

Analysis of bibliometrics in studying the influence of the environment on preschool children's psychological development

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ABSTRACT

This article aims to provide an overall picture of research on the environment's influence on preschool children's psychological development. The researchers used the preferred reporting items for systematic reviews and meta-analysis (PRISMA) method to collect data and VOSviewer software to analyze 119 articles from the Scopus database from 2000 to 2023. The results showed that since 2006, i) the environmental influence on the psychological development of preschool children has received much attention; ii) the United States and the United Kingdom are the two leading countries in terms of the number of publications; iii) Leve, Neiderhiser, Reiss, and Shaw are the four leading authors; and iv) 16 out of 20 influential journals in this field are Q1 journals, most of which belong to educational psychology. The two main concerns of the authors in these 119 articles are "parenting" and "development." In the past five years, researchers have focused on topics such as "autism," "preschoolers," "environment," "COVID-19", and "externalizing problems".

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1. INTRODUCTION

Studies on the environment's influence on children's psychological development have garnered significant attention since the beginning of the 21st century [1]–[7]. The environment is a broad and multifaceted concept. The Oxford English Dictionary defines "environment" as "the objects or the region surrounding anything" [8]. The environment can be understood as the totality of surrounding factors that impact human life and all living things. For preschool children, the environment directly and significantly impacts their psychological development. In reality, the research on the influence of the environment on the psychological development of preschool children plays an essential role because the preschool age is a crucial stage and serves as the foundation for long-term human development. Studying the influence of the environment on the psychological development of preschool children helps to understand the impact of the natural environment, family environment, school environment, and social environment on children's psychological development. From this, important factors affecting children's psychological development can be identified, and measures can be taken to create a better environment for the comprehensive development of children. Compared to other topics in research on the psychology of preschool children, the research on the influence of the environment on their psychological development helps parents, preschool teachers,

schools, and social forces to have a proper understanding and take appropriate measures to build a suitable environment to enhance the quality of children's education.

The influence of the environment on the psychological development of children has been studied since the 1980s. However, for a long time, this issue received little attention. It was not until around 2006 that this matter started to gain more attention. Some authors have studied the influence of the environment on the psychological development of children, such as the impact of the family on children's psychological development [9]–[13], the influence of outdoor environments on the cognitive and behavioral development of preschool and first-grade children [14], [15], and the impact of space and color in the physical environment on preschool children's cooperative behavior [16].

There have been some comprehensive studies on the influence of the environment on children. For instance, Sella Enrico and colleagues evaluated the psychological benefits of forest preschools for children [17]. Tamblyn *et al.* [18] conducted a systematic study on the influence of environmental factors in physical or sensory care and education on children. Another researchers [19], [20] conducted a comprehensive study on the influence of the physical environment on children. Ruiz *et al.* [21] evaluated the systematic impact of both natural and social environments on children's cognitive abilities. Kiss *et al.* [22] studied the influence of the family environment and parental influence on children's self-regulation abilities. In this context, the group of authors, who are lecturers training students in early childhood education, need to research to gain an overall picture of studies on the influence of the environment on the psychological development of preschool children. This includes correctly identifying the position and role of environmental factors (school, family, and society) in the psychological development of children and applying these findings in teaching and scientific research. However, no comprehensive study has been conducted on the environment's overall influence on children's psychological development. Therefore, this article aims to review studies conducted on the influence of the environment on the psychological development of preschool children across all fields published in journals and academic literature. It mainly focuses on research topics related to the influence, environment, psychological development, and preschool children by addressing the following four research questions:

- i) How is the overall volume and distribution of published literature across countries regarding the factors influencing the psychological development of preschool children represented?
- ii) Which authors have conducted the most research on the influence of the environment on the psychological development of preschool children from 2000 to 2023?
- iii) Which journals have the most significant impact on research concerning the influence of the environment on the psychological development of preschool children?
- iv) What are the most frequently discussed topics in publications about the influence of the environment on the psychological development of preschool children?

Answering these four research questions, this study might help educators, researchers, and parents understand the new trends in research on the influence of the environment on the psychological development of preschool children. This understanding might enable appropriate adjustments in caring for and educating preschool children. The findings on the number of studies, distribution among countries, influential journals and authors, and the most discussed research topics will provide a database to guide future researchers in their studies and publications.

2. METHO

2.1. Data collection

To analyze and assess the environment's influence on children's psychological development, the researchers collected primary information from the Scopus database, which has been internationally recognized by various organizations for its many strengths, including the abundance of publications, interdisciplinary coverage, provision of full-text documents, incorporation of numerous indexes and statistics, and annual quality assessment using parameters such as SCImago journal rankings, CiteScore, SNIP, and H-index [23]. The article utilizes the preferred reporting items for systematic reviews and meta-analysis (PRISMA) model to gather studies on the environment's influence on children's psychological development. PRISMA was established in 2009 to set standards for reporting systematic reviews and meta-analyses. PRISMA has gained global recognition and serves as the basis that may help us select data through a relatively rigorous, objective, and reliable process for this comprehensive review study. There were five steps in gathering data.

First, the researchers collected data comprising 976 relevant publications from the Scopus database using the following search syntax: TITLE-ABS-KEY (((influence* OR affect*) AND (environment*) AND development* AND psychology* AND ((preschool* AND child*) OR (early AND childhood) OR (kindergarten AND children)))). Second, the researchers excluded articles not published between 2000

and 2023 and obtained a result of 870 articles. Third, the researchers used parameters to filter the data from the initial dataset. The criteria for retaining articles were: i) subject area: psychology, social sciences, arts and humanities; ii) document type: article; iii) source type: journal; and iv) language: English and Chinese. The criteria for excluding articles were: i) not in the field of psychology, social sciences, arts, and humanities; ii) not an article; iii) not sourced from a journal; and iv) not written in English and Chinese. After this step, the researchers obtained 385 data. Fourth, the researchers only selected articles accessible in full text on the Scopus database, so the number of articles after removing articles that were not accessible in full text was 199. Finally, the researchers downloaded the data of these 199 articles on the Scopus database to our computer in CSV file format. They then read the titles, abstracts, and full texts of these 199 articles and unanimously selected these studies on the impact of the environment on preschool children's psychological development. They used the data from these 119 articles to analyze VOSviewer software and the articles' content. The PRISMA diagram reflects the data collection process as shown in Figure 1.

