

## Abstract

**<u>Objective</u>**: Moderate sedation (MS) is a pharmacological behavior guidance technique used in pediatric dentistry, often achieved through oral sedation. However, MS leads to unpredictable outcomes such as worsened behavior that may result in incomplete or modified dental treatments. While various scales assess behavioral outcomes during MS appointments, providers differ on defining success, emphasizing either behavioral results, physiological responses, or amount of dental treatment completed. These inconsistencies have led to differing opinions on what defines a successful MS appointment. This study surveyed dentists and residents nationwide to compare perspectives on MS success and identify factors influencing MS outcomes.

Methods: A 22-item survey was distributed to members of the American Academy of Pediatric Dentistry (AAPD), including pediatric dentists, general dentists, and residents. The survey included provider preferences and attitudes towards MS, ranking patient considerations and other factors associated with MS success.

**<u>Results</u>**: Of 470 respondents, 73% (n=342) reported current MS use, with rates highest among residents (89%), followed by residency-trained pediatric dentists (71%) and general dentists (64%) (P=.0006). Provider outlook towards use of MS was not significantly associated with provider type (P=.3364). MS users had more positive attitudes toward sedation than non-users (P<.0001). Ratings for treatment completed and patient behavior were significantly higher than patient satisfaction or duration of treatment when measuring success of MS (*P*<.0001).

**<u>Conclusion</u>**: MS success was primarily associated with treatment completion and patient behavior, rather than patient satisfaction or appointment duration. Providers prioritized behavioral and treatment outcomes as indicators of success.

## Introduction

The dental experience can be challenging for young, anxious children, or those with limited coping skills. Pediatric dentistry uses behavior guidance to promote cooperation, reduce anxiety, foster a positive dental attitude, and ensure safe, high-quality care. Techniques range from simple methods, like distraction and modeling, to more advanced options including pharmacological interventions with sedatives.<sup>1</sup>

As pediatric dentistry evolves, there's been an increased demand for pharmacological aids in behavior guidance.<sup>2</sup> Sedation varies from anxiolysis to minimal, moderate, or deep sedation. The American Academy of Pediatric Dentistry (AAPD) defines **minimal sedation** as a state where patients respond to verbal commands without affecting their breathing or cardiovascular function. Moderate sedation, previously called oral conscious sedation, involves a depressed level of consciousness where patients can respond to commands or light touch, maintaining normal airway and cardiovascular function. **Deep sedation** results in the patient being unarousable and may include loss of protective reflexes. Sedation levels depend on drug dosage and patient response, requiring providers to anticipate the effect based on the medication administered.<sup>2</sup>

The ideal outcome of moderate sedation is a positive behavioral response and completion of the planned dental procedure. Moderate sedation can be unpredictable and even when the child is moderately sedated, the treatment may be difficult or impossible to complete. Researchers distinguish between "ineffective" sedation, where uncooperative behavior hinders treatment, and "failed" sedation, where the procedure cannot be initiated or completed.<sup>4</sup> Studies show that only 20% of sedations are considered failures, but most lead to ineffective outcomes with agitation and poor behavior. This raises the question of whether sedation success depends more on completing treatment or managing patient behavior.<sup>5</sup>

The literature shows that moderate sedation in pediatric dentistry has success rates ranging from 41% to 60%, likely due to differing provider perspectives on success.<sup>6</sup> Clinicians use various scales to assess sedation success, focusing on treatment completion or behavior during sedation, however no consensus exists on a universal definition of success. There is limited research on how success is defined, and no standardized scale exists to assess sedation outcomes in clinical settings. Standardizing these scales could improve sedation depth monitoring and patient safety. This study aims to survey providers' views on moderate sedation to identify objective measures of success and factors influencing sedation outcomes.

## Materials & Methods

A 22-item survey was distributed to members of the American Academy of Pediatric Dentistry (AAPD), including pediatric dentists, general dentists (affiliate members), and residents, to assess their perceptions of moderate sedation. The survey covered topics such as sedative agents for moderate sedation, provider preferences, external influences, alternative treatments, and factors related to sedation success, including treatment completion and the use of protective restraint. The survey was administered over a three-month period from October 2024 to January 2025, using Research Electronic Capture (REDCap) to collect responses.<sup>7</sup>

Survey responses were analyzed by summarizing counts and percentages, with individuals who did not answer key questions excluded. Associations between practices such as sedation use, protective stabilization, and influences were assessed using chi-squared tests. Repeated measures regression analysis was applied to examine differences in success ratings, adjusting for correlations among responses from the same provider. Post-hoc pairwise comparisons were made using Tukey's adjustment to control for multiple comparisons, with a significance level set at 0.05. All analyses were conducted using SAS EG v.8.2 software.

