

Bibliometric Analysis of Parents' Health Belief Model Study of Vaccine Administration of Covid-19

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ABSTRACT

A bibliometric analysis was conducted to assess the interest and significance of research on the Health Belief Model. The bibliographical information provides insights into the Health Belief Model concerning parents of children receiving the COVID-19 vaccine. As of January 25, 2023, data for the study were obtained from the Scopus database. Our analysis identified 876 articles with the keywords: Health Belief Model, Parents, and COVID-19 Vaccine. Articles were exclusively selected in English, and the analysis was performed using the R Studio 4.2.2 application for Bibliometric Analysis. China hosts the top five most productive authors, with Peking University contributing the highest number of articles (66 in total). The Vaccines Journal emerges as the primary publisher, while the majority of collaborative research on COVID-19 involves authors from the United States. Frequently used keywords include Human, Female, Male, Adult, COVID-19, and Article. The increasing trend in Health Belief Model articles related to the COVID-19 vaccine from 2020 to 2023 underscores the widespread interest in and appeal of this subject for discussion. Given the study's limitation, including only publications released before January 25, 2023, it is plausible that some more recent publications were unintentionally overlooked.

INTRODUCTION

The COVID-19 pandemic has had a profound global impact, with over 661 million confirmed cases reported worldwide as of January 14, 2023, resulting in over 12,000 fatalities. Children infected with the COVID-19 virus may experience severe illness, and those who have previously contracted the disease are 2.5 times more likely to be reinfected (Dashboard n.d.). Consequently, preventing COVID-19 in children is crucial not only to safeguard them from serious illness but also to curb the transmission of SARS-CoV-2, the virus responsible for COVID-19 (Ma et al. 2022). The signs and symptoms of COVID-19 infection in children are similar to

those of other respiratory infections that commonly impact children. Affected children may not promptly receive treatment, potentially accelerating the spread of the infection within the community, including homes, daycare facilities, and schools (Veronese et al. 2020). While vaccination coverage among children and adolescents is lower compared to older age groups, everyone has the right to receive the COVID-19 vaccine (Marks et al. 2022). Vaccinating children is a critical measure to enhance their protection against COVID-19 (Veronese et al. 2020)(7). One explanation for parents' reluctance to vaccinate their children is that low adult vaccination rates are linked to a decreased willingness to do so. (Goldman et al.

2021). In addition to the belief that the COVID-19 vaccine is unsafe or ineffective, the fear of side effects, and the perception that COVID-19 is a non-threatening illness, parents' lower intention to vaccinate their children is caused by the low risk of severe COVID-19 in children and the fact that children are often asymptomatic (Abu El Kheir-Mataria et al. 2023; Al-Qudimat et al. 2022; Bianchi et al. 2023; Ruiz and Bell 2022; Veronese et al. 2020; Yasmin et al. 2021)

The Health Belief paradigm (HBM) is a psychological framework based on the premise that people's beliefs, including their perceptions of benefits, can influence or sustain their behavior (Janz and Becker 1984). The Health Belief Model (HBM) incorporates cognitive variables such as perceived susceptibility, perceived benefits, perceived barriers, and cues to action, aiming to elucidate why individuals take actions to manage their health (Rosenstock, Strecher, and Becker 1988) (Fitriani et al. n.d.) (Janz and Becker 1984). According to the HBM, an individual's health-related behavior is determined by their aspiration to maintain well-being and their conviction that adhering to specific measures will contribute to their overall health. (Sanaeinasab et al. 2022).

Chan et al (Chen et al. 2023) in a bibliometric study related to vaccine doubts from 2013-2022 said that vaccine doubts can hinder public health achievements globally and the United States contributed the most articles and had the largest collaboration with other countries. Sarirete, Akila (Sarirete 2021) in a bibliometric analysis study of the COVID-19 vaccine revealed that the platform of social media sites such as Twitter is a source of health-related information and can be used as a medium to analyze and understand public attitudes towards vaccine acceptance, doubt, and rejection.

