

Gross Motor Skills in Early Grade Students: A Bibliometric Study

Yesica Rosario Felices-Rojas^{1*}, Selene del Carmen Alcantara-Teves², Andrea Angelica Donayre-Revatta³, María del Carmen Ayala-Chacaltana⁴, Herlinda Liliana Vásquez-Arones⁵, Nathaly Rosmery Gomez-Mejía⁶

^{1,2,3,4}University Cesar Vallejo, Lima, Perú; E-mail: yfelices@ucvvirtual.edu.pe

^{5,6}University San Luis Gonzaga de Ica, Ica, Perú

Abstracts: Gross motor skills refer to fundamental motor skills such as running, walking, crawling, jumping and catching. This domain requires adequate coordination of muscular, skeletal and nervous system activity. The objective was to perform a bibliometric analysis of the literature indexed in Scopus on gross motor skills in students of the initial level, between 2003 and 2023. Methodologically, it was a quantitative bibliometric study. The scientific production indicators were generated from 498 documents selected from Scopus using keywords in English ("gossip", "motor", "skills", "childhood"). From 2016 to 2022, published papers increased (66.1%), indicating a growing interest in the subject of study. The United States is the country with the most scientific production (21.3%; n=157), and the University of Wollongong in Australia, has the most publications (n=21). The International Journal of Environmental Research and Public Health published 24 papers, while the most cited was Developmental Medicine and Child Neurology with 707 citations, with author Goodway, J.D. (n=10 papers) being the most cited (n=682). From the studies analyzed, it is concluded that the early stages of a child's life are vital for the growth of gross motor skills, which in turn fosters the acquisition of knowledge, independence and confidence. Consequently, early learners can benefit from physical activity, as it helps them refine their motor skills by giving them the opportunity to work on balance, control and coordination.

Keywords: Gross Motor Skills, Students, Early Education, Scientific Production.

1. INTRODUCTION

Humans depend on their ability to move to achieve many of the most fundamental survival goals, such as exploration of the environment around them, social connection and language, as a means to form relationships with others and socialize (Andrey-Bernate & Tarzona-Buitrago, 2020; Murcia & Corvetto, 2021).

In that order of ideas, according to Landa et al. (2023), a person's motor skills, which have been developing since childhood, include the ability to perform a wide range of actions, from the simplest to the most complex. Thus, coordination of the body with thought or reason includes precise movements, for which gross motor skills are a prerequisite (Garcia et al., 2021). The body, in other words, will move of its own volition (Osorio-Rivera et al., 2019).

Coupled with this, the ability to regulate specific movements arises from the development of motor skills unique to the child, which is a crucial part of the maturation process (Simbaña-Haro et al., 2022). Consequently, motor control is centered in the thalamus and subthalamus, which also provide coordination capabilities and adequate body mass functionality (Agrela, 2022).

Gross motor skills, on the other hand, encompass any process that requires the use of the body, including, among others, the following actions: coordination and laterality, a high level of balance, as well as the synchronization that exists when performing movements of large bone, muscle and nerve groups, daily activities of children (León et al., 2021; Mamani et al., 2019).

In recent decades, the importance of early education for the overall growth and development of the child has been recognized and included in the design of educational institutions (Alonso & Pazos, 2020). Therefore, it is crucial to incorporate physical education in early education as a means to foster the growth of gross motor skills and the opportunity for bodily expression, on the basis that its potential as a pedagogical tool is justified by the importance given to the physical and motor development of the whole child (Bernate, 2021; Navarro & Zambrano, 2021).

On the other hand, Piña et al. (2020) demonstrate that gross motor skills can be greatly improved in children if they participate in a program of moderately active play activities. Human beings grow and change throughout their lives, and physical activities cater to all these stages of growth (Ramírez-Aguirre et al., 2021). Furthermore, it should be noted that physical education plays a crucial role in the development of children because it fosters the acquisition of motor skills, attitudes, abilities and attitudes, through the repeated practice of playful activities and tactics that involve the use of body movements created by the voluntary action of muscle tissue (Rodríguez et al., 2020).

Given the importance of the topic, several investigations have been conducted to explore the fundamentals associated with gross motor development at the early level involving physical education (Álvarez & Pazos, 2020; Gavilanes et al., 2023). Because it fosters growth in all the key domains that together make up the child's mind and body, motor maturity serves as a foundation for overall comprehensive development.

On the other hand, bibliometrics refers to the practice of calculating and evaluating quantitative data on literary works and other published materials (Caló, 2022). In other words, bibliometric analysis helps researchers to track the evolution of scientific writings, to make inferences about the importance of works and, most importantly, to allocate available resources wisely (Leyva et al., 2023). In addition, it is used for databases containing scientific data in order to provide reliable details about the results and procedures involved in scientific discovery (Sanz, 2022). Thus, to quantify the results of the metric analysis of scientific production related to this topic or to various fields of study, bibliometric indicators are developed (Escandon & Rondan, 2021; Pimenta et al., 2020).

According to Arufe-Giráldez et al. (2021), movement is considered a means of expression, connection and communication, and as such, motor skills are crucial for comprehensive character formation, as play helps children grow cognitively, emotionally and socially alongside their physical development. According to Vélez and Triviño (2022), motor education is important for children, since it favors the acquisition and growth of psychomotor aptitudes, abilities, habits and skills that favor complete, harmonious and integral growth in the early stages of life.

Therefore, in order to better explain and portray the academic community's understanding of students' gross motor patterns, it is necessary to categorize the material according to publication, country, subject area, type of document, source and authorship. Based on this premise, the study aims to conduct a bibliometric analysis of the literature indexed in Scopus on gross motor skills in early childhood students, between 2003 and 2023.

