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TRENDS IN EARLY CHILDHOOD DEVELOPMENT: A BIBLIOMETRIC STUDY AND RESEARCH AGENDA

JENIFFER XIMENA VEGA FAJARDO[1], ANDREA DEL PILAR BERNAL LÓPEZ[2], PAULA ANDREA SAAVEDRA PARRA[3] SONIA LUCÍA VARGAS AMÉZQUITA[4], ERIKA YAMILA MELO ROMERO[5]

[1]Magister en Educación, Corporación Universitaria Adventistal, EMAIL: jvega@unac.edu.co, CvLAC: ORCID ID: https://scienti.minciencias.gov.co/cvlac/visualizador/generarCurriculoCv.do?cod_rh=0001372760,ORCID: 0000-0001-6733-891X.
[2]Psicóloga, Magíster en Salud Mental en la Infancia y la Adolescencia, Corporación Universitaria Adventista, EMAIL: apbernal@unac.edu.co, CvLAC, https://scienti.minciencias.gov.co/cvlac/visualizador/generarCurriculoCv.do?cod_rh=0001406806, ORCID:0000-0002-4284-4688.
[3]Magister en Neuropsicología y Educación, Corporación Universitaria Adventista, EMAIl: psaavedra@unac.edu.co, https://scienti.minciencias.gov.co/cvlac/En RecursoHumano/inicio.do, 0009-0001-3042-3528.
[4]Magister en Neuropsicología y Educación, Corporación Universitaria Adventista, EMAIL: svargas@unac.edu.co, CvLAC, https://scienti.minciencias.gov.co/cvlac/visualizador/generarCurriculoCv.do?cod_rh=0001257170 ORCID.https://orcid.org/0000-0003-4813-6583.
[5]Magister en Neuropsicología y Educación, Corporación Universitaria Adventista, EMAIL: docente.emelo@unac.edu.co, https://scienti.minciencias.gov.co/cvlac/visualizador/generarCurriculoCv.do?cod_rh=0001685166, https://orcid.org/0000-0002-1754-8190.

Abstract

Child development is a fundamental field of study that encompasses interrelated dimensions such as physical, cognitive, emotional, social, and spiritual growth. The aim of this study was to analyze research trends on child development between 2020 and 2025, with emphasis on the cognitive, affective, social, physical, and spiritual dimensions. A bibliometric and scientific mapping approach was used, with Scopus as the primary data source. Specific keyword-based search criteria were applied, and tools such as VOSviewer were used to identify patterns of co-occurrence, co-citation, and scientific production networks. A total of 16,013 articles were analyzed after filtering by language, document type, and publication period. The results revealed a progressive decline in scientific output related to child development, particularly in the spiritual dimension, which showed significantly lower representation compared to the others. Thematic analysis identified relevant clusters in each dimension, as well as authors and countries with the highest scientific connectivity. This study not only highlights prevailing lines of research but also proposes an agenda for future exploration, with special emphasis on interdisciplinary and underrepresented areas such as spiritual development. Overall, the study provides an updated and relevant perspective to guide new research and public policies focused on early childhood.

Keywords: Cognitive development, affective development, psychomotor development, social development, moral development, tendency, childhood**.**

INTRODUCTION

Development is a multidimensional and dynamic process that involves continuous changes in the cognitive, emotional, psychomotor, social and spiritual dimensions during the first stage of life. The French theorist Henri Hallon (1879 -1962), in his principles of explanation of child development, argued that it occurs in many directions at the same time and yet there are functions that stand out in each evolutionary stage and manifest itself in a significant way, so the author defends the need to analyze development as it is, observing the respective evolutionary stages and taking into account the differences between them and their dimensions (Wallon, 1949). These multiple changes do not depend exclusively on biological and genetic factors but are permeated by family,

educational, and social environments (Burke et al., 2022; Deng et al., 2025; McGowan et al., 2022; W. S. Wei, 2024). Current studies emphasize the importance of addressing each dimension of development from childhood, considering the positive consequences that can be generated at the personal, family, social, and global levels throughout life (Atashbahar et al., 2021; Rodríguez-Donoso et al., 2024; Salto Cubillos et al., 2024; Serna-Agudelo & Vargas-Suarez, 2024; Ștefan et al., 2022; Xiao, 2025).

This panorama leads to understand the significant increase in recent years of studies in this area, which has driven the design of educational, psychological and therapeutic interventions aimed at optimizing the well-being and integral development of children (Aldakhil, 2024; Apriyansyah et al., 2024; McGowan et al., 2022; Porcar-Gozalbo et al., 2024; Rodríguez & Area-Moreira, 2022a). However, despite the progress in these areas, there is an important gap in the scientific literature regarding the study of the spiritual dimension in child development. This dimension understood as the child's ability to find purpose, connection, and meaning in his or her life (Polemikou & Da Silva, 2022) it has traditionally been approached from philosophical perspectives, but rarely from a scientific approach; This gap limits the comprehensive understanding of human development.

Based on the above, this study aims to analyze trends in research on child development, with a comprehensive approach that contemplates the cognitive, affective, social, corporal and spiritual dimensions. To do this, bibliometric techniques and scientific mapping analysis are used, identifying the most relevant research topics, authors and key documents.

METHODOLOGY

The concept of scientometrics introduced by Nalimov & Mulchenko (1971) focuses on the study of the development of science through the application of quantitative methods, considering science as an information process in which the most used tools are bibliometrics and scientific mapping, which facilitate the visualization and representation of patterns present in scientific production allowing the interpretation and analysis of bibliographic data (Li et al., 2025a).

Bibliometrics has become an essential tool for a detailed understanding of different areas of knowledge (Martínez et al., 2015), it is mainly used to measure the impact of publications (Cobo et al., 2011), as well as the scientific productivity of authors, institutions, journals and countries. This is achieved through indicators and metrics of impact of publications and authors, such as citation count (Garfield, 1955) and h-index (Hirsch, 2005).

Bibliometric analysis makes it possible to evaluate both the quality and quantity of scientific production, in addition to extracting knowledge about a specific field through the use of bibliographic networks. This tool facilitates the identification of reliable sources and contributes to the progress of scientific literature in various areas of knowledge (Gutiérrez-Salcedo et al., 2017).