# **Perceptions of Moderate Sedation Success in the Pediatric Population** Fischer Cosio, N.<sup>1</sup>, Carrico, C.<sup>2</sup>, Oliver-Rainey, V.<sup>3</sup>, Ghassemi, A.<sup>4</sup>, Bortell, E.<sup>1</sup>

<sup>1</sup> Department of Pediatric Dentistry, <sup>2</sup> Department of Dental Public Health and Policy, <sup>3</sup> Department of General Practice, <sup>4</sup> Department of Periodontics, Virginia Commonwealth University School of Dentistry, Richmond, Virginia.

Results



## Figure 1: Self-Reported Medications Used by Residency-Trained **Pediatric Dentists and Affiliate AAPD Providers**



## Figure 2: Factors Associated with Use vs. Non Use of Moderate Sedation

<b>Options for Handling Disruptive Behavior</b>	
Modify the treatment plan	272 (78%)
Carry on with the planned treatment	142 (41%)
Abort the sedation visit	263 (75%)
How likely are you to:	
<b>Recommend General Anesthesia</b>	
Very unlikely/Unlikely	11 (3%)
Neutral	18 (5%)
Very likely/Likely	320 (92%)
Opt for SDF	
Very unlikely/Unlikely	79 (23%)
Neutral	47 (13%)
Very likely/Likely	223 (64%)
Opt for Hall Crowns	
Very unlikely/Unlikely	134 (38%)
Neutral	62 (18%)
Very likely/Likely	153 (44%)

 
 Table 2: Self-Reported Responses to Disruptive Behaviors during
**Sedation Visits** 

## **Sedation Trends**

## **Factors Associated with MS Success**

Factor	Average	
Treatment		
Completed	4.22	4.11
Duration of		
Treatment	3.32	3.21
Patient Satisfaction	3.77	3.66
<b>Patient Behavior</b>	4.39	4.28

**Table 1: Factors Considered for Success** of MS

**Defining Sedation Success & Usage Trends** Out of 8,517 AAPD members, 483 respondents participated in the survey which is a 5.7% response rate. Most respondents were residency-trained pediatric dentists practicing in private settings, who reported higher preference for Midazolam, Hydroxyzine, and Meperidine over Chloral Hydrate or Morphine as sedative agents (Figure 1). Findings suggest that sedation choices are heavily influenced by training experiences, rather than patient-specific factors.

**Factors Influencing Sedation & Treatment Decisions** Despite parental acceptance, moderate sedation is used for less than 25% of pediatric patients, influenced by personal experiences, parental preferences, and liability concerns. Respondents who favored use of MS were significantly associated with personal preference, parental preference, and positive experience in residency compared to non-users of MS. Among the non-users of MS, negative experience in residency and liability were indicated more often than for MS users (Figure 2). Protective stabilization was also explored in relation to defining sedation success. Our results found significant differences in the view of protective stabilization based on provider role, gender, practice settings and regions. Respondents did not identify protective stabilization as a key measurement of MS success or failure.

Our survey revealed that treatment completion and patient behavior were reported as key indicators of sedation success (Table 1). Treatment completion was regarded as a primary indicator of success among sedation users. Approximately half of the respondents considered a sedation visit successful if more than 75% of the treatment was completed, while about one-third defined success as completing at least 50% to 75% of the treatment (Figure 3).

When patient cooperation declines during sedation, respondents favored the use of minimally invasive alternatives like Silver Diamine Fluoride (SDF) or the Hall crown technique. Our results indicate that the Hall technique remains underutilized compared to SDF, possibly due to its perception as a temporary solution before general anesthesia (Table 2).

**Limitations & Future Research** The study's use of outdated terminology ("oral conscious sedation" instead of "moderate sedation") may have influenced responses. While AAPD provides sedation guidelines, patient behavior remains unpredictable, often leading to agitation or paradoxical reactions. Most providers prioritize treatment completion despite behavioral challenges. Limitations include response bias, recall bias, and restricted survey choices. Further research with larger sample sizes is needed to standardize sedation success criteria and improve patient selection.

- treatment is achieved.
- stabilization during sedation appointments.

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Results



**Figure 3: Percent of Treatment Completed to Determine Successful Sedation** 

## Discussion

## Conclusion

• This study reveals that **patient behavior** and **treatment completion** are key factors for determining sedation success. Most of the respondents believe that sedation success occurs when 50% or more of the

• Clear differences were identified in the factors influencing perceptions of moderate sedation users versus non-users. Users of moderate sedation tend to be more influenced by personal and parental factors, whereas non-users are more affected by negative experiences and concerns about liability. • Practice setting type and regional cultural beliefs influence the usage and acceptance of protective

## References

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