



# The impact of Ibero-American science on global bioethical thinking

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## Abstract

The bioethics research conducted in Ibero-American countries has been very much restricted to its own realm.

The aim of this study was to perform a bibliometric evaluation of bioethics papers by authors affiliated with Ibero-American institutions, and to determine how their work influences global bioethics literature.

We performed a literature search in the Web of Science Core Collection (WoS CC) and Scopus.

We identified a total of 5,975 documents, of which 84.3% were articles, 11.6% reviews and 4.1% book chapters. The median number of citations per paper was higher in English-language journals.

Only 10 articles published between 2010 and 2019 in peer-reviewed bioethics journals and produced exclusively by authors from Ibero-American institutions garnered more than 15 citations.

Our study suggests that if researchers from Ibero-American institutions want to influence global bioethical thinking, they must make the required leap in quality to be able to publish in high-quality bioethics and mainstream journals.

## KEYWORDS

codes of/position statements on professional ethics, position statements (of organizations/groups), research on special populations, scientific research

## 1 | INTRODUCTION

It is widely acknowledged that advances – both in the experimental sciences and in humanistic thought – are generated mainly in English-speaking countries, but above all, are disseminated in English-language scientific literature.<sup>1</sup> Accordingly, to assess the extent to which an author, research group, educational institution or country influences current thinking within a given area of knowledge, it may be useful to examine whether the literature produced in these institutions or countries is published in English-language media of accredited scientific quality.

<sup>1</sup>Borry, P., Schotsmans, P., Dierickx, K. (2006). How international is bioethics? A quantitative retrospective study. *BMC Med Ethics*. 7(1), 1; Diekhoff, T., Schlattmann, P., Dewey, M. (2013). Impact of Article Language in Multi-Language Medical Journals - a Bibliometric Analysis of Self-Citations and Impact Factor. *PLoS ONE*. 8(10), e76816; Jin, P., Hakkarinen, M. (2017) Highlights in bioethics through 40 years: a quantitative analysis of top-cited journal articles. *J Med Ethics*. 43(5), 339-45.

The bioethics research conducted in Ibero-American countries has been very much confined to its own setting, with the result that their bioethical thinking has had - and indeed has - little impact on the global bioethics field. To get a general idea of this, one need only review the references of some randomly chosen books on bioethics published in English to verify the presence of Ibero-American authors in the bibliography contained therein. In a random selection of five books written by English-speaking authors,<sup>2</sup> we found that, out

<sup>2</sup>Berg, T. V., Furton, E. J. (2006). Human embryo adoption: biotechnology, marriage, and the right to life. Philadelphia, PA: The National Catholic Bioethics Center; Eijk, W. J., Hendriks, L. M., Raymakers, J. A. (2014). Manual of Catholic Medical Ethics. Cleveland, QLD: Connor Court Publishing Pty Ltd, pp. 722; Etheredge, F. (2019). Conception: An Icon of the Beginning. St. Louis: En Route Books & Media, pp. 643; MacKellar, C., Jones, D. A. (2012). Chimera's Children: Ethical, Philosophical and Religious Perspectives on Human-Nonhuman Experimentation. London: Bloomsbury Continuum, pp. 208; Rosenberg, A., Arp, R. (2009). Philosophy of Biology: An Anthology. Hoboken, NJ: Wiley-Blackwell, pp. 464.

of a total of 2,490 literature references listed, there were no citations for Ibero-American authors.

An approach to understanding the impact of authors from Ibero-American institutions on global bioethical thinking can be made by conducting bibliometric studies, since they offer a quantitative perspective that allows assessment of the development and evolution of research on the issues to be analysed. These studies use easy-to-understand indicators of production, collaboration and impact, identifying trends over time.<sup>3</sup> The methods employed have been widely used in many scientific disciplines,<sup>4</sup> as well as in bioethics. In 2006, Berg and Furton declared that there was a progressive development of bioethics that culminated in an increase in scientific publications.<sup>5</sup> Since then, bibliometric studies have been conducted that have analysed international collaboration in articles on bioethics;<sup>6</sup> scientific production in bioethics in Spain;<sup>7</sup> research in neuroethics;<sup>8</sup> the most cited articles in bioethics;<sup>9</sup> and the value of empirical research for bioethics.<sup>10</sup>

The aim of this study was to analyse the bioethics literature produced by authors affiliated with Ibero-American institutions, to address the following specific objectives: 1) evolution of scientific literature; 2) to determine the Ibero-American countries that publish most; 3) to identify the most cited papers; 4) to examine the relationship between the number of paper citations and the language in which they are published; 5) to determine whether the number of citations varies if authors from Ibero-American institutions collaborate with institutions in other countries; 6) to determine to what extent authors from Ibero-American institutions publish in high-quality bioethics and mainstream journals; and 7) to make an approximation to the areas of research through keyword and co-word analysis.

## 2 | MATERIALS AND METHODS

Papers analysed in this study were retrieved from the Web of Science Core Collection (WoS CC) and Scopus databases. These databases were accessed through the Spanish Science and Technology

Foundation (FECYT), including the literature referenced in these databases<sup>11</sup> up to 2019.

In order to retrieve bioethics-related papers, a specific search equation was designed in each database. In this article, bioethics is considered in a broad sense, where medical ethics is included according to the definition given by the Encyclopaedia Britannica: "In one common usage, bioethics is more or less equivalent to medical ethics, or biomedical ethics [...]. Bioethics, however, is broader than this, because some of the issues it encompasses concern not so much the practice of health care as the conduct and results of research in the life sciences, especially in areas such as cloning and gene therapy [...], stem cell research, xenotransplantation (animal-to-human transplantation), and human longevity",<sup>12</sup> and what Markose et al.<sup>13</sup> say about medical ethics: "The issues in medical ethics often involve [...] rights of patient, informed consent, confidentiality, competence, advance directives, negligence, and many others".

The search equation was not limited only to the thematic categories of journals specialized in ethics, as exemplified by the thematic categories "Medical Ethics" from Journal Citation Reports (JCR) or "Issues, Ethics and Legal Aspects" from Scimago Journal Rank (SJR), since articles not relevant to the search could be included. At the same time, scientific publications in journals from other thematic categories could be excluded by this search, like in the case of the *New England Journal of Medicine*, *Science*, *Nature*, *Lancet* and *JAMA*, among others. In fact, in August 2016, articles on bioethics such as "Equipose and the ethics of clinical research" published in 1987 in the *New England Journal of Medicine* and "What makes clinical research ethical?" published in *JAMA* in 2000, had been cited 1,726 times and 1,656 times, respectfully, in Google Scholar<sup>14</sup>. Accordingly, specific terms such as "bioethics" were included in the search, and generic terms such as "ethics" were combined with medical aspects that are often associated with ethical issues, such as "genetics", "abortion" and "autism".