On the other hand, scientific mapping analysis explores the intellectual, social, and structural relationships between the different actors in scientific research, i.e., it analyzes how authors, institutions, topics, and documents connect with each other within a field of study (Donthu et al., 2021; Zupic & Čater, 2015), thus allowing the identification of patterns and trends in an area of knowledge (Chen, 2017; Leydesdorff, 1987; Noyons et al., 1999), based on various units of analysis such as: author co-citation analysis (Chen, 1999; White & McCain, 1998), document co-citation analysis (Small, 1973; Callon et al., 1983). Also, techniques for network visualization (Herman et al., 2000).

These types of procedures and techniques have gained relevance in the scientific community due to their ability to process and analyze large volumes of data, allowing researchers to identify evolutionary trends in specific fields (Donthu et al., 2020; Donthu et al., 2021) and shed light on emerging areas of research (Verma & Gustafsson, 2020). This interest is reinforced by the increasing availability of databases containing citation information and the development of better analytical tools that are increasing their attractiveness among academics and researchers (Dominko & Verbič, 2019).

That is why the main purpose of research of this type is to provide a broad and detailed view of the development of a specific scientific topic, a broader research domain, or even scientific knowledge as a whole (Li et al., 2021). Although these methods are based on quantitative data, their results are often used to make inferences about qualitative aspects of knowledge (Wallin, 2005).

Therefore, considering the objectives set out in this research, both bibliometric techniques and scientific mapping analysis will be used to comprehensively address the phenomenon of study.

Database Selection

To carry out this research, the Scopus database was selected as the main bibliographic source. This choice is based on its recognition as one of the most preeminent sources in the current academic field (Pranckutė, 2021). Scopus stands out not only for its extensive coverage, with more than 76 million documented records (Baas et al., 2020), but also for its scope, quality, and accuracy in source indexing (Mongeon & Paul-Hus, 2016), making it an invaluable tool for researchers in various disciplines. In addition, several studies (Harzing & Alakangas, 2016;

Zhu & Liu, 2020), have underlined the superiority of Scopus over other databases in several comparative aspects, considering it to be the best database worldwide.

Keyword selection

To identify the relevant literature on child development looking for topicality, relevance and scientific validity, the following search equation was used: TITLE-ABS-KEY ("child development") AND PUBYEAR > 2020 AND PUBYEAR < 2025 AND (LIMIT-TO (DOCTYPE , "ar")). The search equation was formulated from key descriptors combined using Boolean operators, applied to the title, abstract and keyword fields, limiting the results to publications between 2020 and 2025. This allowed filtering only those documents that included the term "child development" in English because Scopus indexes a significant proportion of literature in that language, seeking to recover a greater number of relevant and updated publications. Regarding the type of documents, the search was limited to scientific articles submitted to peer-reviewed and peer-reviewed processes.

Inclusion criteria

After obtaining preliminary results, inclusion and exclusion criteria were applied following a protocol previously designed by the authors, as well as the search strategies and the data extraction scheme to an analysis matrix. Table 1 presents the search parameters established in the database.

Table 1 *Search parameters*

Feature	Criterion
Search the results	Title / Abstract / Keywords
Temporal space	2020 to 2025
Date of consultation	February-May 2025
Database	Scopus
Search Topic	Trends in Child Development
Types of documents	Articles
Language	English
Results before filtering	103226
Results after filtering	16013

Own elaboration (2025).

Bibliometric analysis

For this analysis, the VOSviewer package was used, a tool used for the construction and visualization of bibliometric maps. This application is widely used for this type of analysis due to its ability to process large volumes of data, work with various databases, and present the clusters and the evolutionary map of the field in a clear way (Van Eck & Waltman, 2017). In addition, VOSviewer is a package translated and widely used by the scientific community (Donthu et al., 2021).

RESULTS

Publication trend.

The analysis of the documentary production in Scopus on child development between 2020 and 2025, presents a general decreasing trend, despite the fact that in 2024 a significant increase was observed (3314), this increase was presented as a specific anomaly that did not modify the general decreasing trend (see figure 1.).

This is relevant in the field of child development, where scientific production is key to incorporating recent advances, especially derived from neuroscience, so the decrease in scientific production could limit the appropriation and dissemination of recent findings, evidencing the need to strengthen research on this topic.

Figure 1 *Child Development Trend*

Own elaboration (2025).

The cocitation maps visually represent the documents that make up a knowledge network, built from graph theory (Yang et al., 2017). This technique allows the analysis of various bibliometric properties of the included documents, with special emphasis on the way in which they are linked and interact with each other within the field of study.

This procedure facilitated the identification of the main themes associated with child development and the most representative documents were selected, taking their thematic affinity as a criterion for choice.

Outstanding authors.

The most outstanding authors in the field of child development were analyzed, finding Michel Boivin as the most important seminal author, with 57 papers related to the subject, 811 citations and an h-index of 102, his interdisciplinary studies on neurodevelopment, environmental influences and behavioral trajectories, consolidates himself as a key reference with a great influence on the field of study.

Figure 2 *Featured authors*

Own elaboration (2025)

As can be seen in Table 2, the second outstanding author is Richard E. Tremblay (47 documents, 777 citations), followed by Sylvana M. Côté (37 documents, 486 citations) and Marie-Claude Geoffroy (26 publications, 540 citations) which, according to bibliometric data, configure a high productivity and academic visibility.

The thematic map that emerges from this bibliographic seed reveals a scientific community committed to the comprehensive understanding of child development, presenting thematic groupings that suggest differentiated lines of research, such as cognitive development, mental health, impact of the family environment and psychosocial risk factors.

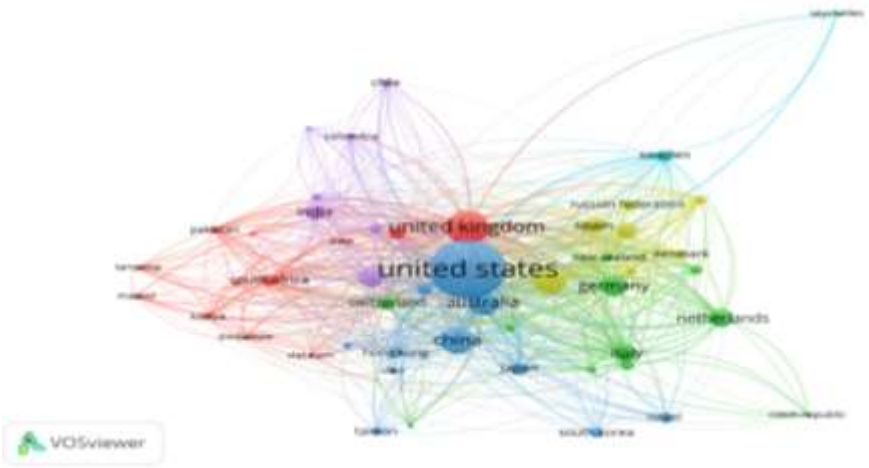
Table 2*Featured Authors Child Development*

Authors	Number of publications	Citations
Boivin, Michel.	57	811
Tremblay. Richard E.	47	777
Côté, Sylvana M.	37	486
Orri, Massimiliano.	27	408
Geoffroy, Marie-Claude.	26	540
Oulett-Morin, Isabelle.	17	389
Van Wijngaarden, Edwin	21	147
Ahum, Marilyn N.	16	184
Shamlaye, Conrad F.	15	119
Strain, J.J.	21	195

Own elaboration (2025).

