namely the emotional well-being and social well-being domains.
B-ECOHis SB parental report (AASM criteria)	Descriptive analysis and Poisson regression with significance level of $P < .05$.	SB prevalence in children was 33.0%. The negative impact on QoL related to oral health of children was associated with SB ($R = 1.238$; 95% CI = 1.055–1.452).	SB had a negative impact on OHRQoL in children according to perceptions of parents/guardians.
OHIP-14 SB (AASM criteria)	Data analysis was done using descriptive statistics, chi-square test, t test, ANOVA, and linear regression model.	The mean OHIP-14 score was significantly higher ($P < .001$) among the inmates with active SB (38.52 ± 12.8) suggesting a high oral health impact compared to inmates without this disorder (31.67 ± 12).	The prevalence of active SB was higher among the inmates of the penal institution compared to the general population. The active SB had a negative impact on OHRQoL.

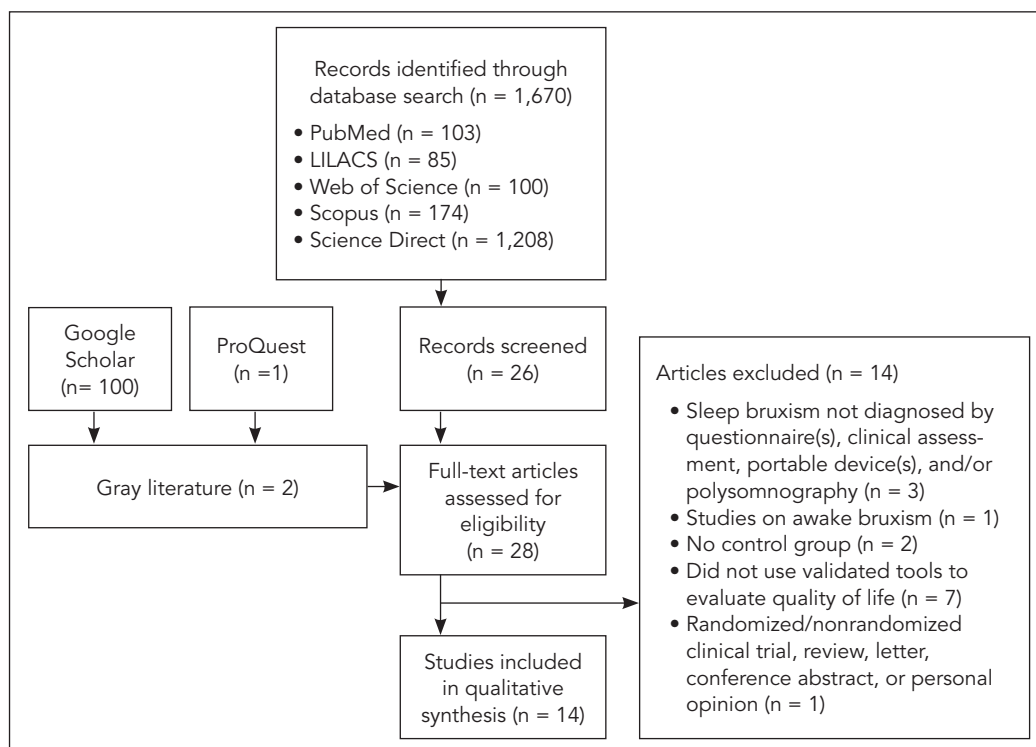


Fig 1 Flowchart of literature search and selection criteria.

ies^{20,24–27,29–34} included children and adolescents in their samples (aged 2 to 15 years), and 3^{19,28,35} had samples composed only of adults (aged 18 to 80 years). Sample sizes ranged from 61 to 1,556 individuals. Nine studies^{19,20,24,25,27,28,33–35} were published in

English, and 5^{26,29–32} were published in Portuguese. Four^{25,27,28,34} of the selected studies had a case-control design, and 10 studies^{19,20,24,26,29–33,35} were cross-sectional.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Castelo et al ²⁴ (general QoL; children)	+	+	-	+	-	-	+	+
Manfredini et al ³³ (general QoL; children)	+	+	-	+	-	-	+	+
Lucchesi et al ¹⁹ (general QoL; adults)	+	+	-	+	-	-	+	+
de Almeida ²⁶ (OHRQoL; children/adolescents)	+	+	-	+	-	-	+	+
Carvalho et al ³⁰ (OHRQoL; children/adolescents)	+	+	-	+	+	+	+	+
da Costa ²⁹ (OHRQoL; children/adolescents)	+	+	-	+	-	-	?	+
Perazzo et al ²⁰ (OHRQoL; children/adolescents)	+	+	-	+	-	-	+	+
Rodriguez-Montero ³¹ (OHRQoL; children/adolescents)	+	+	-	+	-	-	+	+
Silva et al ³² (OHRQoL; children/adolescents)	+	+	-	+	-	-	+	+
a Thetakala et al ³⁵ (OHRQoL; adults)	+	+	-	+	-	-	+	+