The search equation was also applied to bioethics journals listed at Georgetown University,<sup>15</sup> Bioethics.com<sup>16</sup> at the Center for Bioethics & Human Dignity (CBHD), and journals included in the subject category "Bioethics", and medical ethics in Free Medical

<sup>3</sup>Heersmink, R., van den Hoven, J., van Eck, N. J., et al. (2011). Bibliometric mapping of computer and information ethics. *Ethics Inf Technol.* 13(3), 241-9; Kostoff, R. N., Tshiteya, R., Pfeil, K. M., et al. (2005). Power source roadmaps using bibliometrics and database tomography. *Energy.* 30(5), 709-30.

<sup>4</sup>Kostoff, R. N. (2002). Citation analysis of research performer quality. *Scientometrics.* 53(1), 49-71; Moed, H. F., De Bruin, R. E., Van Leeuwen, Th. N. (1995). New bibliometric tools for the assessment of national research performance: Database description, overview of indicators and first applications. *Scientometrics.* 33(3), 381-422; Waltman, L. (2016). A review of the literature on citation impact indicators. *J Informetr.* 10(2), 365-91.

<sup>5</sup>Berg & Furton, *op. cit.* note 4.

<sup>6</sup>Borry, P. et al., *op. cit.* note 1, p. 1.

<sup>7</sup>Belinchón, I., Ramos, J. M., Bellver, V. (2007). Scientific production in bioethics in Spain through MEDLINE. *Gaceta Sanitaria.* 21(5), 408-11.

<sup>8</sup>Leefmann, J., Levallois, C., Hildt, E. (2016). Neuroethics 1995-2012. A Bibliometric Analysis of the Guiding Themes of an Emerging Research Field. *Front Hum Neurosci.* 10, 336.

<sup>9</sup>Jin & Hakkarinen, *op. cit.* note 3, p. 339-45.

<sup>10</sup>Wangmo, T., Hauri, S., Gennet, E., et al. (2018). An update on the "empirical turn" in bioethics: analysis of empirical research in nine bioethics journals. *BMC Med Ethics.* 19(1), 6.

<sup>11</sup>Science Citation Index Expanded (SCI-EXPANDED): 1900-2019; Social Sciences Citation Index (SSCI): 1956-2019; Arts & Humanities Citation Index (A&HCI) --1975-2019; Conference Proceedings Citation Index- Science (CPCI-S) --1990-2019; Conference Proceedings Citation Index- Social Science & Humanities (CPCI-SSH) --1990-2019; Book Citation Index- Science (BKCI-S): 2005-2019; Book Citation Index- Social Sciences & Humanities (BKCI-SSH): 2005-2019; Emerging Sources Citation Index (ESCI): 2005-2019; Scopus 1788-2019.

<sup>12</sup>Britannica. (2020). *Bioethics*. Retrieved January 28, 2021, from <https://www.britannica.com/topic/bioethics>

<sup>13</sup>Markose, A., Krishnan, R., Ramesh, M. (2016). Medical ethics. *J Pharm Bioallied Sci.* 8(5), 1-4.

<sup>14</sup>Jin & Hakkarinen, *op. cit.* note 3, p. 339-45.

<sup>15</sup>Georgetown University. (2015). *Top 100 Bioethics Journals in the World*. Retrieved January 28, 2021, from <https://repository.library.georgetown.edu/bitstream/handle/10822/1043496/Top-0%20Bioethics%20Journals%20in%20the%20World%20%20Bioethics%20Research%20Library.pdf?sequence=1&isAllowed=y>

<sup>16</sup>Bioethics.com. (2020). *Journals & Serial Publications Covering Bioethical Issues*. Retrieved January 28, 2021, from <https://bioethics.com/bioethics-journals-and-serials-publications>

Journals on the Geneva Foundation for Medical Education and Research website.<sup>17</sup>

The search was conducted on February 5, 2020. The bibliographic fields in which the search was made were Source (SO), WoS Category (WC), Paper title (TI), and Topic, the latter of which includes Paper title, Abstract, Keywords, and Keywordplus. Only records with the document type, article, review, proceedings paper, book chapter or book were selected.

Using our own software, "bibliométricos", bibliographic records were included in a relational database with exclusion of duplicates in Scopus;<sup>18</sup> records from Scopus that were already included in the WoS CC were deleted. All papers in which at least one Ibero-American institution had participated were then selected. An institution was considered to be Ibero-American if it was located in one of the 22 countries participating in the Ibero-American Summit<sup>19</sup>: Andorra, Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Chile, Ecuador, El Salvador, Spain, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Portugal, Dominican Republic, Uruguay and Venezuela. We excluded documents that addressed aspects related to ethics but not to bioethics or medical ethics, such as those dealing with aspects related to organisation, business, politics, gaming, sport and economics. In order to exclude them, a search was carried out on the documents that included these terms in the title or key words field in the Access database where the records obtained in the search were downloaded for processing and bibliometric and documentary analysis. The authors then reviewed those records to decide whether or not their exclusion was appropriate.

The authors conducted a random sampling of 100 papers to validate the relevance of the papers retrieved. The percentage of irrelevant papers was 1%, but it was considered that they could be related to broad aspects of bioethics, such as the environment.

Statistical analysis was performed using the IBM® SPSS® Statistics v.26 statistical program. A descriptive study was carried out with measures of central tendency. Chi-square was used for the comparison between papers produced only by authors from Ibero-American institutions or in collaboration with other institutions and the language of publication, as well as whether the paper was published in peer-reviewed journals in the field of bioethics. We used a non-parametric test for comparison of medians of the number of citations between papers written only in English, in English and another language, or only in languages other than English. We chose this non-parametric test since the number of citations per paper did not have a normal distribution. The level of statistical significance was set at  $p < 0.05$ .