Bibliometric analysis of the Health Belief Model was carried out to see whether the research was interesting to do. Bibliographic data presents research findings about the Health Belief Model concerning parents of children vaccinated against COVID-19. Since bibliometric mapping can assist in transforming publication metadata into maps or visualizations that are easier to comprehend and provide insightful information, both the scientific community and the general public can benefit from it. For instance, bibliometric mapping can be used to visualize keywords to identify research themes

or clusters in a given discipline, map author affiliations of particular journals to identify geographic coverage of journals, and map international and institutional partnerships and collaborations. All of these tasks can yield insightful data. Applications of bibliometrics include examining patterns of collaboration, examining publications, and investigating the organization of research areas that can take the form of journals. A retrospective analysis of the journal was provided using a bibliometric method (Donthu et al. 2021), a co-word method based on keywords to map the research trends (Chen et al. 2016)

METHODS

Search Strategy

On January 25, 2023, the Scopus Database was downloaded in order to collect the study's data. With the keywords "Health Belief Model," "Parents," and "COVID-19 Vaccine," our data turned up 876 articles. After selecting English-language papers, it was discovered that up to 56 articles were disqualified, leaving 817 English-language items overall for use in this study (Figure 1).

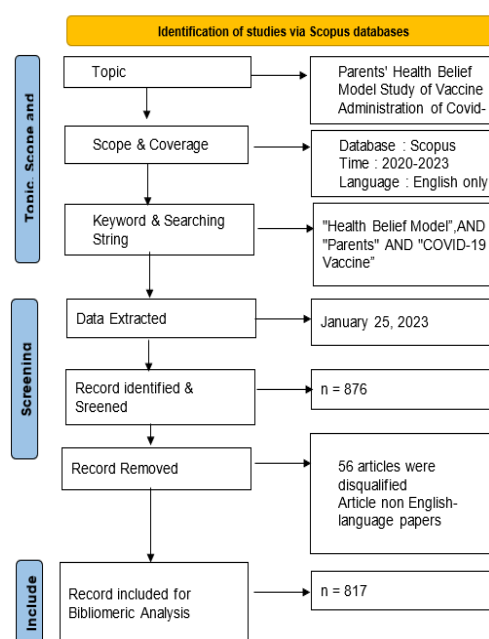


Figure 1. Prisma Flow Diagram

Data Analysis

The Scopus database was used to collect research data for the Health Confidence Model for parents of children who received a COVID-19

vaccine. The R Studio programme was then used to evaluate the data obtained. The open-source R Studio (4.2.2) was created by Ross Ihaka and Robert Gentleman at the University of Auckland in New Zealand. Chambers is a member of the R Development Core Team, which is now working to develop this programme. R Studio offers graphing and a variety of statistical techniques, including time series analysis, classification, clustering, linear and nonlinear modelling, traditional statistical tests, and more.

After determining the database to be used, namely the Scopus database, to identify the bibliometric mapping of parents' health beliefs, the next step was to search using "article, title, and keywords" in the search box with the terms "health belief model," "parents," and "COVID-19 vaccine." Furthermore, the author filtered the search results to include only English-language journals. The author also set a time limit for analyzing international journals, focusing on publications from 2020 to 2023. According to Devos, bibliometric indicators can be measured over a specific period, typically the last 3 to 5 years or longer (Devos 2011).

The excel data obtained from scopus is in the form of a CSV file, the data is then entered into the R studio application by writing library (bibliometrix)-run-biblioshiny()run. The R studio application will automatically bring up biblioshiny.scopus data in the form of CSV files are then uploaded into import or load in the R studio application.

RESULT AND DISCUSSION

During the period from 2020 to January 2023, a total of 817 research documents in English related to the Health Belief Model, parents, and the COVID-19 vaccine were identified in the Scopus database. This unveils a trend in the publication of Health Belief Model research from 2020 to 2023, indicating a consistent increase with the sharpest rise observed in 2022. The categories of documents, average publication, number of citations, and the most prolific authors related to the Health Belief Model, parents, and the COVID-19 vaccine can be seen in the **Table 1** below.

Most Productive Authors

Li L was the most productive author among the top 10 according to the statistics shown in the figure above, with 14 papers that other

Table 1. Data Information on Health Belief Model of Parents regarding the COVID-19 Vaccine in the 2020-2023 Timeframe

DESCRIPTION	RESULT
Key information	
Time Range	2020-2023
Source Document	295
Document	817
Average Publication	1.49
Average citations per document	1.31
Average citations per year per document	14.61
Reference	44,912
DOCUMENT TYPE	
Article	645
Review	75
Book Chapter	4
Conference Paper	4
Note	4
Letter	3
DOCUMENT CONTENTS	
Keywords Plus (ID)	2,268
Author's Keywords (DE)	1,544
AUTHORS	
Authors	4,292
Authors of single-authored documents	33
AUTHOR COLLABORATION	
Single-authored documents	37
Co-Authors per Documents	6.27

authors frequently cited. Wang J with 12 articles and Wang Y with 11 articles came after him (**Figure 2**).

