Revista Médica ELECTRÓNICA

Rev Méd Electrón | Vol. 48. 2026 | ISSN: 1684-1824

HOW TO CITE

Shukla B, Panda A, Chari D. Knowledge production on mHEALTH as a point-of-care tool in Pediatric Dentistry: a bibliometric analysis. Rev Méd Electrón [Internet]. 2026 [citado: fecha de acceso];48:e6579. Disponible en: http://www.revmedicaelectronica.sld.cu/index.php/rme/article/view/6579/6496

***Corresponding author:**

balrajshukla@hotmail.com

Reviewers:
Silvio Faustino Soler-Cárdenas and Alfredo García Martínez.

Key words:
eHealth, mHealth, teledentistry, pediatric dentistry, bibliometric analysis.

Palabras clave:
telemedicina, estrategias de eSalud, odontología pediátrica, bibliometría.

Received: 2025/04/25.
Accepted: 2026/02/12.
Publicado: 2026/02/25.

Comunicación Breve

Knowledge production on mHEALTH as a point-of-care tool in Pediatric Dentistry: a bibliometric analysis

Producción de conocimientos sobre mHEALTH como herramienta en la consulta de estomatología pediátrica: un análisis bibliométrico

Balraj Shukla[1*] https://orcid.org/0000-0002-0923-5136

Anup Panda[1] https://orcid.org/0000-0002-9229-0097

Deepika Chari[1] https://orcid.org/0000-0003-2514-9031

Affiliation:

[1] Department of Pediatric and Preventive Dentistry, College of Dental Sciences and Research Centre, Gujarat University, Ahmedabad, India.

ABSTRACT

Introduction: Pediatric dentistry is a healthcare specialty in which teledentistry was incorporated into official guidance document in 2021. Since them, mHealth has emerged as a predominant modality for delivering teledentistry services in pediatric dentistry.

Objectives: This bibliometric analysis aimed to identify the leading countries, institutions and researchers advancing the application of mHealth in pediatric dentistry.

Methodos: A literature search across PubMed, Cochrane Library, and ScienceDirect retrieved 39 publications that met the inclusion criteria. The selected publications were imported into Bibliometrix software (R package) to perform visual analysis, including publication and citation metrics such as authors, productivity and institutional output. Science mapping was conducted using a co-occurrence analysis and thematic mapping to examine how mHealth has been integrated into pediatric dentistry.

Results: The included articles were published between 2013 and 2024, with an average of approximately four publications per year. Brazil, Finland, and India were the most productive countries in terms of publication output. Science mapping identified computers and handheld devices as an emerging thematic cluster. Seventeen percent of the studies focused on the development of mobile applications.

Conclusion: This bibliometric analysis provides a comprehensive overview of the intellectual structure of mHealth in pediatric dentistry, encompassing applications such as oral health education in preschoolers; caries risk assessment, nursing care, sleep-disordered breathing, special health care needs, oral health surveillance and promotion, screening and diagnosis, and behavior management.

RESUMEN

Introducción: La odontopediatría es una especialidad del ámbito sanitario en la cual la teleodontología se incorporó al documento de orientación oficial en 2021. Desde entonces, la salud móvil (mSalud) ha emergido como una modalidad predominante para la prestación de servicios de teleodontología en odontopediatría.

Objetivos: Comprender los principales países, afiliaciones e investigadores a la vanguardia de la utilización de mSalud para mejorar la odontología pediátrica clínica.

Métodos: Se realizó una búsqueda en PubMed, Cochrane Library y ScienceDirect, que recuperó 39 publicaciones que cumplían con los criterios de inclusión. Estas se introdujeron en el *software* Bibliometrix para interpretar el análisis de rendimiento, incluidos los indicadores de publicación e impacto (autores, afiliaciones, etc.). Se realizó un mapeo mediante un análisis de co-ocurrencias y un mapeo temático para comprender cómo se ha incorporado la sanidad móvil a la odontología pediátrica.

Resultados: Los artículos fueron publicados entre 2013 y 2024, con una tasa anual de cuatro por año. Brasil, Finlandia e India fueron los países que lideraron la investigación sobre mHealth en odontología pediátrica. El mapeo científico

mostró a los dispositivos informáticos/portátiles como el nicho temático. El 17 % de los estudios se centraron en el desarrollo de una aplicación móvil.