Thematic analysis of the publications analysing the frequency of the keywords and the co-keywords network were also studied. The

Pajek program<sup>20</sup> was used to create and graphically display the networks of countries and keywords. The size of the vertices is proportional to the number of occurrences. The thickness of the lines connecting two vertices is proportional to the number of times the two terms appear simultaneously in the total number of papers. For inclusion in the graphic representation of countries, the co-occurrence of more than seven papers was considered. For inclusion in the graphic representation of keywords, the co-occurrence of four or more keywords was considered. This analysis was performed with the authors' keywords in the records. Just over one quarter of records (26.5%) had no keywords. Keywords with more than two occurrences were standardised in terms of abbreviation, singular and plural, and British and American English.

All information relating to the search equation in Web of Science, tables and figures not included in this article are available as supplementary material in Zenodo repository (<https://doi.org/10.5281/zenodo.4446868>).

### 3 | RESULTS

#### 3.1 | Production of papers with bioethical content in general and by authors from Ibero-American institutions

First, the tremendous production of scientific papers with some bioethical content that were included in the study databases up to 31 December 2019 should be highlighted. In that period, 82,387 documents were identified in the WoS CC database and 141,711 in Scopus, although it should be taken into account that some of them may be contained simultaneously in both databases.

If we select papers out of the total number of papers identified in which a researcher from an Ibero-American institute participated, the number of documents is reduced to 6,260. If we then exclude those containing aspects not related to bioethics or medical ethics ( $n=285$ ), the total sample is composed of 5,975 documents, 1,272 of which were retrieved in both databases, 1,786 in WoS alone and 2,917 in Scopus alone. Of the 5,975 documents retrieved, 84.3% were articles, 11.6% reviews and 4.1% book chapters, books or proceedings papers.

#### 3.2 | Scientific production by Ibero-American countries

If we analyse the scientific production by Ibero-American countries, we find first, that of the 22 countries, all except Andorra produced at least one paper with bioethical content in the time period evaluated, and eight produced more than 100 (Table 1). Spain leads the group of Ibero-American countries, with 1,992 papers (33.3%), followed by

<sup>17</sup>Geneva Foundation for Medical Education and Research. (2020). *Free Medical Journals*. Retrieved January 28, 2021, from [https://www.gfmer.ch/Medical\\_journals/Ethics.htm](https://www.gfmer.ch/Medical_journals/Ethics.htm)

<sup>18</sup>Valderrama-Zurián, J. C., Aguilar-Moya, R., Melero-Fuentes, D., Aleixandre-Benavent, R. (2015). A systematic analysis of duplicate records in Scopus. *Journal of Informetrics*, 9, 570-576.

<sup>19</sup>Secretaría General Iberoamericana. (2015). *Ibero-American Summit*. Retrieved January 28, 2021, from <https://www.segib.org/paises/>

<sup>20</sup>The Pajek program. (2020). *Analysis and visualization of very large networks*. Retrieved January 28, 2021, from <http://mrvar.fdv.uni-lj.si/pajek/>

Country	No. records <sup>1</sup>	% of records	No. citations in WoS/Scopus <sup>2</sup>	Ratio citations/paper
Spain	1,992	33.3	11,726	5.9
Brazil	1,414	23.7	6,448	4.6
Chile	574	9.6	1,693	2.9
Mexico	503	8.4	1,863	3.7
Argentina	417	7.0	1,628	3.9
Colombia	413	6.9	710	1.7
Portugal	386	6.5	6,378	16.5
Cuba	222	3.7	359	1.6

1. The same record may have been counted in several countries when the paper was co-authored.
2. The highest number of citations for each document in both databases was selected.

Brazil with 1,414 (23.7%), Chile with 574 (9.6%) and Mexico with 503 (8.4%).

### 3.3 | Diachronic evolution of scientific production

In terms of the diachronic evolution of scientific production by decades, from 1970 to 2019, of the Ibero-American countries that published more than 200 papers, the group is headed by Spain. Both Spain and Brazil have experienced exponential growth in the last two decades, while growth in the other Ibero-American countries has been linear (see Supplementary material, Figure 1).

The two oldest papers retrieved in the databases were from 1973, and were published in Portuguese in two Brazilian journals: "Saude, humanizacao da Medicina e Etica medica", authored by Kassab and published in *Revista da Associacao Medica Brasileira*; and "Sobre o estudo da deontologia nos Cursos de Formacao profissional", authored by Teixeira and published in *Revista da Associacao Medica de Minas Gerais*.

### 3.4 | Publications by authors from Ibero-American institutions in collaboration with authors from institutions in other countries

As regards papers published by researchers from Ibero-American institutions co-authored with researchers from other countries, we found that they collaborated with authors from 108 non-Ibero-American countries. Most of the collaboration was with the United States (US) (n=395; 6.6%) and the United Kingdom (UK) (n=238; 4%), with the strongest collaboration between Spain and the UK (n=119), Spain and the US (n=103) and Spain and Italy (n=85). Among Ibero-American countries, the strongest collaborations were between Brazil and Portugal (n=33), Spain and Portugal (n=30), Spain and Brazil (n=26), and Spain and Chile (n=22). Figure 2 of the supplementary material presents the collaborative network between countries that have co-authored more than seven papers.

**TABLE 1** Distribution of publications and citations by countries with more than 100 papers

### 3.5 | Number of papers published in Ibero-American journals

We consider Ibero-American journals to be those published in Ibero-American countries, although they may also publish articles in English. Journals that have published more than 40 papers are listed in Table 2. *Acta Bioethica* was the most productive, followed by *Cuadernos de Bioética*, *Revista Colombiana de Bioética*, *Revista Médica de Chile*, *Interface Comunicacao Saude Educaçao*, *Ciencia e Saude Coletiva*, and *Medicina Clínica*.

### 3.6 | Assessment of the quality of the papers as determined by the number of citations received

The mean number of citations for articles in the most productive Ibero-American journals was 7.3 in *Cuadernos de Saude Publica*, 6.4 in *Clinical Medicine*, 4.6 in *Revista da Associacao Medica Brasileira*, 4.3 in *Science e Saude Collective*, 2.8 in *Revista Brasileira de Enfermagem* and 2.4 in *Revista Médica de Chile* (Table 2). None of these journals are in the top quartile of the subject categories included in the *JCR* and *SJR*.

The most cited articles in Ibero-American journals were "Animal-based medicines: Biological prospectation and the sustainable use of zootherapeutic resources", by Costa-Neto, published in 2005 in *Anais da Academia Brasileira de Ciencias*, with 94 citations; "Moral deliberation: the method of clinical ethics", by Gracia, published in *Medicina Clínica* in 2001; and "How effective is dog culling in controlling zoonotic visceral leishmaniasis? A critical evaluation of the science, politics and ethics behind this public health policy", by Costa, published in *Revista da Sociedade Brasileira de Medicina Tropical* in 2011, with 76 citations.

