

Mapping Pre-School Children Research: A Bibliometric Analysis of Scopus-Indexed Publications from 1998 to 2026

Norwati Roslim¹, Ng Yu Jin^{2*3}, Zainal Abidin Abdul Majeed⁴, Fazliana Zainal Abidin⁵, Al Hammadi Alaa Othman Ghanem²

¹Academy of Language Studies, Universiti Teknologi MARA, Cawangan Negeri Sembilan, Kampus Rembau, Malaysia

² Faculty of Education and Humanities, UNITAR University College Kuala Lumpur, Malaysia

³ Faculty of Education and Humanities, UNITAR International University, Selangor, Malaysia

⁴ President, DR.Z Progressive Centre, Selangor Malaysia

⁵ Principal, Taska Dr. Z & Tadika Progresif Premier, Selangor, Malaysia

*Corresponding Author

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ABSTRACT

Research on pre-school children and their readiness for formal schooling underpins policy and practice in early childhood education, yet the structure of this literature has rarely been examined quantitatively. This study maps the landscape of pre-school children research indexed in Scopus in order to provide a comprehensive reference for researchers entering the field. Three objectives guide the analysis: to evaluate the trend of publications on pre-school children research, to determine its key topic areas, and to identify its major contributors. A bibliometric method was applied to 37 documents retrieved from the Scopus database in July 2026 using a query combining kindergarten, preschool, readiness, and primary schools, with no restrictions on document type, year, subject area, or language. Descriptive analyses drew on the Scopus analyse search results function, and VOSviewer software version 1.6.19 was used to construct co-occurrence and co-authorship visualisation maps. Findings show that the literature originates in 1998, remains sparse and intermittent for two decades, and then accelerates markedly from 2024, with more than one third of all documents appearing in 2024 to 2026. Output is dispersed across a wide range of journals and subject areas, with Social Sciences, Psychology, and Medicine jointly accounting for 85.9 percent of subject assignments. Keyword co-occurrence analysis identifies school readiness, kindergarten, child development, and academic achievement as the thematic core. Contributions are geographically concentrated, with the United States, Turkey, and China producing the majority of documents and Southeast Asia and other developing regions almost absent. The study contributes a baseline map of a small but growing field, complementing meta-analyses and structured literature reviews, and identifies clear opportunities for geographic diversification and interdisciplinary collaboration in pre-school children research.

Keywords: Pre-School Children; School Readiness; Bibliometric Analysis; Vosviewer; Scopus; Early Childhood Education

INTRODUCTION

The years before formal schooling carry a weight that is disproportionate to their brevity. A substantial body of developmental research shows that the cognitive, linguistic, socioemotional, and self-regulatory skills a child brings to the first year of school predict academic trajectories well into the primary grades and beyond (Blair & Raver, 2015; Duncan et al., 2007; McClelland et al., 2007). Large-scale longitudinal evidence indicates that school readiness skills measured at age four continue to predict achievement, retention, and behavioural outcomes through the fifth grade (Ricciardi et al., 2021), and patterns of readiness at school entry forecast both achievement and socioemotional development at the end of elementary school (Sabol & Pianta, 2012). Economic

analyses reinforce the point from a different direction: investment in disadvantaged young children yields returns that later remediation cannot match (Heckman, 2006). It is therefore unsurprising that pre-school children, their development, and their transition into primary education have attracted attention across education, psychology, medicine, and public health (Blair, 2002; High, 2008; Janus & Offord, 2007).

This attention has produced a literature that is conceptually rich but structurally diffuse. Studies of pre-school children appear in developmental journals, education journals, paediatric and occupational therapy outlets, and national-language venues, and they draw on constructs as varied as executive function, emergent literacy, parental involvement, and transition practice (Bierman et al., 2008; Puccioni, 2015; Tobin et al., 2022; Wilders & Wood, 2023). Recent syntheses have examined particular slices of the field, including transition of children with disabilities to formal schooling (Then & Pohlmann-Rother, 2023) and parental perspectives on kindergarten readiness (Fan et al., 2024), while meta-analytic work has established the contribution of early shared reading and print exposure to child language outcomes (Bus et al., 1995; Mol & Bus, 2011; Noble et al., 2019). What remains missing is a quantitative map of the field itself: an account of how publication activity on pre-school children has evolved, where it is published, which topics dominate, and which countries and collaborations drive it.

Bibliometric analysis is designed to answer precisely such questions. By applying quantitative techniques to publication and citation data, bibliometric methods describe the growth, structure, and intellectual organisation of a research field in a manner that is transparent and reproducible (Donthu et al., 2021; Pritchard, 1969; Zupic & Čater, 2015). Bibliometrics complements rather than replaces systematic review: where a systematic review synthesises findings, a bibliometric study characterises the body of literature in which those findings sit, and the two together give newcomers both a map and a reading list (Lim & Kumar, 2024; Öztürk et al., 2024). The approach has spread rapidly across the social sciences, supported by the availability of curated citation databases such as Scopus (Baas et al., 2020) and accessible visualisation software such as VOSviewer (van Eck & Waltman, 2010).

The present study applies this approach to pre-school children research indexed in Scopus. It analyses the complete set of documents returned by a query combining the terms kindergarten, preschool, readiness, and primary schools, retrieved in July 2026 without restriction on document type, publication year, subject area, or language. Three research questions structure the analysis: first, how has pre-school children research evolved and been distributed; second, what key topic areas have been discussed in pre-school children research; and third, who are the major players in pre-school children research. In answering these questions, the study aims to create a comprehensive single-source reference for researchers concerning pre-school children research, in the same spirit as bibliometric mappings recently produced for learner corpus research, STEM education, and educational technology (Jin et al., 2024; Mohd-Aris et al., 2025; Roslim et al., 2023). Thus, the research questions were formulated as follows:

RQ1. How has pre-school children research evolved and been distributed?

RQ2. What key topic areas have been discussed in pre-school children research?

RQ3. Who are the major players in pre-school children research?

The remainder of the article is organised as follows. Section 2 reviews the substantive and methodological literature that frames the study. Section 3 details the four-step bibliometric procedure. Section 4 reports the results by research question. Sections 5 to 7 discuss the findings, draw out implications, and acknowledge limitations, and Section 8 concludes.

LITERATURE REVIEW

Pre-School Children and School Readiness as a Research Field

Research on pre-school children coalesces around the construct of school readiness, understood as the constellation of skills, behaviours, and dispositions that enable a child to benefit from formal instruction (Blair, 2002; High, 2008). The construct is deliberately multidimensional. Duncan et al. (2007), analysing six

longitudinal datasets, found that school-entry mathematics, reading, and attention skills were the strongest predictors of later achievement, while McClelland et al. (2007) demonstrated that behavioural regulation, the integration of attention, working memory, and inhibitory control, contributes independently to emergent literacy, vocabulary, and mathematics in the pre-kindergarten year. Blair and Raver (2015) subsequently reframed readiness in developmental neuroscience terms, arguing that self-regulation and executive function develop through reciprocal relations with early environments and are therefore legitimate targets for intervention. Experimental evidence supports this claim: enriching Head Start classrooms with a social-emotional curriculum improved readiness outcomes in a randomised trial (Bierman et al., 2008), and meta-analytic findings indicate that executive function in pre-schoolers responds to targeted cognitive training (Scionti et al., 2020).

Measurement and population monitoring form a second strand. Janus and Offord (2007) developed and validated the Early Development Instrument, a teacher-completed measure of readiness across five developmental domains that has since been adopted for population-level monitoring in several countries. A third strand concerns the transition into primary school as an ecological event rather than a property of the child alone. Dockett and Perry (2013) survey international research on starting school and document a shift from child-focused readiness testing toward attention to relationships among children, families, and schools. Recent empirical work in this tradition examines family-school connectivity during the transition year (Tobin et al., 2022), children's own perceptions of the move from play-based to formal environments (Wilders & Wood, 2023), parental expectations surrounding kindergarten entry (Fan et al., 2024; Puccioni, 2015), and the specific transition experiences of children with disabilities (Then & Pohlmann-Rother, 2023). The home literacy environment constitutes a fourth strand, with meta-analyses confirming the association between early book exposure and language development from infancy onward (Bus et al., 1995; Mol & Bus, 2011; Noble et al., 2019; Sénéchal & LeFevre, 2002) and newer work extending these questions to digital reading media (Furenes et al., 2021).