2. MATERIEL AND METHODS

The academic production on the topic of gross motor skills of pre-school students was analyzed using bibliometric methods. Bibliometrics was used to collect the data and perform the analysis of the information, which produced qualitative and quantitative results (Salinas and García, 2022). Additional information was extracted from Elsevier's Scopus database, which includes international publications from the last twenty years (2003-2023).

Subsequently, the information was selected based on its abstract, title or keywords using the search formula ("gossip" AND "motor" AND "skills" AND "childhood") (Ferreira et al., 2021; Wang et al., 2023). Filters were also developed from the collected information. After applying filters based on different descriptors, such as year of publication (2003-2023) and document type, the relevant metadata were extracted. Using this method, a total of 580 records were collected, from which a representative sample of 498 documents could be extracted after eliminating duplicates and normalizing the metadata.

Finally, the frequency of recurrence of specific terms was analyzed by running a keyword co-occurrence analysis on the data collected from the scientific production. This work employs a quantitative bibliometric analysis of the academic literature on gross motor skills in early learners at the global level (Florez-Fernández & Aguilera-Egua, 2020) to determine: the year of publication of the document, its source or journal, its country of origin, authors, type of document, subject area and institutional affiliation of the most influential authors in this field. VOSviewer V_1.6.19 was also used to view the co-occurrence and source density map data, while Excel was used to compile and evaluate the descriptive statistics.

3. RESULTS AND DISCUSSIONS

For the bibliometric analysis, 498 articles were selected from Scopus, all focused on gross motor skills in early learners and published between 2003 and 2023. Figure 1 shows an annual increase of 66.1%, or 329 additional scientific papers, in output between 2016 and 2022. In addition, 2020 was the year with the most publications (n=60, 12%) worldwide.

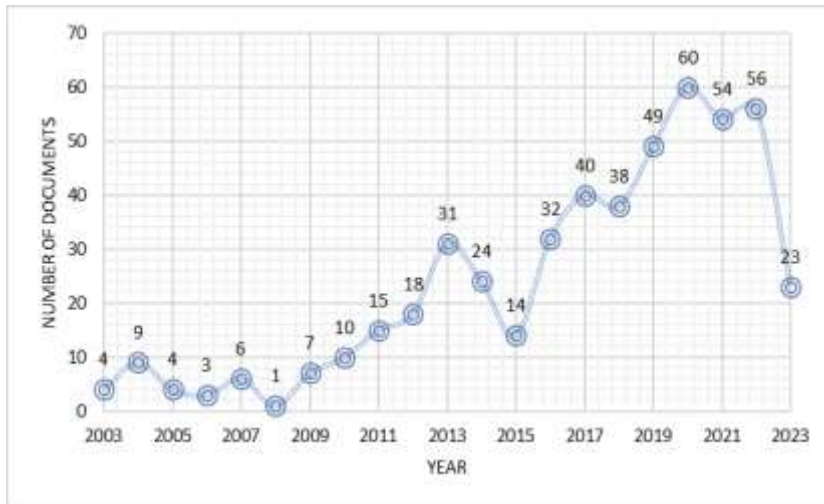


Figure 1. Papers published by year.

Table 1 summarizes the contribution of 73 countries to scientific production, focusing on the nations that have published the most relevant research on the topic studied. In terms of the number of articles published, the United States ranks first (21.3%; n=157), followed by Australia (10%; n=74) and Brazil (6.2%; n=46). Likewise, most of the papers are published in English (97%), and only 3% in Spanish or Portuguese.

Table 1. Publication of papers by country.

N°	Country	Number of documents	%	N°	Country	Number of documents	%
1	United States	157	21.3%	18	Sweden	11	1.5%
2	Australia	74	10.0%	19	France	9	1.2%
3	Brazil	46	6.2%	20	Japan	9	1.2%
4	Canada	45	6.1%	21	Finland	8	1.1%
5	United Kingdom	43	5.8%	22	India	8	1.1%
6	China	22	3.0%	23	South Korea	7	0.9%
7	Italy	21	2.8%	24	Switzerland	7	0.9%
8	Spain	21	2.8%	25	Turkey	7	0.9%
9	Belgium	19	2.6%	26	Chile	6	0.8%
10	Netherlands	19	2.6%	27	Ireland	6	0.8%
11	South Africa	18	2.4%	28	Israel	6	0.8%
12	Portugal	17	2.3%	29	New Zealand	6	0.8%
13	Norway	13	1.8%	30	Poland	6	0.8%
14	Germany	12	1.6%	31	Greece	5	0.7%
15	Hong Kong	12	1.6%	32	Colombia	4	0.5%
16	Iran	12	1.6%	33	Undefined	71	9.6%
17	Denmark	11	1.5%	Total countries		73	

This study uses information extracted from 140 academic sources as a source of data. Table 2 lists the main journals that published the most papers on this topic. The International Journal of Environmental Research and Public Health published the most papers (n=24), followed by BMC Pediatrics (n=15), Journal of Motor Learning and Development (n=14), Research in Developmental Disabilities (n=12) and Research Quarterly for Exercise and Sport

(n=11). Similarly, U.S. journals tend to be among the most influential in the world; the vast majority rank in the top two quartiles of the impact factor.

Table 2. Publication of documents by source or journal.

