

Evaluation of Internet Users' Interests for Paediatric Dental Problems during the COVID-19 Pandemic

Emre Aksoy (✉ dtemreaksoy@outlook.com)

Ondokuz Mayıs University

Emine Sen Tunc

Ondokuz Mayıs University

Research Article

Keywords: COVID-19, Google trends, Paediatric dentistry

Posted Date: March 7th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1321948/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Version of Record: A version of this preprint was published at BMC Oral Health on February 17th, 2023.
See the published version at <https://doi.org/10.1186/s12903-023-02815-4>.

Abstract

Background

The outbreak of pandemic coronavirus (COVID-19) had a significant impact on dental care providers; patients had trouble accessing routine dental care due to concerns about the safety of dentists and patients. Therefore, people spend more time at home due to lockdown and working from home, which increases their likelihood of looking for dental care information on the Internet. The present study aims to compare the trends of Internet searches for paediatric dentistry queries before and after COVID-19.

Design:

The weekly variation of relative search volume (RSV) and the lists of paediatric dentistry-related queries were determined from December 2018 through December 2020 using Google Trends. Two separate data sets were obtained before and after the pandemic. It compared COVID-19's first year to the year before COVID-19. The data sets were analyzed using paired t-test.

Results

There was a statistically significant increase in queries about dental emergencies, especially toothache and dental trauma ($p < 0.05$). Other queries about recommended dental procedures during COVID-19, such as Hall Techniques and stainless steel crowns, showed an increasing trend. However, these were not statistically significant ($p > 0.05$).

Conclusions

People search for many more emergency queries on the Internet due to their limited access to dental care providers. Also, non-aerosol generating procedures such as Hall Techniques are becoming much more popular.

Background

COVID-19 (coronavirus disease 2019) is a novel coronavirus disease that has emerged for the first time in the Chinese city of Wuhan. The World Health Organization (WHO) declared a pandemic on March 11, 2020, as a consequence of COVID-19's rapid spread across many countries. COVID-19 has a high potential for spreading and is transmitted through small droplets.[1] The pandemic has affected a lot of health care systems, such as dental care. Many countries, including the United States and the United Kingdom, prefer to have lockdowns to avoid an overburdened healthcare system. In addition, routine dental care had to be limited due to concerns about the safety of dentists and patients.[2]

WHO stated that oral diseases are a serious public health problem, and the most common noted oral diseases are dental decay, tooth loss, periodontal disease, and trauma. Tooth caries affects 60–90% of school-aged children worldwide. In addition, since the early 1970s, caries prevalence in preschool-aged children has increased due to the higher consumption of sugar-containing diets.[3, 4] Dental trauma is a common oral problem that affects children and can lead to tooth loss.[5] In recent years, the Internet has provided a wealth of information. People get quick access to a piece of information through the Internet search terms.[6] Internet platforms contain a wealth of information about self-medication, alternative treatments, and urgent dental care, and people with dental problems may prefer to search for information on the Internet to manage dental pain.[7] Google is the most popular search engine among Internet users. As a result, people are turning to Google as their first source of dental information.[8]

The outbreak of pandemic coronavirus (COVID-19) had a significant impact on dental care providers; patients had trouble accessing routine dental care due to concerns about the safety of dentists and patients. Therefore, people spend more time at home due to lockdown and working from home, which increases their likelihood of looking for dental care information on the Internet.[2, 9] The Google Trends (GT) service is a Google product that analyzes the popularity of Internet search terms and can contribute to the evaluation of dental problems in communities across different languages and regions worldwide. [10] GT can show us by comparing the first year of the COVID-19 with the year before the COVID-19 what people's dental needs are during the COVID-19. In view of the lack of research on this subject, the study aims to compare the trends of Internet searches for paediatric dentistry queries before and after the COVID-19.

Methods

In this cross-sectional study, GT was used to evaluate Internet search trends during the COVID-19 pandemic worldwide. Google Trends was used to collect data. When a person searches for a term on the Google search engine, Google Trends generates data on how common the query term is. Google Trends presents normalized data about anonymous user searches as relative search volumes (RSV), varying from 0 to 100, where 100 means the maximum value of searches in a given period.