Taken together, these strands show a field that is theoretically productive and practically consequential, but also fragmented across disciplines, journals, and national contexts. Precisely this combination of importance and fragmentation makes the field a suitable candidate for bibliometric mapping.

Bibliometric Analysis as a Research Method

Bibliometrics denotes the application of mathematical and statistical methods to books and other media of communication, a definition that dates to Pritchard (1969) and was consolidated by Broadus (1987). Two families of technique dominate contemporary practice (Donthu et al., 2021). Performance analysis describes the productivity and impact of research constituents, typically through counts of publications and citations by year, source, author, institution, and country. Science mapping examines the relationships among constituents, using methods such as bibliographic coupling (Kessler, 1963), co-citation analysis (Small, 1973), co-authorship analysis, and keyword co-occurrence analysis to reveal the intellectual and social structure of a field. Zupic and Čater (2015) codified the workflow for management and organisation studies, and Ellegaard and Wall (2015) documented the accelerating uptake of bibliometric methods across disciplines.

Methodological guidance has matured accordingly. Donthu et al. (2021) offer general guidelines for conducting bibliometric analysis, including the caution that the method suits fields large enough for statistical description yet focused enough for meaningful interpretation. Mukherjee et al. (2022) set out how bibliometric research can advance theory and practice rather than remain descriptive, Öztürk et al. (2024) propose a design framework spanning research questions, database selection, and technique choice, and Lim and Kumar (2024) provide a sensemaking approach for interpreting bibliometric output. The present study follows this guidance while adopting the four-step procedure used in a series of recent bibliometric mappings in education and language studies (Baharudin & Roslim, 2025; Jin et al., 2024; Mohd-Aris et al., 2025; Roslim et al., 2023; Shafeei et al., 2026), which proceeds from research design through data retrieval and visualisation to interpretation.

Scopus and VOSviewer

Database selection conditions every downstream result in a bibliometric study. Scopus, launched by Elsevier in 2004, is among the largest curated abstract and citation databases of peer-reviewed literature, covering journals, books, and conference proceedings across the sciences, social sciences, and humanities, with content selected and monitored by an independent review board (Baas et al., 2020). Comparative studies show that Scopus offers

broader journal coverage than the Web of Science, particularly in the social sciences, although both databases under-represent non-English and regionally published material (Mongeon & Paul-Hus, 2016; Prancu  t  , 2021). Scopus additionally provides a built-in analyse search results function that returns descriptive breakdowns of a result set by year, source, author, affiliation, country, document type, and subject area, which supports the performance analysis component of bibliometric work. Prior bibliometric studies in education have relied on Scopus for these reasons (AlShehhi et al., 2022; Roslim et al., 2023; Sweileh et al., 2017).

For science mapping, this study uses VOSviewer, a freely available software tool developed for constructing and visualising bibliometric networks (van Eck & Waltman, 2010). VOSviewer implements a unified approach to mapping and clustering based on the visualisation of similarities technique (Waltman et al., 2010), and it offers text mining functionality for building co-occurrence networks of terms extracted from titles, abstracts, and keywords. Its network, overlay, and density visualisations have made it one of the most widely used instruments in bibliometric research, and practical guidance on its text analysis workflow is now available (Bukar et al., 2023). Alternative toolkits exist, notably the bibliometrix package for R (Aria & Cuccurullo, 2017), but VOSviewer was selected here for its accessibility, its suitability for co-occurrence and co-authorship analysis, and its established use in the antecedent studies whose procedure this study adopts.

Bibliometric Studies in Education and the Research Gap

Bibliometric mapping has been applied productively to neighbouring educational domains. Sweileh et al. (2017) profiled a decade of second language acquisition research, Roslim et al. (2023) mapped learner corpus research from 902 Scopus documents, Jin et al. (2024) examined trends and challenges in STEM education, Mohd-Aris et al. (2025) analysed distance and online learning in STEM education, Baharudin and Roslim (2025) charted research on the Padlet platform, and Shafeei et al. (2026) mapped artificial intelligence in higher education. Beyond this series, bibliometric studies have addressed diversity management (AlShehhi et al., 2022) and tourism economics (Comerio & Strozzi, 2019), illustrating the transferability of the method across fields of very different sizes.

Against this background, pre-school children research presents a clear gap. Although the substantive literature reviewed in Section 2.1 is well developed, no published bibliometric analysis has mapped the body of Scopus-indexed work retrieved under the combined terms of kindergarten, preschool, readiness, and primary schools. Researchers entering the field therefore lack a quantitative overview of its growth trajectory, publication venues, thematic structure, and geography of contribution. The present study addresses that gap. Its deliberately focused query yields a compact corpus, which is itself a finding: it delimits the specific intersection of early childhood and school readiness research visible through these terms, and it establishes a baseline against which the field's apparent acceleration in the mid-2020s can be tracked.

RESEARCH METHODOLOGY

This study performed a bibliometric analysis to identify the trends, key areas, and major contributors in pre-school children research. The procedure consists of four steps adopted and adapted from a series of prior bibliometric studies (Baharudin & Roslim, 2025; Jin et al., 2024; Mohd-Aris et al., 2025; Roslim et al., 2023; Shafeei et al., 2026), and it is consistent with the general design guidance of Donthu et al. (2021) and   zt  rk et al. (2024). Figure 1 presents the workflow.

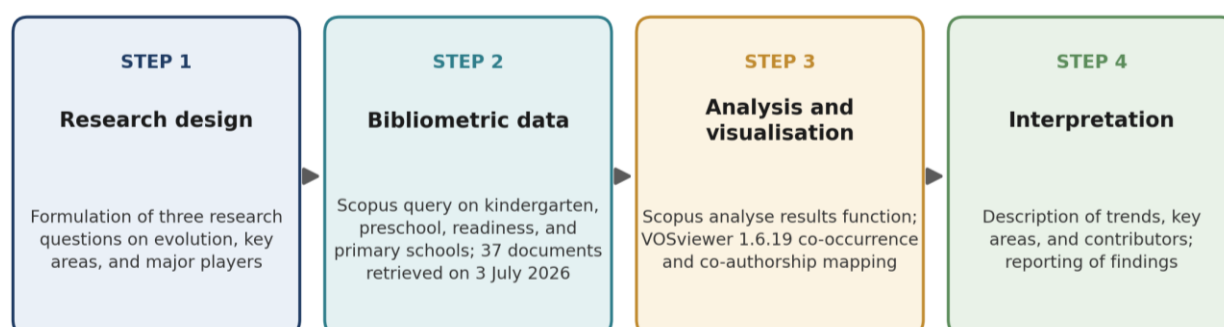


Figure 1. Bibliometric analysis workflow for pre-school children research.

Step 1: Research Design

The bibliometric analysis was designed to answer these questions with matched indicators. For RQ1, on evolution and distribution, the study investigated publications by year, source titles, document and source types, and languages of documents. For RQ2, on key areas, it examined subject areas and conducted a keyword co-occurrence analysis. For RQ3, on major players, it investigated the countries contributing most to the literature and their collaboration structure.

Step 2: Bibliometric Data

The Scopus database was selected as the data source on the grounds of its breadth of curated coverage and its established use in bibliometric research (Baas et al., 2020; Mongeon & Paul-Hus, 2016). The search query combined the terms kindergarten, preschool, readiness, and primary schools, reflecting the study's focus on pre-school children and their readiness for entry into primary education. The search was executed on 3 July 2026 with no restrictions on document type, year of publication, subject area, or language, in order to capture the field in its entirety. The query returned 37 documents spanning 1998 to 2026. Data cleaning detected no duplicate records, so all 37 documents were retained for analysis. The full records were exported in comma separated values format for use as bibliometric files. Table 1 summarises the search profile.