Source or Magazine	Number of documents	Source or Magazine	Number of documents	Source or Magazine	Number of documents
International Journal of Environmental Research and Public Health	24	Archives of Physical Medicine and Rehabilitation	5	Pediatrics	4
BMC Pediatrics	15	Brain and Development	5	Adapted Physical Activity Quarterly	3
Journal of Motor Learning and Development	14	Children	5	Early Childhood Education Journal	3
Research in Developmental Disabilities	12	Early Child Development and Care	5	Gait and Posture	3
Research Quarterly for Exercise and Sport	11	Perceptual and Motor Skills	5	JAMA Network Open	3
Developmental Medicine and Child Neurology	10	Plos One	5	Journal of Pediatric Rehabilitation Medicine	3
Journal of Science and Medicine in Sport	10	BMC Public Health	4	Journal of Physical Activity and Health	3
Developmental Neurorehabilitation	8	European Journal of Paediatric Neurology	4	Journal of Physical Education Maringa	3
Frontiers in Psychology	8	Frontiers in Psychiatry	4	Medicine and Science in Sports and Exercise	3
Child Care Health and Development	7	International Journal of Behavioral Nutrition and Physical Activity	4	Nutrients	3
Frontiers in Pediatrics	7	International Journal of Pediatric Obesity	4	Retos	3
BMJ Open	6	Journal of Paediatrics and Child Health	4	Undefined	137
Physical Education and Sport Pedagogy	6	Journal of Sports Sciences	4	Total Source	140

Using data from the five most cited journals in the world, Figure 2 plots the evolution of research on gross motor skills in pre-school children. The publication of academic papers in the International Journal of Environmental Research and Public Health has remained constant since 2014, with the maximum number of publications occurring in 2020 (n=8). Also, between 2012 and 2022, 15 scholarly papers were published in BMC Pediatrics, with 2020 being the year with the highest number of published papers (n=3).

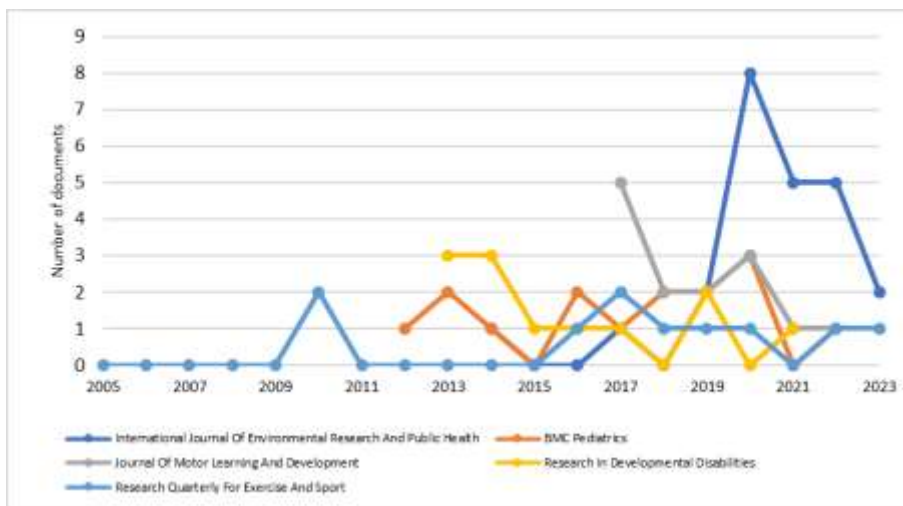


Figure 2. Publication of documents in major sources

A literature clustering analysis was performed using the data from the selected sources to identify the clusters of publications (Figure 3). Five major clusters emerge from this analysis: the first focuses on the source Developmental Medicine and Child Neurology (707 citations), the second on Research Quarterly for Exercise and Sport (671 citations), the third on the source Journal of Science and Medicine in Sport (417 citations), the fourth on Research in Developmental Disabilities (300 citations), and the fifth focus on the source Journal of Motor Learning and Development (236 citations). In other words, the analysis of bibliographic citations shows a strong connection between highly cited papers published in the same journals and primary sources.

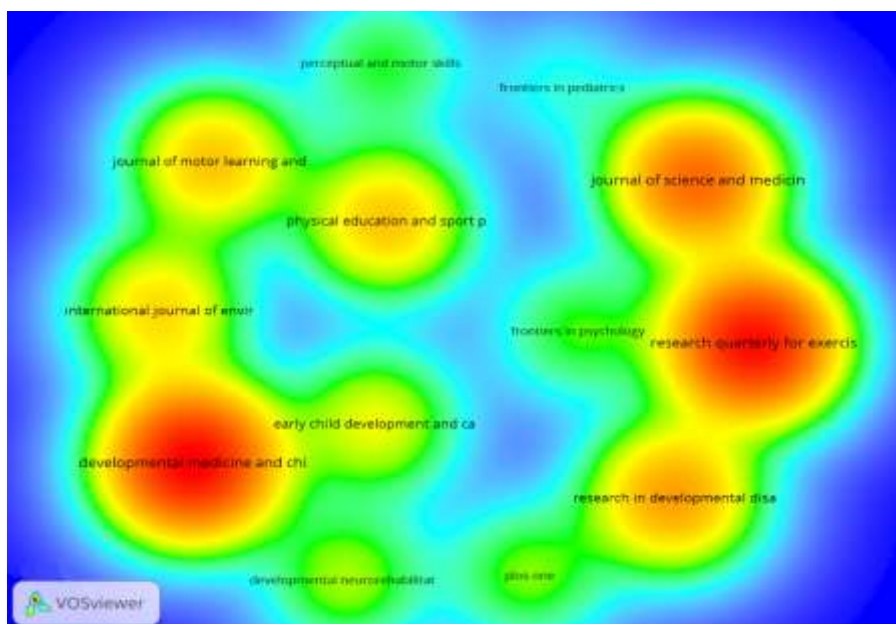


Figure 3. Source or journal clustering density map.

The 498 research papers were the result of collaboration among scholars from 150 institutions. Figure 4 shows that, during the specified study period, the highest number of research papers on gross motor skills of early learners was published by the University of Wollongong (n=21) in Australia, followed by Deakin University (n=18) and finally the University of Queensland (n=17). While the University of South Carolina produced 16 papers respectively, compared to the University of São Paulo and the University of Sydney with 14 scientific publications respectively.

