



## Introduction

On January, 31, 2020 the World Health Organization (WHO) declared the COVID-19 outbreak a public health emergency and then categorized it as a global pandemic on March 11, 2020 (1). Mandatory school closures forced billions of children to stay at home and hampered their ability to play sports and exercise. According to a study done at USC Keck School of Medicine, in children ages 5 to 8 as well as 9 to 12, 54% of parents perceived their children exercising somewhat or much less from the pre-COVID period to early COVID period (2).

Furthermore, office closures caused parents to balance working from home and caring for their children without adequate child care resources. As a result, parents became more lenient with their children's eating habits such as allowing organic food and juices being substituted for sugary beverages and snacks.

Social distancing and restricted store hours made trips to the grocery store less frequent and people were forced to buy items in bulk and with a longer shelf life (3). In fact, worldwide data suggest that added sugar intake begins to rise from the age of 1 year and is highest among school age children and adolescents compared to younger children or adults (4).

Finally, in early March 2020 the CDC recommended that dental offices postpone all elective procedures. Even when this ban was lifted a few months later parents were afraid to bring their children into the office given the higher risk of transmission of COVID 19 from aerosol generating procedures. Overall, changes in lifestyle for parents and kids brought on by the pandemic coupled with delay in seeking preventative care can place children at a increased risk of developing dental caries.

## Study Objectives

Early school age children are in the transition phase going from primary to mixed dentition. Adolescents are more prone to forming caries due to increases in the number of tooth surfaces in the permanent dentition. The American Academy of Pediatric Dentistry (AAPD) states that children face challenges such as unsupervised tooth brushing and increased consumption of cariogenic foods and beverages, placing them at a higher risk of developing caries (5).

The aim of this project was to determine whether factors brought on by COVID-19 placed children at an increased risk of developing dental caries. These includes but are not limited to:

- 1) a sedentary life style
- 2) changes in diet
- 3) delay in routine dental care

## Methods

### Subjects

One hundred and six males and females between the ages of 5 and 17 years met the inclusion/exclusion criteria and took part in this study. These patients had at least one recall/new patient exam completed prior to March 2020 (before COVID) and another exam was done after March 2020 (during COVID).

### Patient Selection

**Inclusion Criteria:** Patients who met the Frankl class II, III, and IV.

**Exclusion Criteria:** Any participant who was determined to be Frankl class I. Special needs patients as well as patients undergoing orthodontic treatment were excluded from this study

### Data Collection

Patients involved in this study were established/recall patients of St. Barnabas Hospital Health System and/or Union Community Health Center. Consent was given by the parent in order to have their child participate in a COVID questionnaire. Data was collected by pediatric dental residents. Patients were handed a questionnaire (Fig. 1) to complete on their own. The assistant in the room was asked to help the patient if there was any difficulty reading a question on the questionnaire in order to avoid any bias answers from the parent. These questions included but not limited to oral hygiene habits, snacking preferences, daily activity level, and learning environment (virtual vs in person vs hybrid). At the same time, the parent were also given a questionnaire (Fig. 2) to assess their fear about receiving dental care during the COVID19 pandemic which was done outside of the room.

The second portion of the study included a clinical and radiographic exam. The Decayed, Missing and Fill Teeth (DMFT) index was used to calculate the caries prevalence for each participant of the study and compared to the previous score determined on an exam visit preceding COVID-19.

### Statistical Analyses

DMFT score and answers to the questionnaire were analyzed using repeated measures analysis of variance followed by regression analysis.

The questions below refer to Since COVID/March 2020:

- 10) How often do you brush in the morning?  
Every morning, Most mornings, Sometimes, Never
- 11) How often do you brush in the evening/night time?  
Every evening, Most evenings, Sometimes, Never
- 12) How often do you floss?  
Every day, Most days, Sometimes, Never
- 13) Do you snack more than once every 3 hours?  
Always, Sometimes, Never
- 14) Do you snack between classes (between or in person)?  
Always, Sometimes, Never
- 15) What do you prefer to drink the most?  
Water, Juice, Soda, Milk
- 16) How often do you engage in physical activity?  
Everyday, A few times a week, Once a week, Never
- 17) Approximately how many hours per day do you spend on an electronic device for school?  
Less than 1 hour, 1-3 hours, 4-6 hours, More than 6 hours
- 18) Approximately how many hours per day do you spend on an electronic device for fun?  
Less than 1 hour, 1-3 hours, 4-6 hours, More than 6 hours
- 19) Are you only going to school virtually?  
Yes, No
- 20) Are you only going to school in person?  
Yes, No
- 21) Are you doing a combination (virtual and in person)?  
Yes, No

