

Minimally Invasive vs Open Approach and BMI in Pediatric Surgery: A 12-Year ACS NSQIP-P Analysis with DOOR Outcomes

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BACKGROUND

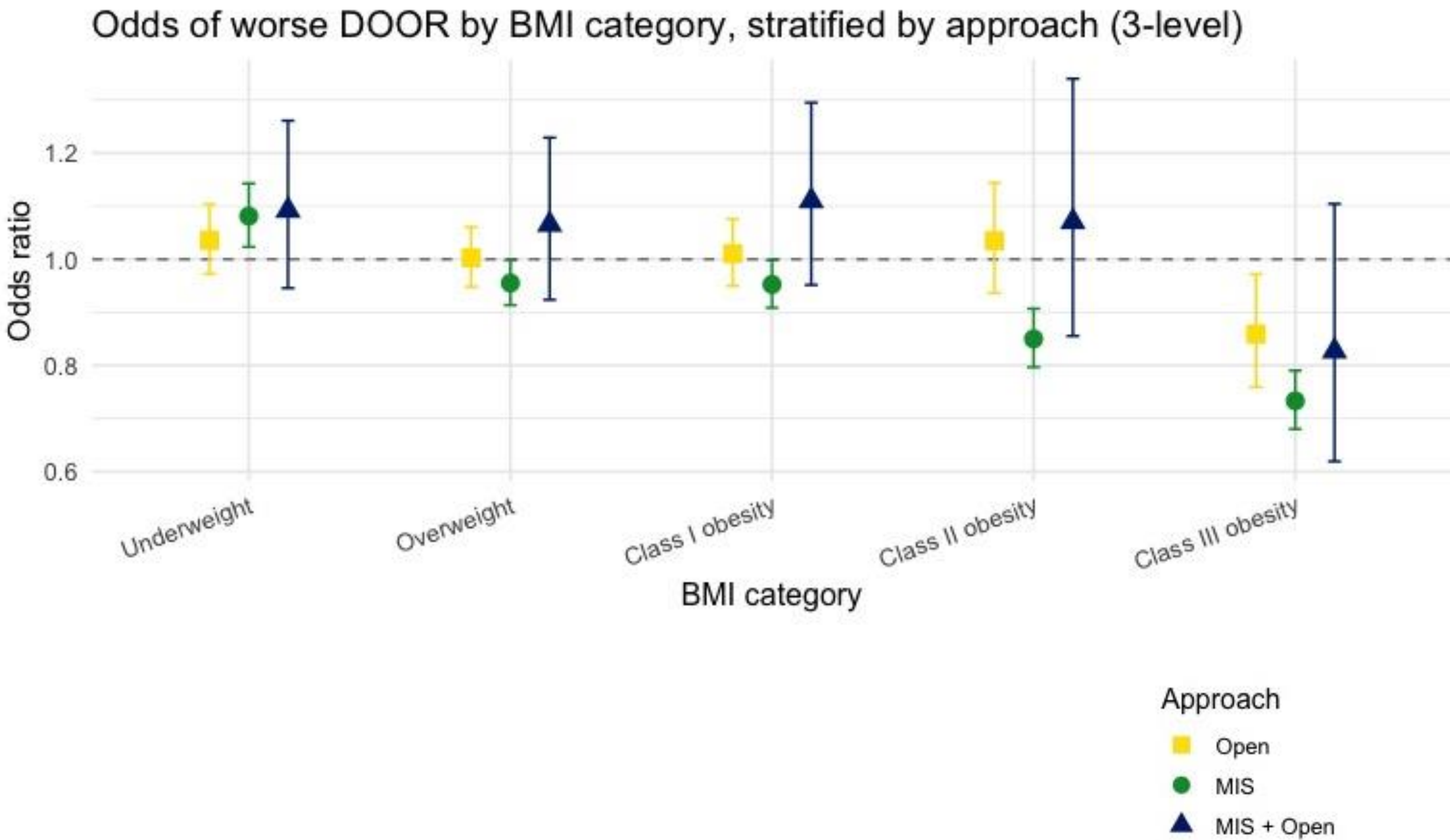
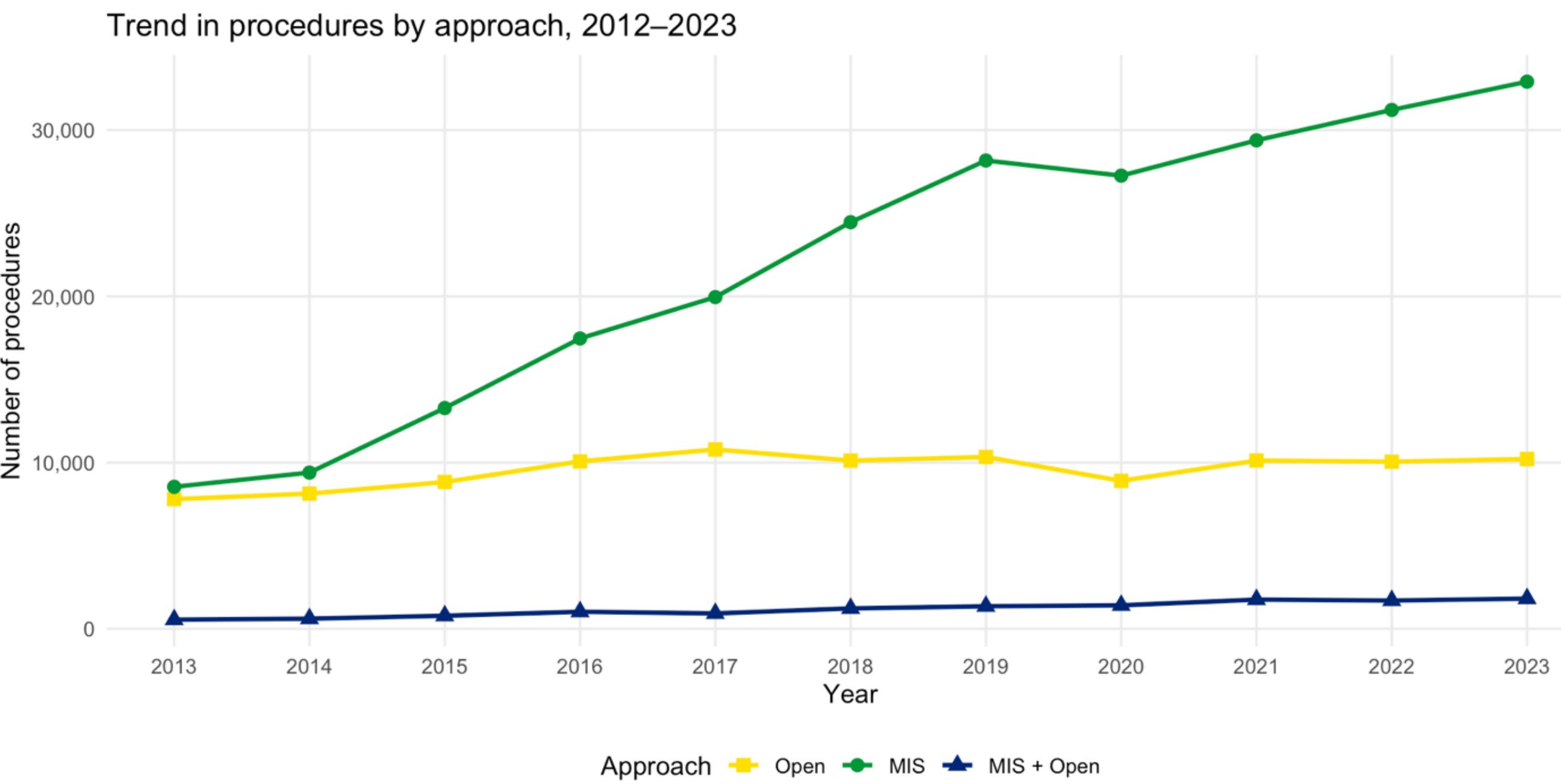
- The relationship between **surgical approach** and **BMI** in pediatric patients is not fully understood.
- We evaluated how **BMI categories** relate to postoperative outcomes after:
 - Minimally invasive surgery (MIS)
 - Open surgery
 - Combined MIS + Open approaches