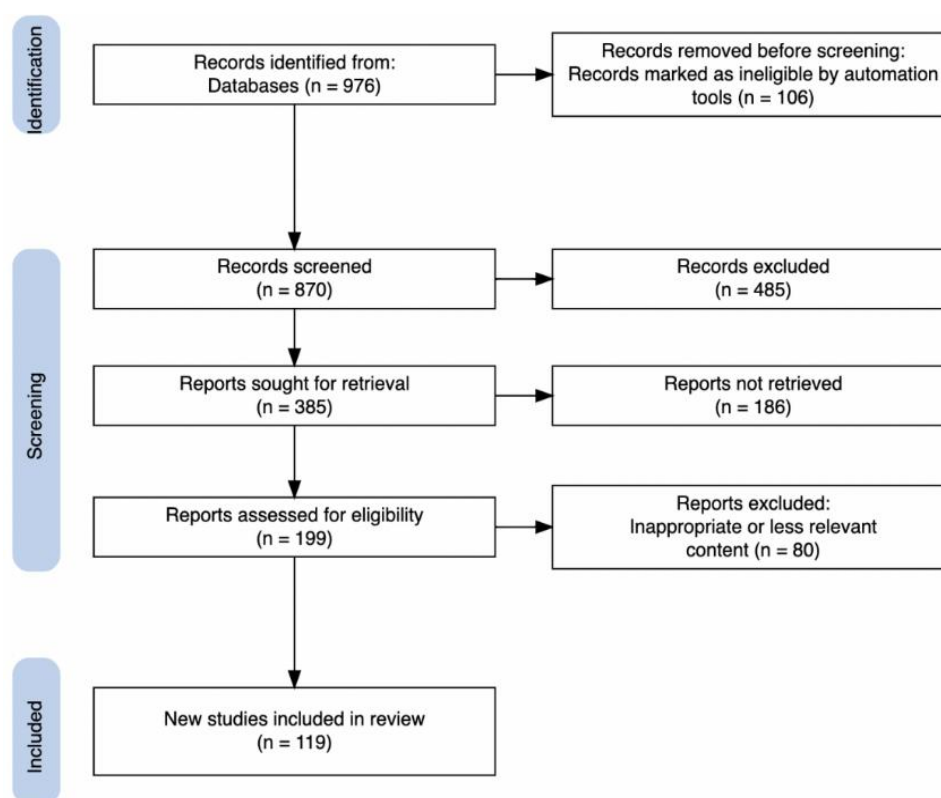


Figure 1. PRISMA flow diagram

2.2. Data analysis

The data is stored in CSV format and displayed using the VOSviewer software. Then, the results of mapping the data are explained to observe the research trends on the influence of the environment on the psychological development of children over the past 23 years. The researchers analyzed the number of articles and the overall distribution of documents published from 2000 to 2023; countries and leading author groups in research on the influence of the environment on the psychological development of children from 2000 to 2023; leading journals in research on the influence of the environment on the psychological development of children from 2000 to 2023; topics on the impact of the environment on the psychological development of children studied and trends in the last 5 years.

3. RESULTS

3.1. The overall volume and distribution of published materials among countries on factors influencing the psychological development of preschool children

Figure 2 depicts the number of documents published from 2000 to 2023. The number of articles selected after the screening steps is 119. Based on the publication data over time, four phases of research

publication can be observed. Phase 1 (2000-2006): this phase had very few studies on the influence of the environment on the psychological development of children. In 2000, there was 1 publication, and from 2001 to 2006, there were no publications. Phase 2 (2007-2013): the number of publications increased, although not significantly. In 2009 and 2010, there were 4 studies each year. In 2011, there was only 1 study. In 2012 and 2013, the number of studies increased to 3 and 5, respectively. Phase 3 (2014-2019): there was a rapid growth in the number of published articles on this topic. In 2014, 14 articles were published, 2.8 times more than in 2013. The number of articles remained above 10 per year from 2014 to 2019, peaking in 2016 with 18 articles. In 2019, the number of articles was also relatively high, with 16 studies. Phase 4 (2020-2023): the number of research articles decreased but remained higher than in the period before 2012. Specifically, there has been a relatively stable number of around 4 or more articles per year from 2020 to 2023.

Figure 3 shows the number of scientific publications by country according to the nationality of the authors. From 2000 to 2023, authors from 29 countries published 119 studies on the influence of the environment on the psychological development of preschool children. The United States is the leading contributor in this field, ranking #1 with 82 publications and 4044 citations. The following countries are the United Kingdom (#2; 20 publications; 1,037 citations) and Canada (#3, 10 publications, 213 citations). In contrast, there are 10 countries where authors have only participated in publishing one article each: Austria, Cyprus, India, Japan, Kenya, Malawi, Nigeria, Belgium, Hong Kong, and Portugal. Figure 3 compares the number of publications of the top 10 leading countries. The distribution of reputable articles in this field is illustrated in Figure 4.

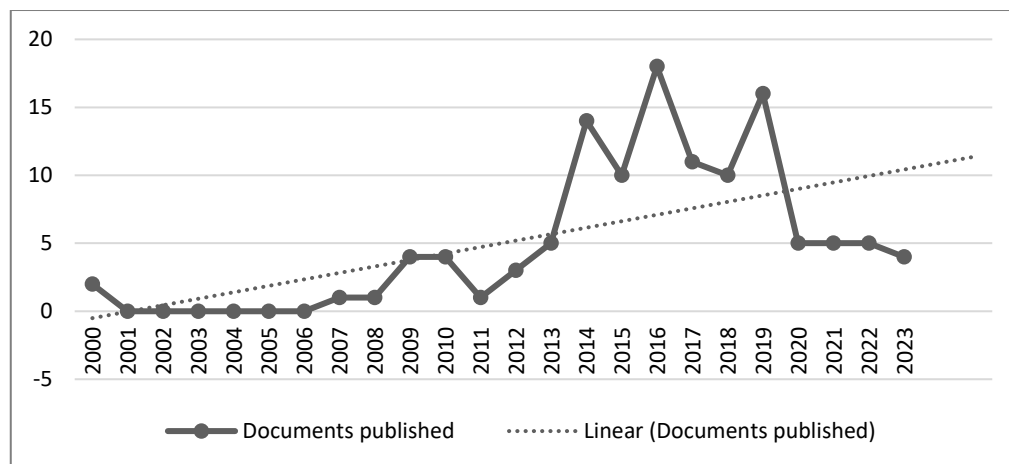


Figure 2. The quantity of documents published between the years 2000 and 2023

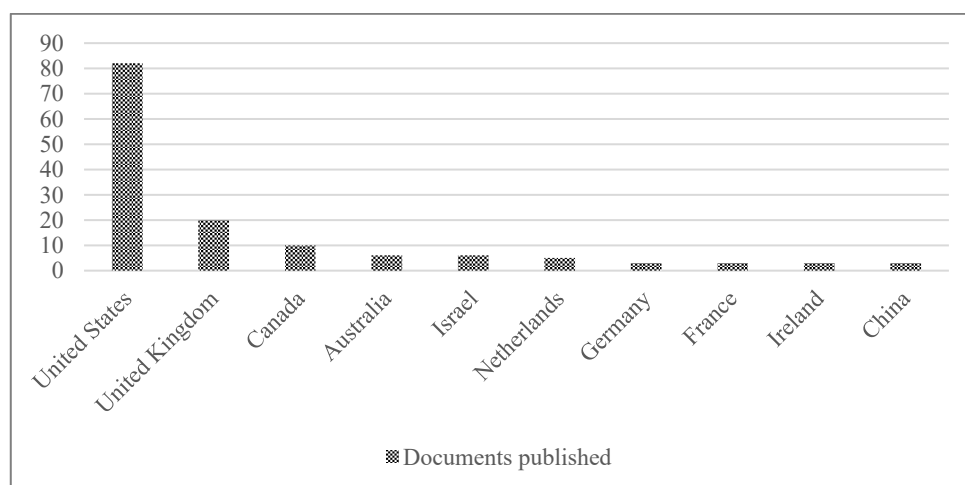


Figure 3. Numbers of scientific output countries based on nationality authors



Figure 4. The spatial location of authors researching the influence of the environment on the psychological development of preschool children in the period 2000-2023

Figure 5 shows that the United States and the United Kingdom are global research hubs for the impact of the environment on the psychological development of preschool children. However, the research trend has shifted from the United States to the United Kingdom and, more recently, to Canada, Israel, and Australia. This trend of focusing on significant countries also highlights the need for researchers from other countries to contribute more comprehensively to this global issue. In addition to these major research centers, Japan and China are two Asian countries that have contributed four articles to journals. These research papers add local perspectives to this global issue [24]–[26]. Each of the 29 countries had the total strength of the co-authorship links with other countries calculated, and the countries with the greatest total link strength were selected.