Conclusiones: Este estudio proporciona una estructura intelectual de mHealth en odontología pediátrica cuyas aplicaciones incluyen educación en salud oral en preescolares, evaluación del riesgo de caries, cuidados de enfermería, trastornos respiratorios del sueño, necesidades especiales de atención médica, vigilancia y promoción de la salud oral, cribado y diagnóstico, y gestión del comportamiento.

INTRODUCTION

The American Academy of Pediatric Dentistry adopted a teledentistry policy for the first time in 2021. The working committee recognized it as part of telehealth, which could support both asynchronous (store-and-forward) and synchronous (live video) modalities to facilitate oral health care.[1]

The World Health Organization's Global Observatory for eHealth defined mobile health (mHealth) as a wireless technology for public health.[2] mHealth, a subset of telehealth, emerged as a point-of-care tool in the mid-2000s due to the increasing use of mobile phones in healthcare. Given their complementary nature, teledentistry and mHealth were rapidly integrated into pediatric dentistry to raise awareness about children's oral health and enhance parental knowledge through digital technologies.[3]

The objectives of this study were twofold: (1) to identify the themes of studies using mobile applications in pediatric dentistry, and (2) to map collaboration and conceptual networks across the most relevant studies focusing on mobile phone applications and their role in pediatric dentistry.

A bibliometric study design was therefore selected, as it enables the characterization of the intellectual structure underlying research on mHealth applications in pediatric dentistry.

METHODOS

This bibliometric review followed the recommended methodology as proposed by Oztürk, et al.[4] The initial literature search on mobile applications in pediatric dentistry was performed in February 2024. Databases accessed included PubMed, Cochrane Library, and ScienceDirect. Unique search strings were developed for each database and are available upon request.

Following title and abstract screening, results from each database were exported and converted to a Microsoft Excel-compatible format. Duplicate records were removed using the same software. Articles lacking essential metadata—specifically authorship, keywords, affiliations, or source information—were

excluded. Opinion pieces, editorials, news articles, and conference abstracts were also excluded. The final list of included articles was tabulated according to field tags as recognized by Bibliometrix software (version 4.1).

After the initial data import, missing fields were identified and manually completed during data cleaning, guided by Bibliometrix recommendations. The refined dataset subsequently reimported. To optimize co-occurrence analysis, a list of synonymous terms and outliers was entered into the software. Science mapping and performance analysis were them performed on the processed dataset.

RESULTS

A total of 39 articles met the inclusion criteria. Quantitative interpretation of publication and impact indicators, along with empirical derivation of science maps, informed the results of this bibliometric analysis.

Publication and Impact Indicators

The 39 articles were published between 2013 and 2024. The most frequently employed study designs were cross-sectional studies (n=8), app development studies (n=7), randomized controlled trials (n=6), and systematic reviews (n=5). Only one article had a single author; the mean number of authors per article was 4.76. The international co-authorship rate was 17.07%, with 187 unique authors identified.

Publication trends indicate that since 2020, at least four articles per year have focused on mobile applications as interventions in pediatric dentistry. Brazil, Finland, India, Iran, and the USA were the most productive countries in this research domain. (Figure 1)

