

GLP-1 Receptor Agonist Use and Sleep Apnea Outcomes: A Database Study and Systematic Review

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Background

- Obstructive sleep apnea (OSA) affects nearly one-third of individuals in the US and has been linked to a variety of downstream implications including hypertension, metabolic and cardiovascular disease, and an overall reduction in quality of life.¹
- Glucagon-like peptide-1 receptor agonist (GLP-1RA) medications have been associated with multiple positive benefits for OSA including weight loss and reduction in the apnea-hypo-apnea index, with tirzepatide being approved for moderate-to-severe OSA in adults with obesity in 2024.²
- However, more research is still needed to determine the incidence and progression of OSA in adults with obesity and/or T2DM on GLP-1RA therapy.

Study objective: The purpose of this systematic review and database study is to assess the pharmacologic effects of GLP-1 receptor agonists (GLP-1RAs) on obstructive sleep apnea (OSA) outcomes.

Methods

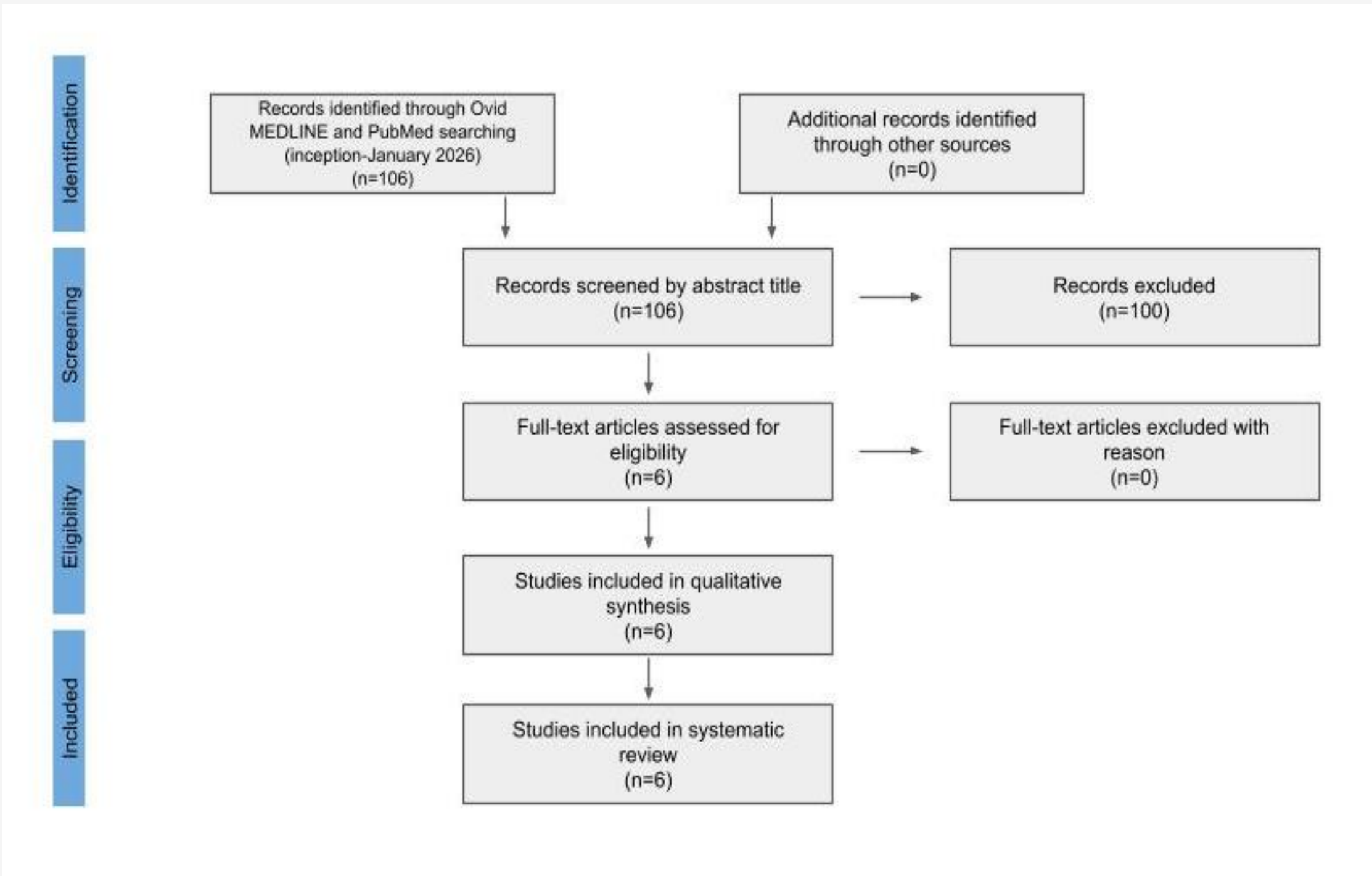


Figure 1. Systematic Review Identification and Screening of Studies Evaluating GLP-1 Receptor Agonists and Obstructive Sleep Apnea Outcomes