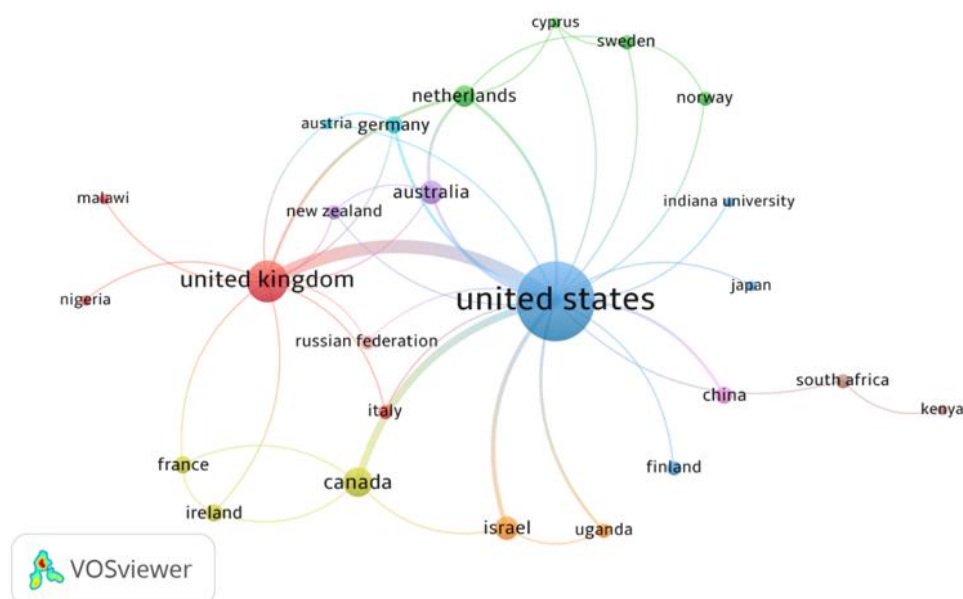


Figure 5: Scientific diagram of the nationality of authors publishing journals

3.2. The leading authors in research on the influence of the environment on the psychological development of preschool children from 2000 to 2023

Table 1 lists the top 20 authors ranked by the number of studies they have published. According to the data, Leve Leslive D., Neiderhiser Jenae M., Reiss David, and Shaw Daniel S. are the leading authors in research on the impact of the environment on the psychological development of preschool children (rank: #1, number of articles: 6, citations: 267). The author, Natsuaki Misaki N., has 5 publications (rank: #2, number of articles: 5, citations: 250). These are the top 5 influential authors in this research field. Harold, Gordon T., Tucker-Drob, Elliot M., Mills-Koonce, W. Roger, and Tuvblad, Catherine follow with over 100 citations each. Although Harold, Gordon T. has only 2 published articles, he ranks 6th in citations (citations: 173).

Figure 6 presents the collaboration network of 35 representative authors out of 516 authors of 119 research papers, divided into six clusters forming six author networks. Cluster 1 (8 items) includes Agrawal, Arpana; Bountress, Kaitlin; Chassin, Laurie; Dick, Danielle; Elam, Kit K.; Lemery-chalfant, Kathr; Pandika, Danielle; Wang, Frances I. Cluster 2 (8 items) includes Ge, Xiaojia; Leve, Leslie D.; Natsuaki, Misaki N.; Neiderhiser, Jenae M.; Reiss, David; Reuben, Julia D.; Scaramella, Laura V.; Shaw, Daniel S. Cluster 3 (7 items) Barch, Deanna M.; Belden, Andy C.; Bogdan, Ryan; Gaffrey, Michael S.; Luby, Joan I.; Tillman, Rebecca; Whalen, Diana; Cluster 4 (6 items) Bray, Brandon A.; Burt, S. Alexandra; Ganiban, Jody M.; Klahr, Ashlea M.; Liu, Chang; Roben, Caroline K.P. Cluster 5 (4 items) Barrett, Douglas; Elam, Kit; Harold, Gordon T.; Thapar, Anita. Cluster 6 (2 items) Barrett, Doug; Gaysina, Darya. According to the color of the clusters in Figure 7, from 2017 onwards, the new group of authors continued the achievements of the previous group of authors and began to form a new author network: Roben, Caroine K.P; Bray, Brandon A; Barch, Deanna M., Belden, Andy C.

Table 1. Top 20 influential studies on the impact of the environment on children’s psychological development (ranked by the number of publications)

Author	Documents	Citations	Author	Documents	Citations
Leve, Leslie D.	6	267	Bass, Judith K.	2	84
Neiderhiser, Jenae M.	6	267	Boivin, Michael J.	2	84
Reiss, David	6	267	Familiar-Lopez, Itziar	2	84
Shaw Daniel S.	6	267	Murray, Sarah M.	2	84
Natsuaki, Misaki N.	5	250	Nakasujja, Noeline	2	84
Mills-Koonce, W. Roger	3	139	Sikorskii, Alla	2	84
Calkins, Susan D.	3	64	Luby, Joan L.	2	82
Harold, Gordon T.	2	173	Tillman, Rebecca	2	82
Tucker-Drob, Elliot M.	2	155	Plomin, Robert	2	75
Tuvblad, Catherine	2	110	Agrawal, Arpana	2	66
Fox, Nathan A.	2	88			

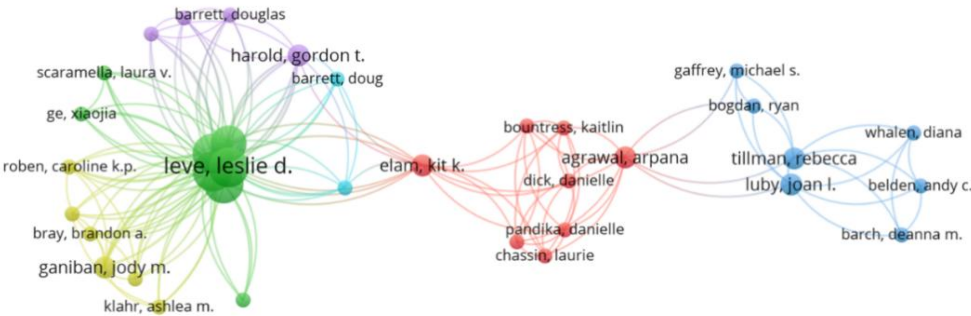


Figure 6. Network visualization of author collaboration based on published documents (35 of 516 authors, each author had at least 1 document)