Because a bibliometric corpus is only ever as wide as the query that defines it, the logic of the search string warrants explicit statement rather than quiet assumption. The four terms were combined so that the retrieved set would sit at the intersection the study set out to map, namely the point at which the pre-school child, the condition of readiness, and the destination of primary schooling are named together in a document's indexed record. The terms kindergarten and preschool fix the population, readiness fixes the construct, and primary schools fixes the transition endpoint, so that a document is retrieved when it participates in this specific conceptual meeting rather than in early childhood research at large. This deliberate narrowness is a design choice with a visible cost, and it is important to name that cost plainly. A great deal of relevant work is framed through adjacent vocabulary, including school transition, early childhood education, pre-primary education, kindergarten transition, and kindergarten entry, and studies using those terms without the readiness framing will not appear in the present corpus.

The substantive literature reviewed in Section 2 confirms as much, since influential transition and readiness studies are indexed under precisely such alternative descriptors (Dockett & Perry, 2013; Fan et al., 2024; Then & Pohlmann-Rother, 2023). The consequence is that this study maps a defined lexical intersection rather than the whole of pre-school children research, a scoping that is consistent with the guidance that a bibliometric query be focused enough for coherent interpretation while remaining transparent about what it excludes (Donthu et al., 2021; Ozturk et al., 2024). Read in that spirit, the compact corpus is not a limitation to be apologised for but the very object of analysis, and the alternative term sets identified here define the first axis along which future replications should broaden the map.

Table 1. Search strategy and corpus profile.

Element	Specification
Database	Scopus
Query terms	kindergarten; preschool; readiness; primary schools
Date of retrieval	3 July 2026
Restrictions applied	None (document type, year, subject area, language)
Records retrieved	37
Duplicates removed	0
Records analysed	37
Coverage period	1998 to 2026
Export format	Comma separated values (CSV)

Step 3: Bibliometric Analysis and Visualisation Maps

Two analytical layers were applied. The first layer used the Scopus analyse search results function to generate descriptive statistics for publications by year, source title, document and source type, language, subject area, and country. The second layer used VOSviewer software version 1.6.19 to construct and visualise bibliometric networks (van Eck & Waltman, 2010). VOSviewer builds networks of journals, researchers, countries, or terms based on citation, bibliographic coupling, co-citation, or co-authorship relations, and its text mining functionality constructs co-occurrence networks of important terms extracted from a body of literature (Bukar et al., 2023; Waltman et al., 2010).

In this study, two types of VOSviewer analysis were conducted. First, the co-authorship type of analysis was applied with countries as the unit of analysis, to characterise the geography of scientific collaboration. Second, the co-occurrence type of analysis was applied with all keywords as the unit of analysis. The minimum number of occurrences of a keyword was set at five; of the 398 keywords in the corpus, 22 met this threshold, and for each the total strength of its co-occurrence links with other keywords was calculated. VOSviewer offers three visualisation modes, namely network, overlay, and density visualisation. The network visualisation was judged appropriate for presenting the keyword analysis and the density visualisation for presenting the countries with most contributions.

Three analytical decisions in the keyword mapping are stated here in full, since bibliometric results are sensitive to each. The first concerns the unit of analysis. The co-occurrence network was built from all keywords rather than author keywords alone, on the established principle that author keywords represent an article's content while database index terms capture how the indexing system classifies it (Comerio & Strozzi, 2019). Retaining both was a considered choice rather than an oversight, because it preserves, and makes visible, the medical and clinical indexing vocabulary that a substantial share of this corpus carries, which is itself a finding about where the literature is processed. Rather than deleting generic descriptors such as human, male, female, and article, the analysis flags them as a distinct indexing layer and interprets them separately from the substantive layer, so that the reader sees both the artefact and the theme without either being silently removed, as the interpretation in Section 5.3 does explicitly. The second decision concerns the occurrence threshold.

A minimum of five occurrences was set because it balances two competing needs in a small corpus: a threshold too low admits one-off and idiosyncratic terms that clutter the network without signalling shared structure, while a threshold too high erases the network altogether. Against the 398 keywords in the corpus, the value of five yields 22 terms, a number large enough to reveal thematic clusters yet small enough to remain legible, and it follows the practice of the antecedent mappings whose procedure this study adopts (Baharudin & Roslim, 2025; Roslim et al., 2023; Shafeei et al., 2026). The third decision concerns harmonisation. No VOSviewer thesaurus file was applied to the keyword field, so terms are reported as indexed; harmonisation was instead performed manually and only where a labelling artefact would otherwise distort a count, most visibly the merging of the Turkey and Turkiye country labels discussed in Section 5.4. For a corpus of this size the manual approach is transparent and auditable, though a thesaurus-based normalisation of synonyms and spelling variants would be a sensible refinement as the corpus grows (Bukar et al., 2023; van Eck & Waltman, 2010).

Step 4: Results Interpretation

The final step was the description and interpretation of the results, following the sensemaking orientation recommended for bibliometric work, in which prominent patterns are first scanned, then situated against the substantive literature, and finally translated into implications for research and practice (Lim & Kumar, 2024). Because the analysis draws entirely on published metadata and involves no human participants, ethical approval was not required.

RESULTS

This section presents the results of the bibliometric analysis in relation to the three research questions: how pre-school children research has evolved and been distributed, what key topic areas have been discussed, and who the major players are.

Evolution and Distribution of Pre-School Children Research (RQ1)

Figure 2 and Table 2 present the annual distribution of documents from 1998 to 2026. The year 1998 marks the entry point of the field, with a single document titled Development of a magnocellular function in good and poor primary school-age readers recorded in Scopus. For the following two decades, output remains sparse and intermittent, with several years recording no documents at all and no year exceeding three. A clear inflection occurs in the mid-2020s: 2025 records six documents, the highest annual count in the series, and 2026 adds five more by the retrieval date, with 2024 to 2026 jointly accounting for approximately one third of the entire corpus. The cumulative curve in Figure 2 shows the corresponding steepening. This pattern indicates that pre-school children research, as captured by the present query, is a small field experiencing a recent and pronounced acceleration of interest.