The comparison strategy was based on standard terms among oral health policies and recommendations of paediatric dentistry defined by the American Academy of Paediatric Dentistry (AAPD) and related popular search queries as posted on GT.[11] Efforts have been made to include terms that are likely to be familiar to people looking for information on dental care. Individuals may not know dental terminology such as regenerative pulp therapy. For example, topical fluoride application was included instead of silver diamine fluoride, and its RSV was higher than another term. Paediatric dentistry-related queries are presented in Table 1. The weekly RSV and the lists of paediatric dentistry-related queries were determined from December 2018 through December 2020 using Google Trends. GT search parameters were set to "Worldwide," "December 2018- December 2020," "All categories," and "Web Search". Two separate data sets were obtained before and after the pandemic. It compared the first year of the COVID-19 with the year before the COVID-19.

Table 1: Top relative search volumes of paediatric dentistry related queries

Paediatric dentistry related diseases and treatments	Search Terms With Top RSV's
Early childhood caries	Baby teeth caries, child teeth caries, baby tooth caries, child tooth caries
Kids toothache	Kids toothache, child toothache
Dental trauma	Avulsed tooth, fractured tooth, broken tooth, broken teeth
Cleft lip and palate	Cleft lip, cleft palate, harelip
Root canal on baby teeth	Paediatric pulpotomy, baby root canal, root canal on baby tooth
Paediatric Restorative Dentistry	Hall Technique, stainless steel crown, fluoride treatment, Atraumatic Restorative Treatment, kids tooth filling
Space maintainer	Band and loop space maintainer, distal shoe space maintainer, Transpalatal Arch, Lingual Holding Arch
Mouthguard	Sports mouthguard, kid mouthguard, child mouthguard
Paediatric dentistry	Pedodontist, child dentist, child dentistry, paediatric dentist

The data sets were analyzed using SPSS software version 25 (IBM Corp, Armonk, NY) $p \leq .05$ was considered statistically significant. The data was analyzed using paired t-test.

Results

There was a statistically significant increase in the queries about dental emergencies, especially toothache and dental trauma ($p < 0.05$). The RSVs of early childhood caries and tooth caries-related queries increased over time. We found a decrease in the RSVs for two search queries about paediatric dentistry and pedodontics. In addition, other queries about recommended dental procedures during the COVID-19, such as Hall Techniques and stainless steel crowns, showed an increasing trend. However, these were not statistically significant ($p > 0.05$). The results of paired t-test analysis are presented in Table 2. Figures 1-8 show comparative RSVs for paediatric dentistry queries data over two years.

Table 2: Compared queries the first year of the COVID-19 with the year before the COVID-19, * $p < .001$, ** $p < .005$

	Before the COVID-19, M (SD)	First year of the COVID-19, M (SD)	t (df)
Early childhood caries	39.60 (19.998)	39.69 (20.019)	-.025 (51)
Kids toothache	34.25 (24.580)	46.54 (22.194)	-2.628 (51)**
Dental trauma	66,25 (14.028)	69,92 (13.128)	-1.326 (51)
Cleft lip and palate	46,62 (4.353)	47,27 (9.394)	-.484 (51)
Root canal on baby teeth	43.73 (25.887)	36.38 (22.216)	1.725 (51)
Hall technique	36.88 (27.837)	40.92 (26.054)	-.757 (51)
Stainless steel crown	42.50 (19.242)	46.88 (20.539)	-1.078 (51)
Space maintainer	43.48 (18.115)	40.15 (20.032)	.875 (51)
Mouthguard	84,56 (6,329)	75,6 (9,602)	7.825 (51)*
Paediatric dentistry	82.94 (9.164)	74.96 (15.560)	3.761 (51)*

Discussion

This is the first study that has used GT queries to compare the trends of internet searches about paediatric dentistry during the COVID-19 pandemic. In addition, there is no GT study about paediatric dentistry queries. Recent studies during the COVID-19 indicate a higher interest in self-treatment for dental problems around the world [12, 13]. Therefore, the study is important to show trends in internet searches for paediatric dentistry queries during COVID-19.

The COVID-19 has had a global impact that has never been seen before. Countries were obliged to implement several measures to control the COVID-19, including restrictions on the health and dental sectors. Dental authorities around the world, such as ADA (American Dental Association), AAPD (American Academy of Paediatric Dentistry), BDA (British Dental Association), recommended postponing elective and non-urgent dental procedures at the beginning of the COVID-19 [14]. Dental care providers accepted only urgent dental treatments and procedures.[15] Pericoronitis, oral trauma, severe toothache, acute abscesses, and life-threatening tissue bleeding were defined as oral emergencies.[16] Patients had difficulty getting dental care during this time. Due to the unpredictable duration of the pandemic, new approaches and management procedures have become mandatory for routine dentistry practices. Paediatric dental practice in the post-COVID era is beginning to be routine. [13, 17, 18] Although people have access to dental care, the current scenario of the COVID-19 pandemic has created panic in people's minds about whether to go to the dentist or stay at home and seek dental care on the Internet until the world returns to normalcy.

