

A Bibliometrics Analysis of Research on Early Childhood Education in 2022

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Abstract

This research aims to find the research focus and to highlight authors, journals, and documents on early childhood education (ECE) in 2022. This article analyzed a dataset with 1586 Clarivate Web of Science indexed articles on this topic, using descriptive, co-occurrence and thematic analyses. The authors applied the preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow to comply with the dataset. Excel, the R program in the Biblioshiny package, and VOSviewer version 1.7 were used for the descriptive and bibliographic analyses. The findings of this paper demonstrate the remarkable contribution of researchers from the United States and China in terms of research quantity and impact, as well as their collaboration with different researchers. The findings revealed four topics: language and speech; programmes, policies and their impact on children and preschool teachers; behaviour of preschool children; the quality of ECE. In addition, we figured out the top influential authors and journals. This study provided an overview of research in ECE in 2022 and highlighted essential issues that need to be focused on by ECE researchers and practitioners.

Keywords: Bibliometrics, Review, Early Childhood Education, Research

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Introduction

The importance of educating children in the first years of life as well as factors affecting the quality of early childhood education (ECE) has been confirmed in many previous literature reviews about ECE such as early childhood development programs (Anderson et al., 2003), positive impacts and interventions on the development of children, ECE quality (Aguiar and Aguiar, 2020; Slot, 2018; Zaslow et al., 2016). High-quality childcare affects the development of children, especially children from disadvantaged backgrounds (Melhuish et al., 2015). However, these studies have pointed out gaps that need to be further researched on ECE. Anderson et al. (2003) showed that evidence is needed to determine the effects of programs on the social cognition and behaviors of children. Besides the above-influencing factors on ECE, some other general studies also focus on issues related to preschool teachers' development of children such as professional development (Zaslow et al., 2010), and well-being (Cumming, 2017).

Research on child development in all areas, including language development, has also been conducted by many previous studies. Differences in language skills have an impact on children's learning abilities (Walker, 2020). Impact measures and interventions to promote language development for diverse children still need to be further researched, especially in areas where there are not many publications.

In recent years, the COVID-19 pandemic has caused significant impacts on education in general and ECE in particular. Research has focused on the effects of this pandemic on children, their families, and preschool teachers as well as the challenges and appropriate strategies in the context of the epidemic (Dayal and Tiko, 2020; Davies et al., 2021). More research on the long-term consequences of Covid 19 on children around the world is needed to enhance ECE's post-pandemic resilience. Therefore, this study focuses on capturing the central issues of ECE research and highlights the field's leading authors and journals in 2022. Evaluation of ECE studies in 2022 is necessary for further research in this area. This study addresses the following key research questions (RQs):

RQ1: What is the geographic distribution and popular research sources of ECE literature in 2022?

RQ2: What are the most researched keywords and topics in ECE studies in 2022?

RQ3: Which journal has the most articles and which author has the most research on ECE in 2022?