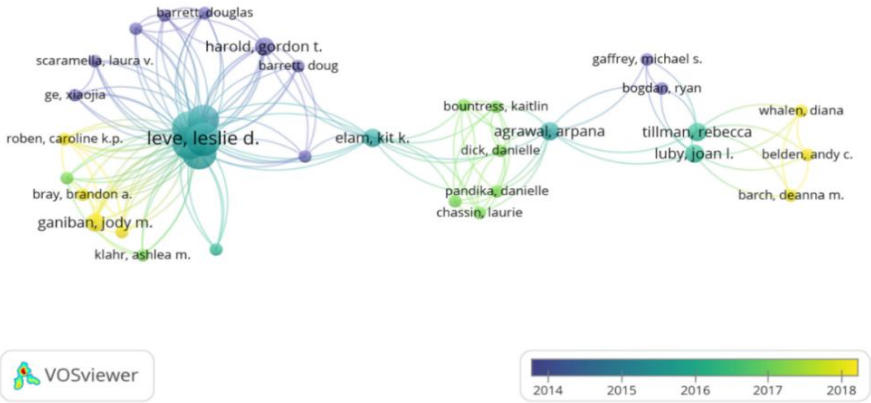


Figure 7. Overlay visualization of author collaboration based on published documents (35 of 516 authors, each author had at least 1 document)

3.3. The journals with the most significant influence on the studies on the impact of the environment on the psychological development of preschool-aged children

Table 2 presents 20 journals on the impact of the environment on the psychological development of preschool children. Table 2 shows 20 journals on the influence of environment on the psychological development of preschool children. Based on the number of publications, development and psychopathology is the leading journal (rank: #1, number of publications: 9, total percentage: 7.6%). The top 4 leading journals collectively contributed 25 articles, accounting for 21.0%. Regarding citations, the Journal of the American Academy of Child and Adolescent Psychiatry ranks first with 42 citations. The table also shows that 16 of the 20 journals are classified as Q1, while 4 are Q2. Regarding the scope of the journals, 12 are in the developmental and educational psychology category, and 3 are in the psychology (miscellaneous) category. Thus, most journals studying this field are within the domain of psychology.

Table 2. Top 20 journals on the impact of the environment on the psychological development of preschool children, order by the number of publications

Order	Source	H-index	GCS	LCS	NP	PY	Q*	Scope
1	Development and Psychopathology	186	783	17	9	2000	Q1	Developmental and Educational Psychology
2	Journal of Child Psychology and Psychiatry and Allied Disciplines	243	300	19	6	2007	Q1	Developmental and Educational Psychology
3	Child Development	281	236	36	5	2008	Q1	Developmental and Educational Psychology
4	Journal of Experimental Child Psychology	131	21	1	5	2014	Q1	Experimental and Cognitive Psychology
5	Child: Care, Health, and Development	92	44	11	4	2012	Q2	Developmental and Educational Psychology
6	Developmental Psychology	236	195	35	4	2014	Q1	Developmental and Educational Psychology
7	Infant Behavior and Development	91	78	1	4	2014	Q2	Developmental and Educational Psychology
8	Journal of Family Psychology	135	92	5	4	2009	Q1	Psychology (miscellaneous)
9	Journal of Speech, Language, and Hearing Research	152	120	4	4	2016	Q1	Linguistics and Language
10	Developmental Science	145	157	17	3	2011	Q1	Developmental and Educational Psychology
11	European Child and Adolescent Psychiatry	108	78	14	3	2015	Q1	Developmental and Educational Psychology
12	Journal of Abnormal Child Psychology	165	120	30	3	2015	Q1	Developmental and Educational Psychology
13	Journal of the American Academy of Child and Adolescent Psychiatry	273	179	42	3	2014	Q1	Developmental and Educational Psychology
14	Research in Developmental Disabilities	105	79	14	3	2014	Q2	Developmental and Educational Psychology
15	Social Science and Medicine	270	198	5	3	2010	Q1	History and Philosophy of Science
16	Health and Place	137	18	0	2	2019	Q1	Sociology and Political Science
17	Appetite	168	113	1	2	2016	Q1	Psychology (miscellaneous)
18	Child Abuse and Neglect	164	89	30	2	2014	Q1	Developmental and Educational Psychology
19	Developmental Psychobiology	104	41	15	2	2017	Q2	Developmental and Educational Psychology
20	Emotion	161	79	7	2	2014	Q1	Psychology (miscellaneous)

Note: GCS=total citation in Scopus database; LCS=total citation in the final dataset; NP=number of publications; PY=published year of the first paper in the final dataset; Q* information of journals were referred from Scimagojr on 6 March 2024.

3.4. The topics in publications on the influence of the environment on the psychological development of preschool children

Figure 8 illustrates the significant clusters related to topics concerning the influence of the environment on the psychological development of preschool children. There are 9 clusters, each represented by different colors (red, brown, green, purple, yellow, orange, light green, navy blue, and blue). The most suitable topics are based on the analysis of clusters of documents presented in Figure 8. The size of a cluster in the figure determines its impact and centrality in research on the influence of the environment on the psychological development of preschool children. In this field, “parenting” and “development” are the most important, with significant impact and high centrality. Typical documents on “parenting” include studies by [27]–[32]. Regarding “development”, remarkable documents are carried by [27], [33]–[36]. Other topics that draw a particular amount of attention are depression, mental health, and cognitive development.

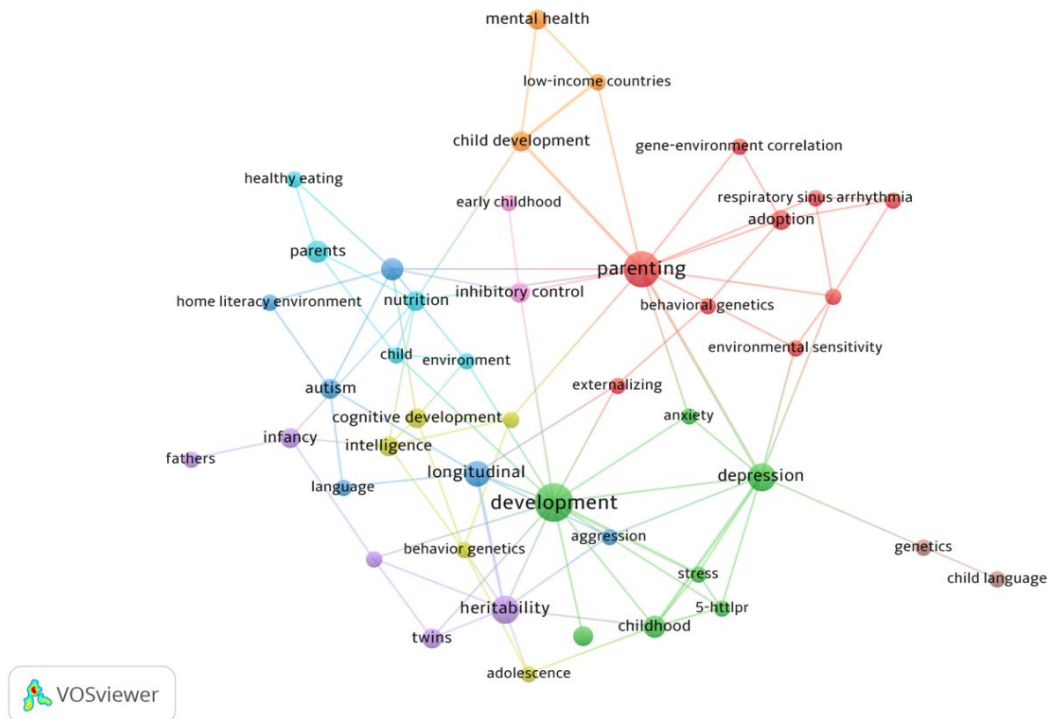


Figure 8. Network map of keywords in studies on the influence of the environment on preschool children's psychological development