Early childhood caries (ECC) is an aggressive form of tooth decay that affects children's primary teeth. ECC has a clear aetiology: high sugar intake, usually from a nursing bottle, combined with poor or non-existent oral hygiene, as a result of parents failing to brush or brushing insufficiently, results in an atypical pattern of caries attack, particularly on the smooth surfaces of upper anterior teeth in young children. Although professional guidelines recommend visiting a dentist at an early age, children are late to go to a first dental visit.[19] Our findings show that search activity for ECC and tooth caries-related queries is increasing. It can be explained by difficulties in accessing dental care providers during COVID-19.

Various factors can cause toothaches, both odontogenic and non-odontogenic. However, odontogenic factors are the most common cause of toothache. Toothache is a sign of poor oral health, and it can negatively impact one's quality of life.[20] Lotto et al.'s study shows a continuous increase in the interests of Internet users on toothache queries over the years. Our results are in line with this study. [21] Also, we found a statistically significant increase during COVID-19. Another clinical condition that affects children and is linked to toothache is dental trauma. Dental trauma is a significant health issue among children, and it has the potential to degrade their quality of life.[22] In this study, dental trauma was the most searched query overall during COVID-19. The consequences of dental trauma can be serious, resulting in an irreversible dental loss at the time of the incident, during treatment, or even years later. Thus, new healthcare approaches for early diagnoses, such as teledentistry, are critical when access to dental care providers is limited, such as during pandemics.

Non-aerosol generating procedures for dental management of paediatric patients are suggested in the post-COVID era. These are atraumatic restorative technique fissure sealants, silver diamine fluoride, hall technique, and interim therapeutic restorations. Atraumatic restorative technique (ART) is a treatment that involves removing caries selectively with hand instruments and filling them with a high-viscosity glass ionomer cement.[23] The Hall Technique is a non-invasive method of restoring carious primary molar teeth using preformed metal (also known as stainless steel) crowns. ART is considered a significant approach for treating children in the post-pandemic era.[14] The Hall Technique is a non-invasive method of restoring carious primary molar teeth using preformed metal (also known as stainless steel) crowns. This technique has some advantages because no local anaesthesia and tooth preparation is required in the post-COVID-19 era. Topical fluorides, such as silver diamine fluoride (SDF), are effective at reducing caries. SDF is recommended by the American Dental Association (ADA) to treat advanced cavitated caries on any coronal surface of primary and permanent teeth. The use of SDF instead of other fluoride agents has grown in popularity in recent years[14]. In this study, we found an increase in non-aerosol generating procedure-related queries. This finding can be explained by the growing popularity of non-aerosol generating procedures.

Surprisingly, we found a decrease in the RSVs for two search queries about paediatric dentistry and pedodontics. This result can be attributed to the fact that people may prefer to search for other dentistry queries rather than these. In addition, patients have trouble accessing dental care providers, leading them to seek dental help for dental emergencies. The statistically significant decrease in the queries about non-urgent procedures such as space maintainers and mouthguards also supports this.

Limitation

These findings need to be interpreted with caution. This data pertains solely to Internet users' behaviours on the Google web platform and does not include queries from other search engine tools. Another issue was that we couldn't access the raw data on GT; as a result, we don't know how many times a single person searched for paediatric dentistry-related queries. This could result in a duplication error in the records.

Conclusion

People searched for many more emergency queries on the Internet due to the COVID-19 pandemic. In addition non-aerosol generating procedures such as Hall Techniques are becoming much more popular.

Accessing accurate information on the Internet can help patients understand their dental condition and make it easier to contact dentists during the COVID-19. Thus, dental organizations should use their websites and social media to disseminate dental care information, and access to the Internet is important.

Abbreviations

ART

Atraumatic restorative technique

COVID-19

Corona virus disease 2019

ECC

Early childhood caries

GT

Google Trends WHO:World health organization

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this published article (and its supplementary information files).

Competing interests

The authors declare that they have no competing interests.