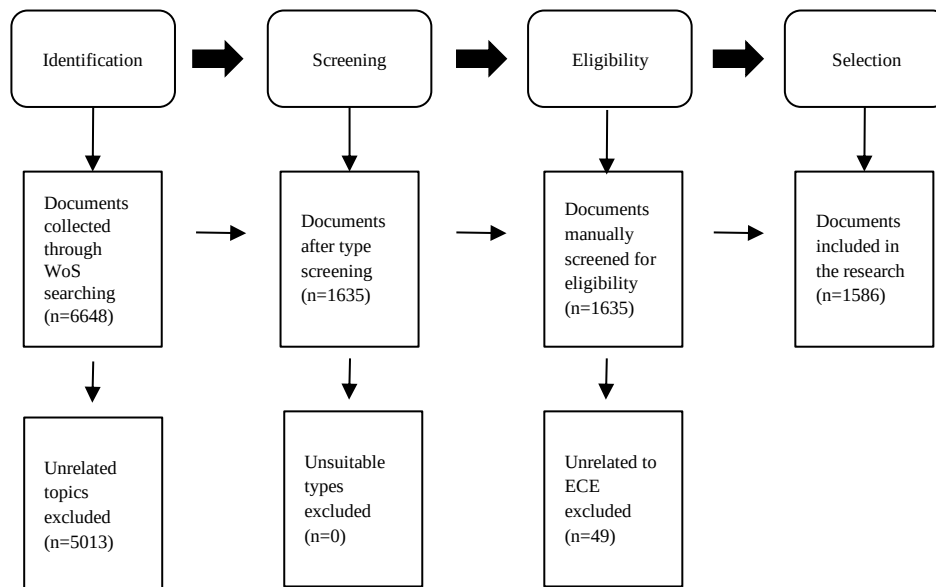
Methodology

Data collection

Articles used for bibliometrics reviews are collected from reliable sources like Clarivate Web of Science (WoS), Scopus and PubMed. According to Li et al. (2018), the Web of Science (WoS) contains a rich bibliographic dataset with many articles and citation connections as well as metadata fields. Clarivate WoS has developed to be one of the leading platforms for searching citations, analytical information and data-intensive research papers (Li et al., 2018). Compared to Scopus, Clarivate Web of Science requires stricter selection criteria for publication (Aksnes & Sivertsen, 2019). For its thorough coverage and high standards, this research used the WoS database as the primary source of data for this study.

Authors utilized the preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow in the procedure of collecting data for this research (Figure 1). The authors based on the Boolean string to conduct the first step:

Early Childhood Education (Topic) OR Preschool (Topic) OR Kindergarten (Topic)



Source: Adopted from Moher et al. (2011)

Figure 1. Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram for ECE research

A total of 6648 publications were published in several languages in 2022. The authors then used several inclusion and exclusion criteria to improve the conciseness of the dataset (Table 1). These helps avoid duplicating findings and are more focused. 5013 papers were removed throughout the screening process, leaving a total of 1635 research articles. Next, a manual review process eliminated 49 studies unrelated to ECE. A final data collection of 1586 papers from 562 journals, conferences, and books was available for further analysis.

Table 1. *Exclusion and Inclusion Criteria to Choose Research Papers in the Study*

Exclusion Criteria	Inclusion Criteria
Meeting abstracts, letters, book reviews, editorial materials, data papers, corrections.	Papers published in all languages Works related to: Education & Educational Research or Language & Linguistics or Psychiatry & Psychology or 6.24 Psychiatry & Psychology (Citation Topics Meso) Journals articles, conference papers, book chapters

Data analysis

Filtering data

The dataset of 1586 indexed articles from Clarivate Web of Science was downloaded and demonstrated in plaintext and spreadsheet forms. This dataset contains metadata including the title of the paper, authors' names, keywords, abstracts, publishers and affiliations of the authors, references, global and local citations and other details. A total of 49 unreadable documents and related information were removed from the Excel and plaintext file. The authors modified some words with various spellings to improve the research results. Those adjusted words may be “pre-school” to be “preschool” and “early-education” to be “early education”.

Methods and Tools

A variety of science mapping techniques were utilized to present the collaboration network, conceptual and intellectual structure of the research on ECE. To understand the geographical distribution of research papers and notable trends of research focus, the researchers used descriptive statistics, thematic maps and factorial analysis. The co-citation

network demonstrated how impactful one research in the scientific community of a particular topic or the so-called intellectual structure (Merigó & Yang, 2017). The researchers also used a collaboration network to explore parties such as countries and authors working together on the research topic (Kim & Jung, 2016).

Excel, the R program in the Biblioshiny package and VOSviewer version 1.7 were used for the descriptive and bibliographic analyses. To answer the first study question concerning, the researchers used Excel to create a number of bar charts and descriptive tables. The researchers performed multiple co-citations, collaboration and factorial analyses using Biblioshiny (Aria & Cuccurullo, 2017). Additionally, the author used VOSviewer's co-occurrence analysis to construct the intellectual framework for ECE.

Results

Geographical distribution of the research topic

In 2022, ECE received the research attention of 4872 authors with 1586 published papers, which means an average of 3.07 authors per publication. There is a trend of cooperation among authors since only 201 out of 4872 authors, accounting for 4.13% of the total number of authors, individually published their papers related to ECE.

All 1586 papers under study have been published in 562 journals, conferences and books. In general, each journal has at least 01 publication and 61 publications at most related to ECE. There are 26 out of 562 journals with ten or more publications and 115 journals with three to nine publications on this topic. Most journals (421 out of 562) just published one or two papers, accounting for 31.71% of the total publications on this topic. Studies are mainly published in 141 journals with leading sources such as Early Childhood Education Journal, Frontiers in Psychology, Early Childhood Education and Development, International Journal of Early Years Education and Early Childhood Research Quarterly.

