

INPLASY

Impact of Adenotonsillectomy on Neurocognitive and Behavioral Outcomes in Pediatric Sleep-Disordered Breathing: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - Nil.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 March 2026 and was last updated on 11 March 2026.

INTRODUCTION

Review question / Objective To investigate the impact of adenotonsillectomy on neurocognitive and behavioral outcomes in children with sleep-disordered breathing and obstructive sleep apnea.

Condition being studied We conducted a systematic review and meta-analysis to quantitatively evaluate the association between adenotonsillectomy and neurocognitive and behavioral outcomes in children with SDB, with specific emphasis on subjective behavioral assessments, objective neurocognitive performance, and ADHD-related symptom measures.

METHODS

Participant or population Pediatric participants diagnosed with sleep-disordered breathing and obstructive sleep apnea.

Intervention Surgical intervention consisting of tonsillectomy with or without adenoidectomy.

Comparator No surgical intervention.

Study designs to be included Randomised controlled trials and prospective studies.

Eligibility criteria (1) included pediatric participants diagnosed with OSA or SDB; (2) evaluated surgical intervention consisting of tonsillectomy with or without adenoidectomy; (3) incorporated clearly defined intervention and comparison groups; and (4) reported subjective or objective neurocognitive or behavioral outcomes, with available pre- and post-intervention assessments or reported between-group differences.

Information sources A comprehensive literature search was performed in PubMed, EMBASE, and the Cochrane Library (including the Database of Systematic Reviews and Central Register of

Controlled Trials) from database inception through August 15, 2025, without language restrictions.

Main outcome(s) Because a wide range of neurocognitive assessment instruments was used across studies, outcomes were categorized into three domains: subjective questionnaire-based measures, objective performance-based measures, and ADHD-specific measures. When two or more studies reported comparable outcomes within the same domain, data were pooled for meta-analysis. When both teacher- and parent-reported assessments were available, parent-reported measures were prioritized to enhance consistency across studies. Given that outcomes were evaluated using different validated instruments, standardized mean differences (SMDs) were calculated to facilitate comparison and quantitative synthesis across studies.

Quality assessment / Risk of bias analysis Risk-of-bias assessments for the randomized controlled trials, conducted using the Cochrane Risk of Bias 2 (RoB 2) tool, are presented in Table S1. All four trials employed a single-blind design because sham surgery was not ethically feasible; however, outcome assessors were blinded to treatment allocation. Overall, all included randomized controlled trials were judged to be at low risk of bias across evaluated domains.

Methodological quality of the non-randomized studies, assessed using the Newcastle–Ottawa Scale (NOS), is also summarized in Table S1. One study (Huang et al.[22]) enrolled children with pre-existing ADHD, meaning all participants had baseline behavioral symptoms prior to intervention. Across the included cohort studies, NOS scores ranged from 8 to 9, indicating moderate to high methodological quality.

Strategy of data synthesis A random-effects model was applied to account for anticipated clinical and methodological heterogeneity across studies. Because neurocognitive and behavioral outcomes were assessed using different instruments, standardized mean differences (SMDs) were calculated using Hedges' to allow comparison across scales and were subsequently pooled for meta-analysis.

Subgroup analysis When sufficient data were available, subgroup analyses and meta-regression were performed to explore potential sources of heterogeneity. Sensitivity analyses were conducted using a leave-one-out approach to assess the robustness of pooled estimates. Because the number of included studies was limited, formal assessment of publication bias using funnel plots

or regression-based tests was not performed. All statistical tests were two-sided, and $p < 0.05$ was considered statistically significant.

Sensitivity analysis Sensitivity analyses were conducted using a leave-one-out approach. The pooled estimates remained stable after sequential exclusion of each individual study, indicating that no single study disproportionately influenced the overall results.

Country(ies) involved Taiwan.

Keywords pediatric OSA, sleep-disordered breathing, neurocognition, behavior, adenotonsillectomy.

Contributions of each author

Author 1 - Yi-Chieh Lee - Author 1 did the analysis and drafted the manuscript.

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Author 2 - Chun-Ting Lu - Author 2 did the search and data collection.

Author 3 - Yun-Ting Wang - Author 3 reviewed the literature and drafted the discussion.

Author 4 - Li-Ang Lee - Author 4 revised the article.

Author 5 - Ming-Shao Tsai - Author 5 revised the article.

Author 6 - Hsueh-Yu Li - Author 6 conceptualized the idea and revised the art.