Featured countries.

Figure 3 *Citations by country*



Own elaboration (2025)

The countries with the highest number of publications represent a dominant position in academic production related to each of the dimensions of child development. Figure 3 and table 3 show that the United States is the most prominent country with 5594 documents and 58840 citations on this topic, followed by the United Kingdom, Canada, Australia and France in terms of productivity and impact. Likewise, Brazil, Italy, the Netherlands, South Africa and Switzerland complete the group of the ten countries with the highest production in this area.

Table 3 *Featured countries*

Country	Documents	Citations	Scientific connectivity
United States	5594	58840	2625
United Kingdom	1929	20271	1475
Canada	1256	15457	1086
Australia	1079	9242	702
France	485	5586	383
Brazil	771	4384	379
Italy	575	7044	367
Netherlands	658	8104	351
South Africa	311	2525	345
Switzerland	321	3620	337

Own elaboration (2025).

Featured magazines.

This section examines the distribution of publications indexed in Scopus, highlighting the number of records obtained in the database of the 10 journals that publish the most (between 2020 and 2025). For each one, the quartile is presented in Table 4, as an indicator of the level of impact and prestige in the thematic area; the H-index, which allows you to see the number of citations, and the SJR 2024 index, which measures the average scientific impact of the articles published and the country to which each journal belongs.

International Journal of Environmental Research and Public Health, a Swiss journal, is positioned as the journal with the highest impact with 438 documents and 3790 citations, although it is located in quartile 2 and with a moderate JRS, this journal with a multidisciplinary approach, reflects the interest in the environmental and social determinants of child development.

In second place is Child Development from the United States with 296 papers and 2903 citations (Q1) supported by an SJR of 2195 and an H-index of 296, this journal is distinguished by its high productivity and high academic impact. In third place is Plos One with 267 documents and 2360 citations, representing a relevant presence in the scientific dissemination of children.

Table 4 *Ranking of journals*

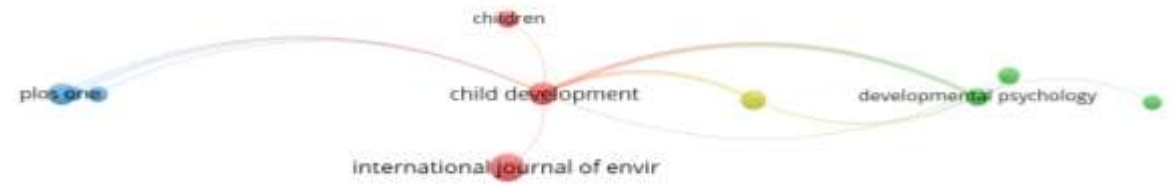
Position	Magazine	Cuartil/H-index/SJR 2024	Documents	Citations	Country
1	International journal of environmental research and public health	Q2/229/0.919	438	3790	Switzerland
2	Child development	Q1/296/2.195	296	2903	United States
3	Plos one	Q1/467/0.823	267	2360	United States
4	Journal of child psychology and psychiatry and allied disciplines	Q1/252/2.988	237	1623	United Kingdom
5	Developmental psychology	Q1/256/1567	198	1593	United States

6	Frontiers in psychology	Q2/212/0.872	178	1174	Switzerland
7	Children	Q2/56/0.674	170	681	Switzerland
8	Bmj open	Q1/176/1.016	151	943	United Kingdom
9	Early human development	Q1/115/0.815	145	865	Ireland
10	Journal of autism and developmental disorders	Q1/217/1,233	144	1468	United States

Own elaboration (2025).

The citation between journals shown in Figure 4 reflects the frequency with which a journal cites or is cited by another within the corpus analyzed. Child Development is located as an axis of connection between different thematic groups, which gives it a role as a reference journal, widely cited by publications from various disciplines related to child development.

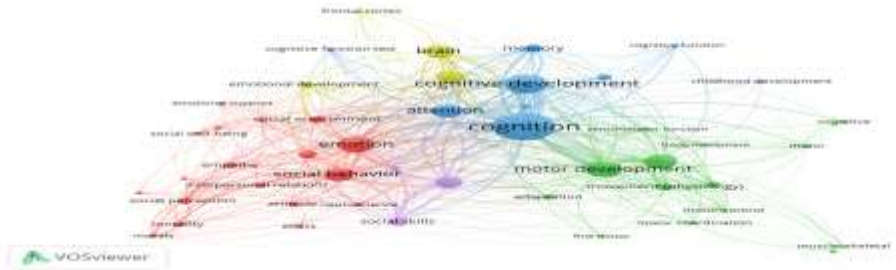
Figure 4*Journal citation network*



Own elaboration (2025).

Featured research topics.
To identify the most relevant topics and research trends in the field of child development, the VOSviewer software was used, which allows the construction and visualization of keyword co-occurrence maps. In this case, the clustering algorithm (Blondel et al., 2008), also known as the Louvain algorithm, was applied, which automatically groups documents or terms into thematic clusters according to their level of relationship within the network.
Each cluster represents a key concept, a set of documents with high thematic affinity or interrelated research areas within the field of child development. The colors assigned by VOSviewer to each group facilitated the identification of common areas of study and emerging themes for the interpretation of the results.
Figure 5 below presents each of the identified thematic clusters.

Figure 5 *Keyword Co-Occurrence Network*



Own elaboration (2025).
Figure 5 allows us to identify the main thematic groups and conceptual interrelationships that structure the field of study of child development.
Cluster 1, identified with the color blue, groups terms related to cognitive development as the dominant dimension in the literature, representing research focused on brain development, executive functions and cognitive processes.