Figure 1: Patient Questionnaire

### Questionnaire for the parent:

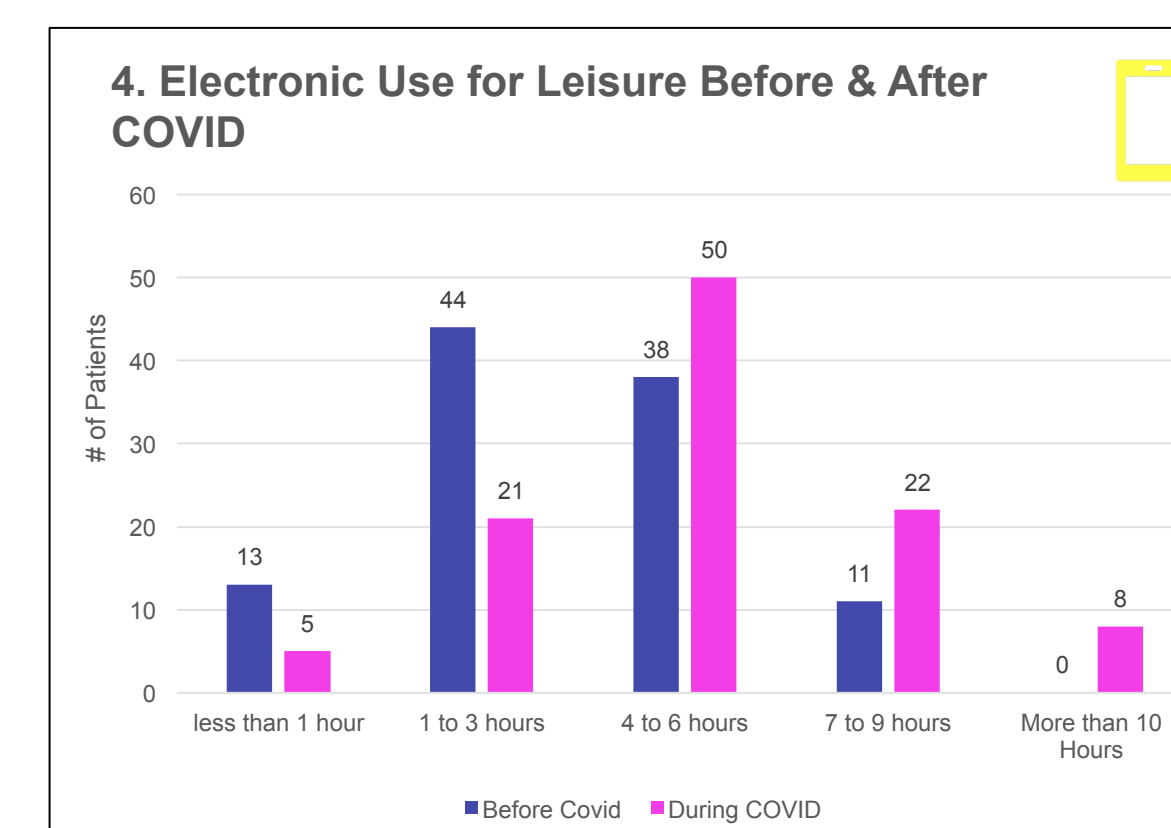
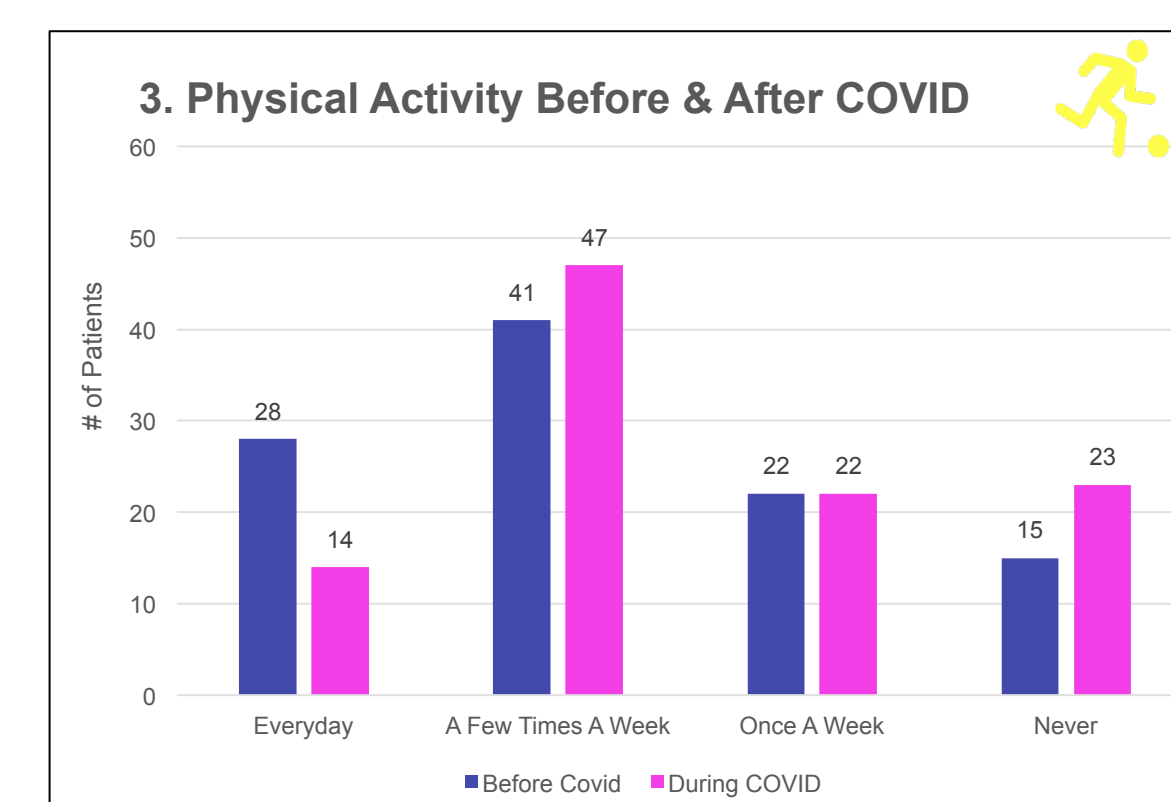
