Malocclusion as a Marker for Sleep-Disordered Breathing Risk in Children: A Prospective Analysis Using the Pediatric Sleep Questionnaire

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BACKGROUND

- Pediatric obstructive sleep-disordered breathing (oSDB) affects approximately 10–15% of children and is associated with neurocognitive, behavioral, and systemic consequences
- Craniofacial and occlusal characteristics such as posterior crossbite and anterior open bite have been associated with elevated SDB risk
- Dentists routinely evaluate occlusion during key developmental periods and may be well positioned to identify children at increased risk

OBJECTIVES

To evaluate the association between malocclusion characteristics and sleep-disordered breathing risk, as measured by the pediatric sleep questionnaire (PSQ), and assess age, gender, and caries experience (dmft/DMFT) as potential modifying variables

MATERIALS & METHODS

Participants & Eligibility
• Children aged 2–11 years
• Columbia Pediatric Dental Clinic
• Exclusion criteria applied

Recruitment
• Eligible clinic patients recruited
• Parent consent obtained

Data Collection
• Clinical examination (malocclusion traits)
• Caries assessment (dmft/DMFT)
• Demographics recorded

PSQ Assessment
• Parents completed validated PSQ
• ≥0.33 = High SDB risk

Statistical Analysis
• Logistic regression
• ORs with 95% CI
• Covariates: age, gender, caries

RESULTS

Study Sample

- 106 children enrolled prospectively from a dental setting
- Mean age 6.8 years
- 58 participants (54.7%) female, 48 (45.3%) male

SDB Screening Outcomes

- 16 children (15.1%) screened positive for elevated SDB risk based on PSQ score
- 90 children (84.9%) screened negative
- SDB risk prevalence in this sample is consistent with reported rates in the general pediatric population (estimated 3–14%)

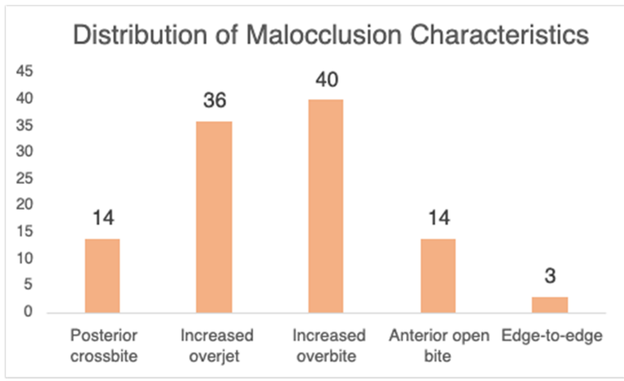
Individual Malocclusion Characteristics

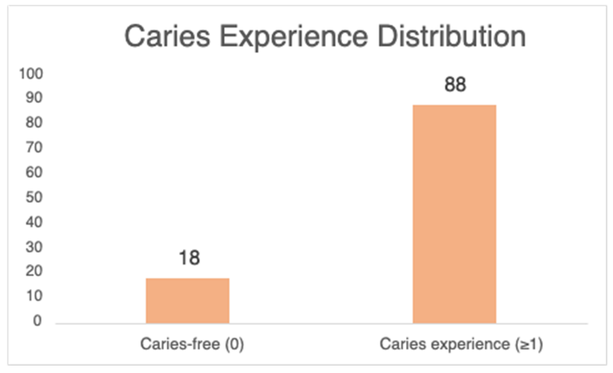
- Malocclusion traits were assessed individually for association with PSQ-defined SDB risk
- No single occlusal characteristic reached statistical significance
- Findings suggest isolated malocclusion traits may have limited predictive value when evaluated independently