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
de Alencar et al ²⁵ (OHRQoL; children/adolescents)	+	+	+	-	+	+	+	+	-	+
Antunes et al ²⁷ (OHRQoL; children/adolescents)	+	+	+	-	+	-	-	+	-	+
Sarit et al ³⁴ (OHRQoL; children/adolescents)	+	-	+	-	+	-	-	+	-	+
b Câmara-Souza et al ²⁸ (OHRQoL; children/adolescents)	+	+	+	+	+	-	-	+	?	+

Fig 2 Risk of bias for (a) cross-sectional and (b) case-control studies. + = low risk of bias; - = high risk of bias; ? = unclear risk of bias. Q1 = Were the criteria for inclusion in the sample clearly defined?; Q2 = Were the study subjects and the setting described in detail?; Q3 = Was the exposure measured in a valid and reliable way? Q4 = Were objective, standard criteria used for measurement of the condition?; Q5 = Were confounding factors identified?; Q6 = Were strategies to deal with confounding factors stated?; Q7 = Were the outcomes measured in a valid and reliable way?; Q8 = Was appropriate statistical analysis used?; Q9 = Was the exposure period of interest long enough to be meaningful?; Q10 = Was appropriate statistical analysis used?

Health-Related QoL Studies

Three studies considered the association between SB and health-related QoL,^{19,24,33} all from South America: two from Brazil^{19,24} and one from Colombia.³³ Two had samples of children,^{24,33} and one had a sample of adults.¹⁹

OHRQoL Studies

Eleven studies^{20,25-32,34,35} evaluated OHRQoL, 9 from Brazil^{20,25-32} and 2 from India.^{34,35} Nine studies had samples of children/adolescents,^{20,25-27,29-32,34} and 2 had adult samples.^{28,35} Five studies^{25-27,29,32} used the Brazilian version of the ECOHIS questionnaire (B-ECOHIS), 3 studies^{28,31,35} used the OHIP-14, 2 used the CPQ,^{30,34} and 1 used the Scale of Oral Health Outcomes for 5-year-old children (SOHO-5)²⁰ for the SB/OHRQoL assessment.

Risk of Bias Within Studies

All selected studies were grouped by age and the type of variable related to SB (QoL or OHRQoL). Two of the general QoL studies were performed in children^{24,33} and one in adults¹⁹ (moderate risk of bias). Nine studies^{20,25-27,29-32,34} evaluated SB and OHRQoL in children and adolescents; of these, six had moderate^{26,27,29,31,32,34} and three^{20,25,30} had low risk of bias. Two studies^{28,35} were performed in adults, one with low risk²⁸ and the other a moderate risk³⁵ of bias (Fig 2). More information about

the risk of bias of included studies is summarized in Appendices 3a and 3b. Lower scores were mostly given for the questions addressing the identification of confounding factors and exposures measured in the cross-sectional studies. Regarding case-control studies, the worst scores were related to the method of measurement, since SB diagnosis was not ideally assessed, confounders were not identified, and the follow-up period was not specified.

Results of Individual Studies

The results show that health-related QoL was correlated with SB in some domains in three social layers, but not in general scores of QoL in the Colombian article.³³ The studies performed in Brazil showed no association between SB and general QoL, and used different tools for children and adults: the Portuguese version of Autoquestionnaire Qualité de Vie Enfant Imagé (P-AUQUEI)²⁴ and the World Health Organization Quality of Life: Brief Version (WHOQOL-BREF),¹⁹ respectively. The study with adult participants¹⁹ did not specifically report the association between SB and QoL, but an effort was made to include the data due to the satisfactory methodologic quality. The authors made the data available; therefore, the variables “presence of bruxism” and “QoL” were considered for statistical analysis. No statistical difference was observed with the cross-tabulated data “absence or presence

of SB" or "worse or better quality of life" ($P = .137$).

