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Background

- Dentinogenesis imperfecta (DI) is the most common hereditary disorder of dentin formation (1 in 8000 births).¹
- Three types (DGI-I), (DGI-II), and (DGI-III) have been described.
- DGI-I is caused by a mutation of procollagen type I COL1A1 or COL 1A2 and affects both permanent and primary teeth. DGI-I is associated with Osteogenesis imperfecta (OI).¹ DGI-II is caused by a mutation in the DSPP gene, but is not associated with Osteogenesis imperfecta. ¹ DGI-III is similar to DGI-II (as it is also caused by a mutation to the DSPP gene), however this variant is rare and localized to the Brandywine population in the State of Maryland in the United States of America. ¹
- In DI, there is an altered interface between the enamel and dentin layer of the dentition leading to premature loss of enamel and subsequent exposure of the dentinal layer. ²
- Rapid wear of both the primary and permanent dentition have been described. The currently accepted treatment of DI depends “upon the severity of discoloration and propensity for enamel loss. ²
- In children who do not have fracturing of the enamel, discoloration of the teeth can be treated with either enamel or dentin bonding).²
- When severe fracturing of the enamel occurs, full coverage of the crowns typically is necessary.”²
- Additional methods to aid in dentin/enamel bonding have been described in the literature including air abrasion and infiltrative resins (low-molecular-weight resins).³