Annual and cumulative publications on pre-school children research, 1998 to 2026

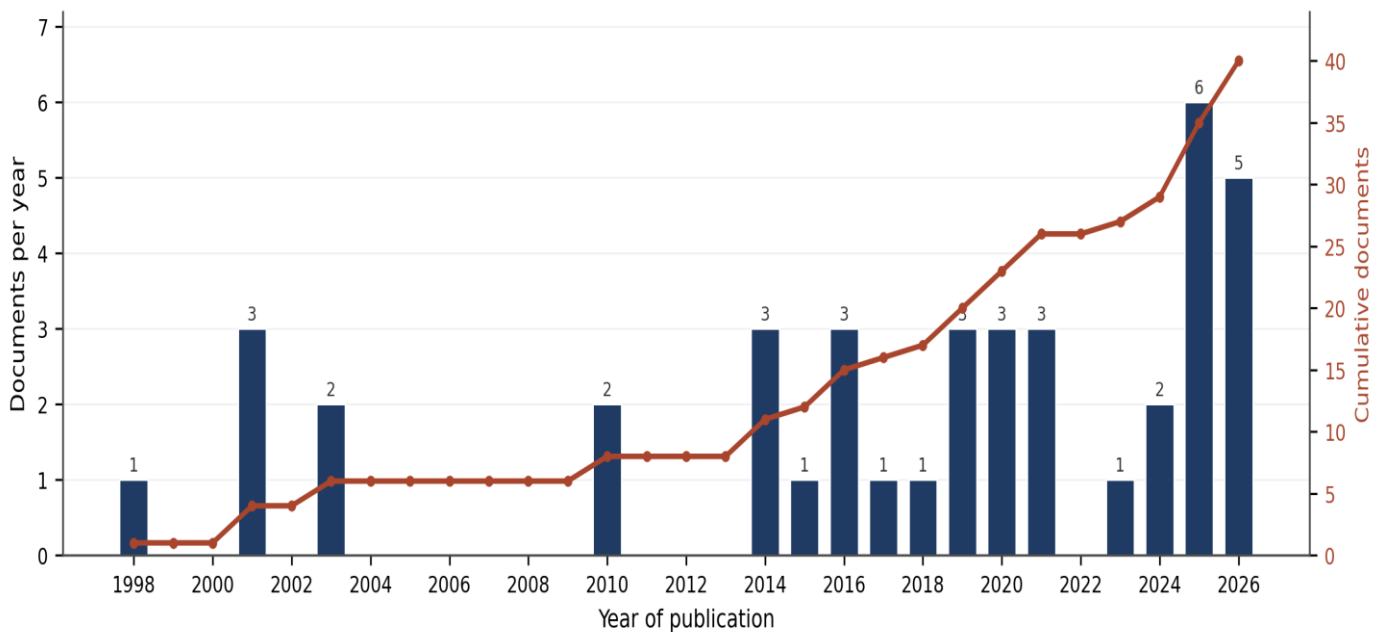


Figure 2. Annual and cumulative publications on pre-school children research, 1998 to 2026.

Table 2. Number of pre-school children research publications by year.

Year	Documents	Year	Documents	Year	Documents
1998	1	2008	0	2018	1
1999	0	2009	0	2019	3
2000	0	2010	2	2020	3
2001	3	2011	0	2021	3
2002	0	2012	0	2022	0
2003	2	2013	0	2023	1
2004	0	2014	3	2024	2
2005	0	2015	1	2025	6
2006	0	2016	3	2026	5
2007	0	2017	1		

Note. Annual counts as returned by the Scopus analyse search results function at the date of retrieval. The 2026 count is partial, reflecting documents indexed up to 3 July 2026.

The leading journals publishing research related to pre-school children are Early Child Development and Care, Early Childhood Education Journal, Early Childhood Research Quarterly, and Universal Journal of Educational Research, each contributing two documents. All remaining sources contribute a single document each. Figure 3 and Table 3 present the top ten sources. The pattern is one of pronounced dispersion: no journal dominates, and the top four sources together account for only 21.6 percent of the corpus. The identity of the leading outlets nonetheless confirms the field's centre of gravity in early childhood education and development, while the presence of Acta Medica Portuguesa, American Journal of Occupational Therapy, and Applied Neuropsychology: Child in the top ten signals the participation of clinical and health disciplines.

Top ten source titles for pre-school children research

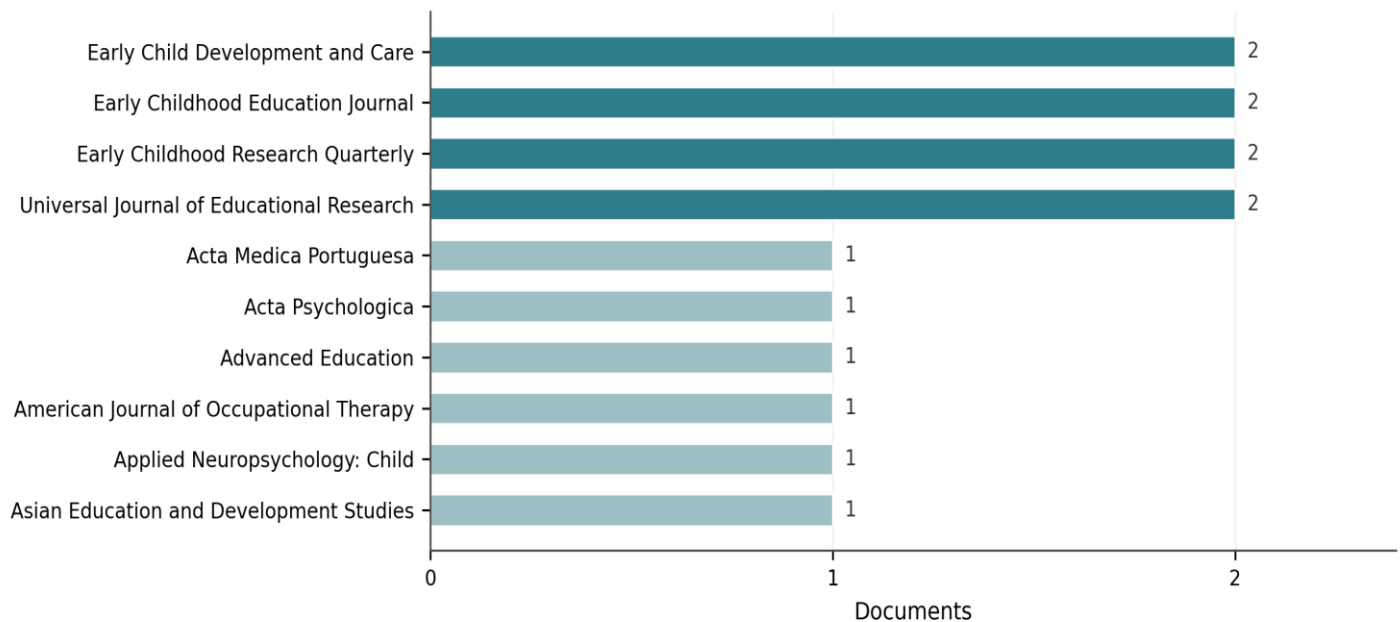


Figure 3. Top ten source titles for pre-school children research publications.

Table 3. Top ten sources for pre-school children research.

Source title	Documents
Early Child Development and Care	2
Early Childhood Education Journal	2
Early Childhood Research Quarterly	2
Universal Journal of Educational Research	2
Acta Medica Portuguesa	1
Acta Psychologica	1
Advanced Education	1
American Journal of Occupational Therapy	1
Applied Neuropsychology: Child	1
Asian Education and Development Studies	1

Table 4 reports the composition of the corpus by document type. Journal articles overwhelmingly dominate, representing 35 documents or 94.6 percent of the total, complemented by one erratum (2.7 percent) and one review (2.7 percent). Panel (b) of Figure 4 visualises this composition. The near-absence of reviews is notable: it indicates that the field has accumulated primary studies faster than it has synthesised them, which strengthens the case for mapping exercises such as the present one.

Document type	Number of documents	Percentage (%)
Article	35	94.6
Erratum	1	2.7
Review	1	2.7
Total	37	100.0

Table 4. Document types for pre-school children research.

Table 5 shows that English is the dominant language of publication, accounting for 34 documents, followed by Turkish with two documents and Croatian with one. The presence of Turkish and Croatian publications, retrieved because the search imposed no language restriction, foreshadows the prominence of Turkey and Croatia in the country analysis reported in Section 4.3 and illustrates the contribution of national-language venues to this literature.

Table 5. Languages used for pre-school children research publications.

Language	Number of documents
English	34
Turkish	2
Croatian	1

Key Areas of Pre-School Children Research (RQ2)

The documents were classified by Scopus subject area, with individual documents assignable to more than one area. As Table 6 and panel (a) of Figure 4 show, research on pre-school children has emerged across a variety of subject areas. Social Sciences leads with 20 assignments (35.1 percent), followed closely by Psychology with 19 (33.3 percent) and Medicine with 10 (17.5 percent). Health Professions and Nursing each account for two assignments (3.5 percent), while Agricultural and Biological Sciences, Arts and Humanities, Biochemistry, Genetics and Molecular Biology, and Neuroscience each account for one (1.8 percent). The three leading areas jointly cover 85.9 percent of assignments, confirming that the field sits principally at the junction of education, psychology, and health, with a long interdisciplinary tail.