The association between SB and OHRQoL did not differ when considering the heterogeneity of results, whether SB was classified as possible^{20,25,26,30,32,35} or probable.^{27,29,31,34} The case-control study that classified definitive SB²⁸ showed a negative impact of SB on OHRQoL and on sleep quality in adults.

Results of the selected studies are reported in Tables 1a and 1b.

Synthesis of Results and Confidence in the Cumulative Evidence

The results show that SB seems not to affect health-related QoL, but has a negative impact on some domains of OHRQoL. All the studies^{19,24,33} evaluating the association of SB with QoL showed no statistical significance when the overall scores were considered. When the association of SB with OHRQoL was evaluated, seven^{25,28–32,35} studies showed SB had an impact on OHRQoL, and four^{20,26,27,34} did not. Some questionnaire domains presented statistical significance. The qualitative analysis is summarized in Table 2.

A meta-analysis was not performed because of the high heterogeneity of the studies due to different ages (children/adults), types of studies (case-control/cross-sectional), SB diagnoses (possible/probable/definite), sample sizes, and the use of different tools to assess QoL.

The overall quality of evidence identified using GRADE was very low (Fig 2). The reasons were: most studies did not assess or control for potential confounders; there were serious inconsistencies; different approaches to assessing the outcomes were used; and the presence of serious imprecision, since the estimate of effect cannot be considered accurate. Additionally, some studies had small sample sizes.

Discussion

Summary of Evidence

The objective of this review was to evaluate whether SB is associated with a negative impact on health-related QoL and/or OHRQoL in the general population.

Table 2 Summary of Qualitative Analysis (n = 14)

	Statistical significance (overall)	Condition(s)
<i>General QoL measure</i>		
P-AUQUEI		
Castelo et al, ²⁴ 2010	No	
PedsQL 4.0		
Manfredini et al, ³³ 2017	Yes	Correlation values for the significant variables were low, and statistical significance was reported in the following domains: emotional functioning, school functioning and psychosocial health summary score.
WHOQOL-BREF		
Lucchesi et al, ¹⁹ 2010	No	Considers the domain of individuals' perception of their own QoL.
<i>OHRQoL measure</i>		
B-ECOHIS		
de Alencar et al, ²⁵ 2017	Yes	Anxiety was found to be the main variable responsible for impact on OHRQoL.
de Almeida, ²⁶ 2016	No	
Antunes et al, ²⁷ 2016	No	
Costa, ²⁹ 2013	Yes	
Silva et al, ³² 2017	Yes	
CPQ		
Carvalho et al, ³⁰ 2015	Yes	
Sarit et al, ³⁴ 2019	No	Statistically significant difference in emotional well-being and social well-being domains.
OHIP-14		
Câmara-Souza et al, ²⁸ 2019	Yes	
Rodrigues-Montero, ³¹ 2014	Yes	
Thetakala et al, ³⁵ 2018	Yes	
SOHO-5		
Perazzo et al, ²⁰ 2017	No	

P-AUQUEI = Portuguese version of the Autoquestionnaire Qualité de Vie Enfant Imagé; PedsQL = Pediatric Quality of Life Inventory; WHOQOL-BREF = World Health Organization Quality of Life: Brief Version; B-ECOHIS = Brazilian version of the Early Childhood Oral Health Impact Scale; CPQ = Child Perceptions Questionnaire; OHIP-14 = Oral Health Impact Profile; SOHO-5 = Scale of Oral Health Outcomes for 5-year-old children.

The results show that SB seems not to affect health-related QoL; however, when the association with OHRQoL was assessed, the results were controversial. SB has a multifactorial etiology, and there is no consensus in the literature regarding the relevance of each factor to its development.³⁶ Another probable cause is the temporality and the proper nature of this sleep behavior, since it is not considered a disturbance for healthy individuals, as reported by the most recent international consensus of experts.²

No other systematic review has evaluated the impact of SB on the QoL of the general population.³⁷ The reason for combining studies of all ages was to examine whether the association of SB and health-related QoL and/or OHRQoL exists, and, if