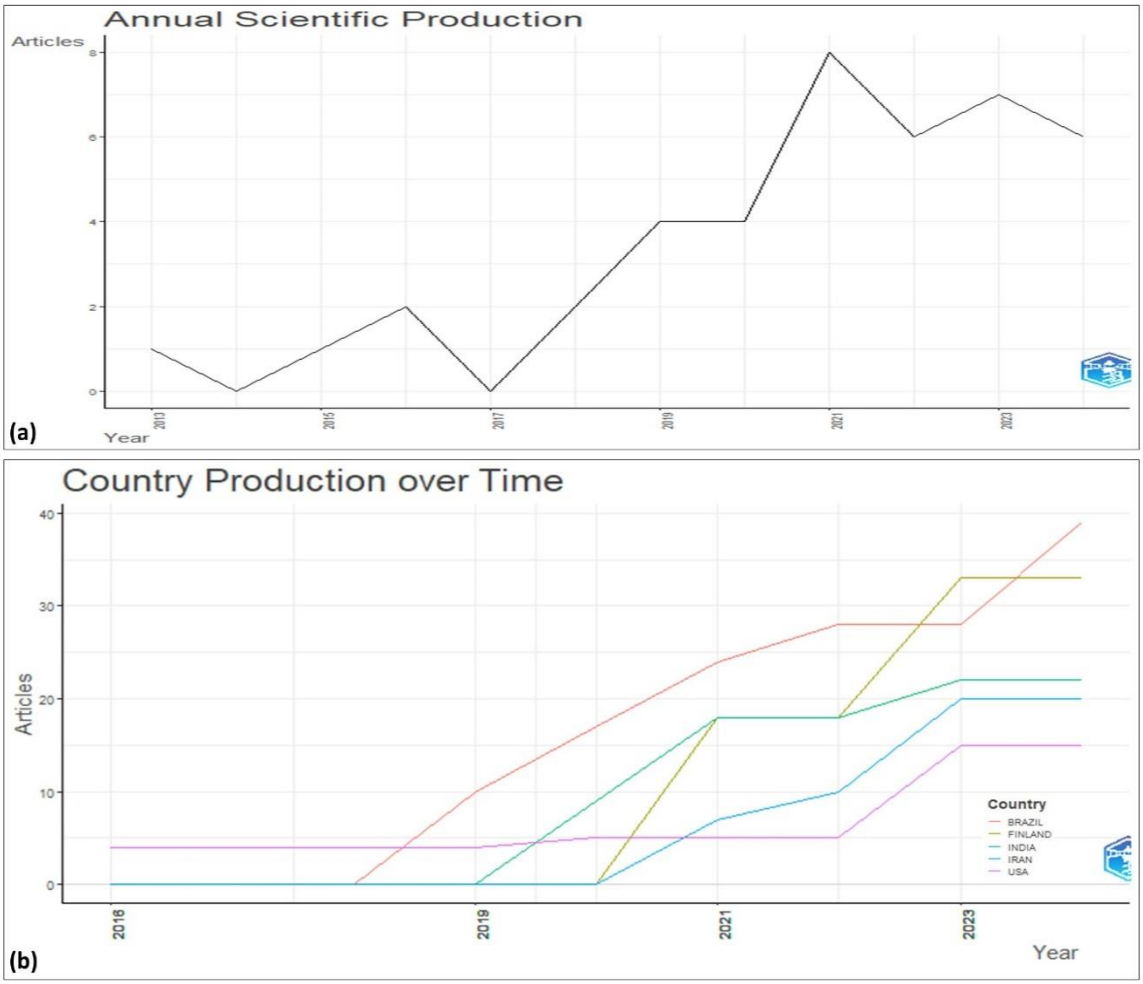

Fig. 1. Temporal trends in scientific article publications by country.

Tehran University of Medical Sciences and the University of Oulu emerged as the leading affiliations, contributing to 14 and 13 research projects, respectively. Performance analysis revealed no single dominant author in this field; eight authors each have published two articles on the topic. However, author productivity metrics indicate that Martha Wells (h-index=13) and Palinee Detsomboonrat (h-index=8) have maintained the longest publication records on mobile applications in pediatric dentistry (fig. 2). The *International Journal of Dental Hygiene*, *Journal of Dental Hygiene*, and *Telemedicine and e-Health* each published three articles on this topic.