Funding

No financial support was received for this research.

Authors' contributions

EA and ET were principal investigators of the study and drafted the manuscript. EA collected the data using Google Trend. EA performed statistical analysis. All authors read and approved the final version of the manuscript.

Acknowledgments

Not applicable.

Author's information

¹ Research Associate, DDS, Department of Paediatric Dentistry, Faculty of Dentistry, Ondokuz Mayıs University, Samsun, Turkey

² Professor, DDS, Ph.D., Department of Paediatric Dentistry, Faculty of Dentistry, Ondokuz Mayıs University, Samsun, Turkey

References

1. Coronavirus disease (COVID-2019) situation reports
[<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>]
2. Cotrin P, Peloso RM, Pini NIP, Oliveira RC, de Oliveira RCG, Valarelli FP, Freitas KMS: Urgencies and emergencies in orthodontics during the coronavirus disease 2019 pandemic: Brazilian orthodontists' experience. *American Journal of Orthodontics and Dentofacial Orthopedics* 2020, 158(5):661-667.
3. Ramos-Gomez FJ, Crystal YO, Ng MW, Crall JJ, Featherstone JD: Pediatric dental care: prevention and management protocols based on caries risk assessment. *Journal of the California Dental Association* 2010, 38(10):746.
4. Meier T, Deumelandt P, Christen O, Stangl G, Riedel K, Langer M: Global burden of sugar-related dental diseases in 168 countries and corresponding health care costs. *Journal of dental research* 2017, 96(8):845-854.
5. Lee JY, Divaris K: Hidden consequences of dental trauma: the social and psychological effects. *Pediatric dentistry* 2009, 31(2):96-101.

6. Cervellin G, Comelli I, Lippi G: Is Google Trends a reliable tool for digital epidemiology? Insights from different clinical settings. *Journal of epidemiology and global health* 2017, 7(3):185-189.
7. Ahlwardt K, Heavilin N, Gibbs J, Page J, Gerbert B, Tsoh JY: Tweeting about pain: comparing self-reported toothache experiences with those of backaches, earaches and headaches. *The Journal of the American Dental Association* 2014, 145(7):737-743.
8. Desktop Search Engine Market Share [<https://www.webcitation.org/6tgBD3t7Y>]
9. Sycinska-Dziarnowska M, Paradowska-Stankiewicz I: Dental Challenges and the Needs of the Population during the Covid-19 Pandemic Period. Real-Time Surveillance Using Google Trends. *International Journal of Environmental Research and Public Health* 2020, 17(23):8999.
10. Google Trends [https://en.wikipedia.org/wiki/Google_Trends]
11. Oral Health Policies & Recommendations (The Reference Manual of Pediatric Dentistry) [<https://www.aapd.org/research/oral-health-policies-recommendations/>]
12. Onchonga D: A Google Trends study on the interest in self-medication during the 2019 novel coronavirus (COVID-19) disease pandemic. *Saudi Pharmaceutical Journal: SPJ* 2020, 28(7):903.
13. Sen Tunc E, Aksoy E, Arslan HN, Kaya Z: Evaluation of parents' knowledge, attitudes, and practices regarding self-medication for their children's dental problems during the COVID-19 pandemic: a cross-sectional survey. *BMC Oral Health* 2021, 21(1):98.
14. Al-Halabi M, Salami A, Alnuaimi E, Kowash M, Hussein I: Assessment of paediatric dental guidelines and caries management alternatives in the post COVID-19 period. A critical review and clinical recommendations. *European Archives of Paediatric Dentistry* 2020:1-14.
15. Long RH, Ward TD, Pruett ME, Coleman JF, Plaisance Jr MC: Modifications of emergency dental clinic protocols to combat COVID-19 transmission. *Special Care in Dentistry* 2020, 40(3):219-226.
16. ADA Website Guidance on Emergency vs. Non Emergency. [<https://www.ada.org/en/publications/ada-news/2020-archive/march/ada-develops-guidance-on-dental-emergency-nonemergency-care>]
17. Hopcraft M, Farmer G: Impact of COVID-19 on the provision of paediatric dental care: Analysis of the Australian Child Dental Benefits Schedule. *Community Dentistry and Oral Epidemiology* 2020.
18. Peres KG, Reher P, Castro RDd, Vieira AR: COVID-19-related challenges in dental education: experiences from Brazil, the USA, and Australia. *Pesquisa Brasileira em Odontopediatria e Clínica Integrada* 2020, 20.
19. Tinanoff N, Baez RJ, Diaz Guillory C, Donly KJ, Feldens CA, McGrath C, Phantumvanit P, Pitts NB, Seow WK, Sharkov N: Early childhood caries epidemiology, aetiology, risk assessment, societal burden, management, education, and policy: Global perspective. *International journal of paediatric dentistry* 2019, 29(3):238-248.
20. Gomes MC, Neves ÉT, Perazzo MF, Paiva SM, Ferreira FM, Granville-Garcia AF: Toothache and non-clinical individual and school factors in five-year-old children: multilevel analysis. *Brazilian dental journal* 2018, 29:569-575.