so, to examine the characteristics present in the age groups, as well as their differences and similarities. One recently published systematic review evaluated the association between SB and OHRQoL in children up to 6 years of age¹⁴ and concluded the evidence was insufficient to affirm or deny the impact of SB on OHRQoL based on the three included studies. In the present systematic review, all six studies that assessed SB and OHRQoL, performed with samples of 2- to 7-year-old children, were from Brazil. Five used the B-ECOHIS,^{25-27,29,32} and one used the SOHO-5.²⁰ Half of the studies showed statistical significance ($P < .05$) for the association between SB and OHRQoL. This result shows it is not possible to affirm the impact of SB on OHRQoL. One study found that anxiety was the main factor that interfered in the OHRQoL of children with SB.²⁵ Some aspects presented an association with SB, including respiratory problems,²⁷ dental wear,²⁷ dental caries,²⁷ malocclusion,^{27,31} sleep quality,²⁸ negative impact on QoL of children and their families,²⁹ school functioning,³³ psychosocial health,³³ and emotional^{33,34} and social well-being.³⁴ These conclusions suggest the need for a wider analysis of variables to come to the right conclusions about this matter, such as sleep quality assessment, evaluation of respiratory patterns, facial skeletal characteristics, dental malocclusion, psychologic characteristics, genetics, heredity, and behavioral and environmental factors, as well as self-perception of QoL. The self-perception in studies with children is even more complicated because of the difficulty of data interpretation about subjective themes. Children's parents answered the B-ECOHIS, so the validity of the results is even more doubtful.

All three studies that used the OHIP-14 for OHRQoL assessment found an association between SB and worse QoL. Two studies performed in adults had different designs; one used electromyography,²⁸ and the other used a questionnaire for SB diagnosis in a sample of male prisoners.³⁵ The last one used the OHIP-14 for a sample of 12- to 15-year-old adolescents and self-reports for SB assessment.³¹ In addition to this study, there were two more included studies that evaluated the association between SB and OHRQoL in the age group from 11 to 15 years, but with the use of the CPQ.^{30,34} One of them had statistical significance considering the overall score,³⁰ while the other did not present the same result.³⁴ These characteristics show the high heterogeneity in studies of adults and adolescents, indicating the need for standardization in order to have more comparable studies. In addition, OHRQoL questionnaires are mainly destined for caries and not for all specific oral diseas-

es/conditions. This is also a limitation that must be considered.

SB may be combined with other factors that may also be associated with QoL. These factors can negatively influence QoL (for example, dental pain³⁸ and headache).³⁹ Individuals with SB but without a significant symptomatology do not report worse QoL. This may be one of the reasons for the heterogeneous results.

Some important limitations of the included studies should be considered regarding QoL perceptions. SB noises disturb those in the same room (spouse or sibling), but for the child, there is no difference at all, because they are sleeping while the SB happens. Another limitation is that parents answer QoL questionnaires of studies in children, so the perception of QoL is from the parents' point of view, and not the children telling about their perceptions.

All selected studies were cross-sectional, and most based on questionnaires and parental reports, so the results must be considered with caution. QoL is a subjective variable with an intrinsic risk of bias, especially because it is assessed with questionnaires and depends on the individuals' perceptions. In addition, there is the risk of a reporting bias because of the difficulty of publishing data without statistical significance. The systematic review attempted to diminish reporting bias by asking authors directly for data and searching the gray literature to answer the main question.

Conclusions

There is insufficient scientific evidence to support or disprove the association between SB and QoL/OHRQoL in the general population.

Highlights

- Knowledge about the possible association between SB and QoL is important for the clinical practice of orofacial pain and TMD, as these factors (SB and orofacial pain) may occur concomitantly and frequently.
- There is a need for prospective studies involving variables that present an association with SB.

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J.D.: all phases of review elaboration; F.L.D.: Phase 1 of review process; P.P.: Phase 2 of review process, figure elaboration, and manuscript writing/review; C.M.: Phase 2 and manuscript writing/review; M.B., A.L.C.H., and G.L.C.: manuscript writing and review.