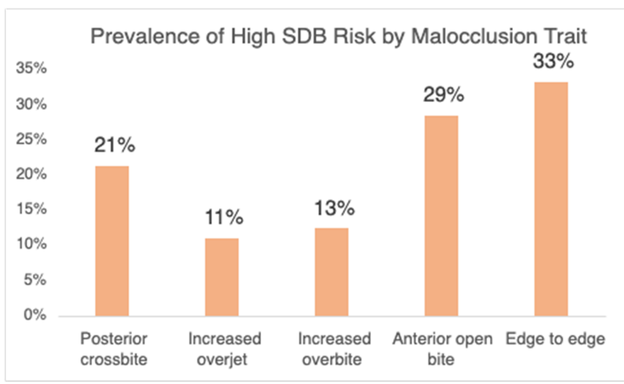
Composite Dolichofacial Variable

- Traits associated with a dolichofacial craniofacial pattern were grouped into a composite variable
- Children presenting with ≥1 dolichofacial trait demonstrated notably higher odds of elevated SDB risk vs. those with no traits:
  - OR 2.56 (95% CI 0.85–7.69; p=0.095)
- Although this did not reach conventional statistical significance (p<0.05), the effect size is clinically meaningful
- Wide confidence interval and trend-level p-value likely reflect limited sample size rather than absence of a true effect
- Results support the hypothesis that craniofacial pattern, rather than isolated occlusal findings, may be a more relevant risk indicator for SDB in children

RESULTS







DISCUSSION

- While prior studies have reported associations between specific malocclusion traits—including posterior crossbite, increased overjet, and anterior open bite—and SDB, findings across the literature remain inconsistent, and our results did not demonstrate statistically significant associations for any individual trait examined. This variability likely reflects differences in study design, sample composition, SDB diagnostic criteria, and the multifactorial nature of airway obstruction in children.
- The absence of significance in this study should be interpreted cautiously; with only 16 high-risk cases, the analysis was likely underpowered, making a type II error probable. The observed OR of 2.56 for the dolichofacial composite variable represents a clinically meaningful effect size that may reach significance with an adequately powered sample.
- Importantly, the dolichofacial growth pattern—not isolated occlusal traits—emerged as the more relevant unit of analysis, aligning with evidence that vertical craniofacial morphology, including increased lower anterior face height, steep mandibular plane angle, and retrognathia, is associated with anatomically compromised airways and increased SDB risk in children.
- The PSQ is a validated, widely used screening tool with reported sensitivity of 0.85 and specificity of 0.87 for SDB detection; however, it is inherently limited by parent-reported symptom recall and does not capture craniofacial or occlusal findings. This underscores the complementary—and arguably irreplaceable—role of dental examination, particularly in non-obese children whose SDB risk may be driven more by craniofacial anatomy than adiposity-related airway narrowing
- For the dentist, these findings reinforce a compelling clinical message: the dental chair may be the first place a child's airway risk is recognized. Orthodontists and pediatric dentists routinely assess facial growth patterns, arch morphology, and occlusal development—the features that may signal underlying airway compromise. Tools such as the Pediatric Sleep Questionnaire can be feasibly integrated into dental intake workflows as a low-burden, high-yield adjunct to clinical observation
- This study is limited by its relatively small high-risk cohort, reliance on questionnaire-based screening rather than polysomnography as the diagnostic gold standard, and use of a convenience sample from a single academic setting, which may restrict generalizability to community-based or more demographically diverse populations.

CONCLUSIONS

- No statistically significant association was found between individual malocclusion traits and elevated SDB risk as measured by the PSQ
- Children presenting with ≥1 dolichofacial trait showed a 2.56-fold increase in odds of elevated SDB risk—a clinically meaningful trend that did not reach statistical significance, likely due to sample size limitations
- Findings suggest that craniofacial growth pattern may be a more informative screening indicator than any isolated malocclusion characteristic
- Dentists are uniquely positioned to recognize dolichofacial features during routine examination, making the dental visit a valuable—and currently underutilized—opportunity for early SDB risk identification
- A composite craniofacial screening approach may improve sensitivity for detecting at-risk children compared to evaluating individual occlusal traits alone
- Larger prospective studies with greater statistical power are needed to validate these findings and determine whether specific malocclusion traits or craniofacial profiles can serve as reliable, actionable screening indicators for SDB