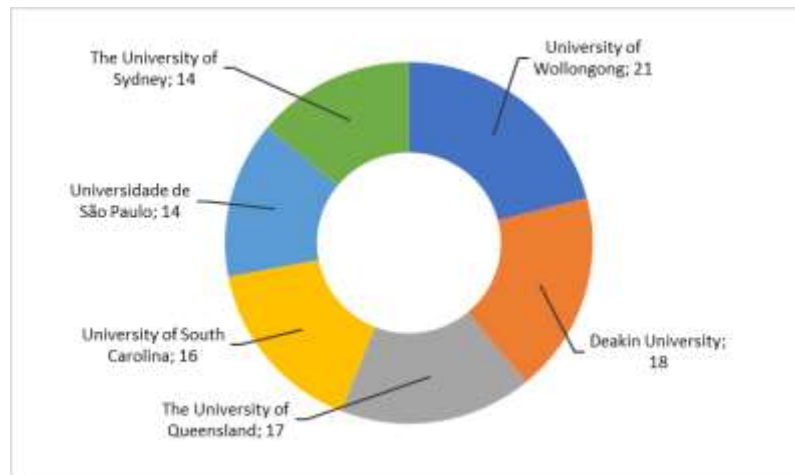


Figure 4. Papers published by institution.

A total of 140 authors from 150 different institutions participated in the papers. Table 3 shows that Okely, A.D. is the researcher with the most scientific publications (n=14). It also shows that Brian, A. and Jones, R.A. have 11 scientific papers each. While Goodway J.D. and Temple V.A. each have ten papers in their name.

Table 3. Papers published by author.

By author	Quantity	Total citations	By author	Quantity	Total citations
Okely, A.D.	14	406	Lenoir, M.	6	535
Brian, A.	11	236	Naylor, P.J.	6	126
Jones, R.A.	11	262	Robinson, L.E.	6	271
Goodway, J.D.	10	682	Stodden, D.F.	6	152
Temple, V.A.	10	193	Veldman, S.L.C.	6	206
Barnett, L.M.	9	507	Boyd, R.N.	5	90
Draper, C.E.	8	131	Crane, J.R.	5	110
Cattuzzo, M.T.	6	82	Hinkley, T.	5	112

In addition to the study of publications by author, Figure 5 shows the most cited authors in the field of gross motor skills of early learners: Goodway, J.D. tops the list with 682 references. While Lenoir, M. (n=535), Barnett, L.M. (n=507) and Okely, A.D. (n=406), receive a significant number of citations in published works. Robinson, L.E. (n=271) is the fifth most cited author.

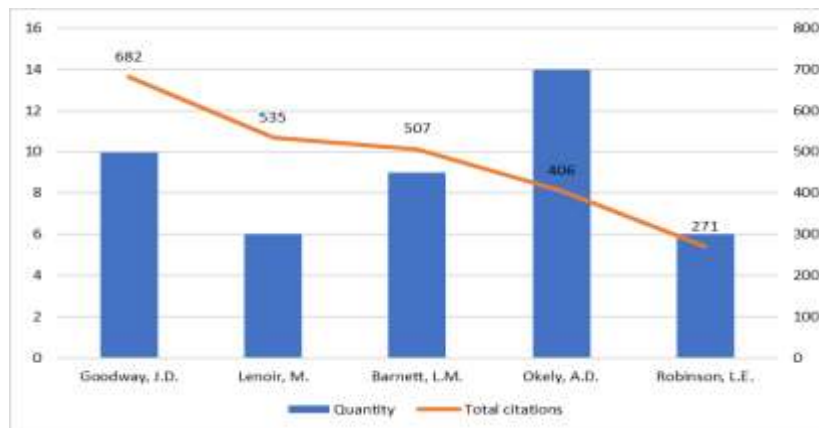


Figure 5. Most cited papers by author.

Table 4 shows all the papers published throughout the research period (2003-2023) dealing with gross motor 1048

skills in early childhood education students, organized thematically and by type of publication. The results show that, out of a total of 20 different thematic areas, the combined bibliographic production in the fields of medicine and psychology represents 57% of the overall total.

Table 4. Publication of documents by thematic area and type.

By area	Quantity	%
Medicine	374	44%
Psychology	107	13%
Neuroscience	104	12%
Social Sciences	67	8%
Health Professions	55	6%
Biochemistry, Genetics and Molecular Biology	42	5%
Environmental Science	28	3%
Nursing	28	3%
Arts and Humanities	9	1%
Multidisciplinary	7	1%
Other areas	28	3%
Total	849	100%
By type	Quantity	%
Article	485	97.4%
Book Chapter	12	2.4%
Book	1	0.2%
Total	498	100%

Likewise, Figure 6 shows the proportion of scientific production that goes to medicine (44%), psychology (13%) and neuroscience (12%). Furthermore, when the production is analyzed in terms of the different types of documents created, it can be seen that scientific articles account for most of the production (97.4%), followed by book chapters (2.4%) and books (0.2%).