Publications by countries

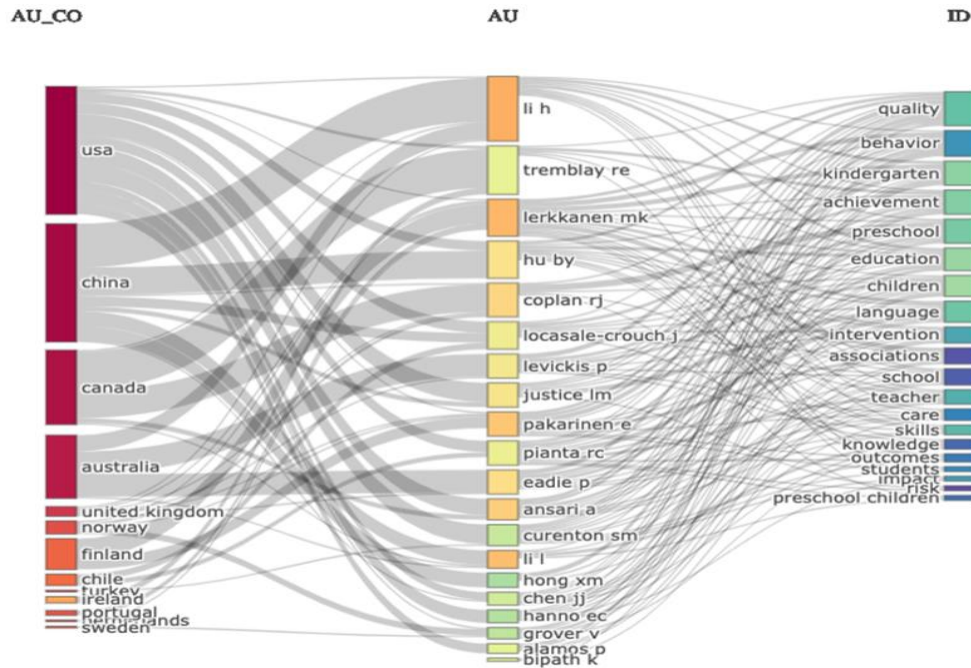


Figure 2. Research topics from authors across countries

Figure 2 describes authors and their important research topics from thirteen countries with the most publications. In particular, the USA, China, Canada, Australia and Finland are the top 5 leading countries in publishing papers related to ECE.

The USA emerged as the leading country with eight authors publishing papers on ECE, followed by China and Australia with three authors per country. The third and fourth positions belong to Canada and Finland with two scholars per country. Notably, most of the top 20 notable authors collaborated with many affiliations from many different countries. For example, Li H worked at Shanghai Normal University (China) and collaborated with East China Normal University, Nanjing Normal Univ, Dezhou Univ, Hangzhou Normal Univ (China), Education University of Hong Kong (EdUHK) (Hong Kong), Macquarie Univ (Australia), Kean University (USA) and Univ Oxford (The United Kingdom).

The rightmost column shows the top 20 keywords frequently appearing in research papers

on this topic. Significantly, five keywords mentioned the most are “language” (161 times), “quality” (84 times), “behavior” (69 times), “achievement” (67 times), “intervention” (62 times).

Particularly, language has become the most searched topic across countries. Authors from the USA, China, Canada and Australia mainly focus on language, behaviours, skills and quality. While Chinese scholars in 2022 did not discuss intervention in education, US and Canadian authors were interested. Similarly, the topic of achievement in early education received research attention from US authors but remained untouched in China, Canada, and Australia.