The content analysis conducted by the research team reveals several critical topics of interest. Most studies focus on the mother's impact on the psychological development of preschool children. For example, Yoo *et al.* [37] assert that repeated exposure to the mother's distress over a long period can contribute to ongoing suffering across generations for the child, stemming from negative emotional biases in the child's perception of family relationships. Reuben *et al.* [30] highlight the critical role of parental warmth as an environmental influence on children's psychological development. Maternal depression and child irritability influence each other bidirectionally, particularly in the early stages of child development [34]. Study by Longa *et al.* [38] emphasized the importance of tactile experiences for understanding social emotions in preschool children. Other study [39] experimentally clarified the role of the quality of the caregiver-child relationship, noting that "caring touch might play an important role in guiding children's emotion detection." While most research analyzes maternal influence, the study by Yan *et al.* [25] examines the perspective of how children adjust to maternal influence. It confirms that children have the potential to shape their development by initiating changes in their family environment. Compared to research on maternal influence, studies on paternal influence are less common. However, Schacht *et al.* [40] raise several issues regarding the impact of fathers on children's emotional security and internalizing versus externalizing behaviors.

In addition, many studies focus on the impact of parents or the family environment in general on the psychological development of preschool children, proposing significant issues for the development of these children. Zilanawala *et al.* [41] emphasize the importance of investigating characteristics related to the child's family environment and examining behavioral models throughout childhood. They suggest that to support children and their families best, policy solutions should focus on reducing poverty and family depression while considering the comprehensive nature of the child's family environment [41]. Silventoinen *et al.* [42] analyze the effects of genetic and environmental factors on children's sense of attachment, highlighting the crucial role of the childhood home. Heyman and Hauser-Cram [43] affirm the influence of the family environment and childhood home on the adaptive functioning of children with developmental disabilities in school settings. Mills-Koonce *et al.* [29] study how early life contexts, including family socioeconomic status, family chaos, and parenting behaviors, impact child conduct problems and callous-unemotional traits. In another study, through a survey of 324 foster parents of children aged 3-7, indicate the impact of the foster family on children coping with trauma. They suggest the necessity of trauma-sensitive training for foster parents, with stress management as a crucial component [44].

The social environment is also a factor influencing the psychological development of preschool children. Studies such as those by [31], [45]–[47] have addressed this issue. Gavrilov *et al.* [46] assert that

cultural ecology appears to be related to children's joint attention, laying the foundation for initiating social sharing signals between children and adults. The authors also suggest that children's joint attention regulates how children internally represent their ecological environment [46]. Additionally, the research on the impact of the physical environment on the psychological development of preschool children has been explored in several studies. For example, Stern-Eliran *et al.* [48] indicate that when children play in colorful environments, their play behavior can become disrupted, and they may lose focus.

Figure 9 depicts the trend of research topics from 2012 to 2023. From 2012 to 2014, research focused on child language, 5-HTTpr, aggression, intelligence, fathers. Furthermore, from 2014 to 2016, research concentrated on depression, cognitive development, infancy, adoption, inhibitory control, and externalizing. Afterwards, from 2018 onwards, research has been interested in longitudinal studies, autism, preschoolers, environment, COVID-19, adolescence, and externalizing problems. For example, the research related to the COVID-19 topic includes [49], [50]. Furthermore, the research on children with autism spectrum disorder is also a significant concern of researchers worldwide, as this has become increasingly prevalent globally [45], [47], [51]–[53].

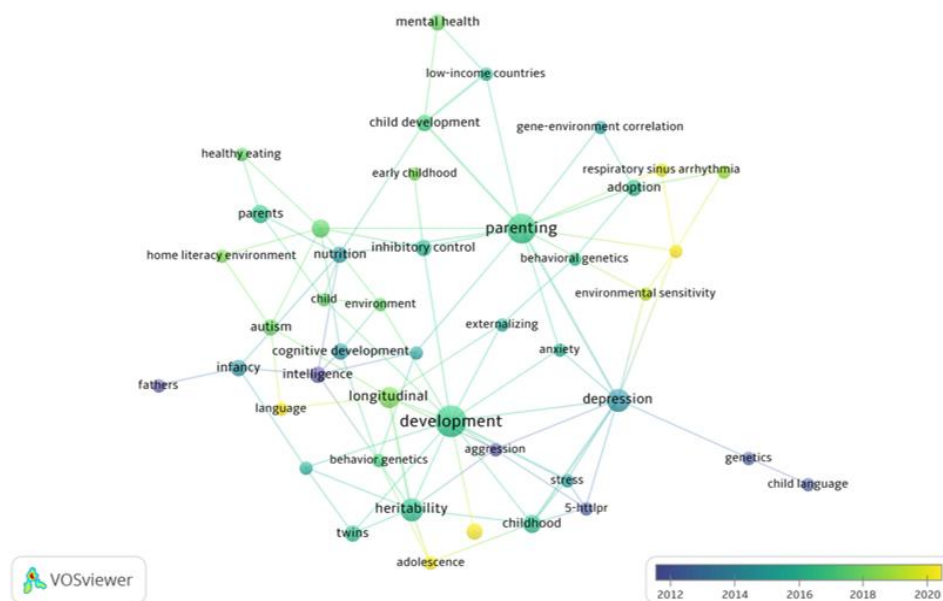


Figure 9. Overlay map of keywords in studies on the influence of the environment on preschool children's psychological development

4. DISCUSSION

Several review articles have examined the impact of the environment on a child's psychological development. However, these articles generally approach the topic in-depth and focus on the effects of a single factor and its relationship with other factors influencing a specific psychological function of the child. For example, the study by Ruiz *et al.* [21] evaluated 258 eligible studies and assessed positive and negative stress factors related to children's general cognitive abilities. The study by Berti *et al.* [20] reviews the relationship between physical environments in educational settings and child psychological development. Other study examine research analyzing the progression of children's self-regulation abilities in conjunction with parental characteristics, parent-child relationships, parenting variables, and family structure or environment [22]. Tamblyn *et al.* [18] reviewed how physical or sensory aspects of early childhood care and education environments affect children's social and emotional development. Sella *et al.* [17] evaluated the psychological benefits of attending forest schools for preschool children and systematically reviewed physical environment factors in preschools from an environmental psychology perspective. Ata *et al.* [54] evaluated the physical environment factors in preschools in terms of ecological psychology. Cann *et al.* [55] reviewed the relationship between indoor environments and children's health. In this study, the researchers use the PRISMA method, VOSviewer software, and content analysis to evaluate the overall number and distribution of published materials between countries on factors affecting the psychological development of preschool children; the most prolific authors and journals on the impact of the environment on preschool children's psychological development; and the most discussed topics in publications on the effects of the environment on preschool children's psychological development from 2000 to 2023.

