



## Background

- Many young patients have limitations in managing dental anxiety, and in many cases pharmacological intervention is required<sup>1</sup>
- In a survey of AAPD members, 97% of respondents use nitrous oxide in their practice<sup>1</sup>
- Rapid onset and recovery makes nitrous oxide a favorable pharmacological tool to manage cooperative but anxious patients<sup>2,3,4,5</sup>
- Nitrous oxide has a superior safety profile with no recorded fatalities or cases of serious morbidity when used within recommended concentrations (< 50%)<sup>2,3,4,5</sup>
- There are recent trends towards ensuring patient safety, so clinician familiarity with evidence-based studies concerning nitrous oxide is paramount<sup>5</sup>
- Serious adverse events, such as chest pain, desaturation, and apnea, have been reported with 50-70% nitrous oxide levels<sup>6</sup>
- Parental preference for pharmacological behavior management techniques is increasing, and is likely impacting patient management decisions<sup>7</sup>

## Objectives

The purpose of this study is to identify prevalence and variables that may lead to adverse events that occur following nitrous oxide administration in a dental school clinic

## Materials and Methods

- 9,484 nitrous oxide logs were collected between August 1, 2017 and July 6, 2022
- 7,554 nitrous oxide logs were analyzed (21% of all collected forms were excluded due to missing data)
- Information obtained included age, sex, nitrous oxide concentration and duration, dental department, and presence of an adverse event
- The records of patients with adverse events were accessed via the electronic health record for further investigation

## Results

- 7,176 (96.5%) forms reviewed were from pediatric dentistry
- 117 (0.7%) patients experienced adverse events across all departments
- 116 (99.1%) of adverse events occurred in pediatric dentistry
- The adverse event group spent an average of 41.8 minutes on nitrous oxide, while the non-adverse event group spent an average of 34.2 minutes on nitrous oxide (p < 0.001)
- Males experienced 65% of all adverse events
- Age is not significant in determining presence of an adverse event (p > 0.05)
- Gender and duration of time on nitrous oxide were significant factors for adverse events (p < 0.05)
- The most common adverse event was “nausea/vomiting”

