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Mapping Global Research on Free Preschool Education and Its Supporting Conditions: A CiteSpace-Based Bibliometric Analysis of the Web of Science Core Collection, 2005–2025

Jinlong Liang, Yutong Yang, Chanchan Ma

College of Educational Science, Northwest Normal University, Lanzhou, Gansu, China

Abstract: Expanding access to free preschool education has become an important policy strategy for promoting educational equity and supporting high-quality early childhood development. Using CiteSpace 6.4.R1, this study conducts a bibliometric and visual analysis of 131 articles indexed in the Web of Science Core Collection from 2005 to 2025. The findings show that international research on free preschool education has evolved through three stages: a nascent stage (2005–2010), an uneven growth stage (2011–2017), and a rapid expansion stage (2018–2025). Collaboration networks among institutions and authors remain sparse, with network densities of 0.0185 and 0.0099, respectively, indicating a multi-centered but fragmented research landscape dominated by English-speaking countries such as the United States, the United Kingdom, and Australia. Keyword clustering reveals four major themes: policy effectiveness and program evaluation; child development and academic outcomes; program quality, family involvement, and supportive conditions; and social equity and compensatory mechanisms for disadvantaged children. The field has undergone three interrelated shifts: from average treatment effects to heterogeneous effects, from black-box impact evaluation to mechanism-oriented analysis, and from academic outcomes to broader developmental conditions. The clustering quality indicators (Q = 0.5748, S = 0.8268) indicate a well-structured and internally consistent clustering solution. Overall, international research on free preschool education is moving toward a more comprehensive and equity-oriented direction.

Keywords: Free Preschool Education; Free Pre-Primary Education; Publicly Funded Preschool; Bibliometric Analysis; CiteSpace; Educational Equity

1. Introduction

Over the past two decades, free preschool education-defined by the UNESCO Institute for Statistics as the number of legally guaranteed pre-primary years that are free of tuition fees and ideally correspond to the grades children are expected to complete before entering primary school (UNESCO Institute for Statistics, n.d.)-has become a widely adopted policy strategy worldwide, although age and grade coverage varies across countries[1]. As the OECD (2024) notes, almost all OECD countries provide at least one year of free early childhood education before primary school[2]. Academic research in this field has grown rapidly, with a substantial body of empirical work examining the effects and mechanisms of such programs. Research has documented the immediate and long-term effects of publicly funded preschool on children's cognitive, language, and social-emotional development (Gormley & Gayer, 2005; Ansari & Winsler, 2016; Johnson et al., 2019)[3,4,5]. Other studies have examined how classroom quality, teacher-child interactions, and family involvement mediate program outcomes (Pianta et al., 2020; Kelty & Wakabayashi, 2022) [6,7]. A growing body of work has also addressed social equity, showing that publicly funded preschool can narrow achievement gaps among low-income children, minority children, and dual-language learners (Valentino, 2018; Rothbart & Heflin, 2023; Kose, 2023) [8,9,10].

Despite this growing body of evidence, little bibliometric research has systematically mapped the intellectual structure or evolution of this field. Several questions therefore remain open: What is the overall knowledge landscape of free preschool education research? How have research foci shifted over the past two decades? What emerging themes and future directions can be identified? This study addresses these questions by using CiteSpace to conduct a

bibliometric and visual analysis of 131 articles indexed in the Web of Science Core Collection from 2005 to 2025. Specifically, it identifies publication trends, collaboration networks, major research themes, evolutionary pathways, and emerging fronts. By mapping the knowledge base and identifying frontier topics, this study provides a foundational reference for researchers designing future studies and for policymakers seeking evidence-informed strategies to advance equitable and high-quality free preschool education.

2. Materials and Methods

2.1 Data Collection

The data were retrieved from the Web of Science Core Collection (WoSCC), including SCI-Expanded and SSCI-indexed journals, to ensure coverage of high-quality peer-reviewed literature. The search was performed on December 25, 2025, with the time span set from January 1, 2005, to December 25, 2025. The search strategy was developed iteratively. The final query was: TS=("free" OR "tuition-free" OR "non-tuition" OR "no-cost" OR "subsidized preschool" OR "publicly funded preschool" OR "government-funded preschool" OR "universal pre-primary education") AND ("preschool education" OR "early childhood education" OR "kindergarten" OR "nursery school" OR "pre-K") NOT ("free play" OR "free choice" OR "free activity"). Given the diversity of institutional and terminological contexts across countries (e.g., "free preschool education," "tuition-free preschool," "universal pre-K," "publicly funded preschool," "government-funded preschool," and "subsidized preschool"), a broad search string was intentionally used to avoid missing studies that address tuition relief or public financial support under different labels. Manual screening was then applied to enforce the conceptual boundary of free, universal, or predominantly publicly funded preschool provision.