Research cooperation across countries

Table 2. *Publications by Countries*

No	Country	Total Articles	Articles (Cores)	SCP	MCP
1	USA	1253	465	418	47
2	CHINA	357	151	101	50
3	SPAIN	169	85	77	8
4	AUSTRALIA	179	79	57	22
5	TURKEY	149	73	71	2
6	CANADA	218	71	53	18
7	UNITED KINGDOM		66	44	22
8	GERMANY		60	52	8
9	SWEDEN		40	32	8
10	NORWAY		38	27	11
11	NETHERLANDS		31	22	9
12	PORTUGAL		30	23	7
13	FINLAND		29	19	10
14	GREECE		23	19	4
15	ISRAEL		21	18	3
16	ITALY		21	16	5
17	CHILE		18	12	6
18	JAPAN		16	12	4

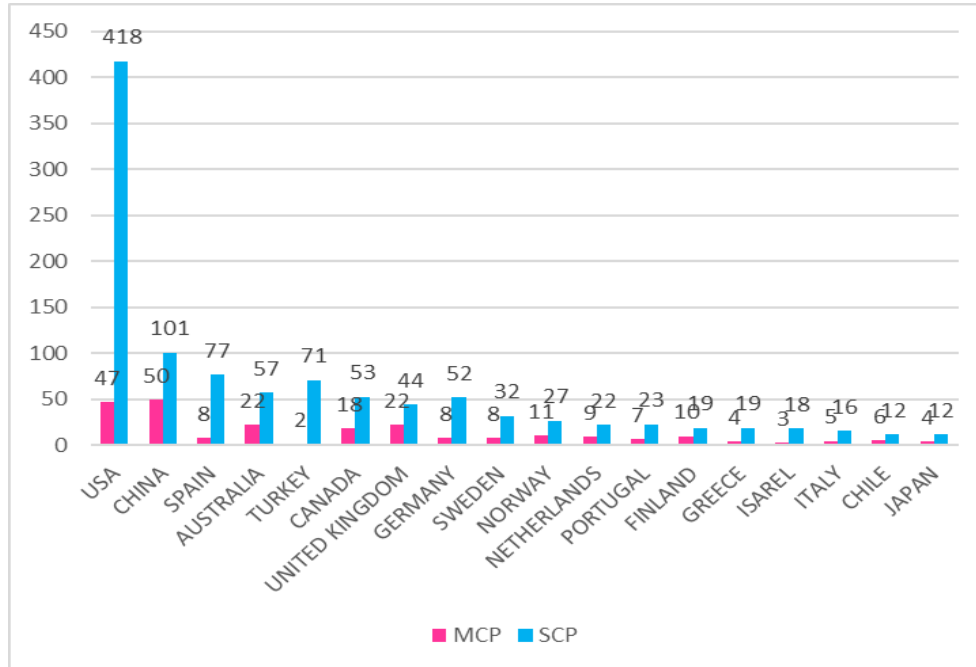


Figure 3. Single country publication (SCP) and multiple country publication (MCP) by countries

Figure 3 demonstrates the top eighteen countries with the highest total publications on this topic. The USA continued to be dominant in researching ECE with 465 publications (accounting for 29.32%), including 418 SCPs and 47 MCPs. The second place is China with 151 publications (9.52%), including 101 SCPs and 50 MCPs. However, China's MCP index is higher than the US, showing that China is the leading country in the number of publications authors from different countries jointly conduct.

The third, fourth, fifth, sixth, seventh and eighth places belong to the countries: Spain, Australia, Turkey, Canada, The United Kingdom, Germany with the SCP index respectively is: 77, 57, 71, 53, 44, 52 and the MCP index respectively is: 8, 22, 2, 18, 22, 8. Notably, some countries have high SCP scores but low MCP, for instance, Turkey (only 2 MCP), Greece (4 MCP) and Portugal (7 MCP). Authors from these countries rarely cooperated with their counterparts in other countries. Australia, The United Kingdom and Canada have a lower total number of publications but high MCP such as Australia (22 MCP), United Kingdom (22 MCP) and Canada (18 MCP). The remaining countries in the top 18 have SCP

index ranging from 12 to 32 and MCP index ranging from 3 to 11. Therefore, international cooperation on this topic is relatively popular.

Overall, authors from the top 8 countries published 1050/1586 articles under study (66.20%), while those from the remaining ten countries only contributed 267 articles (16.83%). All other countries account for only 16.97% of the corpus with 269 articles published.