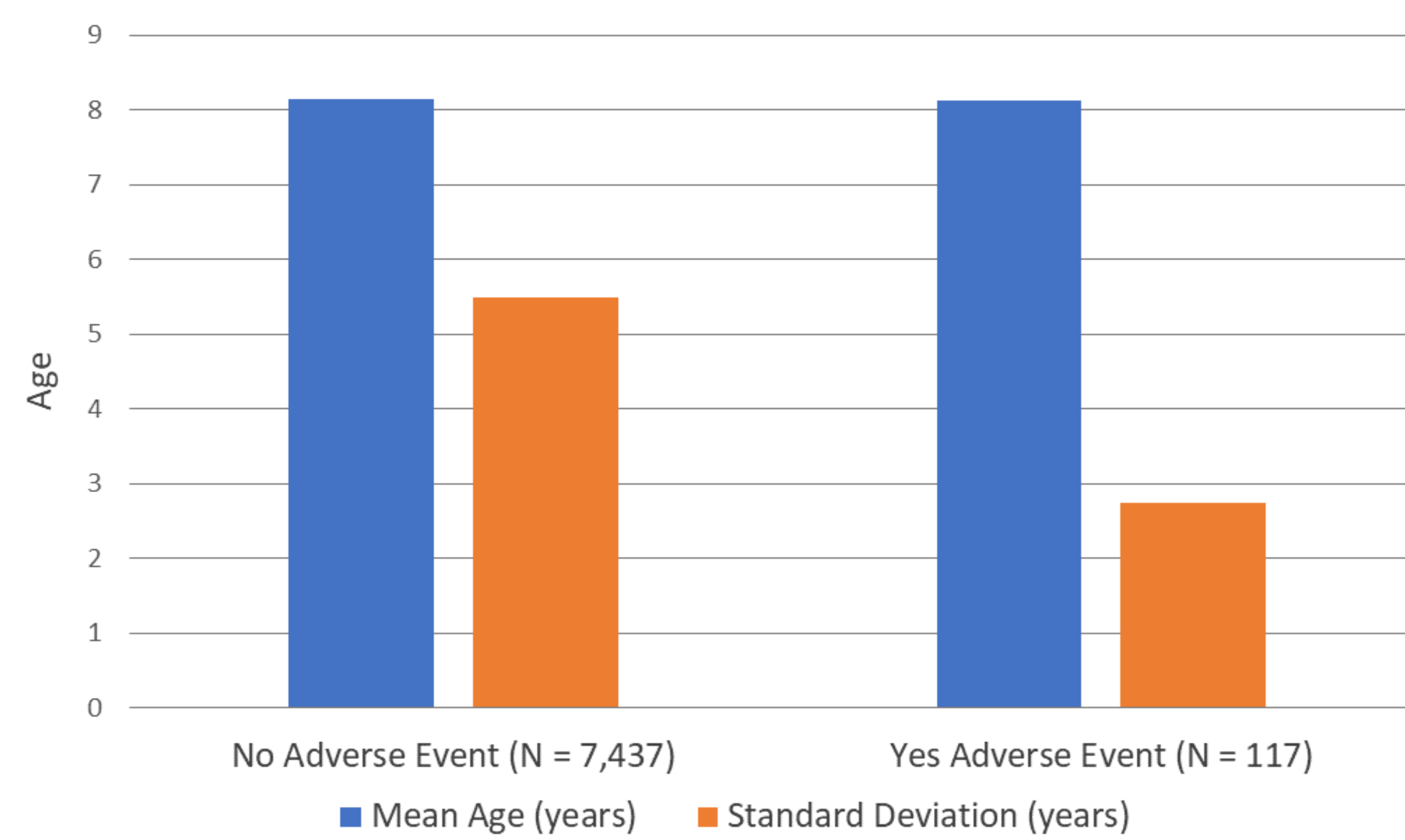


Figure 1. Age and Adverse Events (p = 0.376)

Table 1. Age and Adverse Events

Adverse Event?	No (N = 7,437)	Yes (N = 117)	Total (N = 7,554)	P-Value = 0.376
Mean Age (SD)	8.142 (5.489)	7.692 (2.740)	8.135	
Range	1.000 - 88.000	3.000 - 17.000	1.000 - 88.000	