Because free preschool programs are often embedded in broader publicly funded early childhood service systems, topics such as school meals, nutritional support, health risks, and attendance may appear as supportive services, developmental contexts for disadvantaged children, or mechanisms through which program effects are realized. This study does not treat these supportive services as equivalent to free preschool policy itself. Rather, they are interpreted as contextual factors for understanding the equity and developmental effects of free preschool education. Accordingly, studies were included if they focused on tuition-free, universal, or publicly funded preschool programs and explicitly discussed policy implementation, child outcomes, or program evaluation; were written in English; and were published in peer-reviewed SCI or SSCI journals. Studies were excluded if they were conference abstracts, editorials, book reviews, news items, or dissertations; if they focused primarily on partial subsidies rather than free or publicly funded preschool provision; if "free" referred to free play or free-choice activities; or if they exclusively discussed school lunch programs, nutritional supplements, health risks, or family welfare benefits without any reference to free, universal, or publicly funded preschool provision.

The initial search yielded 365 records. After removing records not indexed in SCI/SSCI and excluding conference papers, dissertations, and news items (n = 18), 347 records remained. Full-text screening excluded another 216 records based on the inclusion and exclusion criteria described above. The final analytic sample comprised 131 articles.

2.2 Software and Methods

CiteSpace (version 6.4.R1) was used for bibliometric visualization. The software integrates social network analysis and cluster analysis to map research fronts and emerging trends (Chen, 2006) [11]. Parameter settings followed established practices: time slicing = 1 year per slice; node types = author, institution, country, and keyword; g-index k = 25; pruning = Pathfinder and pruning sliced networks. For keyword clustering, the log-likelihood ratio (LLR) algorithm was applied. Clustering quality was assessed using modularity Q ($Q > 0.3$ indicates significant structure) and silhouette S ($S > 0.7$ indicates high consistency). The overall clustering quality indicators were $Q = 0.5748$ and weighted mean $S = 0.8268$. Burst detection was performed using Kleinberg's algorithm to identify emerging research fronts (Kleinberg, 2002) [12].

3. Results

3.1 Publication Trends

Figure 1 presents the annual publication volume

of free preschool education research from 2005 to 2025. Between 2005 and 2010, publication output remained low, with a total of 11 articles and an average of fewer than two articles per year. In 2011, a notable increase occurred, reaching the first peak of eight articles. From 2011 onward, the volume fluctuated but showed a general upward trend. Beginning in 2018, publications rose markedly and remained at a relatively high level, peaking at 13 articles in 2019. Between 2018 and 2025, the average annual output was approximately 10.4 articles, substantially higher than in the earlier period.

3.2 Collaboration Network Analysis

Using CiteSpace, we constructed collaboration networks for institutions and authors. The institutional network comprised 175 nodes and 282 links (density = 0.0185), while the author network comprised 321 nodes and 507 links (density = 0.0099). These density values indicate a sparse and decentralized collaboration pattern.

3.2.1 Institutional collaboration analysis

Figure 2 presents the institutional collaboration network. Four institutions ranked highest with 10 publications each: University of Virginia, Georgetown University, University of North Carolina, and State University System of Florida. Among these, the State University System of Florida exhibited the highest centrality (0.19), followed by Georgetown University (0.17) and the University of Virginia (0.17), indicating their bridging roles within the collaboration network. The network shows dense connections within several collaborative clusters and relatively rich connections between clusters. Geographically, the most productive institutions are concentrated in English-speaking countries, including the United States, the United Kingdom, Australia, and Canada.

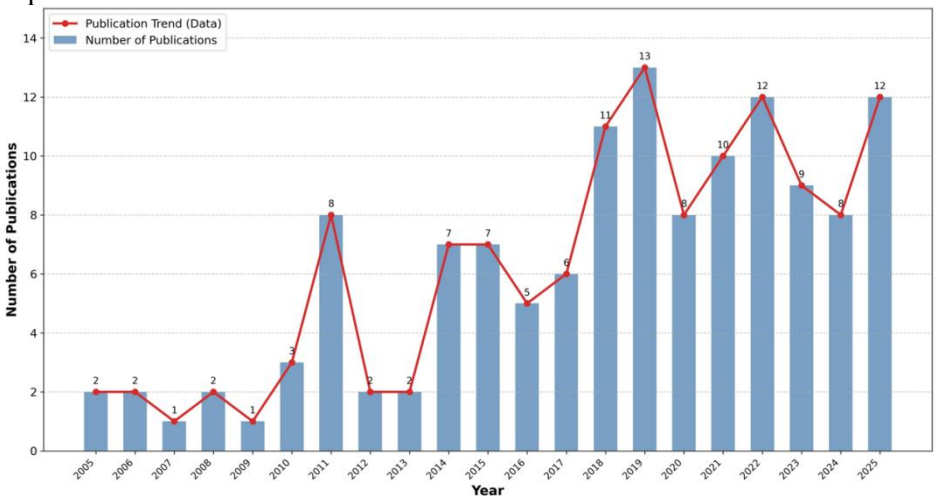

Figure 1. Annual Publication Volume of Free Preschool Education Research, 2005–2025.