Cluster 2 focuses on the motor and psychomotor development of the child related to movement and sensorimotor functions, groups terms related to the body dimension and is identified with the color green.
Cluster 3 focuses on learning and social competences, the terms it groups are related to the social dimension and is identified with the color purple, although it shows a relationship with the red cluster.
Cluster 4 addresses emotions, attitudes and interpersonal relationships. It is identified by the color red.
Finally, cluster 5 identified in the co-occurrence network with the color yellow also relates terms connected to emotional development and social behavior.
In the lower left corner you can see some terms related to ethics, morality and morality, concepts interrelated with spiritual development since they are linked to the construction of meaning, the formation of moral conscience and the internalization of values, but they appear within the cluster of social or emotional development. This connection suggests that the spiritual dimension, although scarcely explicitly mentioned in the literature, its fundamental components are being explored, evidencing the need to intentionally integrate this dimension into theoretical and research frameworks as an essential component in the integral well-being of the child.
Therefore, these clusters or thematic groups will be analyzed below, integrating yellow with red, focusing on the emotional or affective dimension and from the terms: ethics, morality and morality, the spiritual dimension will be developed, providing clarity about the dimensions of child development.

Cluster 1. Cognitive Dimension

The development of the cognitive dimension in contemporary studies continues to advance towards an understanding of the neurobiological mechanisms that predict and support the acquisition and consolidation of cognitive functions (Altindağ & Sümer, 2025), from the exploration of connections between brain activity (Tan et al., 2023), cortical structures, (Cadime et al., 2024), and other biological factors such as gestational age and birth weight (Tomasi & Volkow, 2025; Nath et al., 2023; Berger & Posner, 2023).
Some basic physiological processes, such as breastfeeding (Vargas-Pérez et al., 2025), sleep, growth, nutrition, vision, and overall physical health have been shown to have a direct impact on brain maturation, specifically in regions associated with executive control, indicating that it may affect the development of executive functions of inhibition and self-control in preschool-aged children. crucial for cognitive development (Christopher & Kiruthiga, 2024; Cernigliaro et al., 2024; Schmitz et al., 2023; Saeed et al., 2025: Shobeiri et al., 2022; Buriak, 2024; Provenzi et al., 2023; Beaugrand et al., 2023; Yang et al., 2022; Cioffredi et al., 2024 and Bando et al., 2025).
Likewise, environmental and psychosocial variables (Al-Khresheh, 2025) such as family environments (Drago et al., 2020; R. Wei et al., 2024), socioeconomic (DeJoseph et al., 2022), community, educational (Drago et al., 2020; Wei et al., 2024), and individual (Lobo et al., 2024); affect brain activation and cognitive skills in children, reaffirming the correlation between context and childhood neurocognitive development (Schneider et al., 2024). Therefore, it is necessary to identify modifiable factors that seek to prevent or mitigate gaps in children's cognitive development (Surani et al., 2023).
Findings indicate that there is a brain synchrony between caregivers and infants modulated by the emotional quality of the interactions, this synchronization observed through hyperscanning, allows simultaneously measuring the brain activity of two people (mother and child for example), highlighting the importance of emotional co-regulation and affective reciprocity in the first years of life (Kristoffersen et al., 2025). In addition, factors such as verbal responsiveness, gestures, joint attention and the family's socio-emotional environment favor cognitive development (Muès et al., 2024). In the school environment, the quality of teacher-student interactions also influences this development, so it is advisable to strengthen these dynamics through training and public policies (Inan et al., 2024). A key component is the interrelationship between executive functions and self-regulation in cognitive tasks, which are not only essential for academic performance, but also for the development of skills such as persistence, autonomy and intrinsic motivation in learning (Guedes et al., 2025).
On the other hand, it is important to highlight that language is closely related to basic cognitive functions: attention, memory, perception, and symbolic thinking (Blasco et al., 2025; Spencer et al., 2025, Xue et al., 2024; Kongstad & Petersson, 2025; Surakka et al., 2025). In this sense, it can be said that there is a dynamic interaction between language and cognition characterized by a mutual influence, especially in the first years of life (Esmer et al., 2025; Khakimova et al., 2025; Kable et al. 2024; Shani et al., 2024), which makes it possible to understand language not only as an acquired system, but as a functional manifestation of neuroanatomical differences, which provides an integrative perspective between neuroscience, cognition, and language education (Ramoser et al., 2024).
Regarding risk factors for language delay, Tsai et al. (2024) mention that frequent consumption of sugary foods at 12 and 24 months slows down cognitive performance, evidencing a cumulative effect over time. For their part, Borjon et al., (2024), identified environmental stress, poverty, or trauma as early predictors of language delays, opening up an innovative field in the relationship between physiological regulation, emotional states, and emergent communication. In contrast, Wadan et al. (2025) present the adaptive function that neurons can have when intentionally inducing DNA breaks during key processes, highlighting the efficiency of DNA repair in stages

of brain maturation, especially in childhood. Wadan also links the emotional dimension as a determining factor in the release of neurochemicals, the modulation of the immune and endocrine systems and the acceleration or deceleration of brain degeneration. On the other hand, early vocabulary development favors executive functions during the preschool stage, hence the importance of promoting language from an early age, positioning vocabulary development as a factor of protection and promotion of comprehensive cognitive development (Thériault-Couture et al., 2025), through playful activities, problem solving (Zhang et al., 2025), motor planning (Marti et al., 2025), and rhythmic play (Bell et al., 2025), which can have a positive and lasting impact on children's cognitive performance.

Children's cognitive development is based on the brain's ability to build and update mental models through functional networks (Duncan, 2025), which requires including neuroscience training in teacher training programs to avoid neuromyths and apply scientific advances in education (Williams et al., 2025). Models such as the T-Factor group together environmental conditions essential for integral child development (Luby et al., 2024), while practices such as skin-to-skin contact act as emotional regulators in early stages (Kristoffersen et al., 2025).

Cluster 2. Body Dimension

Body development in childhood has been widely addressed in recent literature from different angles such as: psychomotor, motor, compositional and locomotor. With regard to psychomotor development and motor disorders, studies show that motor delay continues to be of great concern, mainly in contexts of great vulnerability, associating it with conditions such as malnutrition and low birth weight. Research agrees on the importance of culturally adapting motor assessment tools to detect motor delays in a timely manner and thus design relevant and essential assessment instruments to develop public health policies with a preventive approach. (Karimi et al., 2025; Mitiku et al., 2023).