Table 3 shows the 12 papers with more than 125 citations. None of them were written only by authors from Ibero-American institutions; authors from a non-Ibero-American institution - especially English-speaking - co-authored all of them, and they were published in English-language journals. It should also be noted that none of these articles were published in specialist bioethics journals.

In terms of citations, the effect of the language in which the paper is published is notable, since the 3,276 (54.8%) papers that

**TABLE 2** Ibero-American journals with more than 40 publications, country of publication, subject category in JCR and SJR, impact factor and quartile

Title of Journal	Country	No. Art.	No. citations WoS/Scopus <sup>1</sup>	Ratio citations/paper	Subject Category JCR	IF JCR-2019	Quartile in JCR <sup>2</sup>	Subject Category SJR	SJR-2019	Quartile in SJR <sup>2</sup>
<i>Acta Bioethica</i>	Chile	319	423	1.3	Social Sciences Biomedical; Medical Ethics; Ethics	0.153	Q4	Health Policy; Health (social science)	0.178	Q4
<i>Cuadernos de Bioética</i>	Spain	294	250	0.9	n/a	n/a	n/a	Medicine (miscellaneous)	0.115	Q4
<i>Revista Colombiana de Bioética</i>	Colombia	195	96	0.5	n/a	n/a	n/a	n/a	n/a	n/a
<i>Revista Medica de Chile</i>	Chile	123	297	2.4	Medicine, General & Internal	0.531	Q4	Medicine (miscellaneous)	0.213	Q3
<i>Interface-Comunicacao Saude Educacao</i>	Brazil	81	143	1.8	n/a	n/a	n/a	Communication; Education; Health (social science)	0.354	Q2
<i>Ciencia e Saude Coletiva</i>	Brazil	72	311	4.3	Public, Environmental & Occupational Health	1.019	Q4	Health Policy; Medicine (miscellaneous); Public Health, Environmental & Occupational Health	0.575	Q2
<i>Medicina Clínica</i>	Spain	62	394	6.4	Medicine, General & Internal	1.635	Q3	Medicine (miscellaneous)	0.245	Q3
<i>Cadernos de Saude Publica</i>	Brazil	56	410	7.3	Public, Environmental & Occupational Health	1.408	Q4	Medicine (miscellaneous); Public Health, Environmental and Occupational Health	0.565	Q2
<i>Revista da Associacao Medica Brasileira</i>	Brazil	52	239	4.6	Medicine, General & Internal	0.915	Q4	Medicine (miscellaneous)	0.289	Q3
<i>Revista Brasileira de Enfermagem</i>	Brazil	44	124	2.8	n/a	n/a	n/a	Medicine (miscellaneous) Nursing (miscellaneous)	0.241	Q3
<i>Gaceta Medica de Mexico</i>	Mexico	44	74	1.7	Medicine, General & Internal	0.581	Q4	Medicine (miscellaneous)	0.172	Q4
<i>Mundo da Saude</i>	Brazil	42	36	0.9	n/a	n/a	n/a	Public Health, Environmental & Occupational Health	0.111	Q4

1. The highest number of citations in the databases for each document is listed.

2. The highest quartile in any of the categories that the journal is ranked is shown.

JCR=Journal Citation Report.

SJR=Scimago Journal Rank.

n/a=Not available.

**TABLE 3** Papers with more than 125 citations, number of citations, ratio of citations per year and document type.

Authors	Title	Journal	No. citations	Ratio no. citations/year	Document Type
Rossi, S.; Hallett, M.; Rossini, P.M.; Pascual-Leone, A.; Avanzini, G. et al	Safety, ethical considerations, and application guidelines for the use of transcranial magnetic stimulation in clinical practice and research	Clinical Neurophysiology 2009; 120(12): 2008-2039	2519	251.9	Review
Victoria, C.G.; Habicht, J.-P.; Bryce, J.;	Evidence-Based Public Health: Moving Beyond Randomized Trials	American Journal of Public Health 2004; 94(3): 400-405	649	43.3	Review
Sprung, C.L.; Cohen, S.L.; Sjøkvist, P.; Baras, M.; Bulow, H.H.; Hovliehto, S. et al	End-of-life practices in European intensive care units - The ethicus study	JAMA-Journal of the American Medical Association 2003; 290(6): 790-797	599	37.4	Article
Baker, J.T.; Borris, R.P.; Carté, B.; Cordell, G.A.; Soejarto, D.D.; Cragg, G.M. et al	Natural product drug discovery and development: New perspectives on international collaboration	Journal of Natural Products 1995; 58(9): 1325-1357	226	9.4	Article
Crump, J.A.; Sugarman, J.;	Ethics and Best Practice Guidelines for Training Experiences in Global Health	American Journal of Tropical Medicine and Hygiene 2010; 83(6): 1178-1182	223	24.8	Article
Materstvedt, L.J.; Clark, D.; Eilershaw, J.; Forde, R.; Gravgaard, A.M.B. et al	Euthanasia and physician-assisted suicide: a view from an EAPC Ethics Task Force	Palliative Medicine 2003; 17(2): 97-101	216	13.5	Article
Beghin, L.; Castera, M.; Manios, Y.; Gilbert, C.C.; Kersting, M.; De Henuau, S. et al	Quality assurance of ethical issues and regulatory aspects relating to good clinical practices in the HELENA Cross-Sectional Study	International Journal of Obesity 2008; 32(5): S12-S18	159	14.5	Article
Wilkoff, B.L.; Auricchio, A.; Brugada, J.; Cowie, M. et al	HRS/EHRA expert consensus on the monitoring of cardiovascular implantable electronic devices (CIEDs): Description of techniques, indications, personnel, frequency and ethical considerations	Europace 2008; 10(6): 707-725	154	14.0	Article
Antal, A.; Alekseichuk, I.; Bikson, M.; Brockmüller, J.; Brunoni, A.R.; Chen, R. et al	Low intensity transcranial electric stimulation: Safety, ethical, legal regulatory and application guidelines	Clinical Neurophysiology 2017; 128(9): 1774-1809	151	75.5	Review
Evans, S.C.; Roberts, M.C.; Keeley, J.W.; Blossom, J.B.; Amaro, C.M.; Garcia, A.M. et al	Vignette methodologies for studying clinicians' decision-making: Validity, utility, and application in ICD-11 field studies	International Journal of Clinical and Health Psychology 2015; 15(2): 160-170	148	37.0	Article
McHanwell, S.; Brenner, E.; Chirulescu, A.R.M.; Drukker, J.; van Mameren, H.; Mazzotti, G. et al	The legal and ethical framework governing Body Donation in Europe - A review of current practice and recommendations for good practice	European Journal of Anatomy 2008; 12(1): 1-24	143	13.0	Review
Weijer, C.; Grimshaw, J.M.; Eccles, M.P.; McRae, A.D.; White, A.; Brehaut, J.C. et al	The Ottawa Statement on the Ethical Design and Conduct of Cluster Randomized Trials	PLoS Medicine 2012; 9 (11)	133	19.0	Article