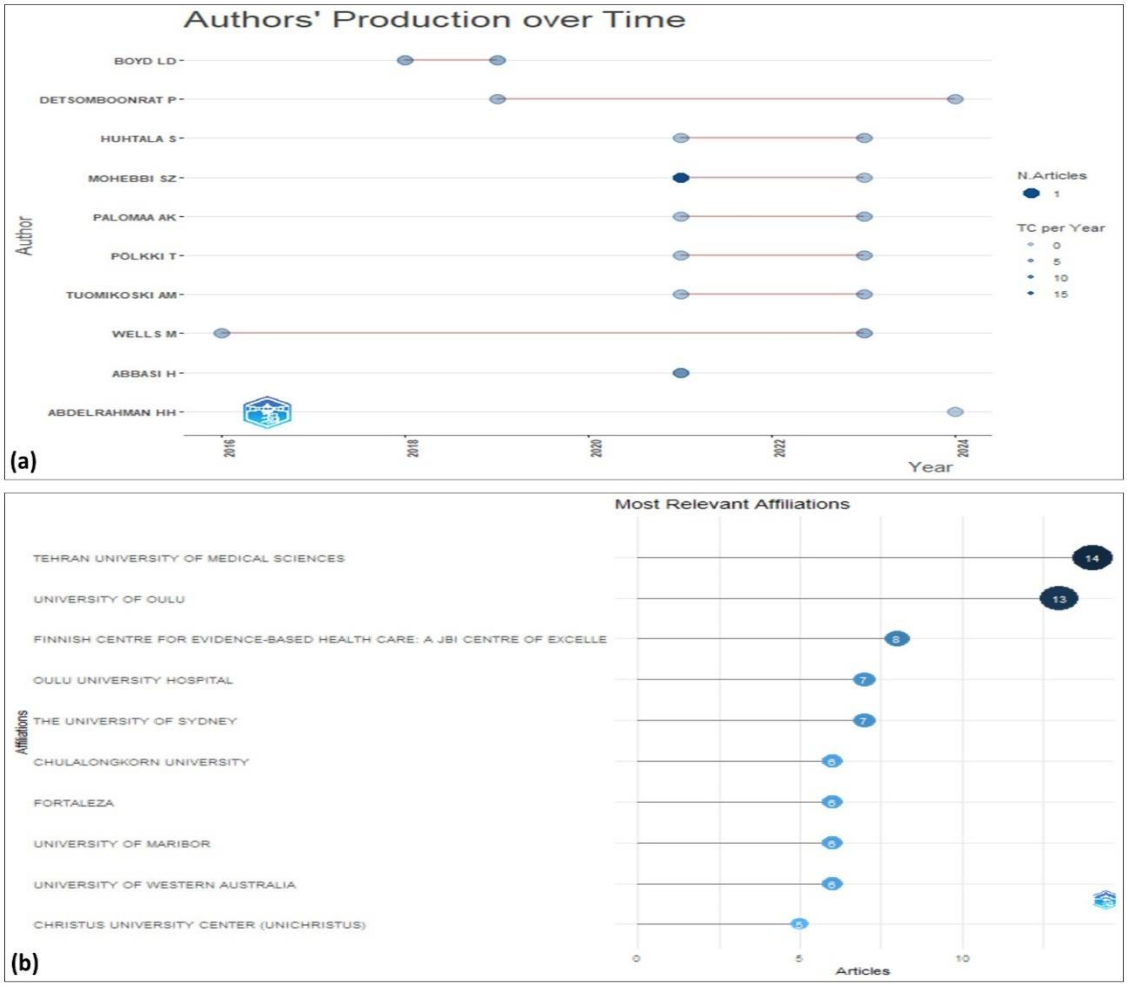

Fig. 2. (a) Scientific production of authors on oral health and mobile applications over time. (b) Institutions with the greatest number of relevant publications in oral health and mobile applications

B. Underwood's cross-sectional study featuring the Brush DJ application received the highest global citation count (175 citations). M.S. Alshaya's non-randomized interventional study evaluating teledentistry capabilities for diagnosis in mixed dentition ranked second (136 citations). M.P. Toniazzo's systematic review and meta-analysis was the third most-cited document (120 citations).

Science Mapping

The key word co-occurrence network revealed predominant research themes. A word cloud displaying terms sized by frequency facilitated identification of relevant topics (fig. 3). Thematic mapping classified humans and children as motor themes (high centrality and density), computers and handheld devices as niche themes (low centrality, high density), healthcare delivery as an emerging

theme (high centrality, low density), and reproducibility of results as a basic theme (low centrality and density). (Figure 4)