In this same sense, studies highlight that the role of play accompanied by adequate nutrition and vitamin D supplementation have been shown to have a positive impact on motor coordination. Similarly, it is highlighted that physical literacy combined with parental participation and the school environment have been associated with more active routines in childhood, evidencing that unstructured free play enhances skills such as balance, agility and coordination, consolidating a vision in which natural stimulation, the family environment and adequate nutrition play fundamental roles for good motor development(Chaponan-Lavalle et al., 2023; Kurnia et al., 2024; Samawi et al., 2025).

In relation to technology, both its potential and risks have currently been explored, documenting that portable digital devices facilitate assessments in a more accessible and personalized way, but warning at the same time that excessive use of screens greatly affects body and cognitive development, highlighting that higher motor competence predicts better physical and academic results in childhood (Deng et al., 2025; Erika et al., 2024; Peixoto Silva & Pereira, 2025). This evidence supports the implementation of programs that integrate cognitive and motor skills in an interdisciplinary way, increasing motor competence and predicting better physical and academic outcomes in childhood (Canli et al., 2025; Chichinina et al., 2025; Lorenzo-Martínez et al., 2025; Šeflová et al., 2025).

Another recent aspect in this area is the gender difference, coinciding with the fact that boys tend to have greater development of gross motor skills (D'Anna et al., 2025; Zheng et al., 2025). Because of this, the design of programs that allow equity of participation is recommended, since it has been shown that integrating physical activity on a regular basis reduces performance gaps and promotes inclusion. (Dantas De Araujó et al., 2025).

Various studies have indicated that overweight in childhood is closely related to sedentary lifestyles and inadequate eating patterns, especially in school environments where physical activity is little encouraged, increasing the risk of liver diseases (Akbar et al., 2025; Gispert-Llauradó et al., 2025; Maduri et al., 2025; Sarkkola et al., 2025). Similarly, it has been highlighted that the combination of healthy eating, regular physical activity, and adequate rest directly influences the nutritional and functional status of children and adolescents (Lewandowska et al., 2025; Rahimiderazi et al., 2025).

Regarding gait and locomotion, the literature highlights that both motor acquisition processes and the support of therapeutic technologies have shown positive results in the development of coordination, balance, and gait in children with motor difficulties (Błażkiewicz & Hadamus, 2024; Tschenett & Baur, 2025). Similarly, it has been observed that behaviors such as "pull-to-stand" are closely related to previous experiences and that factors such as sleep significantly influence motor and linguistic development (Belia et al., 2025; Graciosa et al., 2024; Thurman & Rose, 2025). From a contextual point of view, it has been shown that the accompaniment of the adult during walking favors emotional and social development. Similarly, it is proposed that the early identification of motor milestones allows timely interventions in the event of possible locomotor alterations (Bowler et al., 2024; Karasik & Fernandes, 2024). However, it is worth mentioning that spatial navigation skills and functional mobility are closely linked to children's autonomy, reinforcing a multidimensional understanding of the locomotor process (Hospodar & Adolph, 2024; Martín-Pozuelo et al., 2024).

Cluster 3. Affective dimension.

Emotional regulation and its impact on child development are topics of interest in current research. Affective interactions between parents and children, such as the Kangaroo Method, are fundamental for the psychophysiological self-regulation of babies, improving their emotional and physiological connection (Grumi et al., 2025 ; Staring et al., 2025), in relation to child maltreatment, research has revealed the importance of mediators such as parental reflexive functioning and social support (Dehghan Manshadi & Sarafraz, 2025; Vogelsang et al., 2025). On the other hand, the impact of maternal parental stress has a significantly negative effect on child development, mediated by depression and moderated by family resilience (Pan et al., 2025; Jiang et al., 2025; Yu et al., 2025; Zhu et al., 2025). Therefore, for future research, it is suggested to include factors such as couple conflict, family context, institutionalized children, and the influence of socioeconomic status (Chen et al., 2025; Cleaver, 2025; López-Zamora et al., 2025; Pihlaja et al., 2025; Kunz & Oeri, 2025; Levantini et al., 2025; Figueiredo & Silvestre, 2025; Zhao et al., 2025).

Likewise, Lewis & McKelvey (2025) propose to examine the impact of Positive Childhood Experiences (SAPs) at different stages of child development, to better understand their role in mitigating the effects of Adverse Childhood Experiences (CSAs). This research underscores the importance of addressing parents' emotional health in future research to mitigate negative effects on their children. On the other hand, it has been observed that flexibility in emotional regulation strategies and their integration are more successful in their effectiveness (Lüken et al., 2025; Girgis et al., 2024; Liu et al., 2025; Yang et al., 2202), motivating research involving children with psychiatric diagnoses and their parents to gain a broader understanding of emotional regulation in clinical contexts (Pala et al., 2023).

The need to address emotional regulation from childhood becomes apparent, as emotional and behavioral problems can accelerate hypothalamic development, suggesting that early interventions are essential to prevent long-term consequences (Y. Wang et al., 2025). In addition, longitudinal studies are significant for establishing causal relationships, such as chaos in the home (Cai & Meng, 2024) or the loss of a parent, observing how patterns of attachment and openness to experience evolve throughout life (Dvilansky et al., 2025).

Another emerging approach is the relationship between adverse childhood experiences and emotional regulation in adulthood, particularly in populations with disorders such as ADHD. A recent study found that the dimensions of ADHD mediate the relationship between adverse childhood experiences and aggression in adulthood, suggesting that maladaptive emotional regulation is a key factor in this process (Barra et al., 2025; Viragova et al., 2025). The findings indicate that individuals with high levels of adverse experiences and ADHD symptoms are at increased risk for aggressive behaviors, highlighting the need to investigate emotional regulation strategies that can be implemented in treatments.

Likewise, childhood emotional reactivity is a key predictor of behavioral problems, implying that emotional regulation should be a central focus in the prevention of these problems (Jusienė et al., 2025). Conscious maternal parenting has been associated with mitigating the negative effects of depression on children's emotional regulation, underscoring the importance of close parent-child relationships (He et al., 2025; Zhang et al., 2024). Therefore, it is necessary for future research to incorporate diverse educational levels of mothers and other demographic factors to better understand the impact of parenting in different sociocultural contexts, as well as to explore individual factors such as temperament that may moderate the relationship between parenting styles and social interactions (Li et al., 2025). Longitudinal studies are also urged, which will allow a more dynamic analysis of these interactions (Khamis, 2023).