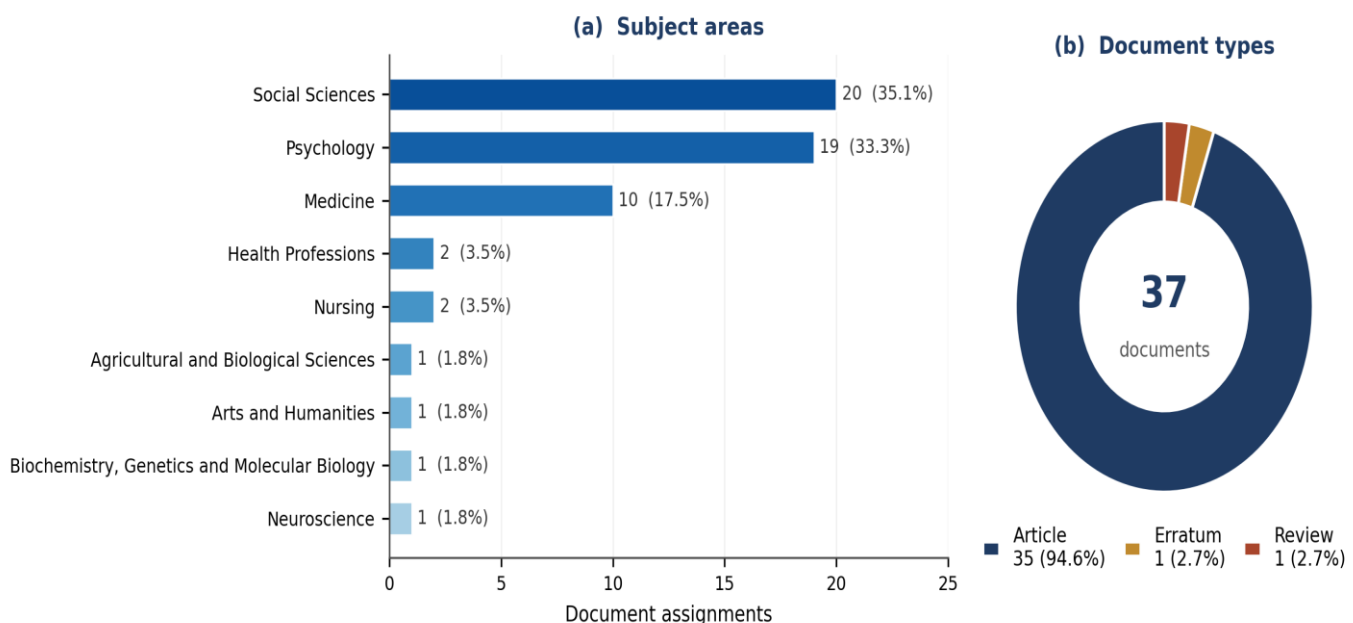


Figure 4. Subject areas and document types in pre-school children research.

Table 6. Subject areas of pre-school children research.

Subject area	Number of documents	Percentage (%)
Social Sciences	20	35.1
Psychology	19	33.3
Medicine	10	17.5
Health Professions	2	3.5
Nursing	2	3.5
Agricultural and Biological Sciences	1	1.8
Arts and Humanities	1	1.8
Biochemistry, Genetics and Molecular Biology	1	1.8
Neuroscience	1	1.8

Note. Documents may be assigned to more than one subject area; percentages are of the 57 subject assignments recorded for the 37 documents.

The fundamental principle of keyword analysis is that authors' keywords adequately represent the contents of an article (Comerio & Strozzi, 2019). For the keyword analysis, the co-occurrence type of analysis with all keywords as the unit was used in VOSviewer, with the minimum number of occurrences of a keyword set at five. Of the 398 keywords in the corpus, 22 met the threshold, and for each of these the total strength of its co-occurrence links with the other keywords was calculated. Table 7 lists the top twenty keywords by total link strength, and Figure 5 presents the network visualisation map.

Table 7. Top twenty keywords in pre-school children research.

Keyword	Occurrences	Total link strength	Keyword	Occurrences	Total link strength
human	22	237	school	11	131
male	21	231	major clinical study	10	119
child	20	225	longitudinal study	10	103
female	20	224	school readiness	15	102
preschool child	18	207	teacher	8	102
primary school	15	180	schools	8	101
article	16	175	child development	6	76
humans	15	173	academic achievement	6	74
child, preschool	14	159	psychology	5	72
kindergarten	12	147	controlled study	5	67

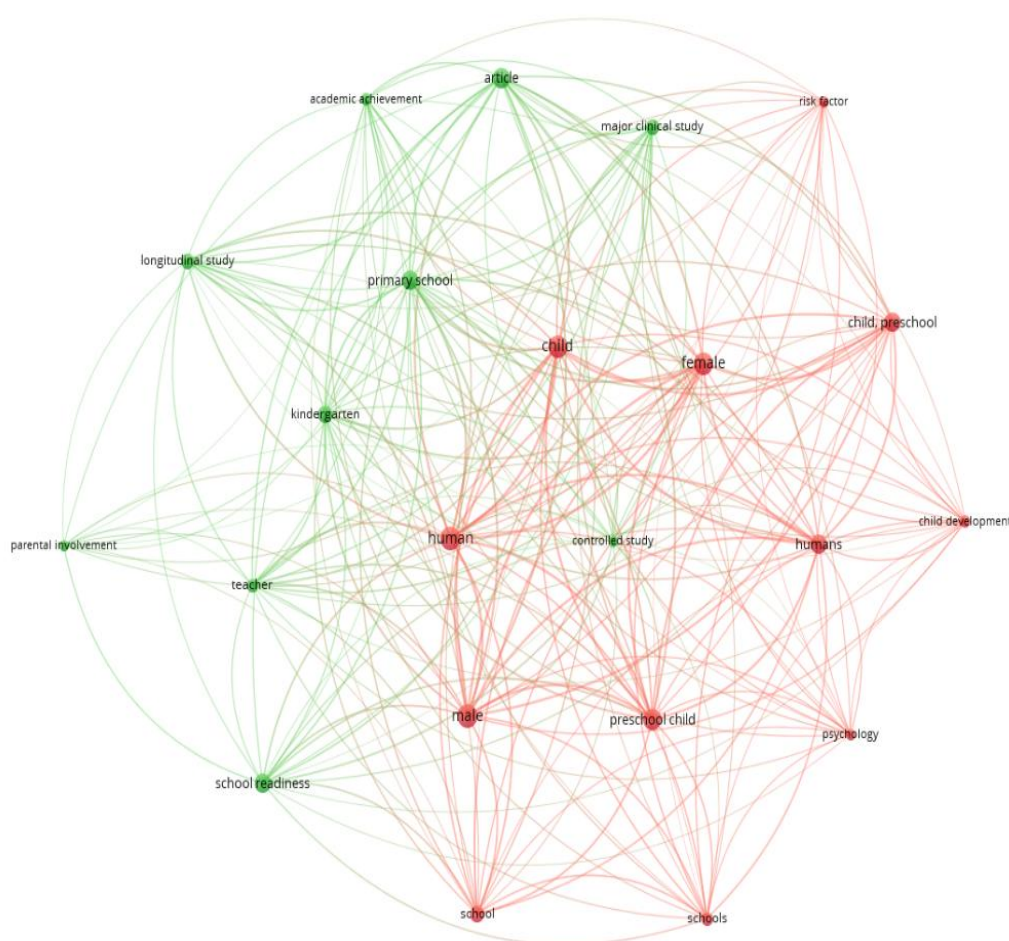


Figure 5. Network visualisation map of the co-occurrence of keywords in pre-school children research.

In the network map, colour, circle size, font size, and the thickness of connecting lines represent the strength of relationships among keywords, and keywords sharing a colour were commonly listed together (Sweileh et al., 2017). Two layers are visible in the results. The first is an indexing layer composed of generic descriptors such as human, humans, male, female, article, major clinical study, and controlled study, which derive from the structured indexing vocabularies applied to the substantial medical and clinical share of the corpus, and whose high counts reflect indexing convention rather than substantive theme. The second is a substantive layer in which child, preschool child, primary school, kindergarten, school readiness, school, teacher, child development, academic achievement, and longitudinal study cluster together. In this study, child, preschool, schools, child development, and psychology carry similar colours, suggesting that these keywords were closely related and usually occurred together. Within the substantive layer, school readiness stands out: with 15 occurrences it is among the most frequent thematic terms, confirming that readiness for formal schooling is the conceptual core around which this corpus is organised, linked outward to child development, academic achievement, and the longitudinal designs used to study them.