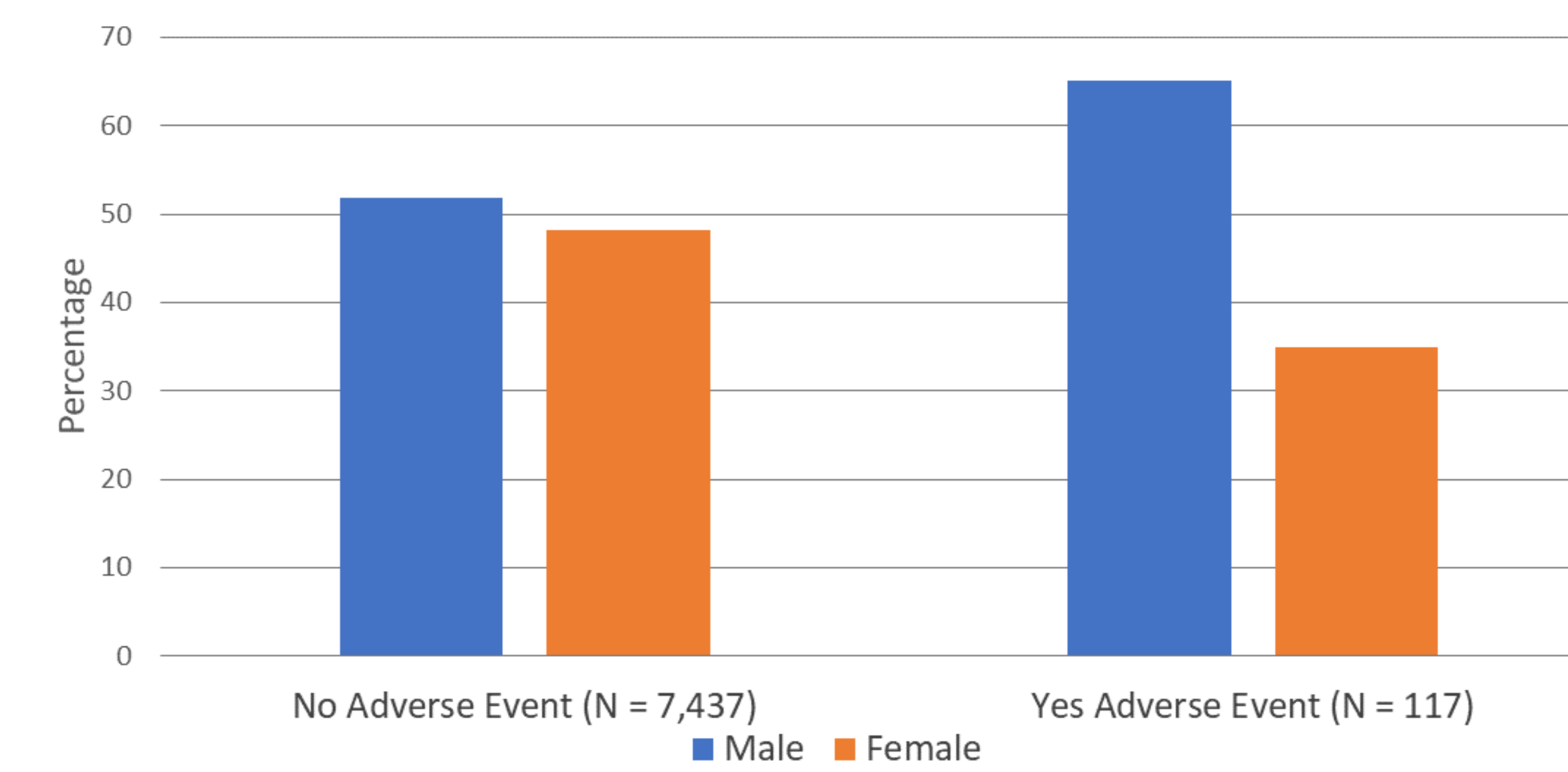


Figure 2. Gender and Adverse Events (p = 0.005)

Table 2. Gender and Adverse Events

Adverse Event?	No (N = 7,437)	Yes (N = 117)	Total (N = 7,554)	P-Value = 0.005
Unidentified	3	0	3	
Female	3579 (48.1%)	41 (35%)	3620 (47.9%)	
Male	3855 (51.9%)	76 (65%)	3931 (52.1%)	