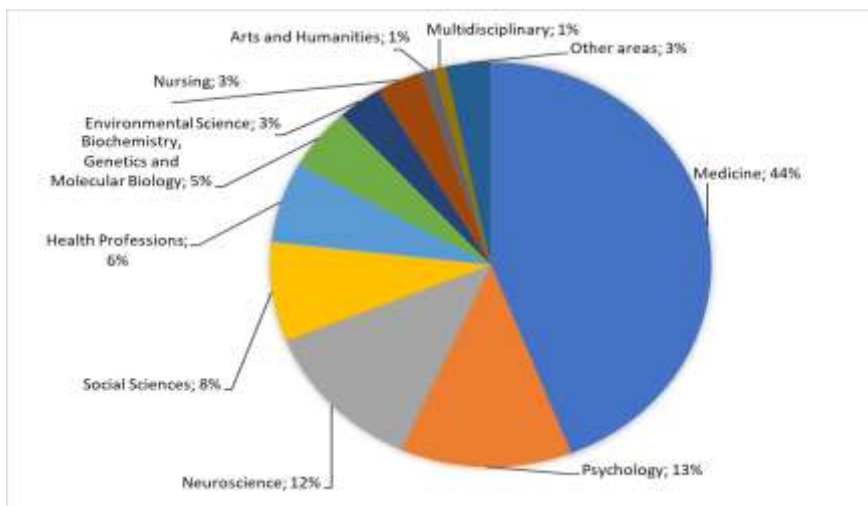


Figure 6. Publication of documents by subject area.

Selecting terms appearing more than five times in the title, keywords, and abstract fields yielded the data shown in Figure 7. Each color was assigned to a set of conceptually related words based on their degree of linkage estimated using VOSviewer.

- Red cluster. "motor skills" (n=231 occurrences), clusters the following words: physical activity, children, body mass, schoolchild, body mass index, cross-sectional studies, motor activity.

- Yellow cluster. "motor development" (n=175 occurrences), is associated with the words: gross motor test, childhood, child health, controlled study, early childhood.
- Blue cluster. "child development" (n=141 occurrences), is associated with the words: age, infant, age factors, developmental disorder, newborn, developmental disorder.
- Green cluster. "gross motor function" (n=123 occurrences), refers to a cluster of related words including: cognition, psychology, motor disorders, motor dysfunction, pathophysiology, infant disease.

The groupings reveal that the most frequently used terms are closely related to the area of research.

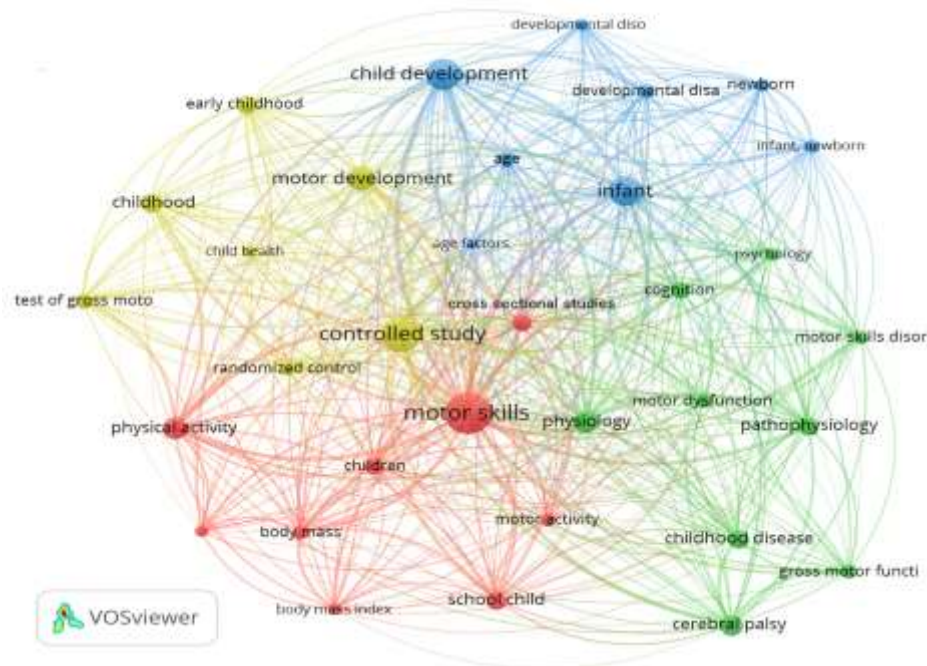


Figure 7. Map of keyword co-occurrence.

The results reveal that there is an upward trend in the number of academic papers published each year on the topic of gross motor skills in early learners, with the highest total number of publications in 2020, 2021, and 2022 (n=170; 34%). According to Villacis (2023), he notes that in recent years there has been an increase in the number of academic papers addressing this topic. This is because research has demonstrated the importance of motor education adopting a holistic and systemic approach in its study of human movement, paying attention to the growth of the interpersonal, communicative, expressive and operative aspects of character, as an integral element of being, doing and relating (Pinargote et al., 2019).

On the other hand, the University of Wollongong, was the most productive academic institution in terms of development, with 21 total publications. In addition, the United States leads the world scientific production, with 21.3%, with English being the main language of almost all publications (97%). Also, the author with the most published papers was Okely, A.D. (n=14), however, the author with the most citations (n=682) was Goodway, J.D., of The Ohio State University. Also, it was evident that most of the articles were published in the journals: International Journal of Environmental Research and Public Health (n=24) and BMC Pediatrics (n=15). However, the most influential and cited publications were Developmental Medicine and Child Neurology (n=707) and Research Quarterly for Exercise and Sport (n=671).

According to Dominguez et al. (2022), they argue that without international cooperation, no progress can be made in advancing the momentum of academia. Thus, the development of motor skills is crucial, as doing so results in the growth of mental, physical, and spiritual faculties as a result of the rational practice of activities (Elles et al.,

2021). The academic world benefits from this because experiences and experiences are a very important source of learning, so the priority assigned to the body in the school context can be analyzed (Ochoa-Martínez et al., 2020). Therefore, it is essential that children have the opportunity to relate to their bodies at school through gross motor practice, so that school is not only a place where information is transmitted, but also where ideas are generated and shared (Chicaiza et al., 2023).