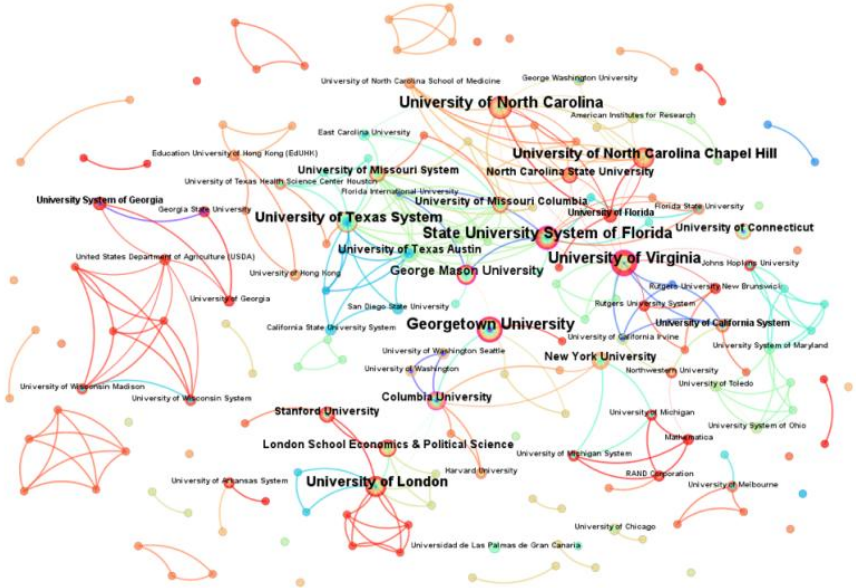

Figure 2. Institutional Collaboration Network

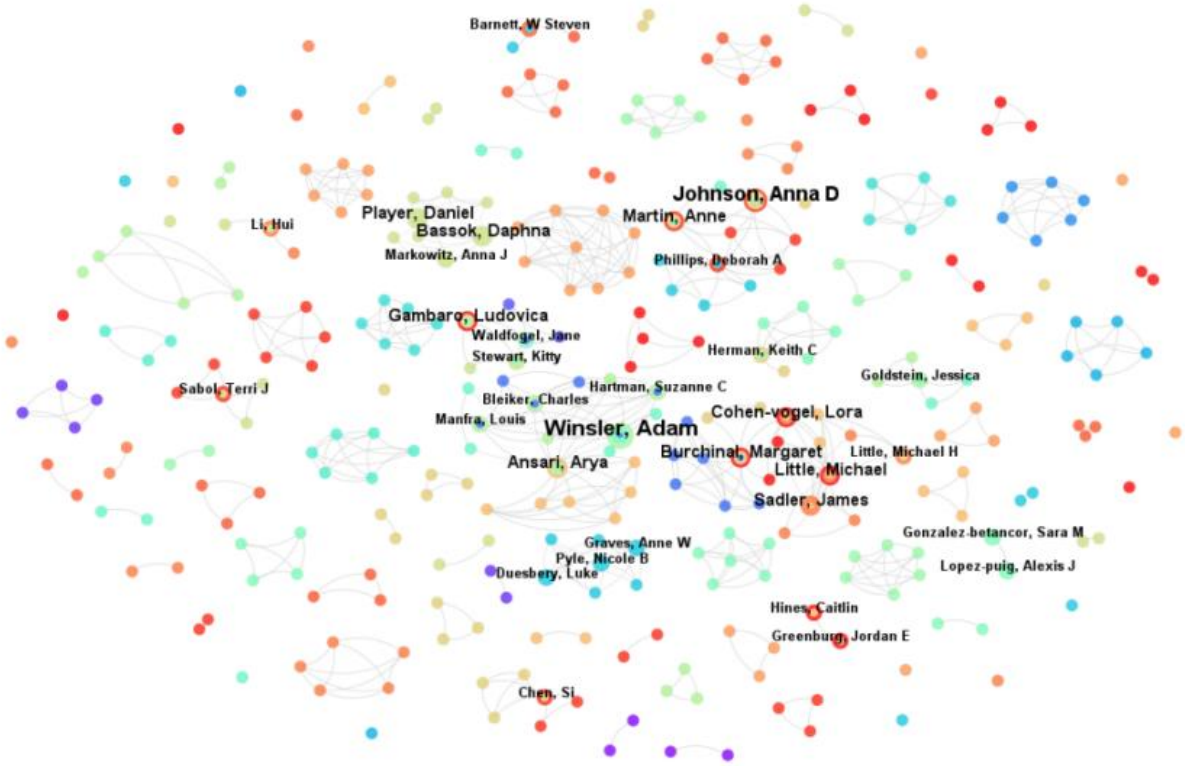

Figure 3. Author Collaboration Network

3.2.2 Author collaboration analysis

Figure 3 shows the author collaboration network. Most researchers are affiliated with universities. Winsler published the most articles (n = 5), followed by Johnson (n = 4) and Bassok (n = 3). The network contains several relatively independent collaborative clusters, each with dense internal connections but sparse cross-cluster connections. This pattern indicates a decentralized field composed of several small collaborative groups with limited links among them.

3.3 Keyword Co-occurrence and Cluster Analysis

Keyword co-occurrence analysis was conducted to identify research trends and their interconnections in the field of free preschool education. The keyword co-occurrence network generated by CiteSpace is shown in Figure 4. The network contained 340 nodes and 1,366 links, with a network density of 0.0448. Each node represents a keyword, and node size reflects frequency of occurrence. Clustering quality was assessed using modularity Q and silhouette S. The overall clustering quality indicators were Q = 0.5748 and weighted mean S = 0.8268, indicating a well-structured and internally consistent clustering solution (Q > 0.3, S > 0.7).

Table 1 presents the top 10 high-frequency keywords. “Children” (n = 32, centrality = 0.23) and “early childhood education” (n = 25, centrality = 0.21) were the most frequent nodes, followed by “kindergarten” (n = 22, centrality = 0.10) and “achievement” (n = 22, centrality = 0.32). The high centrality of “achievement” (0.32) suggests that it functions as a pivotal bridge connecting different research themes.

Table 2 lists the 10 keyword clusters identified by the LLR algorithm. All clusters had silhouette values above 0.76, indicating good internal consistency. These clusters can be integrated into four major research themes: (1) policy effectiveness and program evaluation (clusters #0, #1, #5, #6), (2) child development and academic outcomes (clusters #4, #7, #8), (3) program quality, family involvement, and supportive conditions (clusters #2, #3), and (4) social equity and compensatory mechanisms for disadvantaged children (clusters #6, #9). Notably, cluster #3 includes “dietary quality” and other terms related to children’s developmental contexts, while cluster #8 primarily centers on academic achievement. These terms are not treated as core components of free preschool policy; rather, they are interpreted as contextual or supportive conditions that may shape the effects of free or publicly funded preschool programs for disadvantaged children.