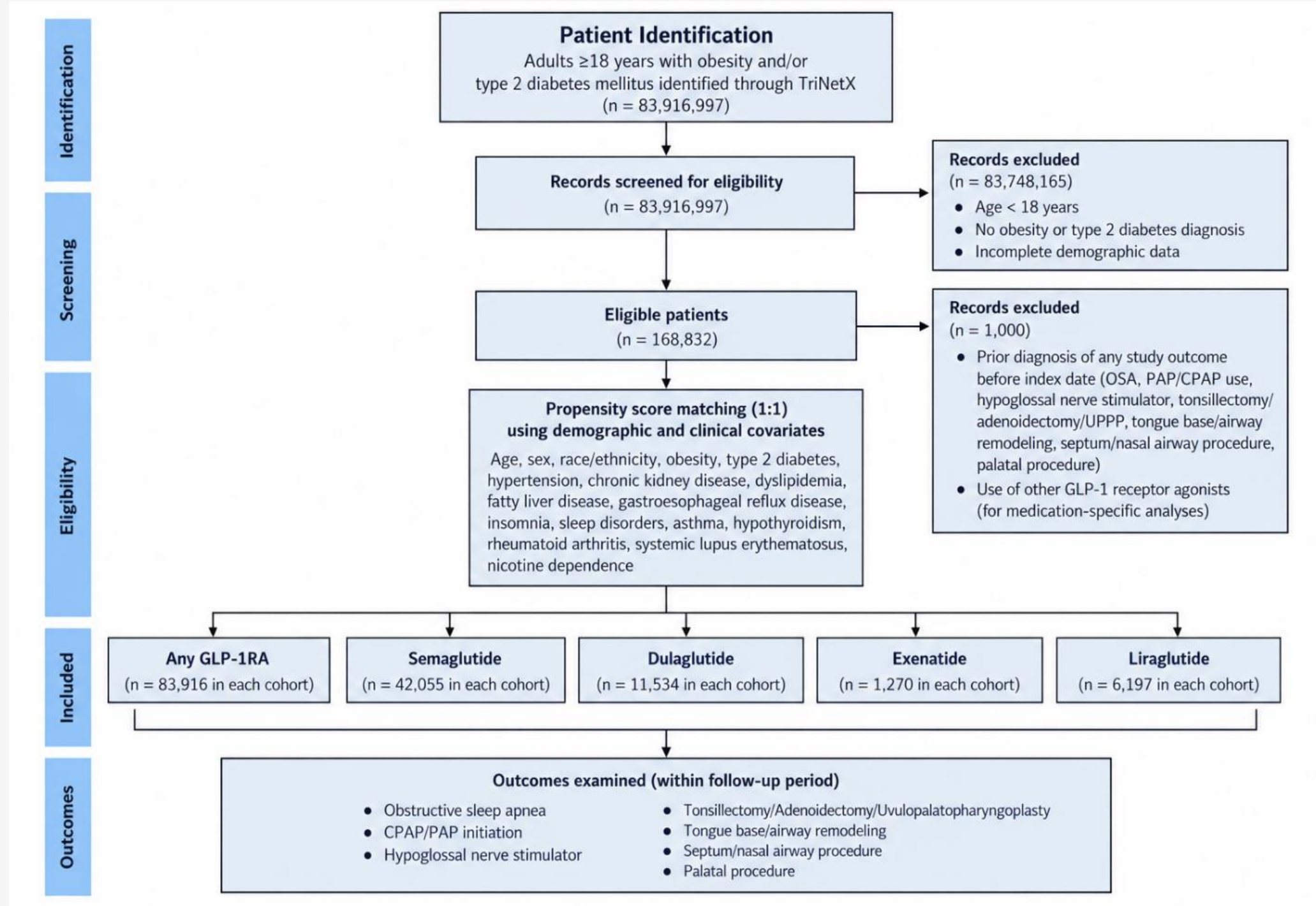


Figure 2. TriNetX Cohort Selection, Propensity Score Matching, and Outcome Assessment for GLP-1RA Analyses

Results

Study	Sample Size	Intervention Method(s)	Duration of Therapy	OSA Outcomes
Blackman et al. (2016)	276	Liraglutide vs placebo	32 weeks	• AHI ↓ 12.2 events/hr (6.1 greater reduction vs placebo)
Jiang et al. (2023)	90	Liraglutide vs no intervention	12 weeks	• AHI ↓ 4.9 events/hr (6.4 greater reduction vs control) • ↑ minimum O ₂ sat vs control
O'Donnell et al. (2024)	30	Liraglutide vs CPAP vs Liraglutide + CPAP	24 weeks	• AHI ↓ 54→42 (liraglutide) • AHI ↓ 48→3 (CPAP), • AHI ↓ 48→5 events/hr (combination) • O ₂ desaturation index improved in all groups
O'Donnell et al. (2024)	30	Liraglutide vs CPAP vs Liraglutide + CPAP	24 weeks	• CPAP and combination therapy produced greater AHI reductions than liraglutide alone
Malhotra et al. (2024)	469	Tirzepatide vs placebo	52 weeks	• AHI ↓ 25.3–29.3 events/hr (20.0-23.8 greater reduction vs placebo) • ↓ hypoxic burden vs placebo
Malhotra et al. (2025)	469	Tirzepatide vs placebo	52 weeks	• Significant improvements in pAHI and hypoxic burden vs placebo

Table 1. Summary of Studies Involved in Systematic Review Evaluating GLP-1 Receptor Agonists in OSA. Studies included were identified through Ovid MEDLINE and PubMed queries from inception through January 2026. The search yielded 106 studies; studies were further screened by title and abstract. 