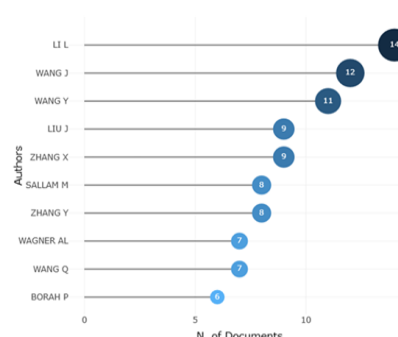


Figure 2. Names of Authors Who Often Conduct Research

Source Journals with the Highest Number of Published Articles

The analysis's findings indicate that the top 10 journals released the greatest number of articles. With a total of 110 articles, the VACCINES Journal has published the most on parents, the COVID-19 vaccination, and health belief models. 54 articles were published in Human Vaccines and Immunotherapeutics, 52 articles in the International Journal of Environmental Research, 38 articles in Frontiers in Public Health and Vaccines, 37 articles in Plos One, 13 articles in BMC Public Health, 12 articles in Frontiers in Psychology, 11 articles in Social Science and Medicine, and 9 articles in VACCINEX:X (Figure 3).

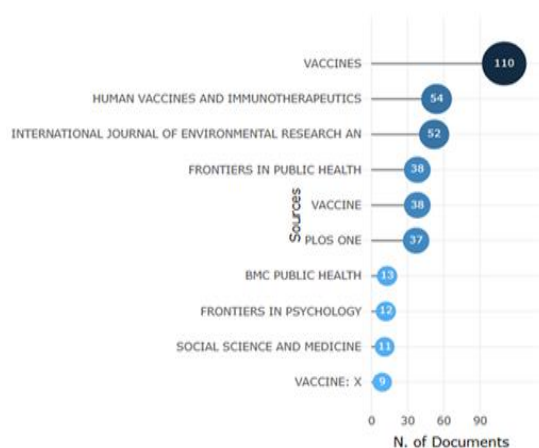


Figure 3. The Journal with The Most Published Articles

The Most Cited Journals

Figure 4 shows the top 10 most cited journal sources from 2020 to 2023. The VACCINE Journal has been cited the most, namely 2,968

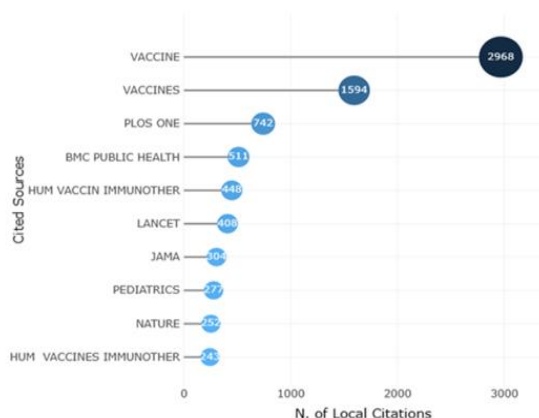


Figure 4. The Most Cited Journal Sources

times. VACCINES Journal has been cited 1,594 times, PLOS ONE journal 742 times, BMC Public Health journal 511 times, Hum Vaccin Immunother journal 448 times, LANCET journal 408 times, JAMA journal 340 times, PEDIATRICS journal 277 times, NATURE journal 252 times, and the journal Hum Vaccines Immunother 243 times. Figure 4 shows the top 10 most cited journal sources from 2020 to 2023.