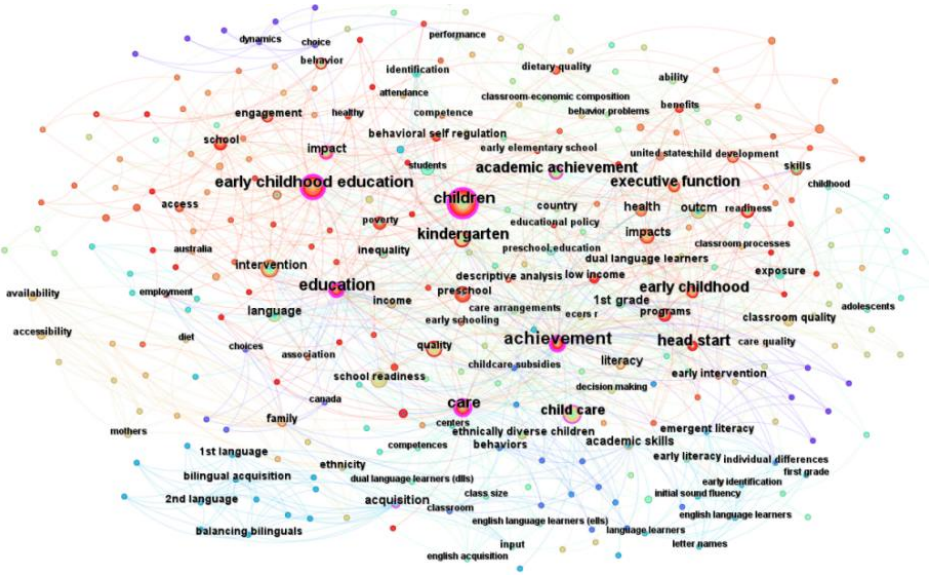

Figure 4. Keyword Co-occurrence Network

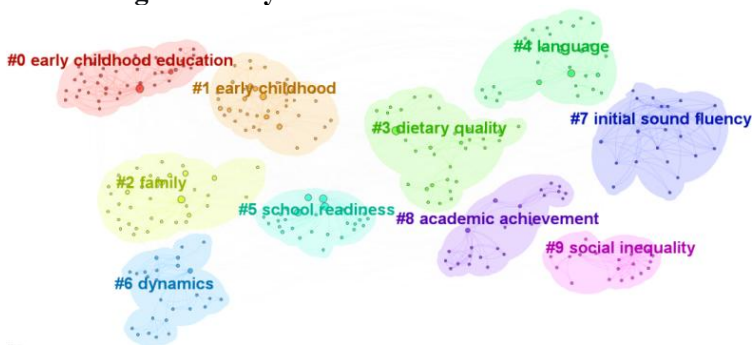

Figure 5. Keyword Clustering Network

Table 1. Top 10 High-Frequency Keywords.

Rank	Keyword	Frequency	Centrality	Year
1	children	32	0.23	2011
2	early childhood education	25	0.21	2011
3	kindergarten	22	0.10	2006
4	achievement	22	0.32	2005
5	care	21	0.20	2008
6	education	21	0.22	2007
7	quality	20	0.01	2005
8	school readiness	19	0.01	2008
9	head start	18	0.08	2005
10	intervention	12	0.05	2008

Table 2. Summary of Keyword Clusters.

Cluster ID	Size	Silhouette (S)	Top 5 label terms
#0 early childhood education	43	0.797	early childhood education; early childhood care; computational thinking; treatment weights; chinese education policy engagement;
#1 early childhood	41	0.779	early childhood; child development; educational policy; descriptive analysis; regression analyses pre-k;
#2 family	39	0.766	behaviors; family; settings; classroom; preschool education;
#3 dietary quality	34	0.841	associations; children; dietary quality; impact; lunch program childcare provision;
#4 language	30	0.859	kindergarten; language; identification; children; learning disability achievement gaps;

#5 school readiness	27	0.838	school readiness; pre-kindergarten programs; childcare subsidies; ethnic diversity; treatment weights head start
#6 dynamics	26	0.816	private; public schools; impact; pre k; dynamics disadvantaged groups
#7 initial sound fluency	23	0.808	oral leading fluency; first grade; english language learners; initial sound fluency; letter naming fluency longitudinal analysis
#8 academic achievement	23	0.922	academic achievement; classroom-economic composition; lead poisoning; screening-early childhood; school attendance lead poisoning
#9 social inequality	20	0.945	bilingual acquisition; language use; sequential bilingualism; language proficiency; second language acquisition social inequality

4. Discussion

4.1 Publication and Collaboration Patterns

The annual publication trends of free preschool education research reveal three distinct phases: a nascent stage (2005–2010), an uneven growth stage (2011–2017), and a rapid expansion stage (2018–2025). The marked increase after 2018 coincides with global policy momentum, including the expansion of universal pre-K in the United States and growing international interest in tuition-free and publicly funded preschool programs. Previous systematic reviews have similarly noted the rapid expansion of pre-K research following major policy initiatives (DeAngelis et al., 2020) [13]. International comparative studies further highlight the variability of free preschool effects across different welfare contexts (Burger, 2010) [14].

Collaboration networks among institutions and authors studying free preschool education are sparse and decentralized, with network densities of 0.0185 for institutions and 0.0099 for authors. This fragmented pattern suggests that the field remains relatively siloed, with limited cross-institutional and cross-author collaboration. Such fragmentation deserves attention because free preschool policies involve not only access to education but also program quality, family support, child development conditions, and equity-oriented public policy. Geographically, research capacity is concentrated in English-speaking countries, particularly the United States, which dominates in both publication volume and institutional productivity. This geographic concentration raises questions about the generalizability of findings to non-English-speaking and under-resourced contexts, where free preschool policies may face different implementation challenges and equity implications.

4.2 Major Research Themes

Keyword cluster analysis identified four major research themes within the literature on free preschool education.