100 studies were excluded, and six full-text articles were assessed for systematic review eligibility. All six articles met inclusion criteria and were included in the systematic review. The table above summarizes sample size, intervention method, duration of therapy, and reported OSA outcomes. Specifically, outcomes of interested included the apnea hypoapnea index and nocturnal oxygenation.

Outcome RR (95% CI)	GLP1-RA RR (95% CI)	Semaglutide RR (95% CI)	Liraglutide RR (95% CI)	Dulaglutide RR (95% CI)	Exenatide RR (95% CI)
Obstructive Sleep Apnea	0.917 (0.887-0.948)	1.028 (0.984-1.075)	0.977 (0.87-1.097)	0.742 (0.674-0.816)	1.21 (0.948-1.545)
PAP Initiation	0.711 (0.685-0.738)	0.693 (0.657-0.732)	0.933 (0.823-1.057)	0.642 (0.58-0.71)	1.231 (0.934-1.623)
PAP Continuation	2.264 (1.319-3.884)	–	–	–	–
Hypoglossal Nerve Stimulation	0.949 (0.796-1.132)	0.979 (0.773-1.24)	0.647 (0.304-1.381)	0.677 (0.427-1.042)	–
T&A/UPPP	0.444 (0.384-0.514)	0.363 (0.292-0.45)	0.543 (0.341-0.866)	0.456 (0.294-0.706)	–
Tongue Base/Airway Remodeling	0.355 (0.23-0.546)	0.26 (0.141-0.479)	–	–	–
Septal/Nasal Airway Procedures	0.675 (0.64-0.712)	0.574 (0.532-0.62)	0.865 (0.714-1.047)	0.627 (0.534-0.736)	0.813 (0.518-1.278)
Palatal Procedures	0.892 (0.607-1.31)	0.5 (0.269-0.93)	–	–	–