Authors

The origins of the top 10 authors are Peking University with 66 authors, Fudan University with 49 authors, the Chinese University of Hong

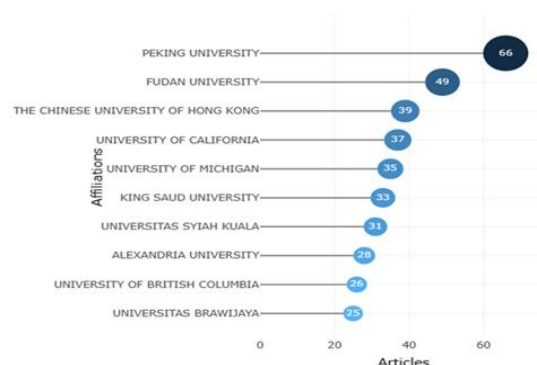


Figure 5. Author Affiliation with Articles about the Health Belief Model

Kong with 39 authors, University of California with 37 authors, University of Michigan with 35 authors, King Saud University with 33 authors, Syiah Kuala University with 31 authors, Alexandria University with 28 authors, University of British Colombia with 26 authors, and Brawijaya University with 25 authors (Figure 5).

Authors Collaborations by Country

The table below describes the collaboration among 19 key authors based on their respective countries, with Single Country Publication (SCP) where all authors are from the same country, indicating collaborations within that country, and Multi Country Publication (MCP) where authors are from different countries, signifying collaborations between nations. The country breakdown can be found in Table 2 below (Sweileh et al. 2017)(Sweileh and Moh'd Mansour 2020)(Sweileh et al. 2019).

According to Table 2, authors from the USA contributed the most between 2020 and January 2023, providing 166 articles in both SCP and MCP, for an MCP to SCP ratio of 0.133. With 100 articles and an MCP ratio of 0.33, Chinese

authors took second place. Australian authors came in third place with 42 articles and an MCP ratio of 0.333. The same MCP ratio for Australia and China indicates that both nations collaborate with other nations equally. With 16 articles and a ratio of 0.625, Hong Kong had the highest MCP ratio. With 13 articles total—8 Single Country Publications (SCP) and 5 Multiple Country Publications (MCP)—with an MCP ratio of 0.385, Indonesian authors are ranked 13th.

Table 2. The Most Cited Journal Sources

Country	Articles	SCP	MCP	Frequency	Rasio MCP
USA	166	144	22	0.203	0.133
China	100	67	33	0.122	0.33
Australia	42	28	14	0.051	0.333
Italy	31	20	11	0.038	0.355
United Kingdom	30	17	13	0.037	0.433
Canada	26	13	13	0.032	0.5
Saudi Arabia	18	7	11	0.022	0.611
Hongkong	16	6	10	0.02	0.625
Malaysia	16	9	7	0.02	0.438
Ethiopia	15	12	3	0.018	0.2
Bangladesh	13	7	6	0.016	0.462
India	13	11	2	0.016	0.154
Indonesia	13	8	5	0.016	0.385
Iran	13	9	4	0.016	0.308
Turkey	12	12	0	0.015	0
Germany	11	6	5	0.013	0.455
Jordan	11	5	6	0.013	0.545
Korea	10	7	3	0.012	0.3
Peru	10	5	5	0.012	0.5

Trends in Research Topics

In **Figure 6**, various keywords are displayed based on their font size. If a keyword has a larger font size compared to others, it indicates more frequent usage.



Figure 6: Frequently Used Keywords

Keywords that often appear in research can be seen based on the size of the letters in **Figure 6**. these keywords are 'human', 'male', "adult", COVID-19, "female", these keywords can illustrate that many have researched about it. keywords such as "health belief", "vaccination hesitancy", "behaviour", "perception", "young adult", "influenza vaccine", "intention", "trust" have a small font size, The small font size keywords suggests that these for research are still relatively rare. **Table III** outlines the most extensively researched topics, particularly the subject of vaccination, totaling 918 articles.

Table 3 . Research Trend Topics

Topic	Frequency	2020	2021	2022
Vaccination	918	-	V	V
Human	588	-	V	V
Female	486	-	V	V
Questionnaire	206	-	V	V
SARS-COV-2	188	-	V	V
Middle Aged	186	-	V	V

Studies on vaccination topics have been prevalent from 2021 to 2022, followed by 588 articles on the topic of Human, 486 articles on Female, 206 articles on Questionnaire, 188 articles on SARS-COV-2, and 186 articles on Middle Aged. All of these were conducted between 2021 and 2022 (**Table 3**).