21. Lotto M, Ayala Aguirre PE, Rios D, Andrade Moreira Machado MA, Pereira Cruvinel AF, Cruvinel T: Analysis of the interests of Google users on toothache information. PLoS One 2017, 12(10):e0186059.
22. Magno MB, de Paiva Cabral Tristão SK, Jural LA, Aguiar Sales Lima SO, Coqueiro RdS, Maia LC, Pithon MM: Does dental trauma influence the social judgment and motivation to seek dental treatment by children and adolescents? Development, validation, and application of an instrument for the evaluation of traumatic dental injuries and their consequences. International journal of paediatric dentistry 2019, 29(4):474-488.
23. Raggio DP, Hesse D, Lenzi TL, AB Guglielmi C, Braga MM: Is Atraumatic restorative treatment an option for restoring occlusoproximal caries lesions in primary teeth? A systematic review and meta-analysis. International journal of paediatric dentistry 2013, 23(6):435-443.

Figures

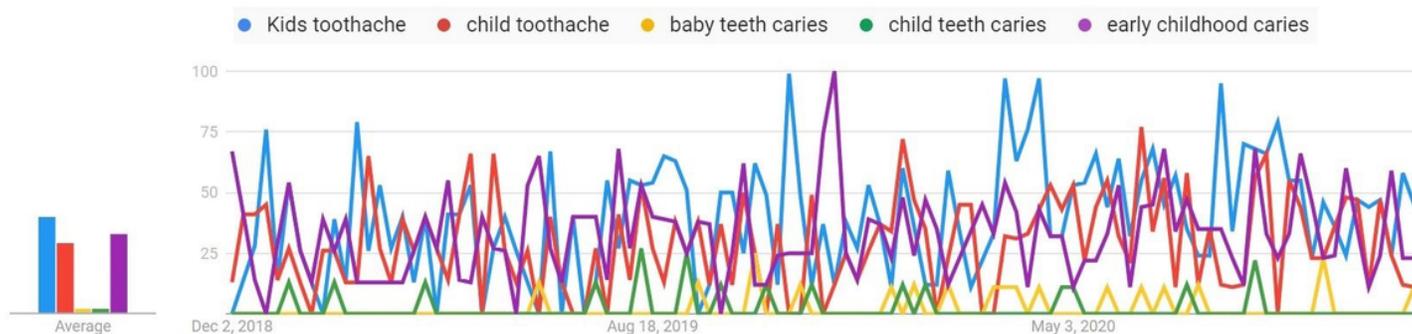


Figure 1

Comparative RSVs of kids toothache, child toothache, baby teeth caries, child teeth caries, early childhood caries from December 2018 to December 2020.