Likewise, interdisciplinarity is observed in fields such as psychology, neuroscience, social sciences, health professions, among others, but the papers studied here stand out in the field of medicine. In addition, 97.4% of all the papers produced were scientific articles. The most used keyword in this study is "motor skills"; however, other keywords such as "motor development", "child development", and "gross motor function" do not stray too far from what was explored by the authors.

Therefore, motor skills are crucial because they foster students' motor activity, allowing them to fully develop in all their fundamental movement patterns, in the domains of motor control, lateral thinking, object handling, and balance (Rodríguez et al., 2019). This will lay the foundation for children to develop the skills they will need in the future. In general, the subject of motor skills should focus on developing students' fundamental motor skills and their full range of perceptual-motor abilities, while maintaining a link to the intellectual and affective dimensions (Rapray et al., 2021; Gutiérrez et al., 2023). Therefore, it is imperative that educational centers place greater emphasis on the teaching of motor skills, as they should form the basis of initial education (Caiza et al., 2023).

Finally, the keywords around gross motor skills in students point towards a multidisciplinary strategy, as evidenced by applications in medicine, neuroscience, genetics and molecular biology, nursing, arts and humanities, among others (Valdivia-Loro & Sánchez-Justo, 2023; Sanipatin & Delgado, 2022; Jiménez & Romero, 2019). Consequently, the co-occurrence network provides a graphical representation of the core ideas shared by all relevant papers and disciplines in the form of clusters (Castillejo et al., 2023).

CONCLUSIONS

Consistent with the objective of the study, a bibliometric analysis of papers indexed in Scopus from 2003 to 2023 worldwide found that research on the gross motor skills of entry-level students increased exponentially between 2016 and 2022 (accounting for 66.1%, or n=329). In addition, the United States also accounts for 21.3% (157 publications) of all scientific output from 73 countries.

In addition, the International Journal of Environmental Research and Public Health has published more articles than any other journal (n=24). The University of Wollongong, meanwhile, has produced a total of 21 academic papers. Meanwhile, Okely, A.D. is the author with the most scientific publications on gross motor skills in students (n=14), while the most cited was Goodway, J.D. (682 citations). It was also observed that most of the papers were scientific articles (97.4%), in the field of medicine (44%), psychology (13%) and neuroscience (12%). In addition, a keyword analysis using the VOSviewer tool revealed that "motor skills" was the most frequent term (n=231 occurrences).

From the analysis of the 498 documents that make up the study sample, it is concluded that the development of gross motor skills in early childhood is crucial for the discovery of the environment, exploration, confidence and self-esteem. It is also a determinant of the good functioning of fine motor skills in later stages. Consequently, early learners can benefit from early physical activity, as it fosters the development of motor skills and abilities by providing opportunities to practice balance, control, and coordination of their bodies.

REFERENCES

- [1] Agrela, F. (2022). Regiones de la vida: núcleos de la base y sistema límbico. *Ciencia Latina Revista Científica Multidisciplinar*, 6(2), 3367-3382. https://doi.org/10.37811/cl_rcm.v6i2.2098
- [2] Alonson, Y., & Pazos, J. (2020). Perceived importance of motor skills in early childhood education in schools in Vigo (Spain). *Educ. Pesqui.*, São Paulo, 46, 1-46. <https://www.scielo.br/j/ep/a/B6szgJmpzFrXXpdgvxsZ8ht#>