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Appendix 1 Database Search

Database	Search (December 20, 2019)
Web of Science	(bruxism OR "sleep bruxism" OR "teeth grinding" OR "tooth grinding" OR "tooth clenching" OR "teeth clenching" OR "parafunction" OR "parafunctions") AND ("quality of life" OR "life quality" OR "health related quality of life" OR "oral related quality of life" OR HRQoL OR OHRQoL)
Scopus	(TITLE-ABS-KEY (bruxism OR "teeth grinding" OR "tooth grinding" OR "parafunction" OR "parafunctions" OR "teeth clenching" OR "tooth clenching") AND TITLE-ABS-KEY ("quality of life" OR "life quality" OR "Health related quality of life" OR "oral related quality of life" OR hrqol OR ohrqol))
PubMed	(((((("bruxism"[MeSH Terms] OR "bruxism"[All Fields]) OR ("sleep bruxism"[MeSH Terms] OR ("sleep"[All Fields] AND "bruxism"[All Fields]) OR "sleep bruxism"[All Fields])) AND ("bruxism"[MeSH Terms] OR "bruxism"[All Fields] OR ("tooth"[All Fields] AND "grinding"[All Fields]) OR "tooth grinding"[All Fields])) AND ("bruxism"[MeSH Terms] OR "bruxism"[All Fields] OR ("teeth"[All Fields] AND "grinding"[All Fields]) OR "teeth grinding"[All Fields])) OR ((("tooth"[MeSH Terms] OR "tooth"[All Fields]) AND clenching[All Fields])) OR ((("tooth"[MeSH Terms] OR "tooth"[All Fields] OR "teeth"[All Fields]) AND clenching[All Fields])) OR parafunction[All Fields] OR parafunctions[All Fields]) AND (((("quality of life"[MeSH Terms] OR "quality"[All Fields] AND "life"[All Fields]) OR "quality of life"[All Fields]) OR ("quality of life"[MeSH Terms] OR "quality"[All Fields] AND "life"[All Fields]) OR "quality of life"[All Fields] OR ("life"[All Fields] AND "quality"[All Fields]) OR "life quality"[All Fields])) OR ("quality of life"[MeSH Terms] OR "quality"[All Fields] AND "life"[All Fields]) OR "quality of life"[All Fields] OR ("health"[All Fields] AND "related"[All Fields] AND "quality"[All Fields] AND "life"[All Fields]) OR "health related quality of life"[All Fields])) OR ((("oral health"[MeSH Terms] OR ("oral"[All Fields] AND "health"[All Fields]) OR "oral health"[All Fields]) AND a related[All Fields] AND ("quality of life"[MeSH Terms] OR ("quality"[All Fields] AND "life"[All Fields]) OR "quality of life"[All Fields])) OR ("quality of life"[MeSH Terms] OR "quality"[All Fields] AND "life"[All Fields]) OR "quality of life"[All Fields] OR "hrqol"[All Fields])) OR OHRQoL[All Fields])
LILACS	(tw:(bruxism OR "teeth grinding" OR "tooth grinding" OR parafuncion OR parafuncions OR "teeth clenching" OR "tooth clenching" OR bruxismo OR parafunc* OR "ranger de dentes" OR "rangimento d* dentes" OR "ranger de dientes")) AND (tw:(("quality of life" OR "life quality" OR "Health related quality of life" OR "oral related quality of life" OR hrqol OR ohrqol OR "qualidade de vida" OR "calidad de vida"))
Google Scholar	(bruxism AND "quality of life")
ProQuest Dissertation and Theses	(bruxism OR "teeth grinding" OR "tooth grinding" OR "parafuncion" OR "parafuncions" OR "teeth clenching" OR "tooth clenching") AND ("quality of life" OR "life quality" OR "health related quality of life" OR "oral related quality of life" OR HRQoL OR OHRQoL)
Science Direct	(bruxism OR "teeth grinding" OR "tooth grinding" OR "parafuncion" OR "parafuncions" OR "teeth clenching" OR "tooth clenching") AND ("quality of life" OR "life quality" OR "Health related quality of life" OR "oral related quality of life" OR hrqol OR ohrqol)
OpenGrey	bruxism OR "teeth grinding" OR "tooth grinding" OR "parafuncion" OR "parafuncions" OR "teeth clenching" OR "tooth clenching") AND noft("quality of life" OR "life quality" OR "health related quality of life" OR "oral related quality of life" OR HRQoL OR OHRQoL)

Appendix 2 Excluded Articles and Reasons for Exclusion

Study, y	Reason for exclusion
Cavallo et al, ¹ 2014	No control group
Cavallo et al, ² 2016	Did not use validated tools to evaluate quality of life
Einarson et al, ³ 2014	Sleep bruxism not diagnosed by questionnaire(s), clinical assessment, portable device(s), and/or polysomnography
Fulgêncio, ⁴ 2013	Did not use validated tools to evaluate quality of life
Ghalebani et al, ⁵ 2011	No control group
Inglehart et al, ⁶ 2014	Randomized/nonrandomized clinical trial, review, letter, conference abstract, personal opinion
Mengatto et al, ⁷ 2013	Did not use validated tools to evaluate quality of life
Murrieta et al, ⁷ 2014	Did not use validated tools to evaluate quality of life
Ohayon, et al, ⁹ 2001	Did not use validated tools to evaluate quality of life
Papagianni et al, ¹⁰ 2013	Sleep bruxism not diagnosed by questionnaire, clinical assessment, portable devices, and/or polysomnography
Puliti, ¹¹ 2012	Study on awake bruxism
Sakaguchi et al, ¹² 2014	Did not use validated tools to evaluate quality of life
Serra-Negra et al, ¹³ 2012	Did not use validated tools to evaluate quality of life
Yamashita et al, ¹⁴ 2015	Sleep bruxism not diagnosed by questionnaire, clinical assessment, portable devices, and/or polysomnography