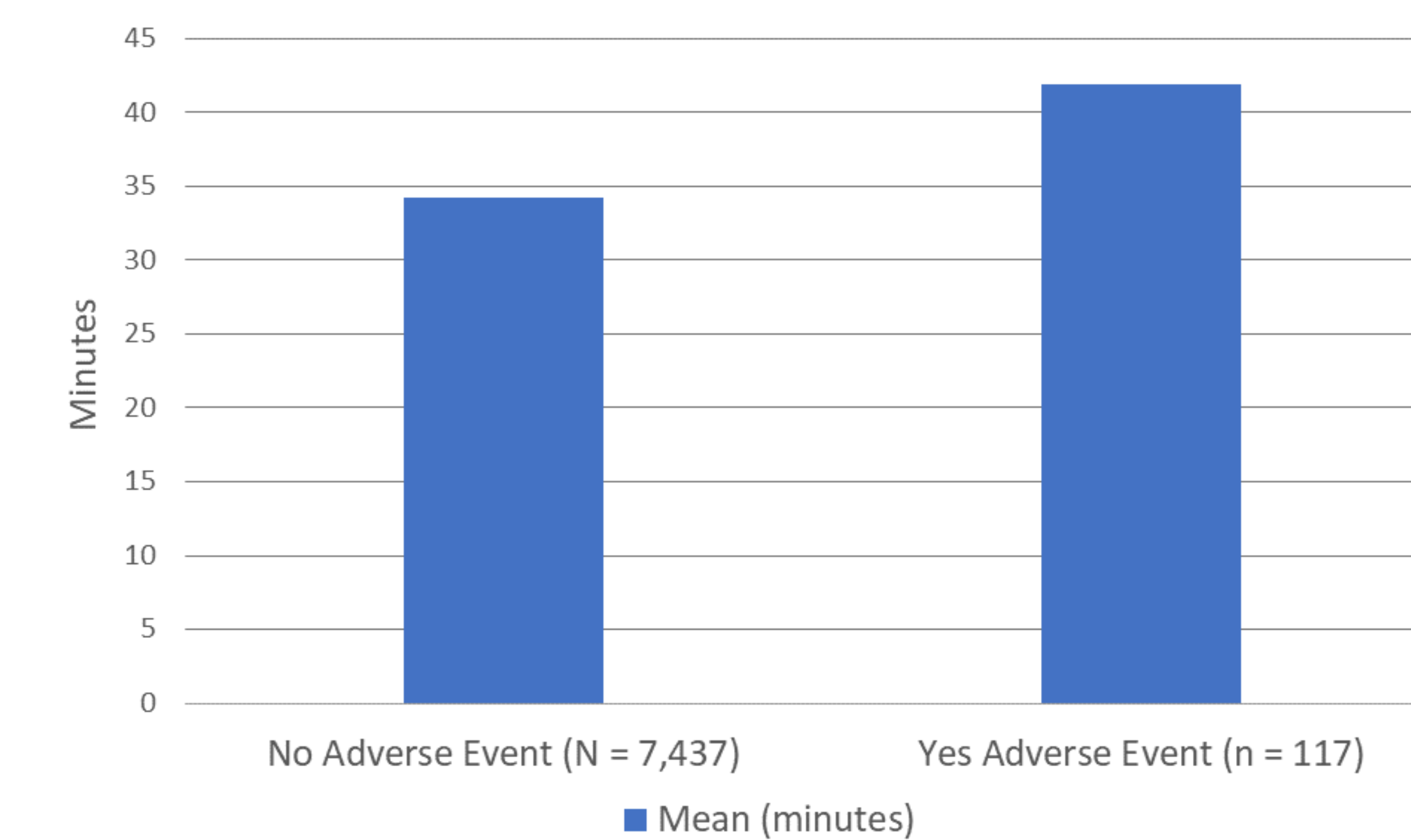


Figure 3. Duration of Time on N2O and Adverse Events (p < 0.001)

Table 3. Duration of Nitrous Oxide Use and Adverse Events

Adverse Event?	No (N = 7,437)	Yes (N = 117)	Total	P-Value < 0.001
Mean (minutes)	34.236	41.863	34.354	
Range (minutes)	1.000 - 174.000	4.000 - 120.000	1.000 - 174.000	

## Limitations

- Lack of standardization among providers concerning what constitutes an adverse event
- Improper documentation of nitrous oxide logs resulting in exclusion from the study
- Inconsistencies in charting
- Did not assess nitrous oxide concentrations higher than 50%

## Conclusions

- The results of the study suggest that males have a higher likelihood of experiencing an adverse nitrous oxide event.
- More time spent on nitrous oxide appears to increase the odds of an adverse event.

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## References

1. Unkel et al. Effectiveness and Safety of Elevated Dosages of Nitrous Oxide in Behavior Management of Pediatric Dentistry. 2022; 46 (1).
2. Foley J. A prospective study of the use of nitrous oxide inhalation sedation for dental treatment in anxious children. Eur J Paediatr Dent 2005;6(3):21-7
3. Holyroyd I. Conscious sedation in pediatric dentistry: A short review of the current UK guidelines and the technique of inhalational sedation with nitrous oxide. Paediatr Anaesth 2008;18(1):13-7.
4. Lyratzopoulos G, Blain KM. Inhalation sedation with nitrous oxide as an alternative to dental general anesthesia for children. J Public Health Med 2003;25(4):303-12.
5. Wilson, S. Survey of American Academy of Pediatric Dentistry on Nitrous Oxide and Sedation: 20 years later. Journal of Pediatric Dentistry. 2016; 38 (5):385-392.
6. Chi, Seong In. Complications caused by nitrous oxide in dental sedation. Journal of dental anesthesia and pain medicine vol. 18,2 (2018): 71-78
7. Patel, Monica et al. Parental Attitudes Towards Advanced Behavior Guidance Techniques Used In Pediatric Dentistry. Journal of Pediatric Dentistry. 2016 February; 38 (1): 30-35