Discussions

Table 1 The Scopus database contained up to 817 English-language research publications about parents, the COVID-19 vaccine, and the health belief model between 2020 and January 2023. demonstrates the publishing pattern of research on the health belief model from 2020 to 2023, which is found to be increasing, with the biggest increase occurring in 2022. The increasing trend in publications shows that there is still much to talk about when it comes to research on the COVID-19 vaccination, parents, and the Health Belief Model. Using the Health Belief Model, parents' views and intentions regarding vaccinations for their children aged 5 to 11 (Almalki et al. 2022)(Hause et al. 2021)(Li et al. 2022)(Dubé, Gagnon, and Pelletier 2022)(Dubé et al. 2022).

Figure 2 Based on the results of bibliometric analysis, the names of the five most authors come from China (Li l, Wang J, wang y Liu J and Zang X). This is because the initial cases of COVID 19 disease originated in Wuhan, China.

so that a lot of early research was done there related to the behavior of using the covid 19 vaccine (Wang et al. 2020). The top ten publications that publish articles on parents, the COVID-19 vaccine, and health belief models are displayed in **Figure 3**. Because of its association with the COVID-19 vaccine, the Vaccines Journal publishes the most articles (Bord, Satran, and Schor 2022; Chen and Yalin He and Yuan Shi 2022; Li et al. 2022; Limbu, Gautam, and Zhou 2022; Shahani et al. 2022; Vatcharavongvan et al. 2020)

Figure 4 shows that the most cited journal is the vaccine journal. Because the keywords used are one of them is about the COVID 19 vaccine. And in 2020-2023 many articles have discussed the COVID 10 vaccine. **Figure 5** The most authors come from packing universities as many as 66 articles this is because the location of the campus is in China. This location is close to the case of the spread of COVID 19. so many researchers are conducting research on parental behaviour in the use of the COVID 19 vaccine (Wang et al. 2020).

Tabel 2 shows the collaboration of research on COVID 19 which is mostly carried out by the United States, this is likely related to the use of the COVID 19 vaccine which focuses on clinical trials of vaccine safety and efficacy, research on vaccine immunology, and immuno informatics, and vaccine hesitancy. Immunology and immunoinformatics, and vaccine hesitancy (Chen et al. 2021). **Figure 6** There are frequently used keywords in Health Belief Model article, show on large font size. Therefore, studies focusing on the Health Belief Model in parents still offer promising opportunities for future research. The terms "human," "female," "male," "adult COVID-19," and "article" are frequently used in the health belief model papers published between 2020 and January 2023. The small size of the health belief keywords indicates that health belief models are still uncommon subjects of study (Chen et al. 2016; Sweileh et al. 2017) Moreover, the health belief model is not among the six popular research topics to be studied in 2021-2022. Since global vaccination campaigns were conducted that year, the topic of vaccination is frequently brought up. And keywords such as perception, social media, behavior, education status, health knowledge, and attitudes , intention, vaccination hesitancy are rare used in Health Belief Model research. Therefore, studies

focusing on the Health Belief Model in parents still offer promising opportunities for future research.

CONCLUSIONS

The increasing trend in Health Belief Model articles related to the COVID-19 vaccine from 2020 to 2023 underscores the widespread interest in and appeal of this subject for discussion.. The study's results provide insights into the state of Health Belief Model research on parents globally. However, there are several limitations to this study. Firstly, different researchers may use different terms to convey the same idea, potentially resulting in the oversight of publications with varying expressions when gathering articles from Scopus. Additionally, since this study relies on Scopus as the database for publication accumulation, some publications exclusive to other databases (such as Web of Science, PubMed, and Google Scholar) may have been excluded. Furthermore, the analysis may have overlooked more recent papers, as it only includes publications published before January 25, 2023. Secondly, a limitation of RStudio is that the visualizations produced by Biblioshiny are sometimes less interactive compared to specialized tools like VOSviewer, which can limit further data exploration. Therefore, applying both methods can provide more engaging visualizations and better data outcomes (Aria and Cuccurullo 2017; Arruda et al. 2022)

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AUTHORS' CONTRIBUTIONS

Conceptualization: EK, DAP, FP,LMI; Data curation : DAP, FP,LMI ; Formal analysis: DAP, FP; Methodology: EK, DAP, FP; writing -original draft : EK, DAP, FP ; writing -review and editing: EK, DAP, FP

CONFLICT OF INTERESTS

The authors have no conflict of interests related to this publication.

ETHICAL CONSIDERATION

This study did not require research ethics approval, as it only involved reviewing articles from journals indexed in SCOPUS.

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