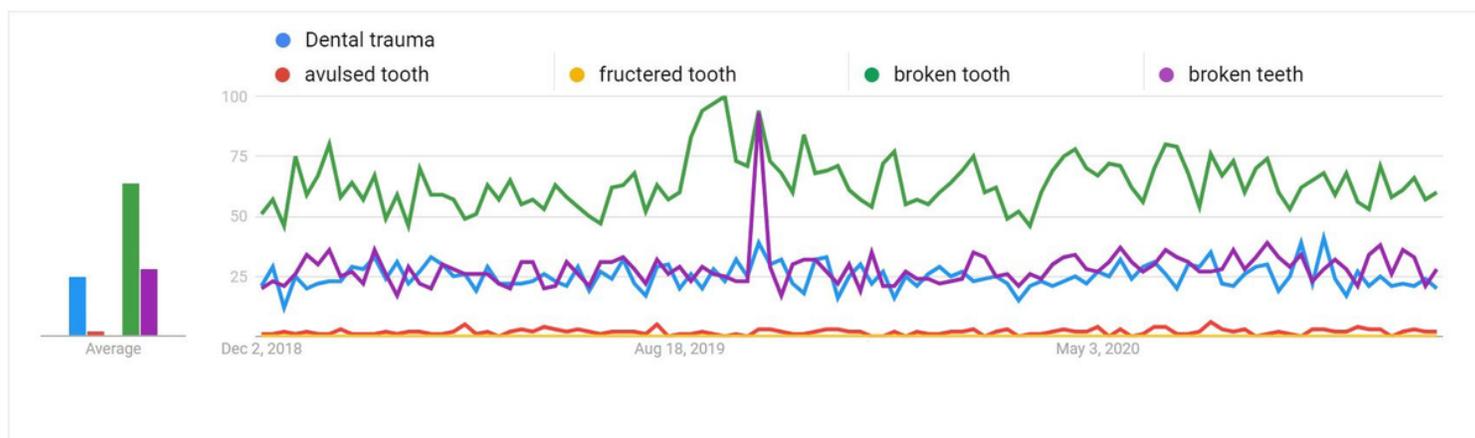


Figure 2

Comparative RSVs of dental trauma, avulsed tooth, fractured tooth, broken tooth, broken teeth from December 2018 to December 2020.

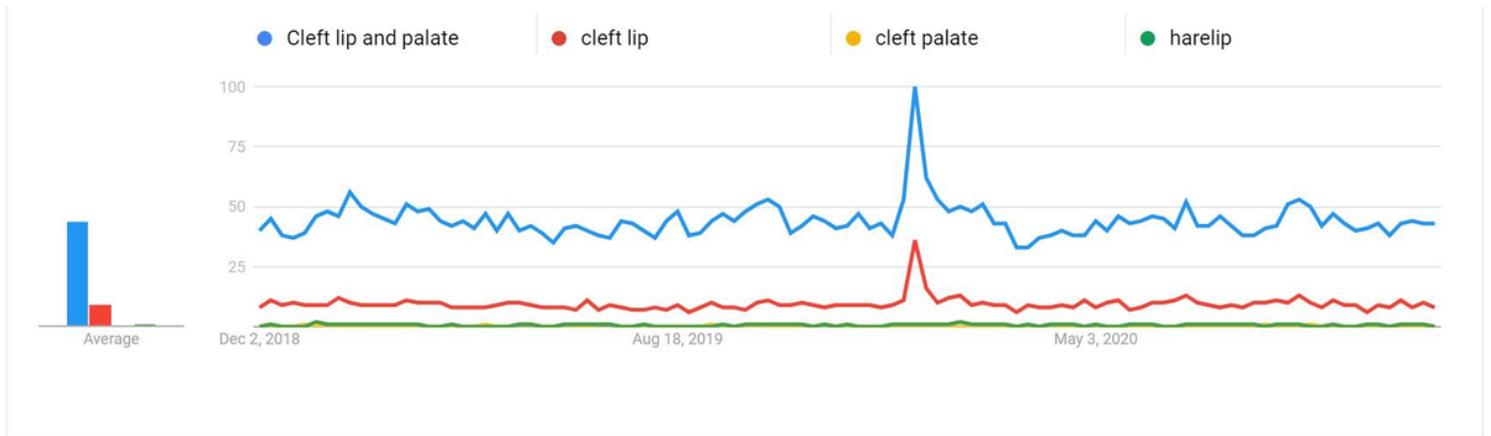


Figure 3

Comparative RSVs of cleft lip and palate, cleft lip, cleft palate, harelip from December 2018 to December 2020.

