ANALYSIS OF RESEARCH TRENDS IN EARLY CHILDHOOD INTERVENTION

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Introduction

An investigation of early childhood Intervention, like any other scientific discipline, has undergone changes over the time. Specific topics of interest have arisen and vanished, and the range of complexity of the research topic matter has increased. A bibliometric analysis is a methodology used to study and analyze the characteristics of literature collections or research related to a specific topic. A bibliometric analysis of family-centered early childhood intervention could include insight into the number and different types of research articles, books, and other publications relevant to this topic, as well as the authors, journals, and institutions involved in the research. This type of analysis can help identify trends and patterns in the literature and highlight areas in which more research is needed.

A bibliometric analysis of early childhood intervention refers to providing quantitative analysis of the research output in this field. Bibliometric analyses can be conducted using databases such as Web of Science (WoS) to identify and analyze research articles, conference proceedings, books, and other scholarly publications related to early childhood intervention. Some of the key measures that can be used to analyze the research output in this field include: publication output, citation analysis, co-authorship analysis, keyword analysis and journal analysis.

Keyword analysis: involves providing co-occurrence analysis of keywords with a word frequency in publications related to early childhood intervention. A keyword analysis can provide insights into the major topics and trends in this field.

The authors of a research article provide Author Keywords, while Thomson Reuters generates Keywords Plus by extracting words or phrases that appear in the titles of references cited in articles using an automatic computer algorithm. The Keywords Plus are selected based on their frequent appearance in the titles of references, regardless of whether it was used as Author Keywords or in the title of the article itself (Garfield, 1990). The same author claimed that Keywords Plus terms can express contents of the articles with greater depth and variety. Therefore, Keywords Plus terms have been used to identify research trends in a variety of scientific fields. Keywords Plus and Author Keywords revealed similar research trends. However, Keywords Plus terms emphasized research methods and techniques, whereas Author Keywords tended to hone in on specific diseases and conditions. Bibliometric analyses of the structure of scientific fields should use Keywords Plus, because a large number of terms and their broad meanings confer several advantages (Zhang et al., 2015)

Objectives, Materials and Methods

This study aimed to explore research trends in the field of early childhood intervention by employing bibliometric analysis using the bibliometrix R-Tool. The WoS is a powerful literature database that can provide good access to bibliometric indicators of the published items and allow us to explore literature on different scientific fields. Thus, our bibliometric analysis was conducted using WoS literature database. We started by searching keywords related to our topic (including 'Title', 'Abstract', 'Author Keywords', and 'Keywords Plus'). Then, we limited the length of the research period from 2013 till the end of 2022 and limited the document types to articles, proceedings, and reviews.

The keyword was: early childhood intervention.

Results

Bibliometric analyses are most commonly based on quantitative measurements in the evaluation of the impact of various research units, such as publications, authors, and countries/regions. This involves tallying the number of documents and the total number of citations, as well as using global and local citation scores and word counts to identify relevant themes. Author keywords, which are commonly included in the article's metadata, play an important role in analyzing research topics, and co-word analysis is a useful tool for identifying connections between different themes. In this particular study, keyword analysis was used to identify themes within sub-themes, with the possibility that individual papers may contain multiple themes.

Table 1. Main information about data 2013-2022

Description	Results
Timespan	2013-2022
Sources (Journals, Books, etc)	1100
Documents	10102
Annual Growth Rate %	10.2
Average citations per doc	15.39
Author's Keywords	16072
Authors	35049
Single-authored docs	537
Co-Authors per Doc	4.9
International co-authorships %	22.7

Annual Scientific Production

In the time spam analysis the number of Author keywords was 1,6072 and Keyword Plus was 12,317. The word cloud of the most often used keywords was presented. The most relevant keywords in the documents were: intervention, children, preschool, early intervention, and parenting.

The size is proportional to the frequency of each keyword. The larger the word size is, the more important it is. For highlighting the important keywords, the keywords with high frequencies and large sizes are displayed at the center of the word cloud.

Figure 1 Word cloud of the most widely used keywords..

Major trends in early childhood intervention research showed variations across publication years. An overview of the keywords showed stability related to some topics while others demonstrated instability. The results of the bibliometric mapping showed that early childhood intervention, child development, and parenting, were the most valuable ECI research themes.

Next, a strategic diagram was used in order to display the themes, categorized by Callon's centrality (x-axis) and density (y-axis). Callon's centrality and Callon's density, can be used to measure the performance of the themes in each sub-theme (Callon, Courtial, & Laville, 1991). Callon's centrality is an indicator of the importance of a theme across a full set of publications, while Callon's density is an indicator of the theme's development.