METHODS

- Data source:** American College of Surgeons National Surgical Quality Improvement Program-Pediatric (ACS NSQIP-P), years 2012 to 2023.
- Population:** Children 2 to 17 years undergoing general, urologic, or gynecologic procedures.
- BMI exposure:** Categories based on CDC age- and sex-specific percentiles.
- Primary outcome: Desirability of Outcome Ranking (DOOR)** using 22 NSQIP-P outcomes:
 - Score 1 = no complication
 - Score 6 = least desirable outcome
- Statistical analysis:** Adjusted **ordinal logistic regression** for DOOR including approach, BMI category, age group, sex, race/ethnicity, inpatient status, specialty, ASA class, wound class, preoperative sepsis, admission origin, case type, cancer status.

Higher BMI does not compromise outcomes in pediatric surgery — and MIS independently improves them.

RESULTS



360,628 pediatric procedures analyzed (2012–2023)

MIS: 67.1% (N=242,050)

Open: 29.2% (N=105,391)

Odds of Worse DOOR by BMI Category, Stratified by Approach

MIS + Open: 3.7% (N=13,187)

DOOR 1 (No complication): MIS 91.8% vs Open 86.0% vs MIS+Open 81.8% (p<0.001)

Approach Effect on DOOR (ref: Open)

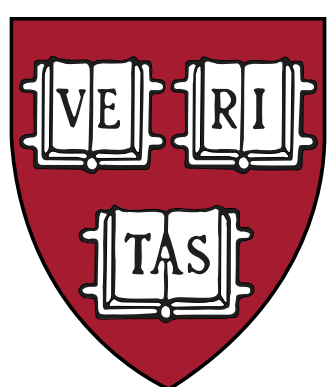
Approach	OR (95% CI)	Interpretation
MIS	0.74 (0.72–0.76)	Lower odds of worse DOOR
MIS + Open	1.24 (1.17–1.30)	Higher odds of worse DOOR

BMI Effect on DOOR by Approach (ref: Normal weight)

BMI Category	MIS OR (95% CI)	Open OR (95% CI)
Underweight	1.08 (1.02–1.14)*	1.05 (0.98–1.12)
Overweight	0.95 (0.91–1.00)	1.00 (0.95–1.06)
Class I obesity	0.95 (0.91–1.00)	1.01 (0.95–1.08)
Class II obesity	0.85 (0.80–0.91)*	1.04 (0.95–1.16)
Class III obesity	0.73 (0.68–0.79)*	0.85 (0.75–0.97)*

CONCLUSION

In contemporary pediatric surgical practice, MIS is independently associated with superior postoperative outcomes compared to open surgery, while combined MIS and open cases fare worse, likely reflecting greater complexity. Higher BMI categories were not found to increase risk of least desirable postoperative outcomes across the surgical approaches. Our findings suggest BMI alone should not preclude MIS and highlight underweight patients as a priority for risk mitigation.



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