Finally, in the educational setting, social-emotional learning (SEL) in primary schools has been shown to be valuable for the development of emotional competencies, although more studies are needed to assess its effectiveness in diverse contexts and to better align SEL programs with school curricula (Tinnes-Vigne et al., 2025; Carpendale et al., 2025; Klemp et al., 2025; Yang et al., 2025; Waly et al., 2025; Way & Taffe, 2024). The deepening of emotional education from childhood has been shown to contribute to children's academic performance and social adaptation (Hosokawa et al., 2024; Diebold et al., 2025). In addition to technology-based interventions such as gamified mobile applications, the use of robots to support the development of socio-emotional skills is being effective tools. In view of the above, it is recommended to implement teacher training programs that strengthen self-efficacy in the teaching of these skills (Nicolaidou et al. 2022; Shipman et al., 2025; Deniz et al., 2025; Yu et al., 2025; Franchino-Olsen et al., 2025; Pan et al., 2025;).

Cluster 4. Social Dimension.

Currently, the social and family environment significantly influence child development. In this sense, studies show that social support perceived by parents impacts children's upbringing, emotional health, and behavior, while social interaction reinforces learning, cooperation, and family bonding. (Hosokawa & Katsura 2024; Gates et al., 2025; Kanngiesser et al., 2024). Likewise, interpersonal relationships contribute to the formation of values and skills, especially in education about forgiveness, facilitating the restoration of healthier social bonds (Beamish et al., 2019; Jin et al. 2017; Partee et al., 2022; Capio et al., 2024; Yong et al., 2023; Collet et al. 2025; Davet & Ata 2025).

In a complementary way, it is crucial to consider the social development of children with different conditions of disability, whether cognitive, physical or emotional, particularly in children with autism, the mother's postpartum period and social education are determinants for family stability and the strengthening of working memory (Strøyer De Voss et al., 2024; Boyne et al. 2025; Murray et al., 2024; Ahmad et al., 2025; Brass et al., 2024; Beamish et al., 2019, Toda et al., 2024, Aldakhil 2024; Handley & Temples, 2025).

On the other hand, empathy, hearing, and emotional health impact children's social development; In turn, empathic accuracy in children is comparable to that of adults, and childhood hearing loss affects language and social integration, highlighting the importance of appropriate and anticipated interventions (Schonfeld et al., 2024; Palmer et al., 2025; Neves et al., 2025; Engdahl et al., 2023; Bigelow, 2025; Palmer et al., 2025).

In addition, psychosocial support for parents and musical interaction enhance linguistic development, favoring school socialization and the acquisition of social skills, thus impacting academic performance and child well-being (Verschueren & Koomen, 2022; Yong et al., 2023; Kaßecker et al., 2025). Along the same lines, anxiety can compromise stability and socio-emotional competencies, particularly in girls, therefore, initial identification and psychological support are essential to guarantee youth well-being in the social aspect (Mauroy et al., 2025; McDorman et al., 2025. Xiao 2025; Stewart et al., 2025; Von Suchodoletz et al., 2023; Kanter et al., 2025; Gonçalves et al., 2025).

Another essential aspect in children's social development is the dialogue between teachers and parents, taking into account that educational communication is based on the creation of meaning and the monitoring of children's thinking, which favors and enhances the child's social development (Jerome & Starkey 2022; Boaden et al., 2025; Parker et al., 2022; Collet et al., 2025; Napier et al., 2025; Handley & Temples, 2025).

Finally, a fundamental strategy for children's social development is play in teaching, although its school implementation faces challenges, an evidence-based approach is recommended, connecting research, educational policy, and teaching practice (Rodríguez & Moreira; 2022, Mossman & Oades 2022; Wang et al., 2022; Calamak & Valencia 2025).

Cluster 5. Spiritual Dimension

From a spiritual perspective, cognitive-emotional well-being in childhood has been linked to practices that promote "spiritual literacy", which is understood as children's innate ability to develop empathy, connection with nature, and self-awareness (Polemikou & Da Silva, 2022). Spirituality seen from this approach is understood more as a fundamental human right that can be cultivated through inclusive pedagogical strategies, such as meditation, art or direct contact with the natural environment rather than as simply a religious phenomenon, in this way, solid foundations are laid for positive emotional development, without imposing specific beliefs, but by fostering spontaneous transcendental experiences (Kaur Bhatia & Vyas, 2023).

Recent studies have identified how spiritual health influences emotional, social, and spiritual aspects during childhood, evidenced by resilience, positive thinking, and self-awareness (Brooks et al., 2022; Moosavi et al., 2024; Safara et al., 2023). For example, Safara et al. (2023) point out that high spiritual health is associated with lower levels of anxiety and depression in children, while Moosavi et al. (2024) highlight that a balanced relationship with oneself, with others, and with the transcendent reinforces emotional well-being. This research indicates that spirituality transcends not only individual empowerment, but also socialization processes and a coherent moral identity, especially in contexts where it is promoted from an early age.

In addition, evidence suggests that spirituality can act as a moderating factor in adverse situations, such as child abuse or psychosocial trauma, reducing its negative impact on mental health (Emirza & Gürhan, 2025; Fitzgerald & Berthiaume, 2022; Saari et al., 2022). Complementing this approach, Kaur Bhatia & Vyas (2023) describe how spontaneous spirituality in early childhood, manifested in curiosity, wonder, and emotional expression, can become a starting point for preventive interventions that integrate the affective, the ethical, and the transcendent.

The spiritual dimension has positioned itself as a fundamental pillar in moral education during childhood, especially in contexts where religious practices and cultural values are closely linked to ethical development (Akrim & Junaidi, 2021). Studies have shown that religious development in early stages not only strengthens personal identity, but also acts as a frame of reference for the internalization of social norms and moral principles (Sztychmiler, 2021). Thus, Akrim & Junaidi (2021) found a positive correlation between the level of religious development and psychological health in Indonesian children, which reflects lower levels of anxiety and depression, as well as greater empathy and respect for others, suggesting that structured religious education from childhood can become a protective mechanism against emotional and behavioral problems. even though secularity is increasingly evident in the new generations (Iles-Caven et al., 2022).

In contexts of special educational needs, such as the case of children with visual impairment, spirituality also manifests itself as a pedagogical resource to promote universal moral values, such as respect, responsibility, and cooperation (Darkembayeva et al., 2023). This study proposes that auditory and tactile stimuli promote socialization and emotional expression, key elements for the formation of an empathic moral conscience, these strategies allow moral education not to be exclusively verbal or visual, but multisensory and contextualized (Darkembayeva et al., 2023).

