






ORIGINAL

Visibility of Latin American scientific production on cognitive neurosciences

Visibilidad de la producción científica latinoamericana sobre neurociencias cognitivas

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ABSTRACT

Introduction: cognitive neuroscience is the convergence of two disciplines, neuroscience and cognitive psychology, which have provided information on the material bases of the cognitive and emotional processes of human behavior. There are currently few records of bibliometric studies on Latin American scientific production in cognitive neuroscience in SCOPUS.

Objective: to describe the behavior of the Latin American scientific production on cognitive neuroscience in SCOPUS in the years 2012 to 2022.

Methods: a bibliometric, observational, descriptive, cross-sectional study was carried out on the behavior of the scientific production in Latin America on cognitive neuroscience in SCOPUS. A search was made of the data offered by Scimago Journal & Country Rank on the publications, from the “Neurosciences” area, “Latin America” region and “Cognitive Neurosciences” category. It used the descriptive statistic.

Results: a total of 3717 documents were published. 2022 was highlighted as the year with the largest number of published documents (514). A total of 55,107 appointments were made in this period, with the highest number of appointments being made in 2016 (9,225). A total of 10,538 self-citations were made and citations per document reached their highest values in 2015 (3,685). Brazil prevailed with an h index of 98.

Conclusions: the Latin American scientific production in SCOPUS on cognitive neurosciences, during the 10 years studied, was high and growing, which predicts great results in this branch for years to come and is satisfactory considering the thousands of questions that arise every day and concern this area of knowledge.

Keywords: Bibliometrics; Cognitive Neurosciences; Latin America; Neurosciences.

RESUMEN

Introducción: la neurociencia cognitiva es la convergencia de dos disciplinas, la neurociencia y la psicología cognitiva, que han aportado información sobre las bases materiales de los procesos cognitivos y emocionales de la conducta humana. Actualmente existen escasos registros de estudios bibliométricos sobre la producción científica latinoamericana en neurociencia cognitiva en SCOPUS.

Objetivo: describir el comportamiento de la producción científica latinoamericana sobre neurociencia cognitiva en SCOPUS en los años 2012 a 2022.

Métodos: se realizó un estudio bibliométrico, observacional, descriptivo, de corte transversal acerca del comportamiento de la producción científica en Latinoamérica sobre neurociencia cognitiva en SCOPUS. Se realizó una búsqueda de los datos ofrecidos por Scimago Journal & Country Rank sobre las publicaciones, del área “Neurociencias”, región “América Latina” y categoría “Neurociencias Cognitivas”. Se utilizó la estadística descriptiva.

Resultados: fueron publicados un total de 3717 documentos. Se destacó el 2022 como el año con mayor

cantidad de documentos publicados (514). Fueron realizadas en este periodo un total de 55 107 citas, siendo el año 2016 en el que mayor cantidad de citas se hicieron (9225). Se realizaron un total de 10 538 autocitas y las citas por documentos alcanzaron sus mayores valores en 2015 (3 68.5). Predominó Brasil con un índice h de 98.

Conclusiones: la producción científica latinoamericana en SCOPUS sobre neurociencias cognitivas, durante los 10 años estudiados se mostró alta y en crecimiento, lo que pronostica grandes resultados en esta rama para años venideros y resulta satisfactorio teniendo en cuenta los miles de interrogantes que surgen cada día y atañen a esta área del conocimiento.

Palabras clave: América Latina; Bibliometría; Neurociencias; Neurociencias Cognitivas.

INTRODUCTION

Education is a science that from the beginning has been based on the classic theories that have allowed its development from a practical point of view; currently neuroscience and especially cognitive neuroscience and its contributions in the pedagogical area have opened a new door to knowledge and evolution in this area.⁽¹⁾

For the teacher, understanding how the processes of knowledge assimilation occur, concepts such as neuronal plasticity, knowing the neuronal bases of learning difficulties, the effects that environments and emotions have on learning, allows him to build a solid base for the design of more effective learning strategies that enable them to solve everyday problems in the classroom and thus optimize the pedagogical activity.^(1,2)

Cognitive neuroscience is the convergence of two disciplines, neuroscience and cognitive psychology, which have provided information on the material bases of the cognitive and emotional processes of human behavior. Other disciplines that contribute knowledge in this sense are psychophysiology, neuropsychiatry, neurology, neuropsychology, neuroimaging and genetics, among others.^(1,2) Although the contributions of cognitive neuroscience do not only concern education, it must be recognized that this has been the most benefited area.