Major Players in Pre-School Children Research (RQ3)

The characteristics of scientific collaboration were examined by analysing the countries that most frequently contributed to the corpus, using the co-authorship type of analysis with countries as the unit. Based on geographical distributions, 15 countries or territories listed in Scopus contributed to the publications. As Table 8 and Figure 6 show, the United States holds the leading position with 11 documents, followed by Turkey with 8 and China with 5. Canada, Croatia, Indonesia, and Italy each contribute two documents, and Australia, the Czech Republic, Portugal, Singapore, Sweden, Türkiye, Ukraine, and the United Kingdom each contribute one. It should be noted that Scopus records Turkey and Türkiye as separate labels within this corpus; combined, they account for nine documents, consolidating that country's position as the second largest contributor.

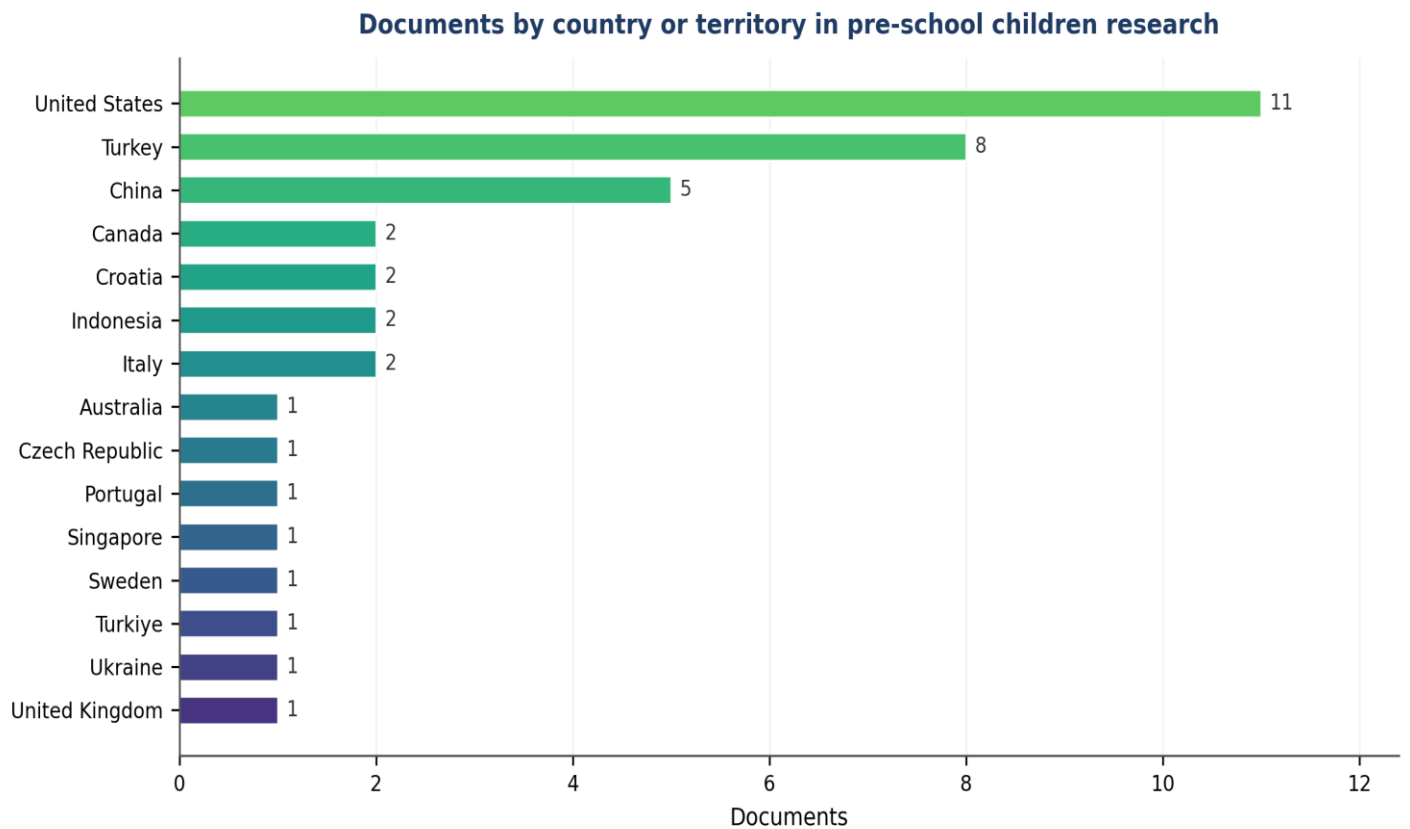


Figure 6. Documents by country or territory in pre-school children research.

Table 8. Geographic origins of pre-school children research.

Country or territory	Documents	Country or territory	Documents
United States	11	Czech Republic	1
Turkey	8	Portugal	1
China	5	Singapore	1
Canada	2	Sweden	1
Croatia	2	Türkiye	1
Indonesia	2	Ukraine	1
Italy	2	United Kingdom	1
Australia	1		

Note. Turkey and Türkiye appear as separate country labels in the Scopus record; combined, they account for nine documents.

The density visualisation map of the top three contributing countries, the United States, Turkey, and China, was created using VOSviewer and is presented in Figure 7. The map shows three largely separate zones of activity rather than a single connected cluster, indicating that the scientific collaborations in this research field span a limited range of geographic regions. Contributions from Southeast Asia are confined to Indonesia and Singapore with three documents between them, and no document in the corpus originates from Africa, the Middle East outside Turkey, or Latin America. The geography of the field is therefore one of concentration in three national research systems accompanied by scattered single-country contributions elsewhere.