On the other hand, the intersection between law, education, and spirituality also emerges as a relevant theme in the literature, especially in relation to the legal rights to religious and moral education in diverse educational systems (Sztychmiler, 2021). In Poland, for example, although the Constitution recognizes the right of children to receive religious education, there are tensions between this right and the state neutrality required by a pluralistic education system. Sztychmiler (2021) points out that these tensions generate legal ambiguities on how to implement religious teaching without imposing specific ideologies or violating the right to freedom of conscience. This underscores the importance of developing inclusive education policies that balance parental autonomy, religious diversity, and holistic child well-being. Future research should delve into international comparative models to identify good legislative and educational practices in this area (Chan, 2020; Polemikou & Da Silva, 2022; Sztychmiler, 2021).

After the theoretical approach to each of the dimensions of child development, Table 5 presents a consolidated list of the most relevant research topics identified from the cluster analysis, which group the publications according to thematic affinities in the field of child development. This research visualizes the current focus of academic production and emerging trends in the scientific literature. This systematization facilitates an understanding of the research landscape and highlights the richness and multidimensionality of child development approached from various disciplines and methodologies.

Table 5. *Featured Research Topics*

Cluster 1 Cognitive Development		
	Research Areas	**Citations**
1	Neurobiology of cognitive development	Yang et al., (2022), Williams et al., (2025), Berger & Posner (2023), Cadime et al., (2024), Duncan (2025), Provenzi et al., (2023), Cioffredi et al., (2024), Nath et al., (2023), Tan et al., (2023), Schneider et al., (2024).
2	Neurodevelopmental disorders and genetic factors	Tomasi & Volkow (2025), Schwaba et al., 2025), E. & Christopher (2024), Wadan et al., (2025), Saeed et al., (2025), Cernigliaro et al., (2024), Shobeiri et al., (2022).
3	Environmental and psychosocial factors associated with cognitive development	Bando et al., (2025), Luby et al., (2024), Inan et al., (2024), Muès et al., (2024), Kristoffersen et al., (2025), Surani et al., (2023), DeJoseph et al., (2022), Wei et al., (2024), Lobo et al., (2024), Drago et al., (2020), Al-Khresheh (2025)
4	Cognitive Processes and Language Development	Shani et al., (2024),Tsai et al., (2024), Kongstad & Petersson (2025), Ramoser et al., (2024), Kable et al., (2024), Khakimova et al., (2025), Borjon et al., (2024), Surakka et al., (2025), Esmer et al., (2025), Xue et al., (2024).
5	Executive functions and memory	Guedes et al., (2025), Thériault-Couture et al., (2025), Zhang et al., (2025), Marti et al., (2025), Vargas-Pérez et al., (2025), Bell et al., (2025), Spencer et al., (2025), Altindağ & Sümer (2025), Blasco et al., (2025)
Cluster 2. Body development		
	Research Areas	**Citations**
1	Psychomotor development and motor disorders.	Mitiku et al. (2023), Karimi et al. (2025), Chaponan-Lavalle et al. (2023), Deng et al. (2025), Samawi et al. (2025), Kurnia et al. (2024), Peixoto Silva & Pereira (2025), Erika et al. (2024).
2	Competence and motor performance.	Canli et al. (2025), DANTAS DE ARAÚJO et al., (2025), Lorenzo-Martínez et al. (2025), Chichinina et al. (2025), Šeflová et al. (2025), D'Anna, Basadonne, et al. (2025), D'Anna, Carlevaro, et al. (2025).

3	Body Composition and Obesity	Akbar et al. (2025), Sarkkola et al. (2025), Lewandowska et al. (2025), Rahimiderazi et al., (2025), Gispert-Llauradó et al. (2025), Maduri et al. (2025), Zheng et al. (2025).
4	Gait and Locomotion	Tschenett & Baur (2025), Błażkiewicz & Hadamus (2024), Thurman & Rose (2025), Belia et al. (2025), Graciosa et al. (2024), Karasik & Fernandes (2024), Bowler et al. (2024), (Hospodar & Adolph, 2024), (Martín-Pozuelo et al., 2024).

Cluster 3. Social development

	Research Areas	Citations
1	Interpersonal relationships and social behavior	Goncalves et al. (2024), Hosokawa y katsura, et al. (2024), Kanter et, al. (2025), Kanggieser et al., (2024), Jin et al., (2017), Partee et al. (2022), Brass et al (2024), Mossman y Oades (2022), Toda et al. (2024), Verschureren y Koomen et,al. (2012).
2	Communication and family relationships	Kanter et al. (2025), Yong et al. (2023), Toda et al. (2024), Kaßecker et, al. (2025), Stroyer de Voss et, al. (2024), Boyne et, al. (2025), Murray et al. (2024), Schonfeld et al. (2024), Bigelow et al. (2025).
3	Cognition and social interaction	Palmer et al. (2025), Neves et al. (2025), Capio et al. (2022), Mauroy et al. (2025), Gonçalves et al. (2025), Porcar Gozalbo et al. (2024), Aldalkhil et al. (2024), Yong et al. (2023), McDorman et al. (2025), Stewar et al. (2025), Napier et al. (2025), Handley y Templeset, et al. (2025).
4	Competence and Social Skills	Palmer et al. (2025), Neves et al. (2025), Capio et al. (2022), Mauroy et al. (2025), Gonçalves et al. (2025), Gozalbo et al. (2024), Aldalkhil et al. (2024), Yong et al. (2023), McDorman et al. (2025), Stewar et al. (2025), Napier et al. (2025), Handley y Templeset, et al.
5	Social change	Jerome et al. (2022), Boaden et al. (2025), Rodríguez et al., (2022), Mossman et al. (2022), Calamak et al. (2025), Engdahl et al. (2023).