In Latin America, during the last five years, the scientific production on neuroscience has gained an important boom; Countries such as Brazil and Mexico have become pioneers in this field of research.⁽³⁾

Bibliometrics or bibliometric studies are metrics that are currently booming. Its use for the evaluation of the scientific production of a thematic area provides information to researchers and journal editors about the state of a field; this offers the possibility of revealing the results and challenges of research in that area and working on it.^(4,5,6)

The Scimago Journal and Country Rank (SJCR) is one of the multiple tools from which information can be obtained on the behavior of science in various branches of knowledge and multiple authors have used it.^(7,8) Since then, Scimago has extracted a wealth of bibliometric information that includes the number of publications of each of the scientific journals currently included in that database, as well as the citations received by each one, and their h index.^(9,10)

There are currently few records of bibliometric studies on Latin American scientific production in cognitive neuroscience in SCOPUS. For this reason, the objective of this study is to describe the behavior of Latin American scientific production on cognitive neuroscience in SCOPUS in the years 2012 to 2022.

METHODS

A bibliometric, observational, descriptive, cross-sectional study was carried out on the behavior of scientific production in Latin America on cognitive neuroscience in SCOPUS, during the years 2012 to 2022.

The data offered by Scimago Journal & Country Rank (SJCR), available at: <https://www.scimagojr.com/>, were used. SJCR is an open access platform that contains metrics obtained through the metadata generated by journals indexed in Scopus; allows searches using various filters, including thematic area, country, region, institution, open access, presence in SciELO and in the Web of Science. In addition, it allows analyzing the quartile in which it is located (position that the journal occupies depending on its SJR within the thematic area), H index and other metric indicators.

In the study, a search was made of the data offered by this platform on the publications, from the "Neurosciences" area, "Latin America" region and "Cognitive Neurosciences" category, made in the region studied from 2012 to 2022.

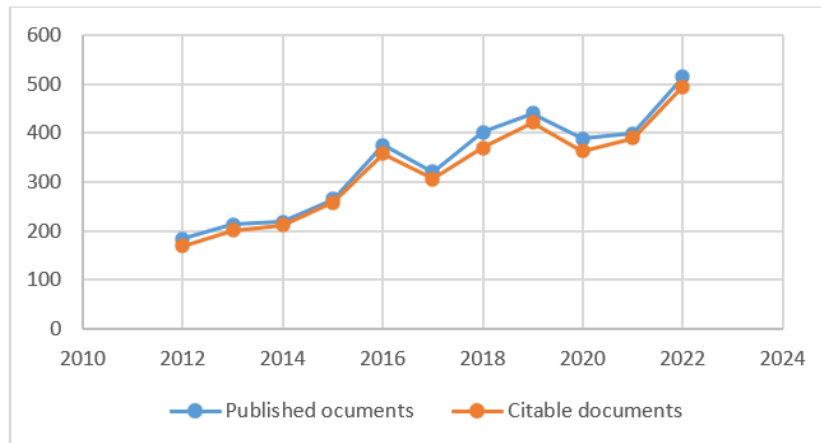
The variables were studied: published documents (number of documents published during the year); citable documents (number of citable documents published during the year); citations (number of citations of documents published during the year); self-citations (number of self-citations of all the dates received by the documents published during the year), citations per document (average citations per document published during the year) and ranking of Latin American countries in cognitive neuroscience (first 10 countries) and h index of each countries.

Descriptive statistics were used, the data was stored in a database prepared for this purpose, for which the statistical software IBM SPSS version 2.3 was used.

This study did not require approval from an Ethics Committee, since the data used is publicly available and anonymous.

RESULTS

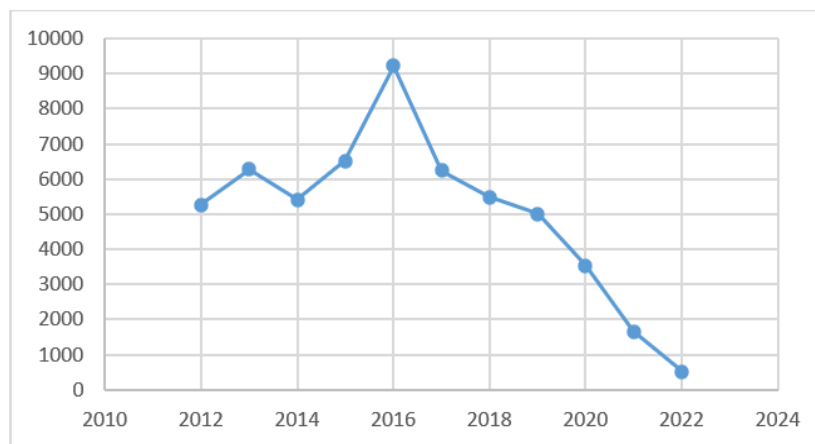
In the period studied, a total of 3717 documents were published for an average of 337 publications per year. 2022 stood out as the year with the largest number of published documents (514), which represented 14 % of the total. Of the published documents, 3,543 were citable documents (figure 1).