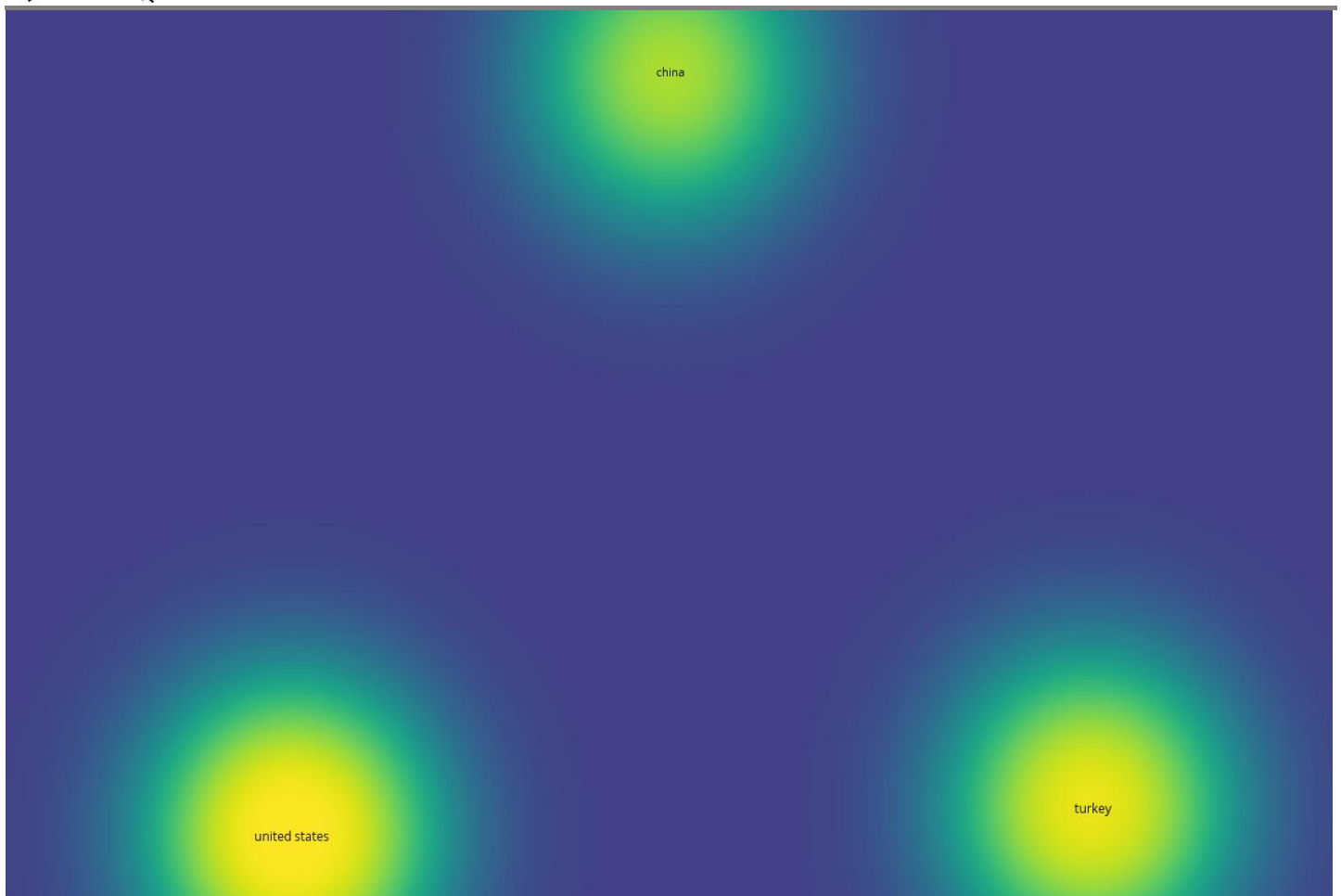


Figure 7. Density visualisation of the top three contributing countries.

SUMMARY OF FINDINGS

Table 9. Summary of findings in relation to the research questions.

Research question	Principal finding	Evidence
RQ1. Evolution and distribution	The field begins in 1998, remains sparse for two decades, and accelerates from 2024, with 2024 to 2026 supplying about one third of all documents. Output is dispersed across many journals, dominated by articles (94.6%) and by English (34 of 37 documents).	Tables 2 to 5; Figures 2 and 3
RQ2. Key topic areas	Social Sciences (35.1%), Psychology (33.3%), and Medicine (17.5%) lead the subject profile. Keyword co-occurrence identifies school readiness, kindergarten, child development, and academic achievement as the substantive core.	Tables 6 and 7; Figures 4 and 5
RQ3. Major players	The United States (11), Turkey (8, or 9 including the Türkiye label), and China (5) dominate contributions across 15 countries, with limited cross-regional collaboration and minimal representation of the Global South.	Table 8; Figures 6 and 7

DISCUSSION

A Small Field at an Inflection Point

The most immediate feature of the results is scale. A query spanning kindergarten, preschool, readiness, and primary schools, run without any restriction on year, language, subject area, or document type, returns 37 documents over nearly three decades. This compactness contrasts sharply with the size of adjacent literatures: bibliometric mappings of learner corpus research and of second language acquisition, conducted with comparable procedures, analysed corpora of 902 and several hundred documents respectively (Roslim et al., 2023; Sweileh et al., 2017). The comparison indicates that the present query captures a specific and tightly delimited intersection, the point at which pre-school children, readiness, and the primary school meet in a document's indexed terms, rather than the entirety of early childhood research. Read in that light, the small corpus is informative rather than deflationary: it shows that work explicitly framed around the readiness of pre-school children for primary schooling, as opposed to early childhood development at large, remains a narrow research front.

Within that front, the temporal pattern is striking. Two decades of intermittent output, with multiple silent years, give way to a pronounced acceleration in which 2024 to 2026 supply roughly one third of all documents and 2025 records the highest annual count in the series. Several forces plausibly converge here. The disruption of early childhood education during the pandemic years directed policy attention to school entry and to the readiness of the cohorts whose pre-school experience was curtailed, and the international policy agenda around early childhood, including the monitoring of early development at population level (Janus & Offord, 2007), has matured into funded research programmes. The acceleration also mirrors growth documented bibliometrically in neighbouring educational domains during the same period, including STEM education and technology-supported learning (Jin et al., 2024; Mohd-Aris et al., 2025), suggesting a general expansion of indexed educational research within which this niche participates. Whether the surge represents a durable change of level or a transient spike is a question the baseline established here will allow future work to answer.

A note of interpretive caution belongs with this pattern. The apparent acceleration rests on small absolute numbers, on a 2026 count that is partial by construction, and on the ordinary lag with which databases index recent work, all of which can inflate or deflate the most recent years of any bibliometric series. The evidence therefore supports the descriptive statement that output has risen sharply in the mid-2020s, but it does not yet license the stronger claim that the field has undergone a durable structural shift to a higher level of activity. Distinguishing a genuine change of level from a temporary spike requires several more fully indexed years, and the baseline established here is precisely the instrument that will let a later analysis draw that distinction (Donthu et al., 2021; Lim & Kumar, 2024). The wording elsewhere in the article is best chosen to describe the rise without pre-judging its permanence.

Dispersion Across Venues and Disciplines

The distribution of the corpus across sources and subject areas portrays a field without a home journal. No source contributes more than two documents, and the top four together account for barely a fifth of the corpus. The four leading venues, *Early Child Development and Care*, *Early Childhood Education Journal*, *Early Childhood Research Quarterly*, and *Universal Journal of Educational Research*, anchor the field in early childhood education, but the remainder of the list ranges across general psychology, occupational therapy, neuropsychology, and national medical journals. The subject area profile tells the same story from a different angle: Social Sciences and Psychology jointly dominate, yet Medicine, Health Professions, Nursing, and Neuroscience collectively hold nearly a quarter of assignments.

This dispersion is consistent with the multidimensional character of school readiness documented in the substantive literature, which spans cognition, self-regulation, health, and family context (Blair, 2002; Blair & Raver, 2015; High, 2008). It carries two practical consequences. First, scholars searching a single disciplinary venue will encounter only a fraction of the relevant work, which strengthens the case for database-level mapping of the kind conducted here. Second, the near absence of review documents in the corpus, one review against 35 articles, indicates that synthesis has lagged behind primary research; the field has accumulated findings faster

than it has consolidated them, a gap that recent systematic reviews in adjacent transition research are only beginning to close (Fan et al., 2024; Then & Pohlmann-Rother, 2023).

The Thematic Core and the Indexing Layer

The keyword analysis yields a two-layer structure that deserves explicit interpretation. The most frequent terms in Table 7, human, male, female, humans, and article, are not research themes but indexing descriptors, inherited from the structured vocabularies applied to the clinical share of the corpus, as are major clinical study and controlled study. Their prominence is an artefact of the decision to analyse all keywords rather than author keywords alone, and it usefully reveals how much of this literature passes through medical indexing pipelines. The substantive layer beneath them is coherent: school readiness, with 15 occurrences, ties together kindergarten, preschool child, primary school, child development, academic achievement, teacher, and longitudinal study. This configuration corresponds closely to the intellectual structure of the field described in Section 2, in which readiness constructs are measured in pre-school populations and linked longitudinally to achievement outcomes in primary school (Duncan et al., 2007; McClelland et al., 2007; Ricciardi et al., 2021; Sabol & Pianta, 2012). The co-occurrence of teacher within the cluster reflects the ecological turn in transition research, which locates readiness not only in children but in the relationships and practices surrounding school entry (Dockett & Perry, 2013; Puccioni, 2015; Tobin et al., 2022).