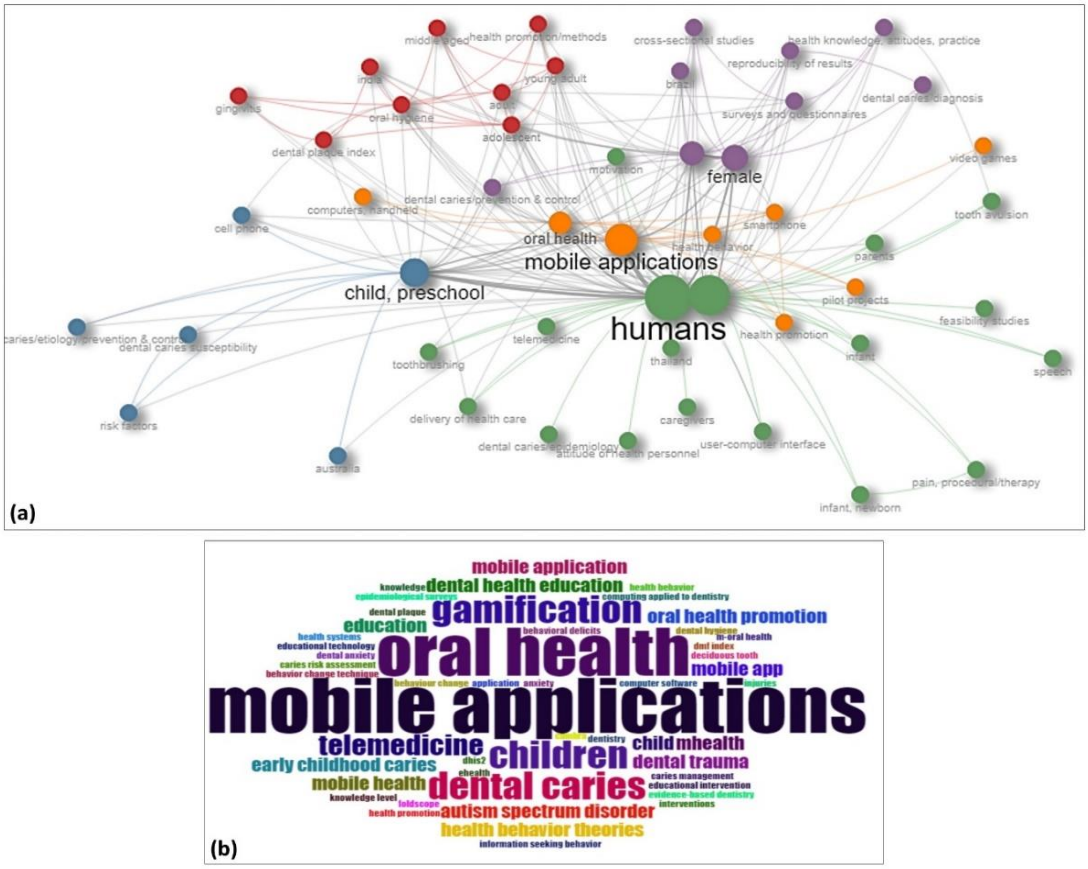

Fig. 3. (a) Co-occurrence network of terms in publications on oral health and mobile applications. (b) Word cloud of frequent topics in studies on oral health and mobile applications.