The themes that displayed high density and centrality were classified as motor themes, recognized as highly developed and important themes that exhibited strong connections with other themes across different quadrants. These were placed in quadrant I. Themes with low density but high centrality were developed but isolated and positioned in quadrant II. Emerging or declining themes with low density and centrality were positioned in quadrant III, while basic and cross-cutting themes, which focused on general topics that intersected with various research areas, were placed in quadrant IV.
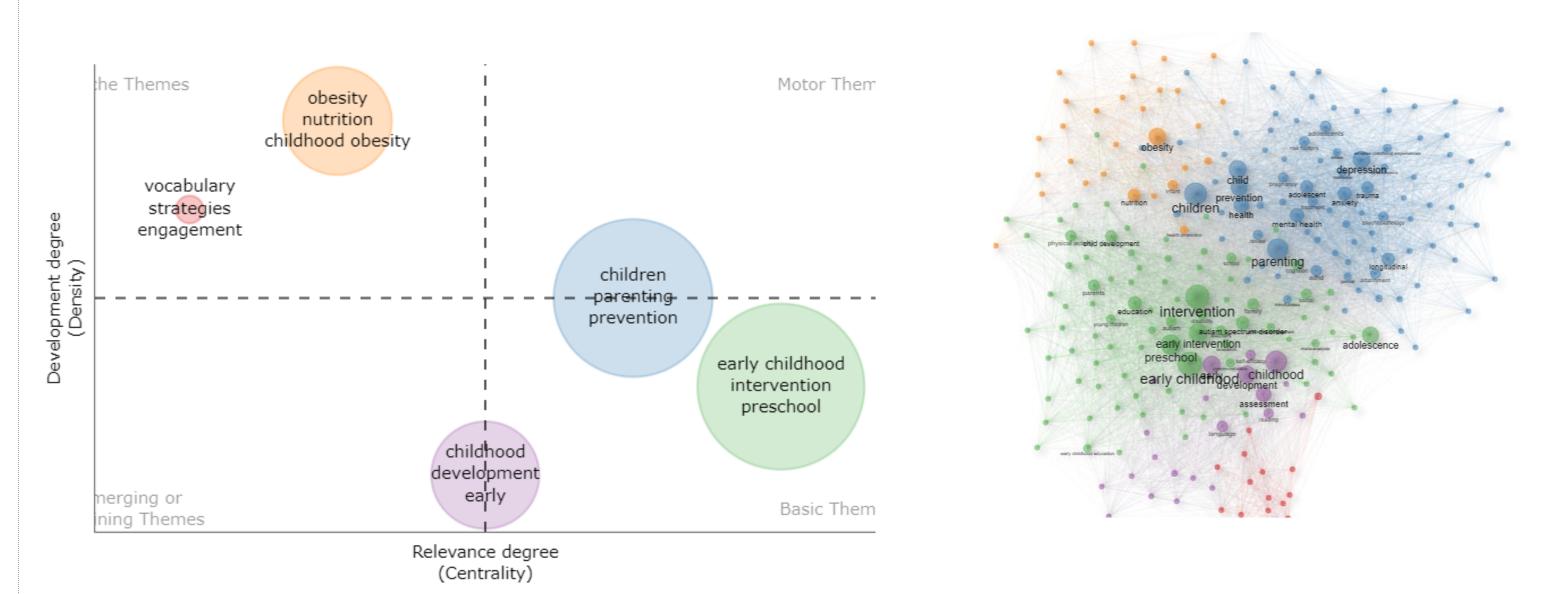

Figure 2. Strategic diagram of theme's development- Author keywords

Figure 3. Network of the clusters - Author keywords

Table 2. Callon's centrality and Callon's density measure

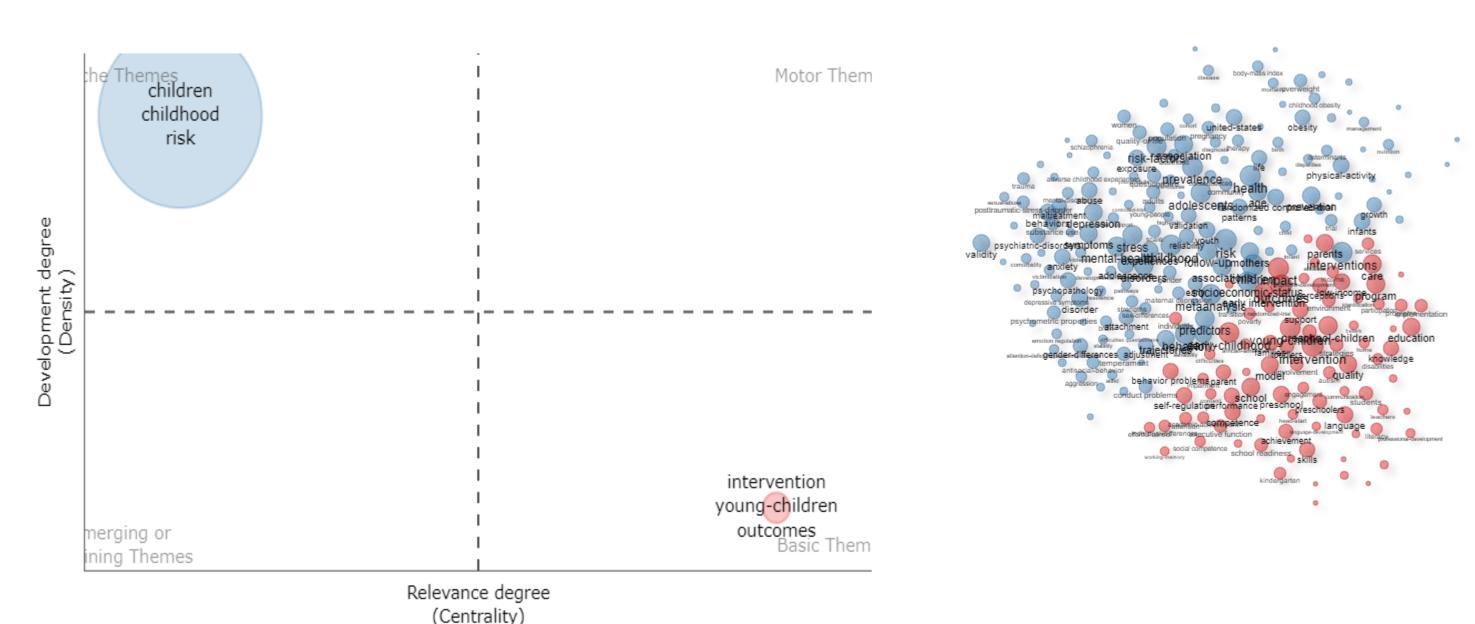| Cluster	CallonCentrality	CallonDensity	RankCentrality	RankDensity	ClusterFrequency
vocabulary	0.02	1.69	1	4	208
children	0.13	1.65	4	3	4566
early childhood	0.15	1.61	5	2	5535
childhood	0.08	1.28	3	1	1379
obesity	0.03	1.80	2	5	1401