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Appendix 3a Joanna Briggs Institute Critical Appraisal Checklist for Analytical Cross-Sectional Studies

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Total (% score Y)	Risk of bias
Sleep bruxism/general quality of life										
Children										
Castelo et al, ²⁴ 2010	Y	Y	N	Y	N	N	Y	Y	62.5	Moderate
Manfredini et al, ³³ 2017	Y	Y	N	Y	N	N	Y	Y	62.5	Moderate
Adults										
Lucchesi et al, ²³ 2010	Y	Y	N	Y	N	N	Y	Y	62.5	Moderate
Sleep bruxism/oral health-related quality of life										
Children/adolescents										
Almeida, ²⁶ 2016	Y	Y	N	Y	N	N	Y	Y	62.5	Moderate
Carvalho et al, ³⁰ 2015	Y	Y	N	Y	Y	Y	Y	Y	87.5	Low
Costa, ²⁹ 2013	Y	Y	N	Y	N	N	U	Y	50	Moderate
Perazzo et al, ²⁰ 2017	Y	Y	N	Y	N	N	Y	Y	62.5	Moderate
Rodrigues-Montero, ³¹ 2014	Y	Y	N	Y	N	N	Y	Y	62.5	Moderate
Silva et al, ³² 2017	Y	Y	N	Y	N	N	Y	Y	62.5	Moderate
Adults										
Thetakala et al, ³⁵ 2018	Y	Y	N	Y	N	N	Y	Y	62.5	Moderate

Y = yes; N = no; U = unclear; Q1 = Were the criteria for inclusion in the sample clearly defined?; Q2 = Were the study subjects and the setting described in detail? Q3 = Was the exposure measured in a valid and reliable way?; Q4 = Were objective, standard criteria used for measurement of the condition? Q5 = Were confounding factors identified?; Q6 = Were strategies to deal with confounding factors stated?; Q7 = Were the outcomes measured in a valid and reliable way?; Q8 = Was appropriate statistical analysis used?

Total = Sum of yes responses/applicable items (nonapplicable items were excluded from the sum).

Risk of bias was categorized as high when the total score was \leq 49%, moderate when the score reached 50%–69%, low when the score reached \geq 70%.

Appendix 3b Joanna Briggs Institute Critical Appraisal Checklist for Analytical Case-Control Studies

Study, y	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total (% score Y)	Risk of bias
Sleep bruxism/oral health-related quality of life												
Children/adolescents												
de Alencar et al, ²⁵ 2017	Y	Y	Y	N	Y	Y	Y	Y	N	Y	80	Low
Antunes et al, ²⁷ 2016	Y	Y	Y	N	Y	N	N	Y	N	Y	60	Moderate
Sarit et al, ³⁴ 2019	Y	N	Y	N	Y	N	N	Y	N	Y	50	Moderate
Adults												
Câmara-Souza et al, ²⁸ 2018	Y	Y	Y	Y	Y	N	N	Y	U	Y	80	Low

Y = yes; N = no; U = unclear; Q1: Were the groups comparable, other than the presence of disease in cases or the absence of disease in controls?;

Q2: Were cases and controls matched appropriately?; Q3 = Were the same criteria used for identification of cases and controls?; Q4 = Was exposure measured in a standard, valid, and reliable way?; Q5 = Was exposure measured in the same way for cases and controls?; Q6 = Were confounding factors identified?; Q7: Were strategies to deal with confounding factors stated?; Q8 = Were outcomes assessed in a standard, valid, and reliable way for cases and controls?; Q9 = Was the exposure period of interest long enough to be meaningful?; Q10 = Was appropriate statistical analysis used?

Total = Sum of yes responses/applicable items (nonapplicable items were excluded from the sum).

Risk of bias was categorized as high when the total score was \leq 49%, moderate when the score reached 50%–69%, low when the score reached \geq 70%.