The first theme, policy effectiveness and program evaluation (clusters #0, #1, #5, #6), addresses a core policy question: whether publicly funded, tuition-free preschool programs improve child outcomes and how different program models compare. Early evaluations of universal pre-K in Tulsa and Georgia established that state-provided free pre-K can enhance school readiness, particularly for disadvantaged children (Gormley & Gayer, 2005; Winsler et al., 2008)[3,15]. Subsequent research extended these findings by comparing Head Start, public school-based free pre-K, and community-based childcare, revealing differential effects across program types (Ansari & Winsler, 2016; Johnson et al., 2019)[4,5]. Comprehensive reviews have confirmed the effectiveness of early educational interventions (Barnett, 2011)[16]. Collectively, this body of work provides an evidence base for free preschool policy expansion, although questions remain about how to sustain long-term effects.

The second theme, child development and academic outcomes (clusters #4, #7, #8), focuses on language acquisition, early literacy, executive function, and other cognitive skills in the context of free preschool attendance. Research in this tradition has identified specific cognitive processes-such as phonological awareness and working memory-that predict later academic success and may be enhanced through high-quality free preschool experiences.

The third theme, program quality, family involvement, and supportive conditions (clusters #2, #3), extends the research lens beyond the child to include classroom quality, teacher-child interactions, family engagement, and contextual supports within publicly funded preschool settings. Threshold analyses suggest that higher classroom quality is particularly beneficial for low-income children who attend pre-kindergarten programs (Burchinal et al., 2010) [17]. The inclusion of nutrition-related

terms in this theme does not imply that nutrition is a core component of free preschool policy. Instead, it suggests that researchers increasingly consider the supportive conditions under which disadvantaged children benefit from free or publicly funded preschool provision (Kinderknecht et al., 2020; Smith et al., 2024) [18,19].

The fourth theme, social equity and compensatory mechanisms for disadvantaged children (clusters #6, #9), examines the role of free preschool in narrowing achievement gaps among low-income children, minority children, and dual-language learners. Studies consistently show that publicly funded preschool can generate especially large benefits for disadvantaged children, although gaps in program quality persist (Valentino, 2018; Kose, 2023)[8,10]. This finding highlights a critical policy tension: while free preschool programs aim to promote equity, unequal access to high-quality classrooms may inadvertently reproduce or even exacerbate existing disparities. Addressing this tension requires not only expanding access to tuition-free provision but also ensuring that quality is equitably distributed across schools and communities.

4.3 Shifts in Research Focus

4.3.1 From average treatment effects to heterogeneous effects

Early studies on free preschool focused on average treatment effects, asking whether tuition-free programs had a positive impact on children's outcomes (Gormley & Gayer, 2005; Henry & Gordon, 2006)[3,20]. Although this question remains important, researchers have increasingly recognized that program effects are not uniform across all children. Recent studies have therefore shifted attention to heterogeneous effects, examining how the impacts of free preschool vary by race, income, temperament, and language background. For example, Kose (2023) found that Head Start gains were most pronounced for Hispanic children, while Johnson et al. (2019) reported that effects varied by child temperament. This shift has important policy implications: resource allocation for free preschool should be tailored to different child needs rather than applied uniformly, and a single "one-size-fits-all" program may not be optimal [10,5].

4.3.2 From black-box evaluation to mechanism-oriented analysis

A second shift involves moving beyond black-box evaluations of free preschool to identify the mechanisms through which these programs produce their effects. Researchers now use mediation analysis and dynamic causal models to examine pathways such as kindergarten entry skills, English proficiency, and school mobility (Ansari et al., 2017; Greenburg et al., 2025; Stephens et al., 2025)[21,22,23]. Long-term follow-up studies have confirmed that early gains from free preschool are sustained through improved school engagement and reduced retention (Phillips et al., 2016) [24]. Landmark longitudinal studies, such as the Chicago Child-Parent Centers program and the Abecedarian Project, have demonstrated lasting effects on educational attainment, health, and well-being into adulthood (Reynolds et al., 2011; Campbell et al., 2012)[25,26]. This mechanism-oriented understanding provides actionable guidance for free preschool policy and practice: improving classroom quality and reducing school mobility can help sustain early gains, whereas simply expanding access without attention to these mechanisms may yield disappointing long-term results.

4.3.3 From academic outcomes to broader developmental conditions

Early research on free preschool concentrated largely on cognitive and achievement measures, reflecting a relatively narrow view of school readiness. Contemporary research has broadened its scope to include language development, early literacy, social-emotional skills, attendance, school mobility, family resources, and health-related background conditions. This expansion does not mean that free preschool policy is equivalent to nutrition or health policy; rather, it indicates growing attention to the conditions under which program effects are generated. For disadvantaged children, tuition-free access can lower the threshold for participation, but sustained benefits may also depend on stable attendance, family support, program quality, and other supportive conditions. The field is therefore moving from a narrow focus on academic outcomes toward a broader understanding of the mechanisms and contexts that shape children's development in free or publicly funded preschool programs.