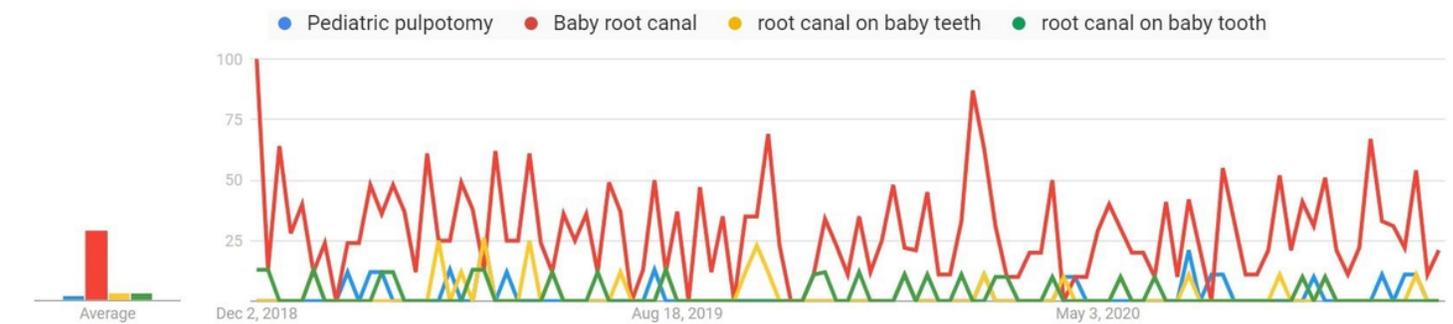


Figure 4

Comparative RSVs of paediatric pulpotomy, baby root canal, root canal on baby teeth, root canal on baby tooth from December 2018 to December 2020.

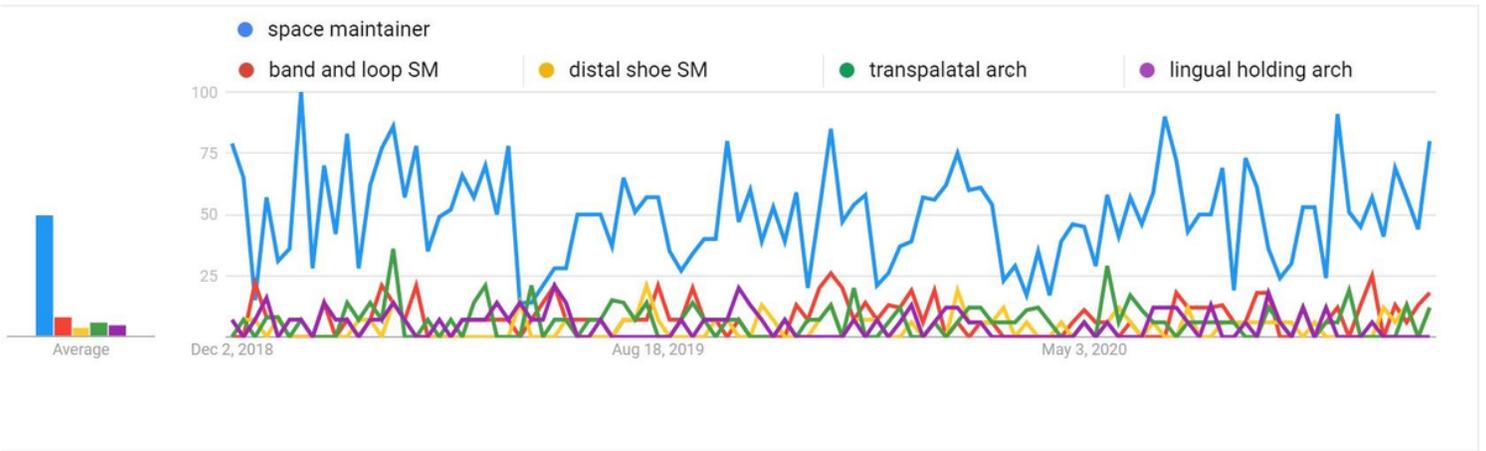


Figure 6

Comparative RSVs of space maintainer, band and loop space maintainer, distal shoe space maintainer, transpalatal arch, lingual holding arch from December 2018 to December 2020.