Notable focus of research on early childhood education in 2022

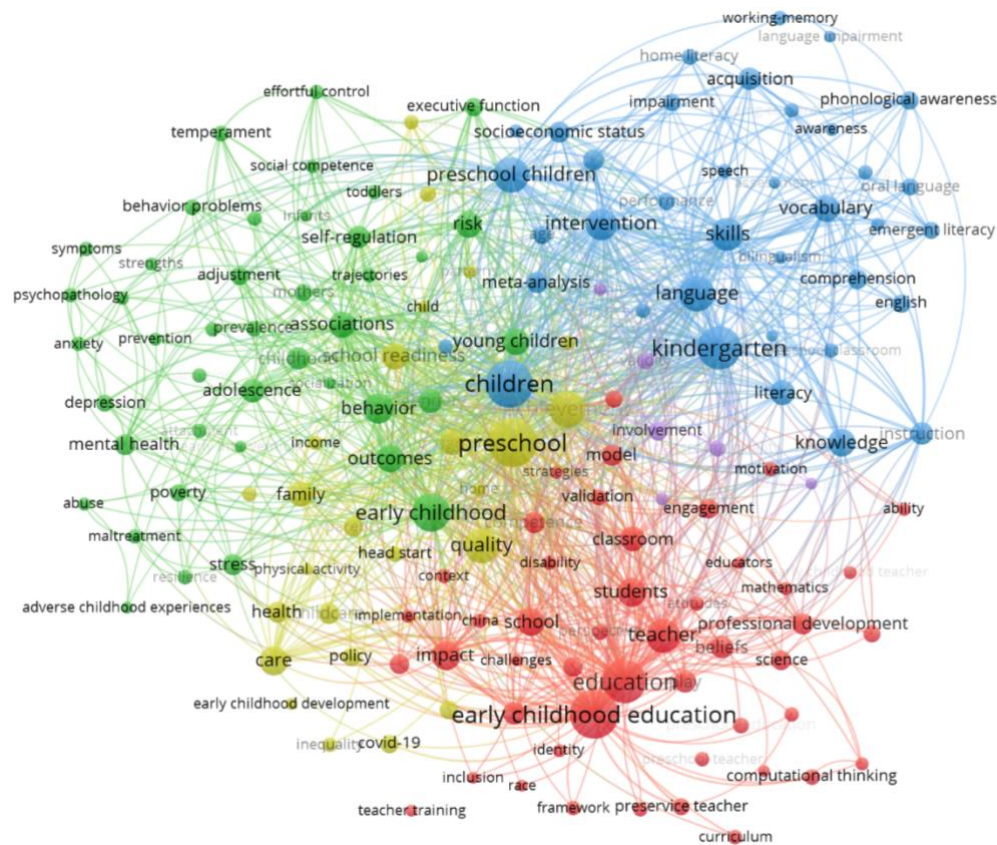


Figure 4. Co-occurrence of research keywords

Language and speech are the primary topics in the blue cluster. Notable keywords in this cluster are related to cognitive and language abilities, including “vocabulary”, “phonological

awareness”, “working memory”, and “reading comprehension”. Research papers containing the keyword “vocabulary” secured the dominant position with 81 studies. According to Hindman et al. (2022) children's vocabulary learning is associated with the frequency of teacher feedback, highlighting the importance of teachers' responses in classroom conversations.

The overview study by Walker et al. (2020) pointed out some highlights such as the use of technology in the delivery of language interventions and it is necessary to have more studies with larger numbers of children from poverty backgrounds and for diverse learners. Some other research studied the use of technology to investigate children's language development such as Egert et al (2022). Other publications studied diverse learners like multilingual and monolingual children (Langeloo et al., 2022); and minority-language children (Jahreie, 2022).

In terms of phonological awareness, Rice et al. (2022) showed that it is one of the five components of reading and the development of phonemic awareness goes along with clear instructions. Working memory is also one of the main topics in this cluster. Speirs Neumeister et al. (2022) compared mediation models and confirmed the relationship between working memory and reading outcomes mediated by pre-literacy skills. Issues related to reading comprehension were investigated in 23 studies. Van der Wilt et al. (2022) showed that children's language ability improved significantly regardless of their assigned group.

Literacy skills and home literacy are significant keywords in the blue cluster. Tastekin et al. (2022) described a conceptual framework and introduced intervention approaches supporting preschool children to develop early literacy skills. In addition, studies have also examined the effectiveness of programs and interventions in developing emergent literacy skills in children (Canut et al., 2023).