Ratio citations/no. citations=Number of citations/years since its publication until 2019.

were published in a language other than English amassed 5,488 citations (1.68 citations per paper); the 264 (4.4%) published in English and other languages amassed 568 citations (2.15 citations per paper); and the 2,435 (40.8%) published in English only amassed 21,509 citations (8.83 citations per paper). The median distribution of citations varies significantly in all three groups ( $p < 0.001$ ), with the median being 2 for papers published in English; 1 for those papers published in English and another language; and 0 for those papers published in a language other than English. Among the Ibero-American countries with more than 100 publications, Portugal, Spain and Brazil have the highest citation rate per paper (Table 1).

### 3.7 | Publication language of the papers

We found papers written in 14 languages; 4.5% were written in more than one language. Of those written in only one language, 2,699 (45.2%) were in English, 2,706 (45.3%) in Spanish, 799 (13.4%) in Portuguese and 35 (0.6%) in French.

Of the papers in which only authors from Ibero-American institutions participated ( $n=5,039$ ), 32.1% were written in English, 5.1% in English and another language, and 62.8% in another language. However, in papers in which an author from a non-Ibero-American institution collaborated ( $n=936$ ), 87.2% were written in English, 0.7% in English and another language, and 12.1% in other languages.

### 3.8 | Number of articles published by Ibero-American authors in peer-reviewed journals in the area of bioethics and the number of citations

This section includes the major bioethics and medical ethics journals selected according to the following criteria: a) all journals included in the JCR, within the categories "Ethics" and "Medical ethics"; b) journals in the top two quartiles of the subject category "Issues, Ethics and Legal Aspects" of the SJR; c) journals in the subject categories "Obstetrics & Gynecology" and "Public, Environmental & Occupational Health" with an impact factor greater than 5; and d) bioethics, multidisciplinary and mainstream journals, which, in the experience of the Bioethics Observatory at the Catholic University of Valencia, usually include papers related to bioethics and medical ethics. The journals selected are shown in the supplementary material.

When only authors from Ibero-American institutions participated, the two Ibero-American journals that published most articles were *Acta Bioethica* (306) and *Cuadernos de Bioética* (287). When the same was assessed in the group of English-language bioethics journals, those that published most papers were: *Nursing Ethics* (54), *Journal of Medical Ethics* (53), *Bioethics* (27), *BMC Medical Ethics* (19), *Science and Engineering Ethics* (19), *Cambridge Quarterly of Healthcare Ethics* (10), and *Journal of Bioethical Enquiry* (10). As of December 2019, a total of 215 papers by authors from Ibero-American institutions had been published in this group. When the

same was considered for papers in which a non-Ibero-American author participated, the journals in which these papers were published were: *Science and Engineering Ethics* (15), *BMC Medical Ethics* (12), *Cambridge Quarterly of Healthcare Ethics* (12) *Journal of Empirical Research on Human Research Ethics* (11), *Developing World Bioethics* (9) and *American Journal of Bioethics* (8). A total of 66 papers were published in this group as of December 2019.

It should be noted that there are differences in the number of papers published in these journals if an author from a non-Ibero-American institution collaborates. Thus, of the 5,039 documents written only by authors from Ibero-American institutions, 931 (18.5%) were published in these journals. However, if authors from non-Ibero-American institutions co-authored the papers ( $n=936$ ), 217 (23.2%) were published in these journals ( $X^2=11.27$ ;  $p < 0.002$ ).

Table 4 shows articles written only by authors from Ibero-American institutions in the decade 2010-2019, and which being published in peer-reviewed bioethics journals have obtained more than 15 citations. Only 10 articles meet this requirement. Notably, of these 10 articles, four were published in *Nursing Ethics*, two in the *Journal of Medical Ethics* and one in *BMC Medical Ethics*. The most cited articles were "Burnout in palliative care: A systemic review," published in *Nursing Ethics*<sup>21</sup> in 2011; "Role of a research ethics committee in follow-up and publication of results," published in the *Lancet*<sup>22</sup> in 2003; and "The vulnerable and the susceptible," published in *Bioethics*<sup>23</sup> in 2003, with 99, 88, and 65 citations, respectively.

The median number of citations per paper in the peer-reviewed journals of the documents produced only by authors from Ibero-American institutions is lower than if authors from other countries collaborated (1 compared to 4) ( $p < 0.001$ ). Likewise, this median number of citations in the papers authored only by authors from Ibero-American institutions was higher in the peer-reviewed journals than if the rest of the journals were considered (1 compared to 0) ( $p < 0.001$ ).

When we determined the percentage of papers published only by authors affiliated with Ibero-American institutions in the decade 2010 to 2019, we found that this was 21.4% compared to 13.4% in the previous four decades ( $X^2=49.99$ ;  $p < 0.001$ ).

### 3.9 | Content analysis of the papers

The keywords assigned by the authors of the papers, excluding those related to the subject of the study, were "informed consent" (192), "nursing" ( $n=130$ ), "autonomy" ( $n=127$ ), "research" ( $n=112$ ), "human rights" ( $n=101$ ) "euthanasia" ( $n=96$ ), "education" ( $n=87$ ), "public health" ( $n=85$ ) and "palliative care" ( $n=83$ ).