Table 2. Sleep and Airway Outcomes Across GLP-1 Receptor Agonist Use. Risk ratios (RRs) with 95% confidence intervals (CIs) were calculated for sleep and airway-related outcomes among patients receiving GLP1RA therapy including exenatide, liraglutide, semaglutide, or dulaglutide. These results were compared with propensity-matched patient controls. Bolded values represent statistically significant associations ($p<0.05$). Dashes (-) indicate outcomes for which estimates were not reported due to insufficient sample size for the TriNetX statistics platform to calculate reliable risk ratios. Abbreviations: PAP, positive airway pressure; T&A, tonsillectomy and adenoidectomy; UPPP, uvulopalatopharyngoplasty.

Conclusions

- Weight loss may partially mediate improved OSA outcomes:** specifically, GLP1RA-associated reduction in body weight and neck circumference, impacting upper airway, could decrease pharyngeal collapse and improve nocturnal oxygenation.
- Potential benefits may extend beyond weight reduction:** our findings were propensity matched for BMI at index, and GLP1RA medications have been associated with positive impacts on metabolic dysfunction and inflammation as a whole. These findings warrant further investigation of GLP1RA therapy in physiologic factors which may contribute to improved OSA outcomes.
- Differences among individual GLP1RA medications may reflect continued confounding:** further studies must quantify these benefits with individual weight loss efficacy of GLP1RA medications, prescribing patterns for OSA, and determine whether these findings are due to specific GLP1RA therapy effects.

References

- Sönmez I, Vo Dupuy A, Yu KS, Cronin J, Yee J, Azarbarzin A. Unmasking obstructive sleep apnea: Estimated prevalence and impact in the United States. *Respir Med.* 2025;248:108348. doi:10.1016/j.rmed.2025.108348
- Kow CS, Ramachandram DS, Hasan SS, Thiruchelvam K. Efficacy and safety of GLP-1 receptor agonists in the management of obstructive sleep apnea in individuals without diabetes: A systematic review and meta-analysis of randomized, placebo-controlled trials. *Sleep Med.* 2025;129:40–44. doi:10.1016/j.sleep.2025.02.010
- Tasali, E., Pamidi, S., Covassin, N. & Somers, V. (2025). Obstructive Sleep Apnea and Cardiometabolic Disease: Obesity, Hypertension, and Diabetes. *Circulation Research*, 137 (5), 764–787. doi: 10.1161/CIRCRESAHA.125.325676.
- Messineo L, Bakker JP, Cronin J, Yee J, White DP. Obstructive sleep apnea and obesity: A review of epidemiology, pathophysiology and the effect of weight-loss treatments. *Sleep Med Rev.* 2024 Dec;78:101996. doi: 10.1016/j.smrv.2024.101996. Epub 2024 Aug 30. PMID: 39244884.
- Rotenberg BW, Murariu D, Pang KP. Trends in CPAP adherence over twenty years of data collection: a flattened curve. *J Otolaryngol Head Neck Surg.* 2016 Aug 19;45(1):43. doi: 10.1186/s40463-016-0156-0. PMID: 27542595; PMCID: PMC4992257.
- Moore, P.W., Malone, K., VanValkenburg, D. et al. GLP-1 Agonists for Weight Loss: Pharmacology and Clinical Implications. *Adv Ther* 40, 723–742 (2023). doi: 10.1007/s12325-022-02394-w
- Blackman A, et al. *Int J Obes (Lond).* 2016;40:1310–1319. doi:10.1038/ijo.2016.52
- Jiang W, et al. *Sleep Breath.* 2023;27:1687–1694. doi:10.1007/s11325-022-02768-y
- O'Donnell C, et al. *Ann Am Thorac Soc.* 2024;21:464–473. doi:10.1513/AnnalsATS.202309-821OC
- O'Donnell C, et al. *Obesity (Silver Spring).* 2024;32:2077–2081. doi:10.1002/oby.24126
- Malhotra A, et al. *N Engl J Med.* 2024;391:1193–1205. doi:10.1056/NEJMoa2404881
- Malhotra A, et al. *Sleep Med.* 2025;136:106853. doi:10.1016/j.sleep.2025.106853