There are 30 studies related to the keyword “speech” (Krolivets, 2022). Several studies centre on the language abilities of children with special needs: children with Developmental Language Disorder (DLD) (Asadi et al., 2022), children with the inconsistent phonological disorder (IPD) (Sayyahi & Boulenger, 2022), Language Delayed (LD) and Typically Developed (TD) children (Chae & Yim, 2022).

The effects of Covid 19 on children's language have received research attention. Weiss et al. (2022) predicted that children's reading skills were hindered due to a lack of access to consistent and structured teaching methods during the Covid-19 pandemic.

The red cluster combines terms related to programs and policies that support teachers and preschool children and their impacts. Forty-one studies with the keyword “professional development” and thirty-five studies with the keyword “self-efficacy” focused on professional development programs for teachers to improve the quality of child care and education. According to Peng et al. (2022), building communities for professional learning is an effective way to develop teachers' professional competence. For preschool teachers, ECE programs are critical practical activities. These conclusions are similar to the research results of Zaslow et al. (2010) in identifying six characteristics that help develop effective professional development for preschool teachers.

Following the research of Totenhagen et al. (2016), some studies in the red cluster indicate factors affecting preschool teachers, such as the Covid 19 pandemic. Souto-Manning and Melvin (2022) indicated that preschool teachers, in particular teachers of colour, have decreased happiness levels in the context of the pandemic.

The keyword “Play” has been mentioned in 60 studies concentrate on expanding the concept of “learning through play” and building concepts such as care in adult-child play, and play profiles. This was mentioned in a study of publications from 2005 to 2007 on children's play by Cheng and Johnson (2010). According to Boonstra et al. (2022) the definition of learning through play is expanded based on the science of learning. These authors referred to international studies for critical findings on the impact of learning through play on children. Some studies mentioned how to encourage children to learn through play in the context of a pandemic (Fleer et al., 2022).

Keywords in the green cluster cover aspects of preschool children's behaviours. Studies showed that many factors influence the behaviours of preschool children, such as the child's unique characteristics, the child's, and the teacher's behaviour. These are quite similar to the results in a previous review study by Huaqing Qi and Kaiser (2003). The authors suggested that factors such as child, parent, and socioeconomic characteristics impact the behavioral problems of children from low socioeconomic backgrounds. Carigiet and Troesch (2022) discovered that individual characteristics, competencies, and socialization experiences could

determine the multidimensional changes of children when they attend preschool. In particular, children's ability to care for themselves links with social-adaptive behaviours in kindergarten.

Regarding individual factors, family factors also influence the well-being and behaviours of preschool children. Antenatal depression, maternal childhood trauma and lower gestational age at birth can predict anxiety disorder in four-year-old children (Galbally et al., 2022).

The review of Sankalaite et al (2021) highlighted the need for more research on the impact of the teacher-student relationship on executive functions and self-regulation of children. These two skills are mentioned in the green cluster. Some research in this cluster showed that teacher behaviours can affect the behaviours of preschool children. The socio-emotional responses of teachers in the classroom can influence the social relationships and behaviours of children aged 3 to 5 (Liu & Wang, 2022).

The next issue mentioned in this cluster is that preschoolers' behaviours can affect their future development. According to Morgan et al. (2022), irritability of three-year-old children predicts their internal and external disorders in adolescence, symptoms of anxiety and depression and more functional impairment.

Measures to promote the behavioural development of children were mentioned in the green cluster. Ellis et al. (2022) believed that although early-life adversity can hinder healthy development, a latent talent approach can still help children who grow up in harsh environments develop intact problem-solving skills when facing difficulties. Besides, using behavioural treatments for ADHD symptoms, behavioural problems, and impairment can be beneficial for children (Groenman et al., 2022).

In the context of the COVID-19 pandemic, authors paid more attention to improving the physical and mental health of preschool teachers (Nong et al., 2022) and parents (Maldei-Gohring et al., 2022). However, studies on the effects of the COVID-19 pandemic on preschoolers' behaviours are limited, paving the way for future research.