Objectives/Methods

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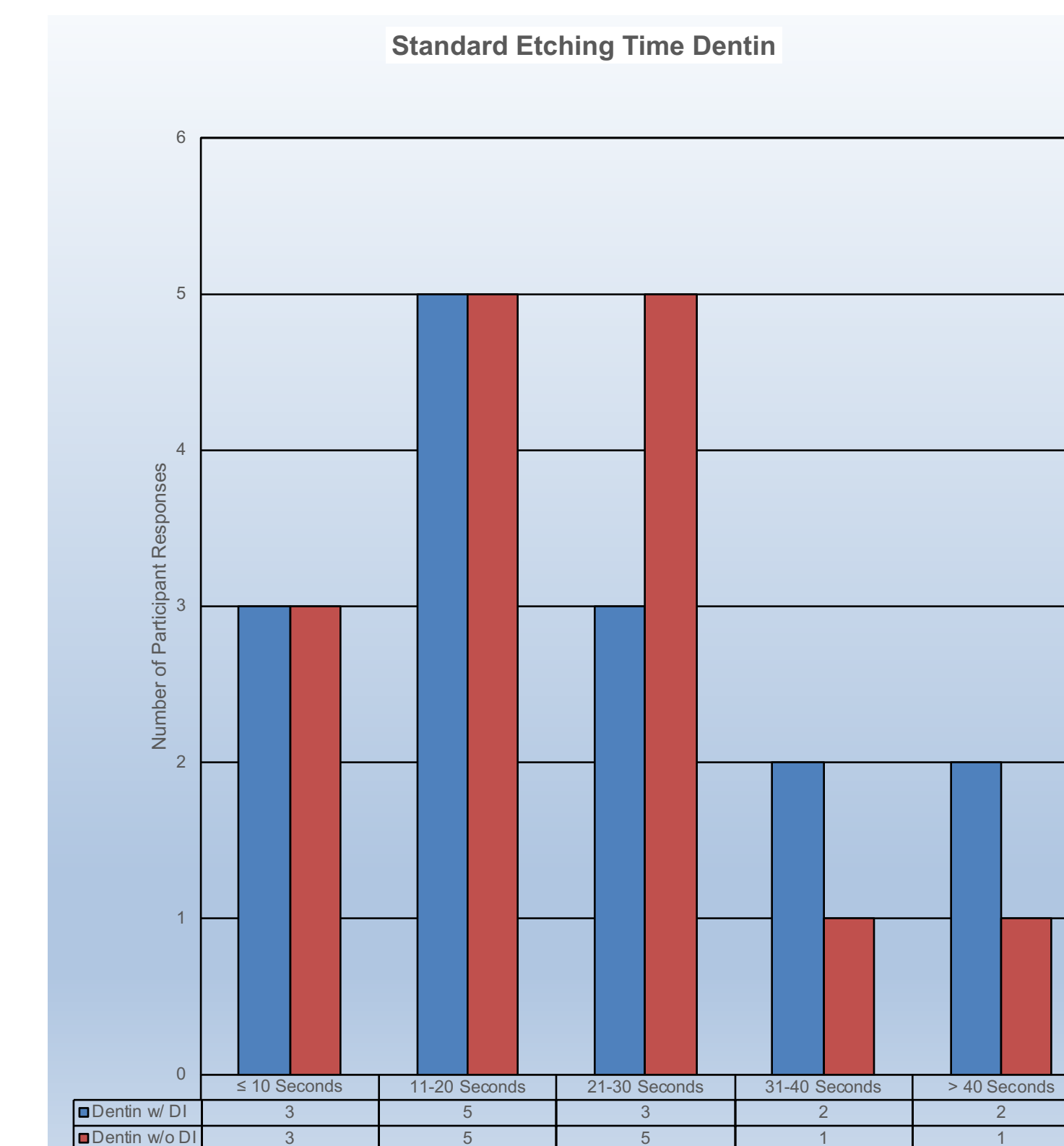
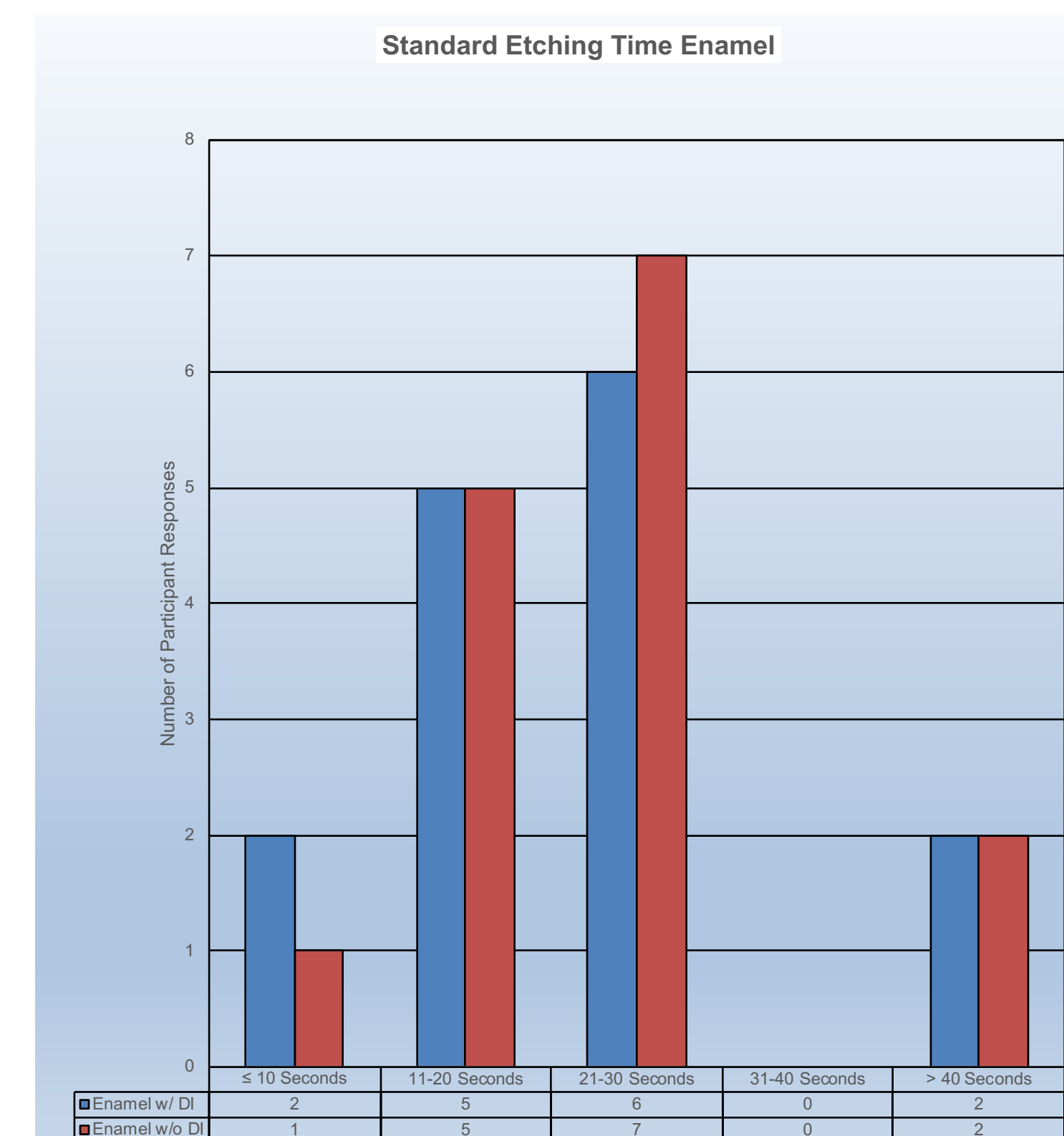
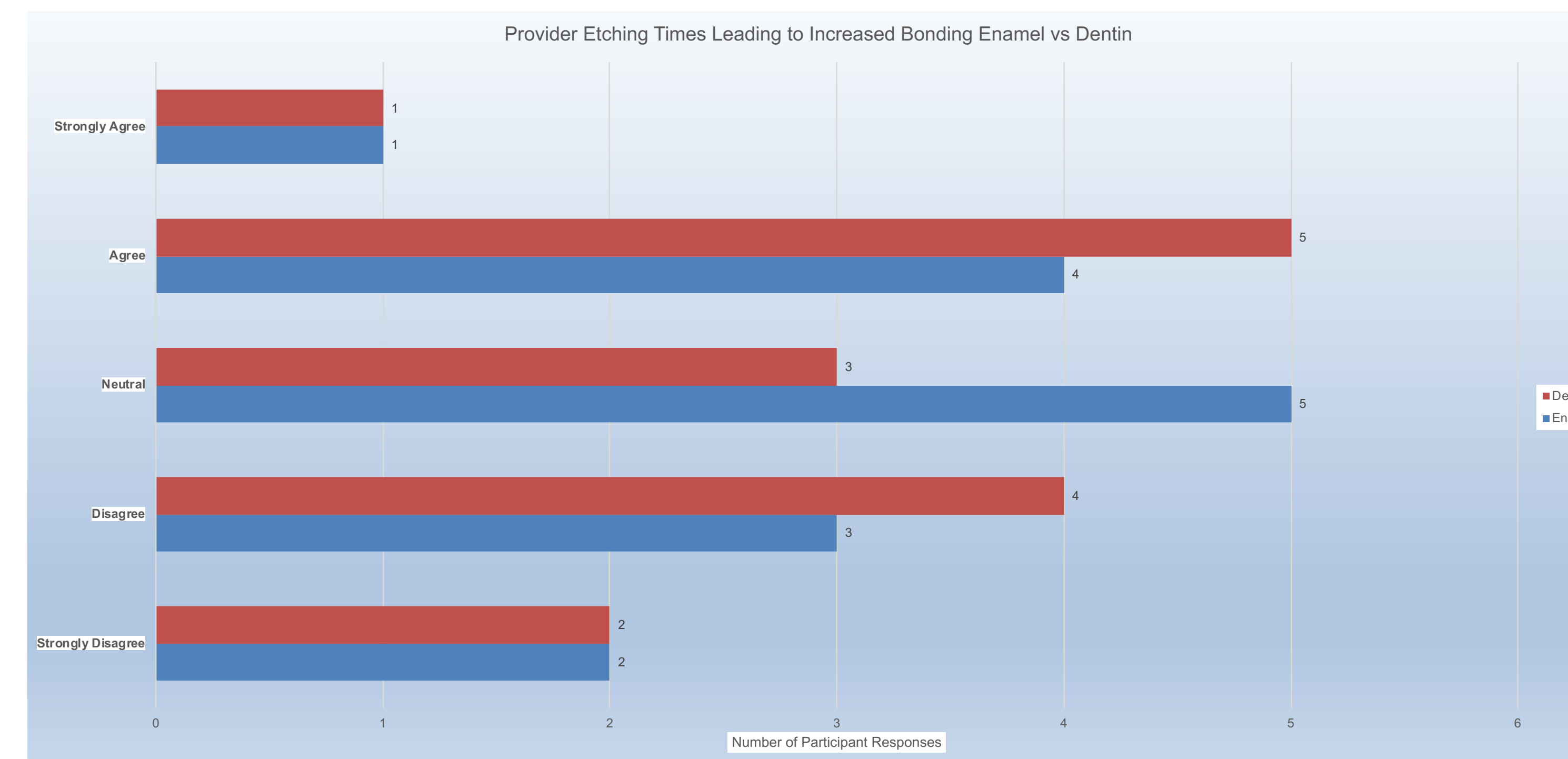
- Survey the current restorative/bonding techniques of newly erupted permanent teeth at specialized clinics in the United States to best understand the management of pediatric dental patients who have dentinogenesis imperfecta.
- Identify current clinical practices with the hopes of developing future Best Clinical Practices or Clinical Practice Guidelines for managing patients with DI.