Source: Database compiled

Figure 1. Published documents and citable documents by year

A total of 55,107 appointments were made in this period for an average of 50,097 appointments per year, with the year 2016 in which the greatest number of appointments were made (9,225), which represented 17 %, followed by the year 2015 (6,512) for 12 % and 2022 the one with the least amount (521) for 1 % (figure 2).



Source: Database compiled

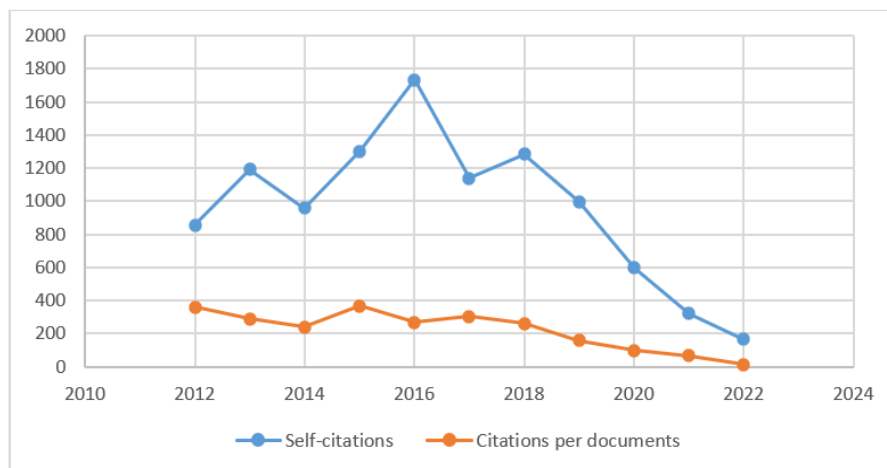
Figure 2. Citations per year

A total of 10 538 self/citations were made, with 2016 being the year with the highest figures (1732), which represented 16 % and 2022, the year with the lowest figures (164), with 2 %, for an average of 958 self-citations per year. Citations by documents reached their highest values in 2015 (368,5) (figure 3).

Brazil heads the list of Latin American countries in the ranking of scientific production on cognitive neurosciences with an h-index of 98, followed by Chile with an h-index of 53 (table 1).

DISCUSSION

Neurosciences occupy an important place in world scientific production as they constitute one of the most innovative and promising areas due to the transcendence of their results. Galvez-Contreras *et al.*⁽³⁾ in their study found a total of 4,267 publications on neurosciences published in the year 2020, which represented a 30 % increase in the scientific productivity of the Latin American region in this field, compared to 5 years previous.



Source: Database compiled

Figure 3. Self-citations and citations by documents per year

Table 1. Distribution of Latin American countries according to h-index in scientific production on cognitive neurosciences

Rank	Country	H index
1	Brasil	98
2	Chile	53
3	Argentina	67
4	México	62
5	Colombia	38
6	Perú	9
7	Uruguay	16
8	Ecuador	10
9	Cuba	44
10	Puerto Rico	19

Source: Database compiled

Neurosciences constitute a new and relatively unexplored area, however, the tendency to increase productivity in this science is clearly observed. As expressed by Dorta-Contreras *et al.*,⁽¹¹⁾ this represents one of the most visible research fronts of Cuban scientific production.

In particular, cognitive neurosciences within these are a highly developed field that occupy the second place among the topics that accumulate the greatest number of publications as found by Perodin-Hernandez *et al.*⁽¹²⁾ in their study carried out in Cuba. The number of articles published in SCOPUS on cognitive neurosciences by countries in the Latin American region was 3717 scientific articles, during the years 2012-2022, which places it among one of the most outstanding areas.