Figure4. Strategic diagram of theme's development- Keywords Plus

Figure 5. Network of the clusters - Keywords Plus

Table 3. Callon's centrality and Callon's density measure

Cluster	CallonCentrality	CallonDensity	RankCentrality	RankDensity	ClusterFrequency
intervention	0.54	1.66	2	1	15832
children	0.39	2.07	1	2	28446

Additionally, a Sankey diagram was used to visualize the association among different themes and how they have evolved over the past decades.

Thematic evolution shows that thematic areas such as early childhood and children evolve continuously from the beginning until the last studied period. Co-occurrence network analysis identifies two sub-networks that indicate the research contents are inter-crossing. Both clusters were similar in size with three distinct groups. A keyword that represents the main idea in the research topic in the first cluster is children, and in the second cluster is intervention.
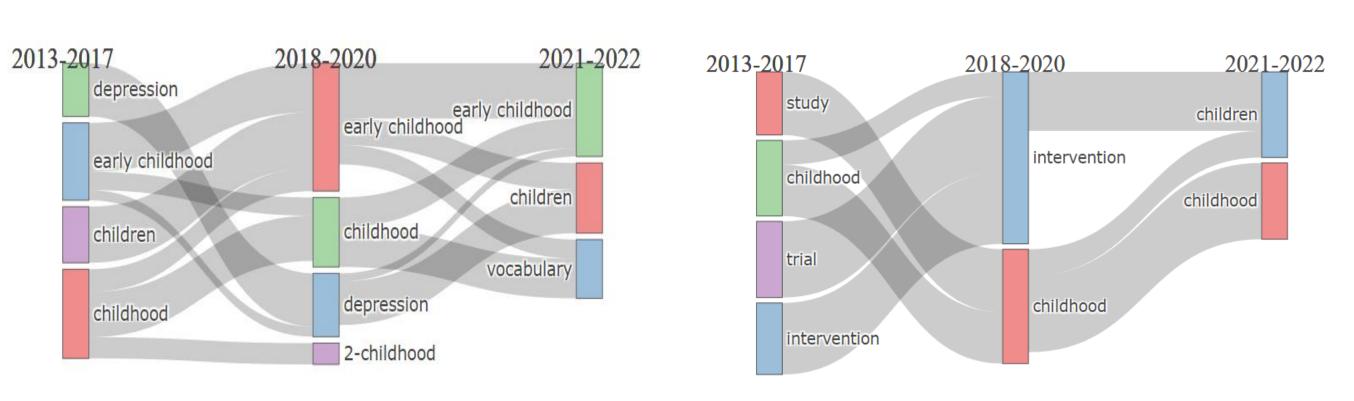

Figure 6. Thematic evolution Author keywords

Figure 7. Thematic evolution Keywords Plus

Conclusion

Bibliometric analysis of early childhood intervention can provide valuable insights into the research output, collaboration patterns, and trends in the field. It can help researchers and policymakers identify gaps in the literature and prioritize areas for further research. Even though research topics varied slightly the results should be useful resources for gaining insight into the trends in the research field of early childhood intervention.

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Garfield, E. (1990). Keywords Plus®: ISI's breakthrough retrieval method. Part 1. Expanding your searching power on Current Contents on Diskette. Current Contents®, 1(32), 5–9.
Zhang, J., Yu, Q., Zheng, F., Long, C., Lu, Z., & Duan, Z. (2016). Comparing keywords plus of WOS and author keywords: A case study of patient adherence research. Journal of the Association for Information Science and Technology, 67.