Methods:

- Upon IRB approval, a cross-sectional study implementing a survey of providers treating patients with dentinogenesis imperfecta was completed. The survey contained 10 questions utilizing a combination of Likert Scale and standard multiple-choice questions for simplicity in grading and consistency.
- All AAPD Pediatric Dentistry Residency program directors and adjunct faculty at hospital and academic residency programs in the United States were invited to participate. The survey was administered via email and the responses were collected via Google Forms Survey.

Results

- Total of 15 pediatric dentists (n=15) who have managed patients with DI completed the survey for review.
- The survey suggests that the polled providers believe that direct resin bonding strength in managing patients with DI most directly relates to the structure of 40% (6) Enamel + Dentin, 33% (5) Dentin, 13.3% (2) Enamel, 6.7% (1) DEJ, 6.7% (1) Enamel, Dentin and DEJ.
- 80% of surveyed participants (12/15) utilize a total etch technique as opposed to a selective etch technique 20% (3/15).
- Providers vary greatly in the belief that longer etching times will aid in more optimal dentin bonding.
- 60% of participants (9/15) utilized retention grooves and 20% (3/15) utilized sodium hypochlorite enamel pre-treatment in the management of patients with DI.
- Bonding systems varied greatly amongst those managing patients with DI highest-- 6th generation (35.7%), followed by 5th and 7th Generation (21.4%), accordingly)



Discussion

- It is important to address the lack of accepted clinical practices in the clinical management of patients with DI.
- Direct resin bonding has been suggested in clinical scenarios with limited enamel fracturing and discoloration, however clinical protocol have not been identified in optimizing direct resin bonding.
- SEM studies conducted by Gallusi et al, suggest that in DI type II permanent tooth enamel from patient's with DI exhibit few structural changes with regularly mineralized enamel. They also noted that the DEJ shows lower degree of mineralization and an altered undulating morphology. Dentin exhibited absence of tubules. The proposed issue with direct resin bonding is due to inability to properly form a hybrid layer between resin adhesives and dentin.⁴
- Survey results show little variety to etching time noted between enamel etching between patients with DI and without DI. More providers report longer dentin etching time in DI patients versus patients without DI. However, no consensus as to whether longer etching times aid in optimal dentin/ enamel bonding was found. No studies evaluating standard etching times in patients with DI and without DI have been identified.
- Nine participants reported utilization of retention grooves prior to placement of direct resins. Three participants reported utilization of sodium hypochlorite enamel pre-treatment. Masse et al suggest sandblasting preparation + acid etching as ways to optimize dentin bonding to direct resin. Retention grooves and sodium hypochlorite enamel pretreatment have not been studied. These were an incidental finding of the study.
- There is no consensus amongst providers about optimal adhesive bonding systems to be utilized in the management of patient's with DI despite noted importance due to non-optimal dentin bonding.³

Conclusion

- Direct resin bonding in the management of DI warrants further investigation.
- A larger sample size is needed to comprehensively evaluate the clinically practiced techniques related to direct resin bonding utilized in the management of patients with DI.

References

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