5. Limitations and Future Directions

Several limitations should be acknowledged. First, because free preschool policies are referred

to by diverse terms across countries, a broad search string was intentionally used and the conceptual boundary of free, universal, or publicly funded preschool provision was applied through subsequent manual screening. Second, the data were sourced exclusively from the Web of Science Core Collection, which may omit relevant publications in other databases or non-English journals. Third, although the search strategy was developed iteratively, it may still have missed studies using alternative terminology.

Future research should further distinguish different levels of public funding, such as partial subsidies and full tuition waivers, and examine their differential effects on child outcomes. Hustedt and Barnett (2011) provide an important foundation for this line of inquiry by analyzing the complex federal, state, and local financing mechanisms of early childhood programs. Expanding the evidence base to non-English and underrepresented regions is also recommended [27].

6. Conclusion

This study provides a bibliometric mapping of free preschool education research over the past two decades. Based on 131 articles from the Web of Science Core Collection (2005–2025), the analysis identified three publication phases-a nascent stage (2005–2010), an uneven growth stage (2011–2017), and a rapid expansion stage (2018–2025)-as well as sparse and decentralized collaboration networks concentrated in English-speaking countries. Four major themes emerged: policy effectiveness and program evaluation, child development and academic outcomes, program quality with family involvement and supportive conditions, and social equity for disadvantaged children. Three shifts characterize the field's evolution: from average treatment effects to heterogeneous effects, from black-box evaluation to mechanism-oriented analysis, and from academic-only outcomes to broader developmental conditions.

Overall, free preschool education research has grown substantially and evolved toward greater nuance, equity orientation, and interdisciplinary integration. The findings suggest that future policy and research should not only expand access to tuition-free provision but also attend to program quality, family engagement, stable participation, and the supportive conditions that shape children's ability to benefit from free preschool education. This synthesis provides a foundational reference for researchers and policymakers seeking to advance equitable and high-quality free preschool education.

References

[1] UNESCO Institute for Statistics. (n.d.). *Metadata for SDG Indicator 4.2.5: Number of years of (a) free and (b) compulsory pre-primary education guaranteed in legal frameworks*. https://www.uis.unesco.org/sites/default/files/medias/fichiers/2025/07/Metadata-4.2.5.pdf

[2] OECD. (2024). *Education at a glance 2024: OECD indicators*. OECD Publishing. https://doi.org/10.1787/c00cad36-en

[3] Gormley, W. T., Jr., & Gayer, T. (2005). Promoting school readiness in Oklahoma: An evaluation of Tulsa's pre-K program. *Journal of Human Resources, 40*(3), 533–558. https://doi.org/10.3368/jhr.40.3.533

[4] Ansari, A., & Winsler, A. (2016). Kindergarten readiness for low-income and ethnically diverse children attending publicly funded preschool programs in Miami. *Early Childhood Research Quarterly, 37*, 69–80. https://doi.org/10.1016/j.ecresq.2016.06.002

[5] Johnson, A. D., Finch, J. E., & Phillips, D. A. (2019). Associations between publicly funded preschool and low-income children's kindergarten readiness: The moderating role of child temperament. *Developmental Psychology, 55*(3), 623–636. https://doi.org/10.1037/dev0000651

[6] Pianta, R. C., Whittaker, J. E., Vitiello, V., Ruzek, E., Ansari, A., Hofkens, T., & DeCoster, J. (2020). Children's school readiness skills across the pre-K year: Associations with teacher-student interactions, teacher practices, and exposure to academic content. *Journal of Applied Developmental Psychology, 66*, Article 101084. https://doi.org/10.1016/j.appdev.2019.101084

[7] Kelty, N. E., & Wakabayashi, T. (2022). Assessing quality in classrooms that blend state pre-kindergarten and Head Start funding: The case of Michigan. *Early Education and Development, 33*(8),

1383–1394. https://doi.org/10.1080/10409289.2021.1976592

[8] Valentino, R. (2018). Will public pre-K really close achievement gaps? Gaps in prekindergarten quality between students and across states. *American Educational Research Journal, 55*(1), 79–116. https://doi.org/10.3102/0002831217732000

[9] Rothbart, M. W., & Heflin, C. (2023). Inequality in literacy skills at kindergarten entry at the intersections of social programs and race. *Children and Youth Services Review, 145*, Article 106812. https://doi.org/10.1016/j.childyouth.2023.106812

[10] Kose, E. (2023). Public investments in early childhood education and academic performance: Evidence from Head Start in Texas. *Journal of Human Resources, 58*(6), 2042–2071. https://doi.org/10.3368/jhr.0419-10147R2