The contributions of cognitive neurosciences cover various areas, but especially education where the neurophysiological and neurobiological processes of thought are studied, the different ways and styles of learning and how the knowledge imparted is constructed and assimilated by the students, from the point of view of the brain, considering memory systems as essential means of learning, in this way, it is possible to improve teaching strategies, aimed at the construction of significant and lasting knowledge.⁽¹²⁾

2020 was an atypical year especially for science, many projects were stopped to give priority to the study of COVID-19, however, on the other hand, the scientific production on COVID-19 was really high, generating information at very short¹³. Correspondingly, this represented that from 2020 to 2022 there was an increase in the number of articles published on the subject, with 2022 being the year with the highest number of articles published, 514.

Even though the situation of the COVID-19 pandemic led to a significant increase in publications, the study carried out by Perodin-Hernandez *et al.*⁽¹²⁾ found that of the 51 publications of the center corresponding to 2020, only 4 of them are related with the theme of COVID-19.

According to Galvez-Contreras *et al.*⁽³⁾ the number of citable articles on neurosciences in general was 5,568. These authors comment that despite the fact that the productivity of Latin America in neuroscience presents

some difficulties, its receptivity at a global level is acceptable compared to the productivity of developed countries. In the results obtained in this article, it was possible to verify that most of the published articles received citations. These results speak in favor of the quality of the work and research in this area.

The citation is a hypertext element resulting from the acknowledgment that an author makes of other published research and it is admitted, regardless of whether the citation has been positive or critical, that he has contributed to the creation of the new work. The relevance of the citation in the field of communication and scientific evaluation lies in its importance as a substantial element in most bibliometric indicators.⁽¹⁴⁾

In this study, a total of 55,107 appointments were made during this period. Despite the higher productivity, the year 2022 showed the lowest number of appointments. On the one hand, this result can be influenced by the time between the year of publication and the moment in which this study is carried out, and on the other hand, the phenomenon known as scientific fashion.⁽¹⁴⁾

In an increasingly science and technology world where information flows faster, the number of citations represents an easy way to estimate the quality of an article. Although it is recognized that other factors influence this, such as the journal in which it has been published, the language, the production of the authors of the work, its structural context, scientific trends, validity/obsolescence and the context theoretical.^(14,15,16,17,18)

A current trend among researchers is self-citations; very frequently, an exorbitant number of self-citations are found in works without a clear justification for them.^(19,20,21,22) These are sometimes necessary and justified even more when it comes to such a specific branch, as is the case of cognitive neuroscience and an author who has been studying that line for years and of course previous studies support or support the results obtained elsewhere. study.^(23,24,25,26)

The number of self-citations found in this study is higher than that found by Salgado-Fuentes *et al.*⁽⁵⁾ in their article on Cuban scientific production in SCOPUS on cardiology and cardiovascular surgery; In this article, the author studies only Cuban scientific production, so the number of articles and citations is substantially lower.

Cognitive neurosciences are a young and rich area to explore, since it constitutes the path to the enigma of learning and there is no branch of knowledge that does not benefit from its contributions. In recent years, Latin America has experienced growth in this area; however, it is necessary to recognize and work on the difficulties that have been identified, such as the low level of investment, the lack of infrastructure, and little specialized postgraduate training.⁽¹¹⁾ Despite the fact that in the study carried out, Brazil represented the Latin American country with the highest publication h index (98), followed by Chile (53), data that coincides with what was stated by Garzón S *et al.*⁽¹⁵⁾ and Zayas-Fundora *et al.*⁽¹⁶⁾ where there was also a predominance of both countries in the continent; The necessary conditions must be created so that at the scale of all of Latin America the study and advancement in research in this field of neurosciences constitutes an incentive.

CONCLUSIONS

The Latin American scientific production in SCOPUS on cognitive neurosciences, during the 10 years studied, was high and growing, which predicts great results in this branch for years to come and is satisfactory considering the thousands of questions that arise every day and concern this area of knowledge. In relation to citations, the highest percentage of articles were cited and only a small number corresponded to self-citations.

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COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORSHIP CONTRIBUTION

Conceptualization: Emmanuel Zayas-Fundora, Emmanuel Cesar Vázquez-Ortiz.

Data curation: Emmanuel Zayas-Fundora, Emmanuel Cesar Vázquez-Ortiz.

Research: Emmanuel Zayas-Fundora, Emmanuel Cesar Vázquez-Ortiz.

Methodology: Emmanuel Zayas-Fundora.

Resources: Emmanuel Cesar Vázquez-Ortiz.

Visualization: Emmanuel Zayas-Fundora.

Writing - original draft: Emmanuel Zayas-Fundora.

Writing - proofreading and editing: Emmanuel Zayas-Fundora, Emmanuel Cesar Vázquez-Ortiz.