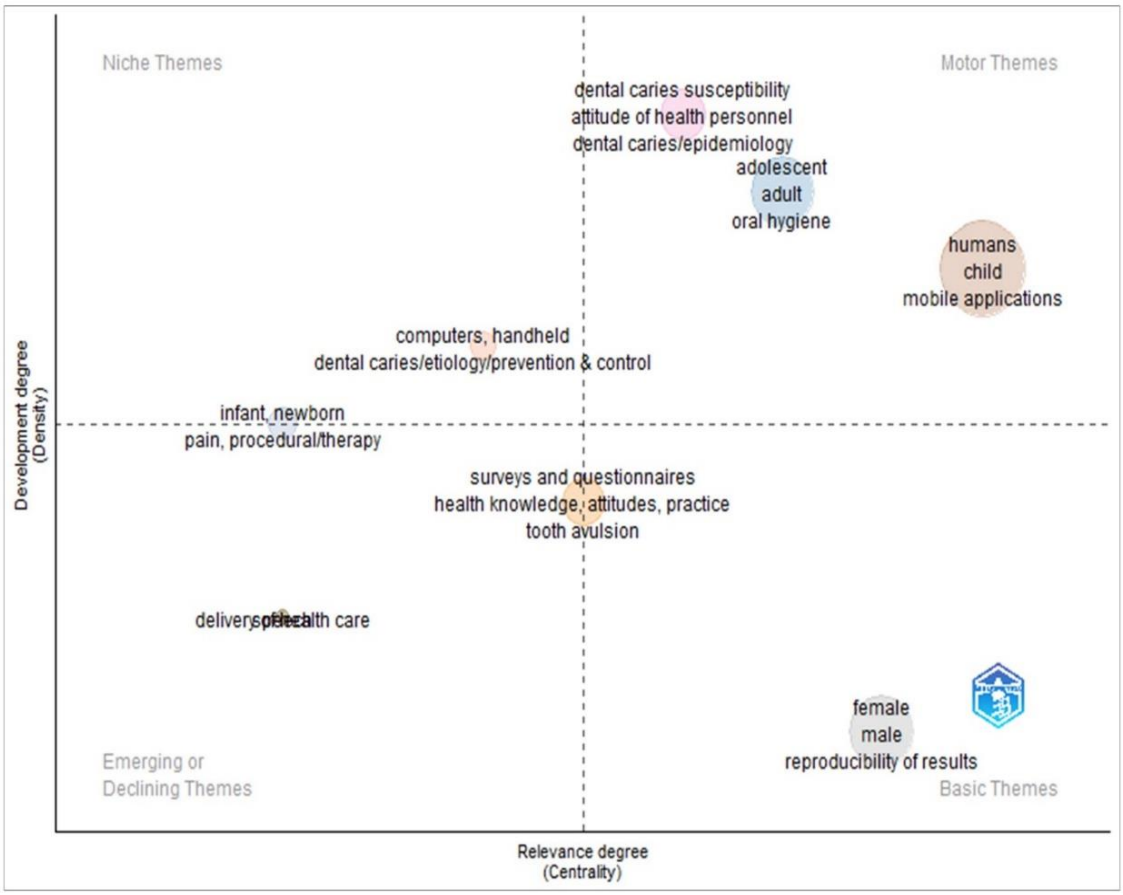

Fig. 4. Thematic map of research on mobile applications in oral health (Classification of topics by degree of development and central relevance).

DISCUSSION

Bibliometric findings can be interpreted through three sequential phases: sensing, scanning, and substantiating.[5] The development of mobile applications, coupled with advances in digital technology and heightening public awareness, created opportunities for collaboration between software developers and dental researchers (sensing). The focus of the authors on pediatric dentistry was guided by evidence that more than half of patient-oriented mobile applications target children and adolescents.[6] Bibliometrix software enabled integration of records from multiple databases, generation of visualizations, and production of customizable statistical reports.[5]

Approximately 17% of the studies focused on mobile application development. Notably, none adhered to an established reporting guideline for app development research. Although, standardized tools exist to evaluate mobile applications, comprehensive reporting standards for development studies remain absent. The analysis of the authors identified recurrent application domains in pediatric

dentistry: oral health education for preschoolers, caries risk assessment, nursing care, sleep-disordered breathing, special healthcare needs, oral health surveillance and promotion, screening and diagnosis, and behavior management (scanning).

This bibliometric review was warranted given the accelerating momentum of mHealth research and growing recognition of the complexities inherent in developing mobile applications as clinical interventions.[7] This trend aligns with the exponential rise of gamification as a behavior management technique in pediatric dentistry.[8] Furthermore, the review indicates that scientific manuscript describing mobile application in pediatric dentistry achieve greater recognition when the applications are grounded in evidence-based literature (substantiating).[9,10]

The three most cited documents represent different facets of mHealth application in pediatric dentistry. Digital enhanced plaque control methods constitute an advanced approach to mechanical oral hygiene[11]; consequently, the Brush DJ application leads in citation metrics. The second-most-cited study demonstrates mobile dentistry capabilities for diagnosis and treatment planning in patients with mixed dentition.[12] The third-most-cited document, a meta-analysis, concluded that mHealth effectively promotes oral health education and gingivitis management.[13]

The Internet of Things (IoT) encompasses interconnected digital technologies applied to healthcare delivery. A recent scoping review of mHealth and eHealth interventions for children's oral health confirmed their potential to improve oral hygiene practices[14], underscoring the importance of mapping current bibliometric trends. Although digital interventions for typically developing children are increasingly available, applications for children with special healthcare needs remain scarce. Existing applications for children with autism spectrum disorders or Down syndrome often fail to address diverse sensory requirements effectively.[15]

This review has limitations. Analysis was restricted to three databases and English language. Additionally, alternative metrics such as Altmetric could provide further insight into the social media impact and public engagement of these publications.

The integration of mHealth as a core component of teledentistry in the era of artificial intelligence holds considerable promise. However, a careful balance must be maintained between technological innovation and Hippocratic principles. Healthcare researchers engaged in clinical practice must prioritize clinical acumen over automation bias.