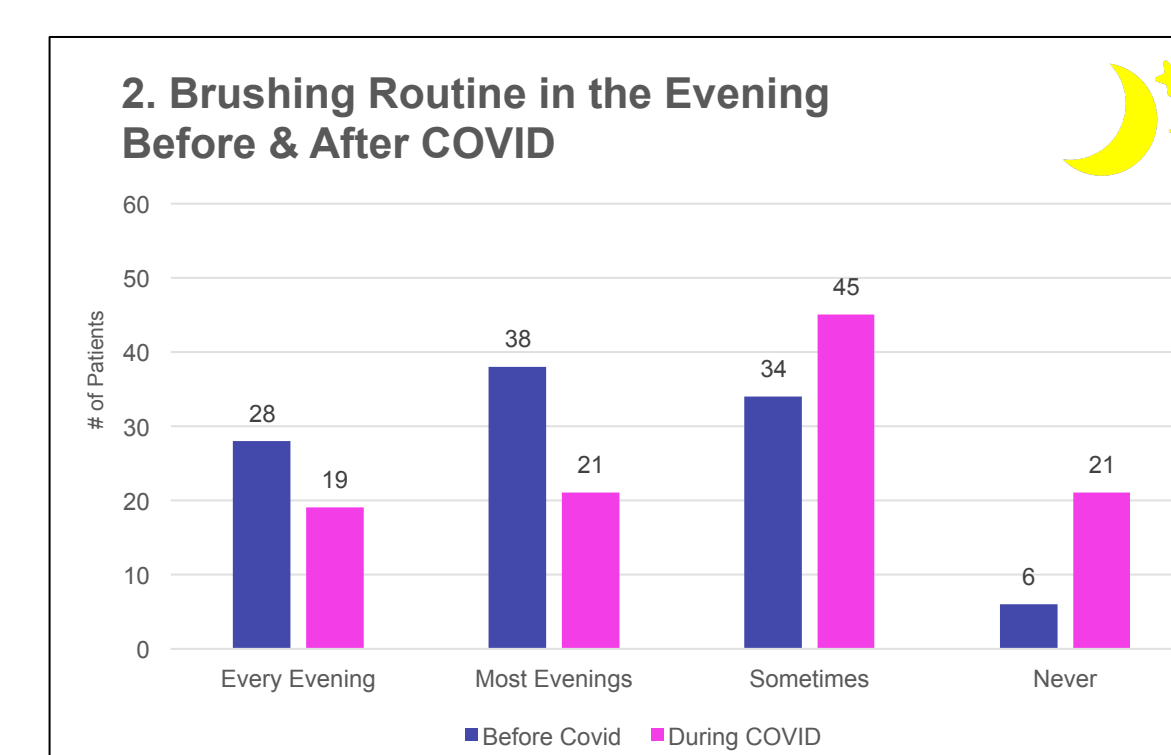
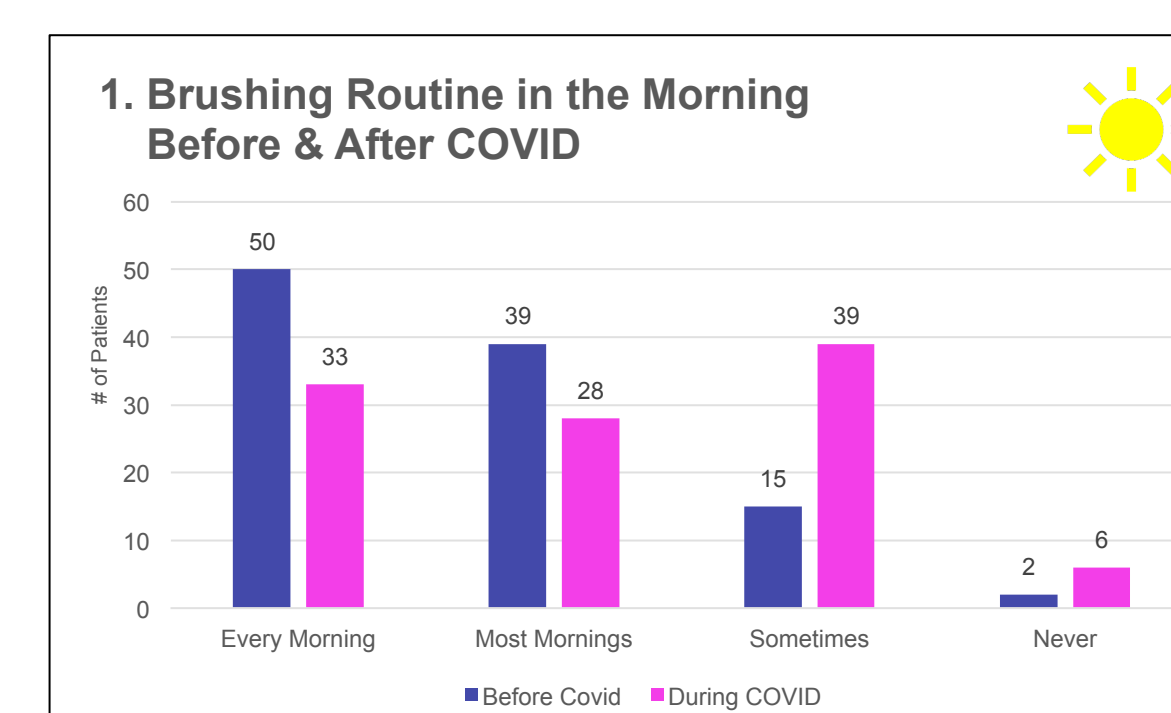
Are you more concerned of bringing your child to the dentist since the pandemic (March 2020)?