The researchers have observed that in just over 20 years, from 2000 to 2023, the number of scientific publications on the impact of the environment on preschool children's psychological development has significantly increased. This indicates that since 2006, there has been a growing interest in the influence of the environment on children's psychological development. A review of the bibliographic references in other systematic reviews reveals that a large portion of cited studies is from after 2006, such as the studies [17], [19], [21]. Sella *et al.* [17] noted that 3 out of 26 studies cited in their qualitative synthesis were from before 2006, while the rest were from after 2006. This research also identifies the United States and the United Kingdom as leading centers for research on the environmental impact on children's psychological development. By using VOSviewer software, we have mapped and clarified this distribution. Additionally, our mapping of journal distribution indicates that recent research trends are shifting to other regions and countries. This new research finding, not previously published in reviews on this topic, provides valuable insights for those interested in studying and teaching about this issue.

The study has highlighted the authors with the most research on the impact of the environment on preschool children's psychological development from 2000 to 2023. According to the data analysis based on the number of publications, Leve Leslive D., Neiderhiser Jenae M., Reiss David, and Shaw Daniel S. are the top authors in this field (rank: #1, number of articles: 6, citations: 267). Additionally, we have provided a table of the 20 most influential authors in this area. The study also illustrates the author's network among 35 closely connected researchers. This newly synthesized result helps readers identify the most influential authors in this field and those continuing their work. This finding facilitates locating experienced scientists in this research area. From this author network, future researchers can identify major global research centers on the impact of the environment on preschool children's psychological development to establish connections and create future collaborations, especially between new researchers and those in developing countries. This will further deepen and broaden the field, making it more comprehensive. The distribution of research across global regions has also been discussed in [19].

Additionally, the study identifies the journals with the most significant impact on research concerning the influence of the environment on preschool children's psychological development. This finding aligns with the research by Kiss *et al.* [22], who referenced 14 articles from development and psychopathology—the top journal in our study regarding the number of publications. This study also cited 15 articles from child development, which ranks third in our study [22]. Tamblyn *et al.* [18] cited 2 articles from development and psychopathology. Ferguson *et al.* [19] also cited 13 articles from child development and 1 article from child: care, health and development. This newly synthesized result aids researchers in locating relevant literature in these prominent journals and selecting suitable journals for publishing research on the environmental impact on preschool children's psychological development.

At the same time, the study highlights the most frequently discussed topics in publications about the impact of the environment on preschool children's psychological development. We point out that 'parenting' and 'development' are the two keywords most commonly found in research on this topic. Previous reviews, such as the one by Kiss *et al.* [22], have examined the impact of family on preschool children's self-regulation. The keyword 'development' also appears in other reviews [17]–[21]. Additionally, we have identified emerging research directions in the past 5 years, with keywords such as longitudinal, autism, COVID-19, adolescence, and externalizing problems. This research suggests that the database should be enriched with more materials on the impact of other surrounding factors on children to provide a more comprehensive picture of how the environment affects preschool children's psychological development. This would enhance the applicability of research findings for children, families, schools, and society.

This is the first study that combines the PRISMA model, VOSviewer software, and content analysis methods to assess research on Scopus data regarding the impact of the environment on preschool children's psychological development. The results of this study provide a relatively systematic overview of the number of published articles, the number of authors, influential journals, and the keywords of interest in this field. This outcome is helpful for educators and researchers to understand research trends, locate reference materials, identify reputable journals and authors, and guide future research directions and practical practices in preschool education and care.

5. CONCLUSION

In conclusion, the findings from this study suggest several areas for further research, such as the impact of peers, teachers, the physical environment, and the psychological environment in preschools on the psychological development of young children. Additionally, the study highlighted that developing countries have very few publications on this topic in the Scopus database, with most research being published in psychology journals. However, there are some limitations to our study: our database consists of articles from Scopus, excluding those without open access full text, published before 2000, not in the fields of psychology,

social sciences, arts and humanities, not classified as articles, lacking journal sources, or written in languages other than English and Chinese. Therefore, our research might not have considered some relevant studies on this topic. Future studies might expand their scope to include new issues, combine theoretical and empirical research, and provide a more comprehensive and practical understanding of how the environment influences the psychological development of preschool children. This would better meet the needs of young children's care, nurturing, and education.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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Pham Thi Kieu Oanh	✓	✓	✓	✓		✓	✓		✓	✓			✓	✓
Vu Thi Thuy		✓				✓				✓	✓			
Le Thi Thuong Thuong					✓		✓			✓		✓		✓
Nguyen Thi Hoa				✓	✓	✓			✓	✓				

C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

CONFLICT OF INTEREST STATEMENT

There is no conflict of interest among authors.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author [PTKO]. The data, which contain information that could compromise the privacy of research participants, are not publicly available due to certain restrictions. Derived data supporting the findings of this study are available from the corresponding author [PTKO], on request.

REFERENCES

- [1] S. X. Xiao, T. L. Spinrad, and D. B. Carter, "Parental emotion regulation and preschoolers' prosocial behavior: The mediating roles of parental warmth and inductive discipline," *Journal of Genetic Psychology*, vol. 179, no. 5, pp. 246–255, Sep. 2018, doi: 10.1080/00221325.2018.1495611.
- [2] M. Shorer, O. Swissa, P. Levavi, and A. Swissa, "Parental playfulness and children's emotional regulation: the mediating role of parents' emotional regulation and the parent-child relationship," *Early Child Development and Care*, vol. 191, no. 2, pp. 210–220, Jan. 2021, doi: 10.1080/03004430.2019.1612385.
- [3] L. A. Frankel, S. O. Hughes, T. M. O'Connor, T. G. Power, J. O. Fisher, and N. L. Hazen, "Parental influences on children's self-regulation of energy intake: Insights from developmental literature on emotion regulation," *Journal of Obesity*, vol. 2012, pp. 1–12, 2012, doi: 10.1155/2012/327259.
- [4] C. Fernandes *et al.*, "Early attachment to mothers and fathers: Contributions to preschoolers' emotional regulation," *Frontiers in Psychology*, vol. 12, pp. 1–7, Jun. 2021, doi: 10.3389/fpsyg.2021.660866.
- [5] N. J. Hajal and B. Paley, "Parental emotion and emotion regulation: A critical target of study for research and intervention to promote child emotion socialization," *Developmental Psychology*, vol. 56, no. 3, pp. 403–417, 2020, doi: 10.1037/dev0000864.
- [6] K. H. Rubin, C. S. L. Cheah, and N. Fox, "Emotion regulation, parenting and display of social reticence in preschoolers," *Early Education and Development*, vol. 12, no. 1, pp. 97–115, Jan. 2001, doi: 10.1207/s15566935eed1201_6.