Following the results of review research in previous years by Zaslow et al. (2016), Slot (2018), and Aguiar and Aguiar (2020) pointed out the quality of preschool education is still mentioned as the main focus of the yellow cluster. This cluster shares common research interests with the red cluster (early education programme), the blue cluster (preschool

language) and the green cluster (preschool behaviour). Keywords emerging in this cluster include “preschool”, “quality”, “outcomes”, “care”, “family”, “health”, and “school readiness”. Authors researched quality issues of preschool education involving identifying factors affecting education quality and assessing the current status of preschool education during the pandemic.

Children, parents and preschool teachers impact the quality of ECE. Parent-teacher cooperation also affects the quality of ECE (Syuraini et al., 2022). The parental involvement level also influences young children's academic and social-emotional outcomes (Cosso et al., 2022).

Researchers also focused on understanding the status of preschool education quality in some countries. Studies have investigated the effectiveness of information and communication technology-based learning activities in early childhood care and education (Egert et al., 2022). In addition, the quality of preschool education during the COVID-19 Pandemic attracted interest from scholars (Shaik, 2022).

In general, the studies on this topic mainly come from developed countries such as the United States (Cosso et al., 2022), Germany (Egert et al., 2022), South Africa (Sewagegn et al., 2022) and Taiwan (Chen et al., 2022). The quantity of ECE in developing countries has also been studied in Indonesia (Syuraini et al., 2022). Therefore, future research can continue to explore this topic in developing countries to get a more comprehensive picture of the quality of ECE worldwide.

Intellectual structure of research on early childhood education

Top Influential Journals

In 2022, articles related to ECE were mainly published in prestigious journals with up-to-date research results about preschoolers and the professional skills of preschool teachers (Brown et al., 2023; Rohloff et al., 2022). At most 61 articles and at least 16 articles were published in journals related to early education. In particular, the Early Childhood Education Journal ranked first with 61 published articles and 708 citations, followed by the Frontiers in Psychology with 47 articles and 516 citations. The third rank belongs to Early Childhood Education and Development with 41 articles and 1156 citations. Those journals are believed

to attract interest from scholars and practitioners in ECE. Early Childhood Research Quarterly ranked 5th among journals with the most articles published and the highest citation of 2160. Although the Developmental Psychology journal ranked 14th with 16 articles, its citations are the second highest with 1188. Besides, Early Years ranked 6th in terms of

Table 3. *Top 16 Most Influential Journals Related to the Field of ECE Based on Total of Publications, Total of Citation*

Journals/ Sources	Articles	Citation/Articles	h-index
Early Childhood Education Journal	61	708	2
Frontiers In Psychology	47	516	3
Early Childhood Education And Development	41	1156	1
International Journal Of Early Years Education	33	234	2
Early Childhood Research Quarterly	32	2160	3
Early Years	27	105	1
European Early Childhood Education Research Journal	27	436	1
Frontiers In Education	26	516	1
International Journal Of Environmental Research And Public Health	23	121	2
Sustainability	22	115	3
Journal Of Early Childhood Teacher Education	21	170	
Education Sciences	20	88	2
International Journal Of Early Childhood Special Education	17	15	X
Developmental Psychology	16	1188	2
Early Child Development And Care	16	648	1
Reading And Writing	16	494	1

publication of articles with 105 citations, which are less than that of the journal Developmental Psychology. Authors published new research findings related to whether preschool stakeholders are conceptually prepared for children transitioning into kindergarten or which may impact how children's transition into elementary school unfolds. They were also interested in whether the changed kindergarten is an appropriate learning environment for children (Brown et al., 2023). According to Beatson et al. (2022), play-based learning was a viable ECE pedagogy fostering school readiness. The authors also focused on shortage of Early Childhood Teacher (ECT) and recruitment and retention (Ciuciu, 2022). More findings were given on providing recommendations to incorporate professional development,

and assessment to improve classroom interactions and support child skills throughout the preschool year (McDoniel et al., 2022) and fostering the multilingual development of young children and their families (Peleman et al., 2022).