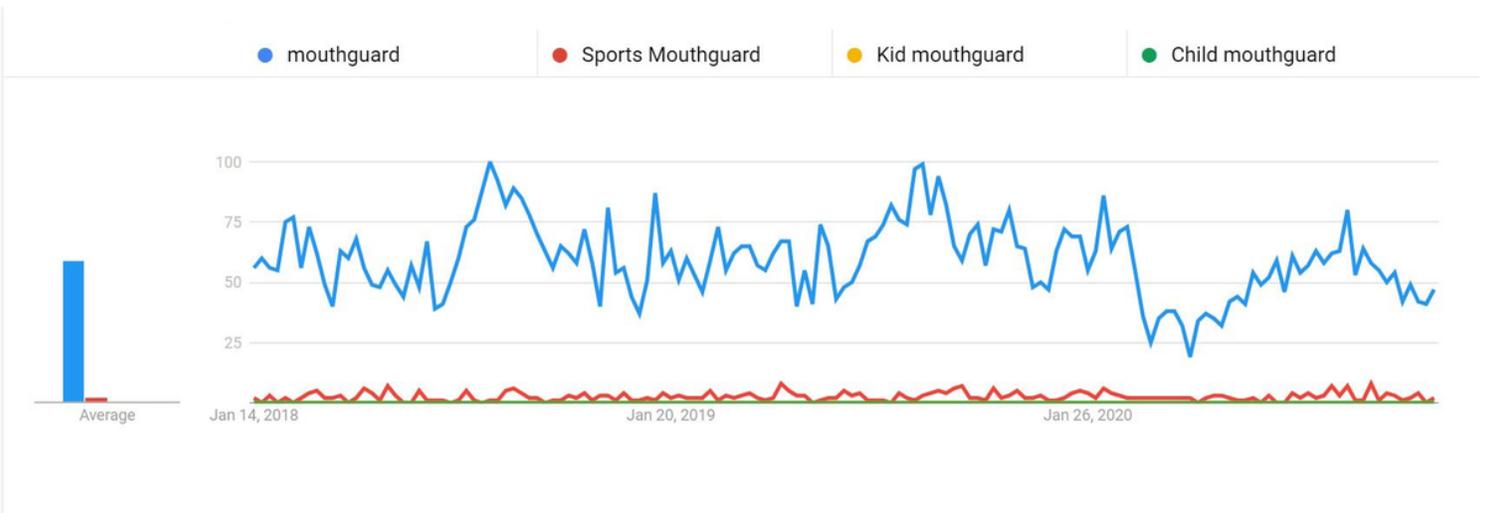


Figure 7

Comparative RSVs of mouthguard, sports mouthguard, kid mouthguard, child mouthguard December from 2018 to December 2020.

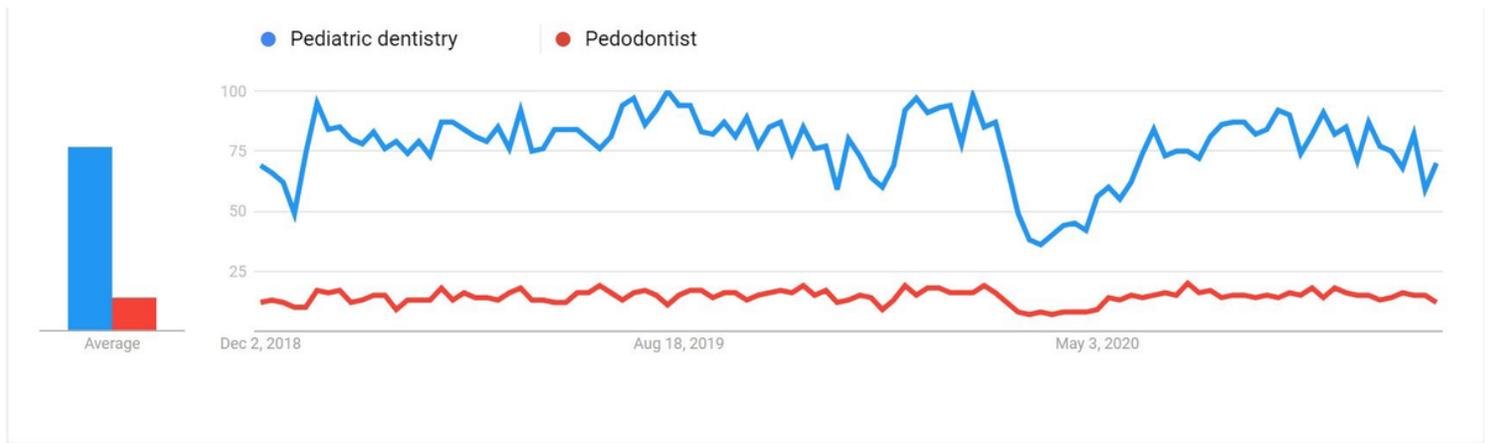


Figure 8

Comparative RSVs of paediatric dentistry and pedodontics from December 2018 to December 2020.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [1Spacemaintainer.xlsx](#)
- [2Mouthguard.xlsx](#)
- [3Dentaltrauma.xlsx](#)
- [5Pediatricdentistry.xlsx](#)
- [7Halltechnique.xlsx](#)
- [8SSC.xlsx](#)
- [9kidstoothache.xlsx](#)
- [10ECC.xlsx](#)