Yes No

If yes, why are you more concerned (write answer on the line below)

Figure 2: Parent Questionnaire

## Results



DMFT Score		
DMFT Score	Before Covid	During COVID
0	24	14
1	12	1
2	17	5
3	19	6
4	14	17
5	13	15
6	4	8
7	2	10
8	1	18
9	0	3
10	0	6
11	0	1
12	0	1
13	0	1
14	0	1
Grand Total	106	106

Parent Answers	Total Number	Main Reason
Yes	76	Getting COVID
No	30	

## Discussion

- The COVID-19 pandemic had a detrimental impact on the frequency with which children brushed their teeth on a daily basis. There was a statistically significant decrease in the number of patients who brushed their teeth every morning or evening.
- The change in levels of physical activity before and during the pandemic were also statistically different. The number of children who engaged in physical activity every day decreased by 50% during COVID. Those that engaged in such activities only a few times per week or never was also higher during the pandemic.
- Children spent much more time on electronic devices for leisure during the pandemic which was statistically significant. There was a greater than 50% decrease in the number of children who only spent 1-3 hours on these devices. Conversely, there was a noticeable increase in those who spent anywhere from 4-9 hours per day.
- There was a significant increase in the frequency of higher DMFT scores during the pandemic, notably 4, 5, 7 and 9 which correlates with changes in dental hygiene and lifestyle leading to worse outcomes in this patient population.
- Finally, regarding the parent questionnaire, a large number of parents (70%) were reluctant to bring their children into the dental clinic during the pandemic with the main concern of getting infected with COVID.

## Conclusions

- This study demonstrates that a sedentary lifestyle, poor oral hygiene, and noncompliance with regular dental visits caused by the COVID-19 pandemic can place children at increased risk of developing dental caries.

## Study Limitations

- Small sample size
- Short study interval and follow up time
- Large age range which could influence comprehension of questions and responses

## References

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