Top influential authors

Table 4. *Top 16 Most Influential Authors Related to the Field of ECE Based on Total of Publications, Total of Articles Fractionalized*

No	Authors	Articles	Articles Fractionalized
1	Li H	12	3.33
2	Lerkkanen Mk	8	1.63
3	Li L	6	2.03
4	Pakarinen E	6	1.37
5	Tremblay Re	5	1.58
6	Ansari A	5	1.39
7	Justice Lm	5	1.13
8	Pianta Rc	5	1.13
9	Locasale-Crouch J	5	1.08
10	Eadie P	5	0.93
11	Levickis P	5	0.93
12	Hu By	5	0.91
13	Coplan Rj	5	0.82
14	Hanno Ec	4	2.45
15	Yang T	4	2.33
16	Bipath K	4	2.17
17	Kucirkova N	4	2.08
18	Chen Jj	4	1.75
19	Hong Xm	4	1.67

Among nineteen authors who published the most articles related to ECE in 2022, Li H became the most productive author with 12 articles and the highest article fractionalized of 3.33. Five of Li H's twelve published articles were collaboratively conducted by two authors or more. Li did research on many different topics, notably the sustainability of ECE from Chinese teachers' perspectives (Liu et al., 2022), policies on ECE in Nanjing, China (Qian et al., 2022).

Lerkkanen Mk followed Li H with eight published and articles fractionalized of 1.63. This author highlighted the quality of ECE programs in European countries. Li L and Pakarinen E similarly had six articles published, but Li L has higher articles fractionalized of 2.03. Eadie P, Levickis P, Hu By, and Coplan Rj ranked 10th with five published articles fractionalized of 0.93, 0.93, 0.91 and 0.82, respectively. Hanno, Yang, Bipath and Keshni have the same productivity level of four published articles and higher articles fractionalized indexes (2.45, 2.33, 2.17 and 2.08, respectively) than that of Li L (2.03). Other authors like Durkin, Lipsey, Farran and Wiesen are not listed as the top productive authors since they only published one article. However, regarding citations, these authors can have higher positions in the list with five citations. Regarding published research results, Durkin, Lipsey, Farran and Wiesen have collaborated on the effects of a Statewide pre-kindergarten program on children's achievement and behaviour in sixth grade, significantly impacting issues related to ECE.

In conclusion, authors listed in the table published more than two articles related to ECE education in the past year, marking their names on this topic. They presented essential findings contributing to improving early childhood care and educational effectiveness.

Conclusion, Recommendations, and Future Research Directions

This study aimed to explore publications of ECE in 2022 using bibliographic data from the WoS database with 1586 publications from 562 journals, conference papers, and books. Eight book chapters and ten proceeding papers were also compiled in this database. Three research questions have been clarified: (1) the geographical distribution of the topic of ECE; (2) outstanding research topics on ECE; (3) top influential authors, documents and journals on ECE.

Regarding the geographical distribution and trajectory of the research topic, the United States, China, Canada, Australia, and Finland are the top five countries that published the most research papers related to ECE. Thus, besides China, Australia and Japan, publications in 2022 from countries in the Asia-Pacific region are not yet large in number.

The importance of children's education in the early years of life has continued to be discussed in several ECE studies in 2022 (Chen et al., 2022). ECE helps equip children with

essential skills, reducing the opportunity gap between children (Suna & Özer, 2022). Research in 2022 continues to analyze emerging issues such as language, education quality, and behavior. Joseph et al. (2022) emphasized the effect of language skills on children's ability to learn and happiness, claiming that the critical period of language acquisition is the first five years of life. Ford et al. (2022) extended the concept of process quality in ECE by proposing informal, formal, and blended practices in children's interactions with adults. García-Fernández et al. (2022) explored that the social processes in childhood involved in the formation of aggressive and victimizing behaviors can help prevent the emergence of bullying behavior in adulthood. Many studies point out the perspectives, programs, policies, and interventions to help improve the effectiveness of early childhood care and education (Lv et al., 2022). These recommendations are still required further research to evaluate their effectiveness in diverse contexts.

Regarding the third research question about the top influential journals and authors in ECE, Early Childhood Education Journal ranked first with 61 published articles and 708 citations. Frontiers in Psychology following Early Childhood Education Journal with 47 articles and total citations of 516. Notably, Li H became the author with the most published articles with 12 articles and the highest articles fractionalized of 3.33.

This study provided an overview of emerging research issues in ECE in 2022. Based researchers continue to develop their other research in the future. However, this study still has some limitations. First, the WoS database in the study may have covered only some ECE studies. A review of various literature from different sources can provide a general view of ECE. Second, the research publications on ECE are only in 2022, so further studies are needed to study the broader period to review this topic comprehensively.

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