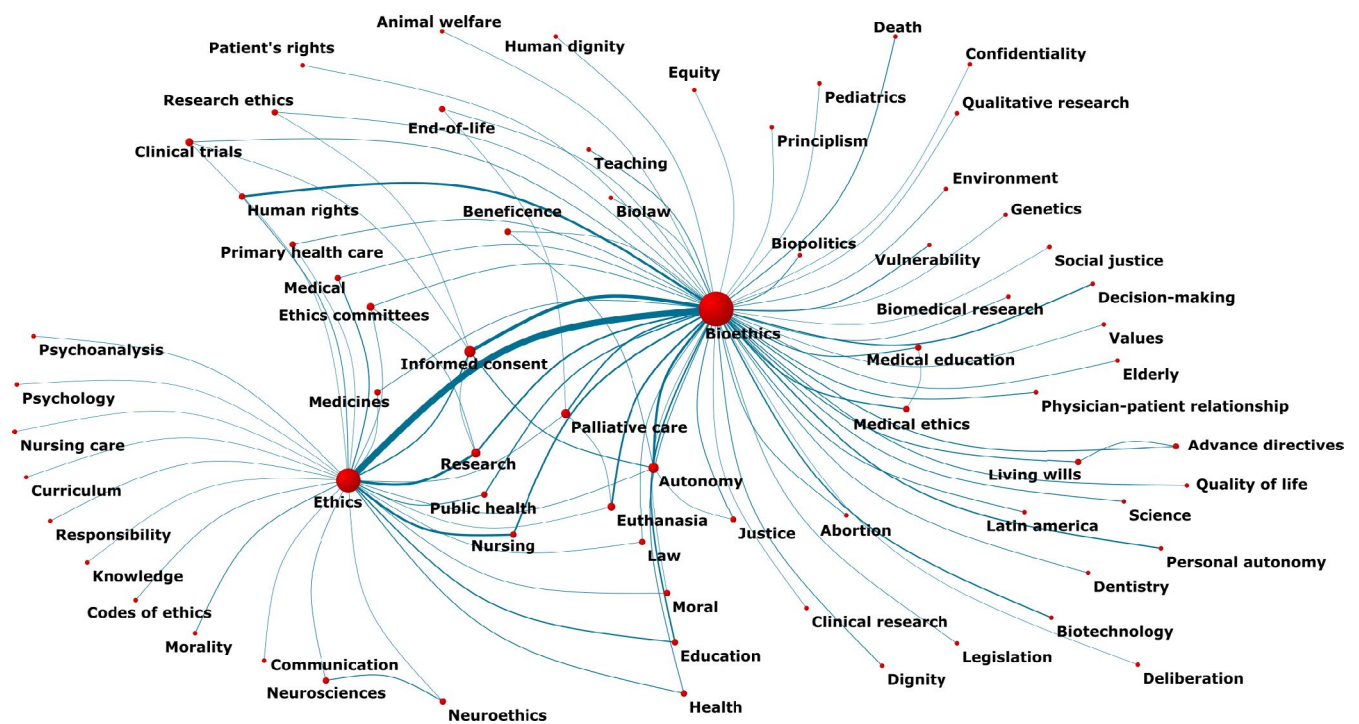
<sup>21</sup>Martins Pereira, S., Fonseca, A. M., Carvalho, A. S. (2011). Burnout in palliative care: A systematic review. *Nursing Ethics*. 18(3), 317-326.

<sup>22</sup>Pich, J., Carné, X., Arnaiz, J-A., Gómez, B., Trilla, A., Rodés, J. (2003). Role of a research ethics committee in follow-up and publication of results. *The Lancet*. 361(9362), 1015-1016.

<sup>23</sup>Kottow, M. H. (2003). The vulnerable and the susceptible. *Bioethics*. 17(5-6), 460-471.

**TABLE 4** Articles produced only by authors from Ibero-American institutions, published in the decade 2010-2019 in peer-reviewed journals, and which have been cited more than 15 times.

Authors	Title	Source	Number of citations
Pereira, SM; Fonseca, AM; Carvalho, AS	Burnout in palliative care: A systematic review	Nursing Ethics 2011; 18(3): 317-326.	90
Sureda, X.; Fernández, E.; López, M.J.; Nebot, M	Secondhand tobacco smoke exposure in open and semi-open settings: A systematic review	Environmental Health Perspectives 2013; 121(7): 766-773.	65
Papaoikonomou, E; Ryan, G; Valverde, M	Mapping Ethical Consumer Behavior: Integrating the Empirical Research and Identifying Future Directions	Ethics & Behavior 2011; 21(3): 197-221.	31
Teixeira, C; Ribeiro, O; Fonseca, AM; Carvalho, AS	Ethical decision making in intensive care units: a burnout risk factor? Results from a multicentre study conducted with physicians and nurses	Journal of Medical Ethics 2014; 40(2): 97-103	28
Barlem, ELD; Ramos, FRS	Constructing a theoretical model of moral distress	Nursing Ethics 2015; 22(5): 608-615	28
Sartorio, ND; Zoboli, ELCP	Images of a 'good nurse' presented by teaching staff	Nursing Ethics 2010; 17(6): 687-694	26
Ruiz-Canela, M; Lopez-del Burgo, C; Carlos, S; Calatrava, M; Beltramo, C; Osorio, A; de Irala, J	Observational research with adolescents: a framework for the management of the parental permission	BMC Medical Ethics 2013; 14.	21
da Silva, MEM; Coeli, CM; Ventura, M; Palacios, M; Magnanini, MMF; Camargo, TMCR; Camargo, KR	Informed consent for record linkage: a systematic review	Journal of Medical Ethics 2012; 38(10): 639-642.	20
Burla, C; Rego, G; Nunes, R	Alzheimer, dementia and the living will: a proposal	Medicine Health Care and Philosophy 2014; 17(3): 389-395.	18
Paganini, MC; Egry, EY	The ethical component of professional competence in nursing: An analysis	Nursing Ethics 2011; 18(4): 571-582.	18



**FIGURE 1** General network of co-words (more than three occurrences)



Figure 1 shows the network made up of keywords with more than three occurrences. As can be seen, the core is established with the terms being examined, “bioethics” and “ethics”. In the overall graph, “ethics” is related mainly to “research” (n=63), “nursing” (n=55) and “informed consent” (n=33), while “bioethics” is mainly related to “informed consent” (n=86), “autonomy” (n=59) and “human rights” (n=58).