CONCLUSION

This bibliometric review establishes an intellectual framework for research on mobile applications as interventions in pediatric dentistry. It delineates predominant research themes and underscores the need for more rigorous reporting standards in mHealth literature within this specialty.

REFERENCES

1. American Academy of Pediatric Dentistry. Policy on Teledentistry. In: Stigers J. The Reference Manual of Pediatric Dentistry [Online]. Chicago: American Academy of Pediatric Dentistry; 2024 [accessed 09/03/2025]. Available from: https://www.aapd.org/globalassets/media/policies_guidelines/p_teledentistry.pdf

2. World Health Organization. Global Observatory for eHealth [Online]. Geneva: World Health Organization; 2024 [accessed 09/03/2025]. Available from: https://www.who.int/observatories/global-observatory-for-ehealth

3. Mohammadzadeh N, Gholamzadeh M, Zahednamazi S, et al. Mobile health applications for children's oral health improvement: A systematic review. Inform Med Unlocked. 2023;37:101189. DOI: 10.1016/j.imu.2023.101189.

4. Öztürk O, Kocaman R, Kanbach DK. How to design bibliometric research: an overview and a framework proposal. Rev Manag Sci. 2024;18:3333-61. DOI: 10.1007/s11846-024-00738-0.

5. Arruda H, Silva ER, Lessa M, et al. VOSviewer and Bibliometrix. J Med Libr Assoc. 2022;110(3):392-5. DOI: 10.5195/jmla.2022.1434.

6. Väyrynen E, Hakola S, Keski-Salmi A, et al. The Use of Patient-Oriented Mobile Phone Apps in Oral Health: Scoping Review. JMIR Mhealth Uhealth. 2023;11:e46143. DOI: 10.2196/46143.

7. Mannino RG, Arconada Alvarez SJ, Greenleaf M, et al. Navigating the complexities of mobile medical app development from idea to launch, a guide for clinicians and biomedical researchers. BMC Med. 2023;21(1):109. DOI: 10.1186/s12916-023-02833-7.

8. Moreira R, Silveira A, Sequeira T, et al. Gamification and Oral Health in Children and Adolescents: Scoping Review. Interact J Med Res. 2024;13:e35132. DOI: 10.2196/35132.

9. Murfin M. Know Your Apps: An Evidence-Based Approach to Evaluation of Mobile Clinical Applications. J Physician Assist Educ. 2013;24(3):38-40. DOI: 10.1097/01367895-201324030-00008.

10. Tiffany B, Blasi P, Catz SL, et al. Mobile Apps for Oral Health Promotion: Content Review and Heuristic Usability Analysis. JMIR Mhealth Uhealth. 2018;6(9):e11432. DOI: 10.2196/11432.

11. Shukla BR, Panda AK. A Novel Classification System of Smart Mechanical Plaque Control: A Cross-Sectional Survey with Cluster Analysis. Indian J Community Med. 2025;50(1):175-80. DOI: 10.4103/ijcm.ijcm_439_23.

12. AlShaya MS, Assery MK, Pani SC. Reliability of mobile phone teledentistry in dental diagnosis and treatment planning in mixed dentition. J Telemed Telecare. 2020;26(1-2):45-52. DOI: 10.1177/1357633X18793767.

13. Toniazzo MP, Nodari D, Muniz FWMG, et al. Effect of mHealth in improving oral hygiene: A systematic review with meta-analysis. J Clin Periodontol. 2019;46(3):297-309. DOI: 10.1111/jcpe.13083.

14. Khafid M, Bramantoro T, Hariyani N, et al. The Use of Internet of Things (IoT) Technology to Promote Children's Oral Health: A Scoping Review. Eur J Dent. 2024;18(3):703-11. DOI: 10.1055/s-0043-1776116.

15. Pisano M, Bramanti A, Di Spirito F, et al. Reviewing Mobile Dental Apps for Children with Cognitive and Physical Impairments and Ideating an App Tailored to Special Healthcare Needs. J Clin Med. 2025;14(6):2105. DOI: 10.3390/jcm14062105.

Conflict of interest

The authors declare no conflict of interest.

Contribution of authors

Balraj Shukla: conceptualization, methodology, formal analysis, investigation and writing original draft.

Anup Panda: visualization, supervision, project administration, review and editing.

Deepika Chari: data curation, software, resources, formal analysis and investigation.