- [3] Álvarez, Y., y Pazos, J. (2020). Importancia percibida de la motricidad en Educación Infantil en los centros educativos de Vigo (España). *Educação e Pesquisa*, 46(1), 1-16. <http://dx.doi.org/10.1590/s1678-4634202046207294>
- [4] Andrey-Bernate, J., & Tarazona-Buitrago, L. (2020). Revisión Documental de la Importancia de la Motricidad en el ámbito humano. *Ciencia y Deporte*, 6(1), 17-32. <https://dialnet.unirioja.es/servlet/articulo?codigo=8441599>
- [5] Arufe-Giráldez, V., Pena, A., & Navarro, R. (2021). Efectos de los programas de Educación Física en el desarrollo motriz, cognitivo, social, emocional y la salud de niños de 0 a 6 años. Una revisión sistemática. *Sportis. Scientific Journal of School Sport Physical Education and Psychomotricity*, 7(3), 448-480. <https://ruc.udc.es/dspace/handle/2183/30082>
- [6] Bernate, J. (2021). Educación física y su contribución al desarrollo integral de la motricidad. *Podium. Revista de Ciencia y tecnología en la Cultura Física*, 16(2), 643-661. http://scielo.sld.cu/scielo.php?pid=S1996-24522021000200643&script=sci_arttext
- [7] Caiza, J., Luje, M., & Bravo, J. (2023). Actividades lúdicas para el desarrollo de la motricidad gruesa y equilibrio dinámico en el nivel inicial. *Revista Dilemas Contemporáneos*, 3(26), 1-21. <https://doi.org/10.46377/dilemas.v10i3.3612>
- [8] Caló, L. (2022). Métricas de impacto y evaluación de la ciencia. *Rev Perú Med Exp Salud Pública*, 39(2), 236-240. <https://www.scielo.org/pdf/rpmesp/2022.v39n2/236-240/es>
- [9] Castillejo, R., Rodríguez, H., Vallejo, M., & Feriz, L. (2023). Niveles de desarrollo de la expresión corporal y motricidad, en la Educación Inicial modalidad virtual. *Podium. Revista de Ciencia y Tecnología en la Cultura Física*, 18(1). http://scielo.sld.cu/scielo.php?pid=S1996-24522023000100008&script=sci_arttext
- [10] Chicaiza, D., Bayas, R., Sandoval, F., & Paz, B. (2023). Guía didáctica de actividades lúdicas para el desarrollo de la motricidad gruesa en el primer año de educación básica. *Polo del Conocimiento*, 8(7), 219-239. <https://polodelconocimiento.com/ojs/index.php/es/article/view/5783>
- [11] Domínguez, L., Barcala, R., Peixoto, L., Rico, J. (2022). Factores que influyen en la motricidad gruesa de niños y niñas con discapacidad visual: revisión de la literatura. *Sportis. Scientific Journal of School Sport, Physical Education and Psychomotricity*, 8(1), 40-59. <https://ruc.udc.es/dspace/handle/2183/30096>
- [12] Elles, E., García, A., Hernández, D., Mallarino, J., & Álvarez, L. (2021). Juegos motores para desarrollar la motricidad gruesa de niños (8-10 años) futbolistas. *Lecturas: Educación Física y deportes*, 26(277), 47-59. <https://efdeportes.com/efdeportes/index.php/EFDeportes/article/download/2519/1404?inline=1>
- [13] Escandon, J., & Rondan, M. (2021). Desarrollo de habilidades y destrezas mediante juegos motrices en futbolistas de 8 a 10 años. *Revista Electrónica Formación y calidad educativa*, 9(1), 270-288. <http://refcale.uleam.edu.ec/index.php/refcale/article/view/3323>
- [14] Ferreira, T., Figueiredo, T., Bick, M., Ferreira, T., Mello, S., & Cardoso, C. (2021). Opportunities in child motor development at home: bibliometric and scientometric review. *Journal of Human Growth and Development*, 31(1), 125-144. http://pepsic.bvsalud.org/scielo.php?pid=S0104-12822021000100014&script=sci_arttext
- [15] Florez-Fernández, C., & Aguilera-Eguía, R. (2020). Indicadores bibliométricos y su importancia en la investigación clínica. ¿Por qué conocerlos? *Revista de la Sociedad Española del Dolor*, 26(5), 315-316. https://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1134-80462019000500012
- [16] García, M., Vera, J., & Vargas, M. (2021). Kinestesia para el desarrollo de motricidad fina en niños de 7 años de la E.B.F. Clemencia Coronel de Pincay Ecuador. *Ciencia y Educación*, 2(1), 25-32. <https://cienciayeducacion.com/index.php/journal/article/view/62>
- [17] Gavilanes, M., Ponce, K., González, L., & Nieve, O. (2023). Importancia de la educación física para potenciar la motricidad gruesa en la educación inicial. Una recopilación teórica. *Lecturas: Educación Física y Deportes*, 28(300), 147-169. <http://www.efdeportes.com/efdeportes/index.php/EFDeportes/article/view/3857/1842>
- [18] Gutiérrez, V., Arroba, G., Ballesteros, T., & Sánchez, I. (2023). El arenero: un recurso didáctico para el desarrollo de la motricidad gruesa en la educación inicial. *Conciencia Digital*, 6(14), 179-201. <https://cienciadigital.org/revistacienciadigital2/index.php/ConcienciaDigital/article/view/1993>
- [19] Jiménez, G., & Romero, C. (2019). Fortalecimiento de la motricidad gruesa en espacios cerrados. *Revista Tecnológica Ciencia y educación Edwards Deming*, 3(2), 1-14. <https://www.revista-edwardsdeming.com/index.php/es/article/view/32>
- [20] Landa, D., Chilibuina, G., Arroba, G., & Ballesteros, T. (2023). Juegos lúdicos para mejorar la motricidad gruesa en niños de 4 y 5 años. *Conciencia Digital*, 6(14), 489-505. <https://cienciadigital.org/revistacienciadigital2/index.php/ConcienciaDigital/article/view/2010>
- [21] León, A., Mora, A., & Tovar, L. (2021). Fomento del desarrollo integral a través de la psicomotricidad. *Dilemas Contemporáneos: educación, política y valores*, 9(1). https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S2007-78902021000700033
- [22] Leyva, I., Rodríguez, E., Vázquez, M., & Ávila, E. (2023). Indicadores bibliométricos y métricas alternativas en la evaluación de la producción científica. *REDINFOHOL*, 1-13. <https://redinfohol.sld.cu/index.php/redinfohol/2023/paper/view/34/31>
- [23] Mamani, D., Laque, G., & Mamani, N. (2019). Programa de aprendizaje de gimnasia básica para niñas del nivel inicial. *Revista Innova Educación*, 1(1), 57-65. <https://dialnet.unirioja.es/servlet/articulo?codigo=8054535>
- [24] Murcia, N., & Corvetto, G. (2021). Motricidad y corporeidad como relaciones basadas en el desarrollo de lo humano. *Cinta de Moebio*, (70), 55-67. https://www.scielo.cl/scielo.php?pid=S0717-554X2021000100055&script=sci_arttext
- [25] Navarro, E., & Zambrano, Z. (2021). Mejora de las habilidades motrices gruesas mediante la actividad física de base cinestésica y contemporánea en la enseñanza inicial. *Ciencia y Educación*, 2(1), 6-17. <https://cienciayeducacion.com/index.php/journal/article/view/60>
- [26] Ochoa-Martínez, P., Hall-López, J., Piña, D., Alarcón, E., & Zúñiga, U. (2020). Análisis comparativo del grado de desarrollo de la coordinación motriz en niños y niñas de educación preescolar. *Cultura, Ciencia y deporte*, 15(44), 277-283. <https://dialnet.unirioja.es/servlet/articulo?codigo=7427868>