The network of co-words of papers by authors from Spanish institutions includes 99 terms. From these, three groups are created: a larger group of 95 keywords and two pairs of terms, one formed by the terms “Crispr” with “gene editing” (n=4) and the other by the terms “principlism” and “virtues” (n=4). In the larger network (Supplementary material, Figure 3), we can see that “ethics” is related to “nursing” (n=11), “informed consent” (n=10) and “research” (n=10), while “bioethics” is related to “informed consent” (n=33), “advance directives” (n=22), “decision making” and “living skills” (n=19). In the network of co-words generated by the papers published by authors from Brazilian institutions, a network of 76 keywords arises which is divided into two groups: a larger one with 74 components and another with two components, with the words “melipona” and “stingless bees” (n=4). Figure 4 of the supplementary material shows the group with the highest number of keywords as it is the most important core. In it, we can see that “ethics” is related to “nursing” (n=35), “research” (n=22) and “education” (n=12), while “bioethics” is also related to “nursing” (n=23), “human rights” (n=17) and “personal autonomy” (n=16).

## 4 | DISCUSSION

The first point to highlight among our findings is the vast amount of published papers that include aspects of bioethics or medical ethics, somewhat in excess of 200,000. Without going into further depth, this certainly reflects the interest of the scientific community in these topics. However, this interest appears to be lower when it comes to the Ibero-American community. In fact, if one considers that there are approximately 7.5 billion inhabitants in the world, we can estimate that the number of documents with bioethical or medical ethics content produced per inhabitant is approximately 1 per 34,000 inhabitants. In contrast, considering that there are some 0.6 billion Ibero-Americans in the world, this index for the Ibero-American world is approximately 1 paper per 95,000 inhabitants, reflecting, in a first approximation, the lower capacity for output of scientific papers on bioethics by authors affiliated with Ibero-American institutions. These data corroborate those reported in an article by Borry et al.,<sup>24</sup> who evaluated the number of papers published in nine of the top bioethics journals, per million inhabitants. New Zealand, with 14 articles per million inhabitants, was the most productive country, followed by the UK (9.2) and Finland (8.8), while Switzerland appeared in last place with 1.6 articles per million inhabitants. Interestingly, no Ibero-American country produced more than 1 article per million inhabitants.

After selecting the papers authored by at least one Ibero-American institution, we found that, of the approximately 200,000 documents retrieved, 5,975 were produced by authors affiliated with Ibero-American institutions exclusively or by these authors in collaboration with institutions in other countries. Notably, 45.2% of papers published were in English, indicating the Ibero-American scientific community's interest in publishing in this language, clearly because they are aware of the greater diffusion of articles published in English.<sup>25</sup> However, if we look at papers published only by authors from Ibero-American institutions, that percentage falls to 37.2%, whereas when they are published in collaboration with other countries, the percentage of those published in English rises to 87.9%. This is probably due to collaboration primarily with English-speaking countries such as the UK, US, Canada and Australia.

In relation to the amount of scientific literature produced by researchers from Ibero-American institutions, only eight countries were identified that published more than 100 papers in the time period evaluated (approximately 50 years). This clearly indicates the scant bioethical- or medical ethics-related scientific production by Ibero-American institutions. The four countries with the highest scientific production are Spain (33.3%), Brazil (23.7%), Chile (9.6%), and Mexico (8.4%). These results are similar to those of other previous studies that identified the scientific production of Latin American countries and have shown that Spain and Brazil are the most productive countries in other areas such as research on local development<sup>26</sup> and legal medicine.<sup>27</sup> Brazil, Chile, and Mexico are also the most productive Latin American countries in terms of research in child sexual abuse<sup>28</sup> and health inequalities.<sup>29</sup> If we look at the diachronic evolution by decades for papers published, Spain and Brazil stand out, with other countries very far behind these two. It is important to note that Portugal, which occupies the 25<sup>th</sup> position in the scientific production ranking,<sup>30</sup> is not among the most productive countries, and that Chile occupies that position. Chile's position is probably due to the strong Catholic tradition in which discussions about the embryo and abortion arise, or the creation in Chile of a number of specific centres such as the Institute of Bioethics at the

<sup>24</sup>Borry, P. et al., *op. cit.* note 1, p. 1.

<sup>25</sup>Borry, P. et al., *op. cit.* note 1, p. 1; Diekhoff et al., *op. cit.* note 1, p. e76816; Jin & Hakkarinen., *op. cit.* note 1, p. 339-45; Di Bitetti, M. S., Ferreras, J. A. (2017). Publish (in English) or perish: The effect on citation rate of using languages other than English in scientific publications. *Ambio* 46(1), 121-7.

<sup>26</sup>Ruiz-Real, J. L., Uribe-Toril, J., De Pablo Valenciano, J., & Pires Manso, J. R. (2019). Ibero-American Research on Local Development. An Analysis of Its Evolution and New Trends. *Resources*, 8(3), 124.

<sup>27</sup>Demir, E., Yaşar, E., Özkoçak, V., & Yıldırım, E. (2020). The evolution of the field of legal medicine: A holistic investigation of global outputs with bibliometric analysis. *J Forensic Leg Med*, 69, 101885.

<sup>28</sup>Vega-Arce, M.; Nunez-Ulloa, G.; Sepulveda-Ramirez, I.; Salas, G.; Fernandez, I.T.; Pinto-Cortez, C. Trends in child sexual abuse research in Latin America and the Caribbean. *Electron J Gen Med* 2019; 16(5): em148.

<sup>29</sup>Almeida-Filho, N., Kawachi, I., Filho, A. P., & Dachs, J. N. W. (2003). Research on health inequalities in Latin America and the Caribbean: bibliometric analysis (1971–2000) and descriptive content analysis (1971–1995). *Am. J. Public Health*, 93(12), 2037-2043.

<sup>30</sup>ICONO. (2019). Indicadores del Sistema Español de Ciencia, Tecnología e Innovación. Retrieved January 28, 2021, from [https://icono.fecyt.es/sites/default/files/filepublicaciones/indicadores\\_2019.pdf](https://icono.fecyt.es/sites/default/files/filepublicaciones/indicadores_2019.pdf)

University of Chile, with support from the Pan American Health Organization.<sup>31</sup> As mentioned, authors affiliated with Ibero-American institutions collaborate extensively with those from other countries, with such collaboration being more substantial with the US and UK, although as has already been noted, this international collaboration is very extensive, as it has been undertaken with 108 countries.

Apart from the aforementioned quantitative assessment, in a first approach to the qualitative assessment, we found that the number of citations was higher for papers published in English, since the 3,276 papers (54.8%) published in a language other than English only merited 1.68 citations per paper, increasing to 2.15 when published in English and another language, and to 8.83 citations when published in English only. This trend toward the increased citation of papers published in English has been observed by other authors<sup>32</sup>, and may be influencing the fact that, in the area of bioethics, highly cited articles have been produced by the US, UK or Canada,<sup>33</sup> which are the countries that collaborate most with the Ibero-American institutions in this study. This finding is also corroborated if we estimate the median number of citations garnered: 2 for papers published in English, 1 for those papers published in another language and in English, and 0 for those papers published in a language other than English.