Concentration and Absence in the Geography of Contribution

The country analysis shows a field led by three national research systems. The United States position is unsurprising given the scale of its early childhood research infrastructure and the long-running policy programmes, from Head Start onward, that have generated much of the readiness evidence base (Bierman et al., 2008). Turkey's second place, eight documents under the Turkey label and a ninth under Türkiye, together with the presence of two Turkish-language documents, points to a productive national community working on school readiness both in international and domestic venues. China's third place is consistent with the rapid expansion of its early childhood education system and research output over the past decade. The density visualisation nonetheless shows these three systems operating as largely separate zones rather than a connected collaborative network, and the co-authorship analysis reflects a limited range of geographic regions overall.

The phrase major player, which frames RQ3, in fact conflates two distinct properties that the analysis is careful to separate. One is output dominance, the sheer count of documents a country contributes, which is a performance-analysis quantity read directly from Table 8. The other is collaboration intensity, or network centrality, the degree to which a country sits at the hub of co-authorship ties, which is a science-mapping quantity read from the co-authorship structure rather than from any count (Donthu et al., 2021; Zupic & Cater, 2015). The distinction matters because the two need not coincide. The United States, Turkey, and China are unambiguously the leaders on output, supplying the great majority of documents, yet the density visualisation shows them occupying largely separate zones rather than a shared collaborative core, which means their prominence is one of volume and not of connectedness (van Eck & Waltman, 2010; Waltman et al., 2010). A country can therefore be a major player in the productivity sense while remaining peripheral in the network sense, and the present corpus appears to contain leaders of exactly that kind, prolific but weakly interlinked. Naming which sense of dominance is meant, on each occasion, keeps the country findings precise and prevents a publication count from being read as evidence of collaborative centrality that it does not establish.

The absences are as informative as the presences. Southeast Asia appears only through Indonesia and Singapore, and no document originates from Africa, Latin America, or the Middle East beyond Turkey. Since questions of school readiness are, if anything, more pressing where access to quality pre-primary education is uneven, this geographic skew implies that the evidence base guiding global policy is drawn from a narrow set of contexts. The interpretation of these absences should hold two explanations in balance rather than privileging either. On one side, the gap is partly real, since regions with limited pre-primary infrastructure and fewer funded research programmes produce fewer indexed studies of school readiness, so the map reflects a true unevenness in where this work is done. On the other side, the gap is partly an artefact of the data source, because Scopus coverage is itself uneven across regions and languages, under-representing non-English and regionally published journals in

exactly the parts of the world that appear empty here (Baas et al., 2020; Mongeon & Paul-Hus, 2016; Pranckuete, 2021).

A study confined to a single database cannot separate these two components, and it would overreach to present the blank areas of the map as a pure measure of research activity. The responsible reading is that Africa, Latin America, and the Middle East beyond Turkey are under-represented in the Scopus record of this field for reasons that combine genuine scarcity with indexing bias, and that telling the two apart would require replication across databases with stronger regional and multilingual coverage. Both parts argue for deliberate efforts to build and index readiness research in under-represented regions, including Malaysia and its neighbours, where national early childhood agendas would benefit from locally grounded evidence.

A final observation concerns data hygiene in bibliometric practice. The appearance of Turkey and Türkiye as separate labels within a single 37-document corpus is a reminder that database country fields embed naming conventions that change over time, and that uncorrected labels can split a contributor's record. Analysts should merge such variants before interpretation, as done here, and database providers could usefully harmonise them at source (Baas et al., 2020).

Implications

For researchers, the study supplies a baseline map and a set of concrete entry points. The thematic core identified in the keyword analysis, readiness constructs linked longitudinally to primary school outcomes, is well established, which directs novelty-seeking researchers toward the edges: the near absence of synthesis, the thin representation of teacher- and family-focused designs relative to child assessment, and the almost untouched question of how readiness research travels across national systems. The demonstrated fragmentation across venues also counsels researchers to search at database level rather than journal level when reviewing this literature, and to treat all-keyword analyses with awareness of the indexing layer they contain.

For institutions and funders, the geographic findings identify collaboration as the clearest structural weakness. Three productive national systems operate in relative isolation, and large regions contribute nothing to the indexed record. Funding instruments that pair established groups in the United States, Turkey, and China with emerging teams in Southeast Asia, Africa, and Latin America would simultaneously diversify the evidence base and connect the field's separated clusters. For Malaysian institutions specifically, the almost complete absence of the region from this corpus represents an opportunity to establish a visible research presence on pre-school children and school readiness, building on the country's existing early childhood policy framework.

For journal editors and database providers, two findings are actionable. The lag of synthesis behind primary research suggests that commissioned reviews and mapping articles would find a ready audience, and the Turkey and Türkiye labelling split illustrates a class of metadata inconsistency whose correction at source would improve every downstream bibliometric study.

Limitations and Future Research

Several limitations bound the conclusions. First, the study draws on a single database. Scopus offers broad curated coverage, but its representation of books, conference literature, and regionally published journals is incomplete, and coverage differs from that of other databases (Baas et al., 2020; Mongeon & Paul-Hus, 2016; Pranckuète, 2021). Documents on pre-school children indexed elsewhere, or not indexed at all, fall outside the analysis. Second, the corpus is defined by a specific combination of query terms. The terms kindergarten, preschool, readiness, and primary schools capture the readiness-centred intersection of the field, but studies of pre-school children that use different vocabulary, for example early years, ECEC, or transition to school without the term readiness, may not be retrieved. The compact corpus should therefore be read as a delimited research front rather than the whole of early childhood research, and the findings should be generalised only to that front.

Third, the small number of documents constrains the analyses that can be meaningfully performed. Citation-based techniques such as co-citation and bibliographic coupling (Kessler, 1963; Small, 1973), author-level productivity rankings, and institutional analyses were not undertaken because a 37-document corpus cannot

support stable results for them. Fourth, the all-keywords co-occurrence analysis mixes author keywords with database indexing terms, which elevates generic descriptors in the frequency counts; the interpretation in Section 5.3 addresses this, but replication using author keywords only would provide a cleaner thematic map. Fifth, the annual counts for 2026 are necessarily partial, and all counts reflect the state of the Scopus record at the retrieval date; subsequent indexing will alter the totals.

These limitations chart the agenda for future work. Replication across additional databases and with expanded term sets would test the robustness of the map presented here. As the corpus grows, citation-based science mapping, author and institutional analyses, and overlay visualisations of temporal trends will become feasible. A companion systematic review of the substantive findings within these documents would complement the structural mapping, and periodic re-analysis will show whether the acceleration observed in 2024 to 2026 marks a durable change in the trajectory of pre-school children research.

CONCLUSION

This study set out to create a comprehensive reference for researchers concerning pre-school children research, pursuing three objectives: to evaluate the trend of publications, to determine the key areas, and to identify the major players in the field. A bibliometric method was applied to 37 documents retrieved from the Scopus database in July 2026, analysed descriptively through the Scopus analyse search results function and structurally through VOSviewer co-occurrence and co-authorship mapping.

Three conclusions follow. First, pre-school children research, as captured by the combined terms kindergarten, preschool, readiness, and primary schools, is a compact field that began in 1998, remained sparse for two decades, and has accelerated markedly since 2024, publishing predominantly journal articles in English across a widely dispersed set of venues. Second, its intellectual centre is the readiness of young children for formal schooling, embedded in a subject profile led by Social Sciences, Psychology, and Medicine and organised, in the keyword network, around school readiness, kindergarten, child development, and academic achievement. Third, its contributors are geographically concentrated, with the United States, Turkey, and China leading a set of 15 countries whose collaborations span a limited range of geographic regions and leave the Global South, including Southeast Asia, largely unrepresented.

By quantifying the structure of this literature, the analysis complements meta-analysis and structured literature review, offering newcomers a map of where the field has been and where it is thin. The baseline established here can be revisited as the field grows, and the gaps it exposes, in synthesis, in collaboration, and in geographic reach, constitute a concrete agenda for the next phase of pre-school children research.

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Data Availability Statement

The bibliometric data analysed in this study were retrieved from the Scopus database and are described in full in the tables and figures of this article.

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