- [27] Osorio-Rivera, V., Pallares, M., Chiva, O., & Capella, C. (2019). Efectos de un programa de actividad física integral sobre la motricidad gruesa de niños y niñas con diversidad funcional. *Revista Lasallista de Investigación*, 16(1), 37-46. http://www.scielo.org.co/scielo.php?pid=S1794-44492019000100037&script=sci_arttext
- [28] Pimenta, R., Silva, L., Bianco, C., Camaroto, M., & Neto, F. (2020). Produção científica em avaliação motora: análise bibliométrica sobre a utilização da Escala de Desenvolvimento Motor. *Revista Educação Especial*, 33, 1-27. <https://www.redalyc.org/journal/3131/313162288047/313162288047.pdf>
- [29] Pinargote, A., Pinargote, L., Alcivar, A., & Rojas, J. (2019). Los espacios físicos dentro y fuera del aula y su incidencia en el desarrollo de la motricidad de los niños y niñas de educación inicial. *Tlatemoani: Revista Académica de Investigación*, 10(30), 249-269. <https://dialnet.unirioja.es/servlet/articulo?codigo=7340400>
- [30] Piña, D., Ochoa, P., Hall, J., Reyes, Z., Alarcón, E., Monreal, L., y López, P. (2020). Efecto de un programa de educación física con intensidad moderada vigorosa sobre el desarrollo motor en niños de preescolar. *Retos*, 1(38), 363-368. <https://doi.org/10.47197/retos.v38i38.73818>
- [31] Ramírez-Aguirre, G., Olivo-Solís, E., Cetre-Vásquez, R. (2021). Proceso de desarrollo psicomotor infantil desde el enfoque de la actividad física. *Polo del Conocimiento: revista científico – profesional*, 6(8), 1049-1061. <https://dialnet.unirioja.es/servlet/articulo?codigo=8094469>
- [32] Rapray, C., Ferrer, C., & López, C. (2021). Efecto del Método lúdico en el desarrollo de la motricidad gruesa en niños de una institución educativa inicial de Oxapampa-Perú. *Kolpa*, 2(1), 11-25. <https://revistas.kolpaeditores.edu.pe/index.php/iu/article/view/45>
- [33] Rodríguez, H., Torres, Z., Ávila, C., y Jarrín, S. (2020). Incidencia de la educación física en el desarrollo de la motricidad fina y gruesa de los niños. *Polo del Conocimiento*, 5(11), 482-495. <http://dx.doi.org/10.23857/pc.v5i11.1938>
- [34] Rodríguez, Y., Sánchez, N., & Porto, F. (2019). Juegos para la motricidad gruesa como parte del desarrollo integral de los niños en sexto año de vida. *Acción*, 15. <https://accion.uccfd.cu/index.php/accion/article/view/60>
- [35] Salinas, K. & García, A. (2022). Bibliometrics, a useful tool within the field of research. *Journal of Basic and Applied Psychology Research*, 3(6), 10-17. <https://doi.org/10.29057/jbapr.v3i6.6829>
- [36] Sanipatin, G., & Delgado, H. (2022). Estrategias didácticas innovadoras para el desarrollo de la motricidad gruesa en educación parvularia. *Revista Observatorio del deporte*, 8(1), 36-49. <https://revistaobservatoriodeldeporte.cl/cargar/wp-content/uploads/2022/01/4-OFICIAL-ART-VOL-8-NUM-1-ENEROABRIL-2022REVODEP.pdf>
- [37] Sanz, J. (2022). Bibliometría: origen y evolución. *Hospital a Domicilio*, 6(3), 105-107. https://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S2530-51152022000300105
- [38] Simbaña-Haro, M., González-Romero, M., Merino-Toapanta, C., & Sanmartín-Lazo, D. (2022). La expresión corporal y el desarrollo motor de niños de 3 años. *Revista Científica Retos de la Ciencia*, 6(12), 25-40. <https://retosdelacienciaec.com/Revistas/index.php/retos/article/view/385>
- [39] Valdivia-Loro, J. P., y Sánchez-Justo, L. (2023). Nivel de clasificación de la función motora gruesa en niños con parálisis cerebral de una institución pediátrica de alta complejidad en Perú. *Investigación e Innovación Clínica y Quirúrgica Pediátrica*, 1(1), 51–55. <https://doi.org/10.59594/iicqp.2023.v1n1.10>
- [40] Vélez, L., & Triviño, J. (2022). El desarrollo de la motricidad gruesa en estudiantes de 4 a 5 años de la Unidad Educativa Alajuela. *Tierra Infinita*, 8(1), 255–265. <https://doi.org/10.32645/26028131.1167>
- [41] Villacis, J. (2023). La práctica del fútbol y el desarrollo de la motricidad gruesa en niños: revisión sistemática. *Revista científica Especializada En Ciencias de la Cultura Física y del Deporte*, 20(2), 39-53. <https://deporvida.uho.edu.cu/index.php/deporvida/article/view/919>
- [42] Wang, J., Qu, S., Zhu, z., Zhao, X., Song, W., Li, X., Chen, W., & Luo, D. (2023). Global hotspots and trends in research on preschool children's motor development from 2012 to 2022: a bibliometric analysis. *Frontiers Public Health*, 11, 1-13. <https://www.frontiersin.org/articles/10.3389/fpubh.2023.1118674/full>
- [43] Kahn, M.R., Ziauddin, K., Jam, F.A., Ramay, M.I. (2010). The Impacts of Organizational Commitment on Employee Job Performance, *European Journal of Social Sciences – Volume 15, Number 3* (pp. 292-298).
- [44] Kaewsang-on R, AL-Takhayneh SK, Jam FA, Chang B-L, Pradana M and Mahmood S (2022) A three wave longitudinal study of school innovation climate and entrepreneurship teachers' acceptance to technology: Moderating role of knowledge sharing and knowledge hiding. *Front. Psychol.* 13:1028219. doi: 10.3389/fpsyg.2022.1028219

DOI: <https://doi.org/10.15379/ijmst.v10i3.1668>

This is an open access article licensed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>), which permits unrestricted, non-commercial use, distribution and reproduction in any medium, provided the work is properly cited.