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- [7] W. Boyer, "Cultural factors influencing preschoolers' acquisition of self-regulation and emotion regulation," *Journal of Research in Childhood Education*, vol. 26, no. 2, pp. 169–186, Apr. 2012, doi: 10.1080/02568543.2012.657923.
- [8] D. Jamieson, *Ethics and the environment: An introduction*. Cambridge University Press, 2008.
- [9] J. Belsky, "Family influences on psychological development," *Psychiatry*, vol. 4, no. 7, pp. 41–44, Jul. 2005, doi: 10.1383/psyt.2005.4.7.41.
- [10] R. S. Wilson and A. P. Matheny, "Mental development: Family environment and genetic influences," *Intelligence*, vol. 7, no. 2, pp. 195–215, Apr. 1983, doi: 10.1016/0160-2896(83)90029-6.
- [11] K. L. Modry-Mandell, W. C. Gamble, and A. R. Taylor, "Family emotional climate and sibling relationship quality: Influences on behavioral problems and adaptation in preschool-aged children," *Journal of Child and Family Studies*, vol. 16, no. 1, pp. 59–71, Jan. 2007, doi: 10.1007/s10826-006-9068-3.
- [12] J. L. Hudson, H. F. Dodd, and N. Bovopoulos, "Temperament, family environment and anxiety in preschool children," *Journal of Abnormal Child Psychology*, vol. 39, no. 7, pp. 939–951, Oct. 2011, doi: 10.1007/s10802-011-9502-x.
- [13] M. Robinson *et al.*, "Pre- and postnatal influences on preschool mental health: A large-scale cohort study," *Journal of Child Psychology and Psychiatry and Allied Disciplines*, vol. 49, no. 10, pp. 1118–1128, 2008, doi: 10.1111/j.1469-7610.2008.01955.x.
- [14] V. Ulset, F. Vitaro, M. Brendgen, M. Bekkhus, and A. I. H. Borge, "Time spent outdoors during preschool: Links with children's cognitive and behavioral development," *Journal of Environmental Psychology*, vol. 52, pp. 69–80, Oct. 2017, doi: 10.1016/j.jenvp.2017.05.007.
- [15] B. Balseviciene *et al.*, "Impact of residential greenness on preschool children's emotional and behavioral problems," *International Journal of Environmental Research and Public Health*, vol. 11, no. 7, pp. 6757–6770, Jun. 2014, doi: 10.3390/ijerph110706757.
- [16] M. A. Read, A. I. Sugawara, and J. A. Brandt, "Impact of space and color in the physical environment on preschool children's cooperative behavior," *Environment and Behavior*, vol. 31, no. 3, pp. 413–428, May 1999, doi: 10.1177/00139169921972173.
- [17] E. Sella, M. Bolognesi, E. Bergamini, L. Mason, and F. Pazzaglia, "Psychological benefits of attending forest school for preschool children: A systematic review," *Educational Psychology Review*, vol. 35, no. 1, pp. 1–29, Mar. 2023, doi: 10.1007/s10648-023-09750-4.
- [18] A. Tamblyn *et al.*, "How do physical or sensory early childhood education and care environment factors affect children's social and emotional development? A systematic scoping review," *Educational Research Review*, vol. 41, pp. 1–25, Nov. 2023, doi: 10.1016/j.edurev.2023.100555.
- [19] K. T. Ferguson, R. C. Cassells, J. W. MacAllister, and G. W. Evans, "The physical environment and child development: An international review," *International Journal of Psychology*, vol. 48, no. 4, p. 437, 2013, doi: 10.1080/00207594.2013.804190.
- [20] S. Berti, A. Cigala, and N. Sharmahd, "Early childhood education and care physical environment and child development: State of the art and reflections on future orientations and methodologies," *Educational Psychology Review*, vol. 31, no. 4, pp. 991–1021, Dec. 2019, doi: 10.1007/s10648-019-09486-0.
- [21] J. D. C. Ruiz, J. J. Quackenboss, and N. S. Tulve, "Contributions of a child's built, natural, and social environments to their general cognitive ability: A systematic scoping review," *PLoS ONE*, vol. 11, no. 2, pp. 1–44, Feb. 2016, doi: 10.1371/journal.pone.0147741.
- [22] M. Kiss, G. Fechete, M. Pop, and G. Susa, "Early childhood self-regulation in context: Parental and familial environmental influences," *Cognition, Brain, Behavior*, vol. 18, no. 1, pp. 55–85, 2014.
- [23] M. Barathkesavan, K. Kartheeban, S. R. Sivasakthivel, and M. Rajagopal, "Bibliographic analysis of soft computing components from 1999–2018 in India," *International Journal of Intelligent Systems and Applications in Engineering*, vol. 12, no. 2s, pp. 322–337, 2024.
- [24] X. Fang *et al.*, "Parental HIV/AIDS and psychosocial adjustment among rural Chinese children," *Journal of Pediatric Psychology*, vol. 34, no. 10, pp. 1053–1062, Nov. 2009, doi: 10.1093/jpepsy/jsp006.
- [25] N. Yan, A. Ansari, and Y. Wang, "Intrusive parenting and child externalizing behaviors across childhood: The antecedents and consequences of child-driven effects," *Journal of Family Psychology*, vol. 33, no. 6, p. 661, 2019, doi: 10.1037/fam0000551.
- [26] S. Sugao, K. Hirai, and M. Endo, "Developing a comprehensive scale for parenting resilience and adaptation (CPRA) and an assessment algorithm: a descriptive cross-sectional study," *BMC Psychology*, vol. 10, no. 1, pp. 1–14, Dec. 2022, doi: 10.1186/s40359-022-00738-3.
- [27] J. Huttenlocher, H. Waterfall, M. Vasilyeva, J. Vevea, and L. V. Hedges, "Sources of variability in children's language growth," *Cognitive Psychology*, vol. 61, no. 4, pp. 343–365, Dec. 2010, doi: 10.1016/j.cogpsych.2010.08.002.
- [28] G. T. Harold *et al.*, "Biological and rearing mother influences on child ADHD symptoms: Revisiting the developmental interface between nature and nurture," *Journal of Child Psychology and Psychiatry and Allied Disciplines*, vol. 54, no. 10, pp. 1038–1046, Oct. 2013, doi: 10.1111/jcpp.12100.
- [29] W. R. Mills-Koonce, M. T. Willoughby, P. Garrett-Peters, N. Wagner, and L. Vernon-Feagans, "The interplay among socioeconomic status, household chaos, and parenting in the prediction of child conduct problems and callous-unemotional behaviors," *Development and Psychopathology*, vol. 28, no. 3, pp. 757–771, Aug. 2016, doi: 10.1017/S0954579416000298.
- [30] J. D. Reuben, D. S. Shaw, J. M. Neiderhiser, M. N. Natsuaki, D. Reiss, and L. D. Leve, "Warm parenting and effortful control in toddlerhood: Independent and interactive predictors of school-age externalizing behavior," *Journal of Abnormal Child Psychology*, vol. 44, no. 6, pp. 1083–1096, Aug. 2016, doi: 10.1007/s10802-015-0096-6.
- [31] D. L. Christensen, L. A. Schieve, O. Devine, and C. Drews-Botsch, "Socioeconomic status, child enrichment factors, and cognitive performance among preschool-age children: results from the Follow-up of growth and development experiences study," *Research in Developmental Disabilities*, vol. 35, no. 7, pp. 1789–1801, Jul. 2014, doi: 10.1016/j.ridd.2014.02.003.
- [32] D. Bitetti and C. S. Hammer, "The home literacy environment and the English narrative development of Spanish-English bilingual children," *Journal of Speech, Language, and Hearing Research*, vol. 59, no. 5, pp. 1159–1171, Oct. 2016, doi: 10.1044/2016.JSLHR-L-15-0064.
- [33] K. C. Koenen, T. E. Moffitt, R. Poulton, J. Martin, and A. Caspi, "Early childhood factors associated with the development of post-traumatic stress disorder: Results from a longitudinal birth cohort," *Psychological Medicine*, vol. 37, no. 2, pp. 181–192, Feb. 2007, doi: 10.1017/S0033291706009019.
- [34] J. L. Wiggins, C. Mitchell, A. Stringaris, and E. Leibenluft, "Developmental trajectories of irritability and bidirectional associations with maternal depression," *Journal of the American Academy of Child and Adolescent Psychiatry*, vol. 53, no. 11, pp. 1191–1205, Nov. 2014, doi: 10.1016/j.jaac.2014.08.005.
- [35] C. Tuvblad, A. Raine, M. Zheng, and L. A. Baker, "Genetic and environmental stability differs in reactive and proactive aggression," *Aggressive Behavior*, vol. 35, no. 6, pp. 437–452, Nov. 2009, doi: 10.1002/ab.20319.