Spain, Brazil and Portugal are the countries that achieve a higher number of citations per paper, which at the outset means that these are the countries that have the highest quality scientific activity in this area of thinking among the Ibero-American community.

If we refer to the quality of Ibero-American journals, according to citation of their articles, the more important ones are *Cuadernos de Saude Publica*, *Medicina Clínica*, and *Revista da Associacao Medica Brasileira*, i.e. general medicine or public health journals.

In our view, however, one of the criteria that can better define the quality of papers published by Ibero-American authors is the number of their articles published in high-quality English-language journals. In the time period evaluated, only 215 articles have been published in these journals by Ibero-American authors. Since this has taken place over approximately fifty years, the average number of articles published in these journals by this group is 4.3 per year. If this same calculation is performed when the articles are co-authored with authors from a non-Ibero-American country, we find that there are 66 articles published in this same time period, i.e. only 1.32 articles per year.

This is in line with the study by Borry et al., who found that, among the 21 countries that had published 12 or more articles in that time period, Spain was the only Ibero-American country, sharing

last place with Switzerland, both countries with 12 publications, accounting for 0.3% of articles published.<sup>34</sup>

These data confirm the difficulty faced by authors from Ibero-American institutions to publish in quality peer-reviewed bioethics journals.

After analysing these data, it is also worth noting that the top four bioethics journals in which authors from Ibero-American institutions have published are: *Nursing Ethics*, *Journal of Medical Ethics*, *Bioethics*, and *Developing World Bioethics*. This is consistent with other studies indicating that the journals that include the highest percentage of papers published in bioethics are the *Journal of Medical Ethics* and *Nursing Ethics*.<sup>35</sup>

All of the above seems to suggest that the Ibero-American bioethical heritage has, at present, little impact on global bioethical thinking. In fact, in the article by Borry and Dierickx<sup>36</sup>, the authors note that between 1990 and 2003, the US was the undisputed leader of bioethical scientific activity, having published 2,390 papers in nine of the leading bioethics journals, accounting for 59.3% of the total; second in that ranking was the UK, but much further behind with 544 articles, accounting for 13.5% of articles published.

Study of the subject shows that the most frequent topics are “informed consent”, “nursing”, “autonomy”, “research”, “human rights”, “euthanasia”, “education”, and “public health”. Research, education, human rights and euthanasia have already been highlighted as main subjects of research in bioethics by Ibero-American countries<sup>37</sup>, with research ethics having increased in recent years, as already stated by Jin et al.<sup>38</sup>. The consolidation of “nursing” may be due, as Tschudin<sup>39</sup> said, to the fact that “nurses are now taking their professional life into their own hands”.

Based on what has been said, a final reflection seems necessary. When writing a bioethical paper, it is essential to know the objective pursued in advance. If authors want to make their findings available to the Ibero-American world, then publishing their research in journals in that sphere will undoubtedly be justified, especially in *Acta Bioethics* and *Cuadernos de Bioética* for Hispanics, and in *Cuadernos de Saude Publica*, *Revista da Associacao Brasileira* and *Ciencia e Saude Collective* for Portuguese speakers. However, if authors want to influence global bioethical thinking, researchers in Ibero-American institutions will have to make the necessary leap in quality to be able to publish in English-language bioethical journals, especially high-quality ones.

## 5 | LIMITATIONS

In the present study, the WoS CC and Scopus databases were selected as the main academic databases, where journals must meet

<sup>34</sup>Borry, P. et al., *op. cit.* note 1, p. 1.

<sup>35</sup>Jin & Hakkarinen., *op. cit.* note 1, p. 339-45.

<sup>36</sup>Borry, P. et al., *op. cit.* note 1, p. 1.

<sup>37</sup>Garcia, L. F., et al. *op. cit.* note 22, p. 323-31.

<sup>38</sup>Jin & Hakkarinen., *op. cit.* note 1, p. 339-45.

<sup>39</sup>Tschudin, V. (2006). How Nursing Ethics as a Subject Changes: An analysis of the first 11 years of publication of the journal *Nursing Ethics*. *Nurs Ethics*. 13(1), 65-85.

<sup>31</sup>Garcia, L. F., Fernandes, M. S., Moreno, J. D., et al. (2019). Mapping Bioethics in Latin America: History, Theoretical Models, and Scientific Output. *J Bioeth Inq*. 16(3), 323-31.

<sup>32</sup>Di Bitetti & Ferreras *op. cit.* note, p. 121-7.

<sup>33</sup>Jin & Hakkarinen., *op. cit.* note 1, p. 339-45.

a number of requirements to be included therein and from which various indices are obtained based on the number of citations received by the articles included. These indices are published in the JCR in the case of the WoS CC, and in the SJR in the case of Scopus. A limitation of this study is that no other databases such as PubMed or the Philosophy Index were considered. This was mainly because PubMed did not begin to include the countries of the authors' working institutions in their records until 2015, with the corresponding author's institution appearing in previous years, while in the Philosopher's Index, the countries of the institutions are not listed. Thus, neither is suitable for the purpose of this study and would not reflect the entire perspective of the health sciences.

Other limitations of the study should be considered: a) the paper studies works in which at least one author has an Ibero-American institutional affiliation, so authors from other countries working at an Ibero-American institution could have been included, or works by Ibero-American authors working at institutions in other non-Ibero-American countries could have been disregarded; b) a random analysis of the records was carried out and an exhaustive search profile was designed and certain records related to other topics were excluded, but it is still possible that non-relevant documents were included or that relevant documents could not be retrieved; c) content analysis was done only on the basis of the papers available in the database of the keywords provided by authors, and relevant subjects may have been left unanalysed. Nevertheless, we believe that both the sample of papers that do include them and their number are high and can therefore be considered sufficiently representative of the total document collection.

### Acknowledgments


The authors would like to thank Ester Bosch for her collaboration in the drafting of the text.

### Conflict of Interest

The authors declare they have no conflicts of interest.

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### SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

**How to cite this article:** Valderrama-Zurián JC, Aleixandre-Benavent R, Aznar J. The impact of Ibero-American science on global bioethical thinking. *Developing World Bioeth.* 2021;00:1-11. <https://doi.org/10.1111/dewb.12309>