Cluster 4. Affective Development

	Research Areas	Citations
1	Emotional Regulation and Psychological Adaptation	Staring et al., (2025), Grumi et al., (2025), Lüken et al. (2025) X. Wang et al. (2025), Liu et al. (2025), Girgis et al. (2024), Pala et al. (2023), Cai & Meng (2024), Y. Wang et al. (2025), Dvilansky et al. (2025), Barra et al. (2025), Viragova et al (2025), Jusienė et al. (2025), He et al. (2025), X. Zhang et al., 2024), D. Li et al. (2025b) Khamis, (2023), Nicolaidou et al. (2022), Shipman et al. (2025) Hosokawa et al. (2024), Diebold et al. (2025), Y. Zhang et al. (2024) Elhusseini et al. (2023), López-Pérez et al. (2023), Figueiredo & Silvestre (2025).
2	Child and emotional development	Dehghan Manshadi & Sarafraz (2025), Vogelsang et al. (2025), Pan et al. (2025), Jiang et al. (2025), Lewis & McKelvey (2025), Zhao et al. (2025), Yu et al. (2025), Zhu et al. (2025), Cleaver (2025), L. Chen et al. (2025), López-Zamora et al. (2025), Pihlaja et al. (2025), Kunz & Oeri (2025), Levantini et al. (2025), Tinnes-Vigne et al. (2025), Carpendale et al. (2025), Klemp et al. (2025), W. Yang et al. (2025), Waly et al. (2025), Way & Taffe (2024), Ahufinger et al. (2025), Deniz et al. (2025), Yu et al. (2025), Franchino-Olsen et al. (2025), Pan et al. (2025).

Cluster 5. Spiritual Development		
Cluster	**Research Areas**	**Citations**
1	Cognitive-emotional well-being	Emirza & Gürhan (2025); Fitzgerald & Berthiaume (2022); Kaur Bhatia & Vyas (2023); Moosavi et al. (2024); Polemikou & Da Silva (2022); Safara et al. (2023).
2	Spiritual dimension and ethical development	Akrim & Junaidi (2021); Chan, 2020; Darkembayeva et al. (2023); Iles-Caven et al. (2022); Montreuil et al. (2020); Polemikou & Da Silva (2022); Sztychmiler (2021).

Own elaboration (2025).

Finally, after identifying the main topics addressed in the scientific literature on child development, a research agenda is presented below that gives continuity to the systematized findings. Table 6 organizes this agenda according to the five dimensions: cognitive, bodily, social, affective, and spiritual, and proposes relevant, emerging, or still little-explored lines of study, which could be considered in future research.

Table 6. *Research agenda*

Dimension	Theme	Reference/DOI
Cognitive	The impact of digital technology on cognitive and linguistic development.	10.3390/children12010012
	Understanding of the precise mechanisms that link physical health in childhood with cognitive and social development.	10.1016/j.dcn.2024.101414
	Interactions between social and environmental factors in child development, to understand their impact on physical and mental health.	10.1016/j.dcn.2023.101287
	The emotional quality of interactions and emotional responses in brain synchronization.	10.1093/scan/nsac061.
	Quality Neuroscience Trainings in Early Childhood Educator Training and Training	10.1016/j.tine.2025.100247
Corporal	To evaluate complementary feeding practices in children under two years of age and their relationship with psychomotor development, considering cultural and socioeconomic variables.	10.1016/j.cegh.2023.101456
	Develop specific intervention programs that promote physical activity and the development of motor skills, with the aim of evaluating their direct impact on inhibitory control and other executive functions in preschool children.	10.1186/s12887-025-05475-1

	Explore the social, environmental, family, and school factors that influence motor competence levels, to identify barriers and facilitators that can be addressed in future interventions.	10.1123/jmld.2024-0010
	To explore the neurobiological and psychological mechanisms underlying appetite regulation and its influence on weight, helping to design personalized approaches to the prevention and treatment of childhood obesity.	10.1038/s41598-025-90786-7
	To design educational interventions for parents based on findings on beneficial practices (such as floor play) and measure their longitudinal impact on child motor development.	10.1016/j.infbeh.2024.101965
Social	To study the impact of social-emotional relationships on early childhood development.	10.59155/is.v7i4.237
	To explore theoretical models and strategies to strengthen social and interpersonal management in childhood.	10.31908/EUCP.63.C625
	To examine how social relationships influence children's emotional regulation and psychological well-being.	10.31908/EUCP.63.C625
	To delve into the needs of children with intellectual disabilities to relate socially.	10.18359/reds.1554
Affective	To investigate how flexibility in emotional regulation develops in various social contexts.	10.1111/SODE.12791
	To assess the effectiveness of interventions that improve parental reflective skills.	10.1186/s40359-025-02627-x
	To investigate the relationship between parental stress and child development in crisis contexts.	10.1186/s40359-025-02575-6
	Assess other factors that might influence the relationship between parental stress and child development, such as marital conflict.	10.1016/j.paid.2025.113165
	Investigate the different types of content consumed on screens and their impact on children's behaviour and mental health.	10.1016/j.jad.2025.03.030
Spiritual	Monitoring the intergenerational transmission of spirituality	10.1177/0022167820938612
	Review of the impact of spiritual development programs on children's emotional well-being.	10.32598/JRH.14.4.2184.1

Own elaboration (2025).

CONCLUSIONS

The present bibliometric study allowed us to identify a sustained decrease in scientific production in this field, although with an outstanding participation of authors and institutions from countries such as the United States, the United Kingdom and Canada, with high-impact specialized journals such as *Child Development* and *Developmental Psychology*.

In the thematic area, studies were addressed around the neurobiology of cognitive development, emotional regulation, early social relationships, motor competence and spiritual well-being. Particularly relevant was the inclusion of the spiritual dimension, usually little addressed in the different studies, which represents a significant contribution to the holistic understanding of child development considering the evidence of its contribution to the integral development of children.

The interpretation of these results highlights the need to continue advancing in integrative research models, which recognize the interaction between biological, psychosocial, cultural and ethical factors. Likewise, it was evident that there is a need for more studies of this type in institutional contexts considering the impact of educational agents and the time that children remain under their influence.

Among the main implications, the importance of training teachers and professionals of childhood from a more holistic perspective in topics such as developmental neuroscience, emotional regulation, and spiritual development from a non-denominational perspective, but significant at the pedagogical level, is highlighted. In addition, it is recommended to promote spaces for observation and intervention strategies that simultaneously consider the physical, mental, social, and spiritual health of children, in line with the most recent findings.

However, the study has some limitations, firstly, it focused on the Scopus database, which could have excluded relevant studies indexed in other sources. Second, by focusing on publications mostly in English, it may not reflect in a representative way the academic production of Spanish-speaking countries or other regions. Finally, the bibliometric analysis offers a valuable quantitative vision and does not delve into methodological or philosophical aspects of the studies analyzed.

Regarding the methodological aspect, it is proposed to consider comparisons between databases for new bibliometric studies, in the same way, to encourage qualitative research that explores the less studied dimensions such as the spiritual. Finally, consider the research agenda proposed in this study.

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