- [36] L. M. Hilt, J. M. Armstrong, and M. J. Essex, "Early family context and development of adolescent ruminative style: Moderation by temperament," *Cognition and Emotion*, vol. 26, no. 5, pp. 916–926, Aug. 2012, doi: 10.1080/02699931.2011.621932.
- [37] Y. S. Yoo, J. Popp, and J. Robinson, "Maternal distress influences young children's family representations through maternal view of child behavior and parent-child interactions," *Child Psychiatry and Human Development*, vol. 45, no. 1, pp. 52–64, Feb. 2014, doi: 10.1007/s10578-013-0377-7.
- [38] L. D. Longa, L. Carnevali, and T. Farroni, "The role of affective touch in modulating emotion processing among preschool children," *Journal of Experimental Child Psychology*, vol. 235, pp. 1–18, Nov. 2023, doi: 10.1016/j.jecp.2023.105726.
- [39] C. Thrasher and T. Grossmann, "Children's emotion perception in context: The role of caregiver touch and relationship quality," *Emotion*, vol. 21, no. 2, pp. 273–282, Mar. 2021, doi: 10.1037/emo0000704.
- [40] P. M. Schacht, E. M. Cummings, and P. T. Davies, "Fathering in family context and child adjustment: a longitudinal analysis," *Journal of Family Psychology*, vol. 23, no. 6, pp. 790–797, Dec. 2009, doi: 10.1037/a0016741.
- [41] A. Zilanawala, A. Sacker, and Y. Kelly, "Internalising and externalising behaviour profiles across childhood: The consequences of changes in the family environment," *Social Science and Medicine*, vol. 226, pp. 207–216, Apr. 2019, doi: 10.1016/j.socscimed.2019.02.048.
- [42] K. Silventoinen, S. M. Volanen, E. Vuoksima, R. J. Rose, S. Suominen, and J. Kaprio, "A supportive family environment in childhood enhances the level and heritability of sense of coherence in early adulthood," *Social Psychiatry and Psychiatric Epidemiology*, vol. 49, no. 12, pp. 1951–1960, Dec. 2014, doi: 10.1007/s00127-014-0851-y.
- [43] M. Heyman and P. Hauser-Cram, "The influence of the family environment on adaptive functioning in the classroom: A longitudinal study of children with developmental disabilities," *Research in Developmental Disabilities*, vol. 86, pp. 20–30, Mar. 2019, doi: 10.1016/j.ridd.2019.01.001.
- [44] M. Vasileva and F. Petermann, "Posttraumatic stress symptoms in preschool children in foster care: The influence of placement and foster family environment," *Journal of Traumatic Stress*, vol. 30, no. 5, pp. 472–481, Oct. 2017, doi: 10.1002/jts.22217.
- [45] V. Talwar, J. Lavoie, C. Gomez-Garibello, and A. M. Crossman, "Influence of social factors on the relation between lie-telling and children's cognitive abilities," *Journal of Experimental Child Psychology*, vol. 159, pp. 185–198, Jul. 2017, doi: 10.1016/j.jecp.2017.02.009.
- [46] Y. Gavrilov, S. Rotem, R. Ofek, and R. Geva, "Socio- cultural effects on children's initiation of joint attention," *Frontiers in Human Neuroscience*, vol. 6, pp. 1–10, 2012, doi: 10.3389/fnhum.2012.00286.
- [47] A. J. Bremner, M. J. Doherty, S. Caparos, J. de Fockert, K. J. Linnell, and J. Davidoff, "Effects of culture and the urban environment on the development of the ebbinghaus illusion," *Child Development*, vol. 87, no. 3, pp. 962–981, May 2016, doi: 10.1111/cdev.12511.
- [48] K. Stern-Eliran, S. Zilcha-Mano, R. Sebba, and N. L. Binnun, "Disruptive effects of colorful vs. non-colorful play area on structured play-a pilot study with preschoolers," *Frontiers in Psychology*, vol. 7, pp. 1–9, 2016, doi: 10.3389/fpsyg.2016.01661.
- [49] A. Bérubé *et al.*, "How societal responses to COVID-19 could contribute to child neglect," *Child Abuse and Neglect*, vol. 116, pp. 1–11, Jun. 2021, doi: 10.1016/j.chiabu.2020.104761.
- [50] A. Martin *et al.*, "A qualitative study of parental strategies to enable pre-school children's outdoor and nature experiences during COVID-19 restrictions," *Health and Place*, vol. 79, pp. 1–10, Jan. 2023, doi: 10.1016/j.healthplace.2023.102967.
- [51] S. Hampton, H. Rabagliati, A. Sorace, and S. Fletcher-Watson, "Autism and bilingualism: A qualitative interview study of parents' perspectives and experiences," *Journal of Speech, Language, and Hearing Research*, vol. 60, no. 2, pp. 435–446, Feb. 2017, doi: 10.1044/2016_JSLHR-L-15-0348.
- [52] S. Mazumdar, A. Winter, K. Y. Liu, and P. Bearman, "Spatial clusters of autism births and diagnoses point to contextual drivers of increased prevalence," *Social Science and Medicine*, vol. 95, pp. 87–96, Oct. 2013, doi: 10.1016/j.socscimed.2012.11.032.
- [53] C. M. van Camp, D. C. Lerman, M. E. Kelley, H. S. Roane, S. A. Contrucci, and C. M. Vorndran, "Further analysis of idiosyncratic antecedent influences during the assessment and treatment of problem behavior," *Journal of Applied Behavior Analysis*, vol. 33, no. 2, pp. 207–221, Jun. 2000, doi: 10.1901/jaba.2000.33-207.
- [54] S. Ata, A. Deniz, and B. Akman, "The physical environment factors in preschools in terms of environmental psychology: a review," *Procedia - Social and Behavioral Sciences*, vol. 46, pp. 2034–2039, 2012, doi: 10.1016/j.sbspro.2012.05.424.
- [55] P. Le Cann, N. Bonvallot, P. Glorennec, S. Deguen, C. Goeury, and B. L. Bot, "Indoor environment and children's health: Recent developments in chemical, biological, physical and social aspects," *International Journal of Hygiene and Environmental Health*, vol. 215, no. 1, pp. 1–18, Dec. 2011, doi: 10.1016/j.ijheh.2011.07.008.

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