[11] Chen, C. (2006). CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. *Journal of the American Society for Information Science and Technology, 57*(3), 359–377. https://doi.org/10.1002/asi.20317

[12] Kleinberg, J. (2002). Bursty and hierarchical structure in streams. In *Proceedings of the Eighth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining* (pp. 91–101). Association for Computing Machinery. https://doi.org/10.1145/775047.775061

[13] DeAngelis, C. A., Erickson, H. H., & Ritter, G. W. (2020). What's the state of the evidence on pre-K programmes in the United States? A systematic review. *Educational Review, 72*(4), 495–519. https://doi.org/10.1080/00131911.2018.1520688

[14]Burger, K. (2010). How does early childhood care and education affect cognitive development? An international review of the effects of early interventions for children from different social backgrounds. *Early Childhood Research Quarterly, 25*(2), 140–165. https://doi.org/10.1016/j.ecresq.2009.11.001

[15] Winsler, A., Tran, H., Hartman, S. C., Madigan, A. L., Manfra, L., & Bleiker, C. (2008). School readiness gains made by ethnically diverse children in poverty attending center-based childcare and public school pre-kindergarten programs. *Early Childhood Research Quarterly, 23*(3), 314–329. https://doi.org/10.1016/j.ecresq.2008.02.003

[16] Barnett, W. S. (2011). Effectiveness of early educational intervention. *Science, 333*(6045), 975–978. https://doi.org/10.1126/science.1204534

[17] Burchinal, M., Vandergrift, N., Pianta, R., & Mashburn, A. (2010). Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs. *Early Childhood Research Quarterly, 25*(2), 166–176. https://doi.org/10.1016/j.ecresq.2009.10.004

[18] Kinderknecht, K., Harris, C., & Jones-Smith, J. (2020). Association of the Healthy, Hunger-Free Kids Act with dietary quality among children in the US National School Lunch Program. *JAMA, 324*(4), 359–368. https://doi.org/10.1001/jama.2020.9517

[19] Smith, T. A., Lin, B.-H., & Guthrie, J. (2024). School meal nutrition standards reduce disparities across income and race/ethnicity. *American Journal of Preventive Medicine, 67*(2), 249–257. https://doi.org/10.1016/j.amepre.2024.03.012

[20] Henry, G. T., & Gordon, C. S. (2006). Competition in the sandbox: A test of the effects of preschool competition on educational outcomes. *Journal of Policy Analysis and Management, 25*(1), 97–127. https://doi.org/10.1002/pam.20158

[21] Ansari, A., López, M., Manfra, L., Bleiker, C., Dinehart, L. H. B., Hartman, S. C., & Winsler, A. (2017). Differential third-grade outcomes associated with attending publicly funded preschool programs for low-income Latino children. *Child Development, 88*(5), 1743–1756. https://doi.org/10.1111/cdev.12663

[22] Greenburg, J. E., Ortiz-Cortes, V., Hines, C., & Winsler, A. (2025). Outcomes associated with school mobility from public school pre-K to kindergarten. *Early Childhood Research Quarterly, 70*, 110–119. https://doi.org/10.1016/j.ecresq.2024.09.010

[23] Stephens, C., Pianta, R. C., Whittaker, J. E., & Vitiello, V. E. (2025). Developmental assets at preschool entry that support dual language learners' academic development

through the first grade. *Early Education and Development*. Advance online publication. https://doi.org/10.1080/10409289.2025.2484849

[24] Phillips, D., Gormley, W., & Anderson, S. (2016). The effects of Tulsa's CAP Head Start program on middle-school academic outcomes and progress. *Developmental Psychology, 52*(8), 1247–1261. https://doi.org/10.1037/dev0000151

[25] Reynolds, A. J., Temple, J. A., Ou, S. R., Arteaga, I. A., & White, B. A. (2011). School-based early childhood education and age-28 well-being: Effects by timing, dosage, and subgroups. *Science, 333*(6040), 360–364. https://doi.org/10.1126/science.1203618

[26] Campbell, F. A., Pungello, E. P., Burchinal, M., Kainz, K., Pan, Y., Wasik, B. H., Barbarin, O. A., Sparling, J. J., & Ramey, C. T. (2012). Adult outcomes as a function of an early childhood educational program: An Abecedarian Project follow-up. *Developmental Psychology, 48*(4), 1033–1043. https://doi.org/10.1037/a0026644

[27] Hustedt, J. T., & Barnett, W. S. (2011). Financing early childhood education programs: State, federal, and local issues. *Educational Policy, 25*(1), 167–192. https://doi.org/10.1177/0895904810386605